DECEMBER 2008

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Broadcast Engineering®

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DOWNLOAD

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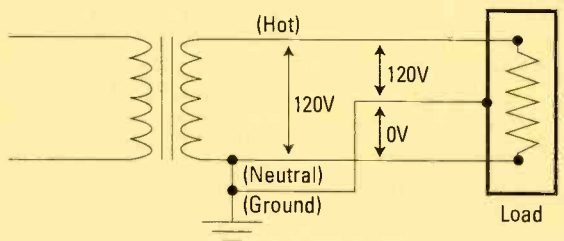
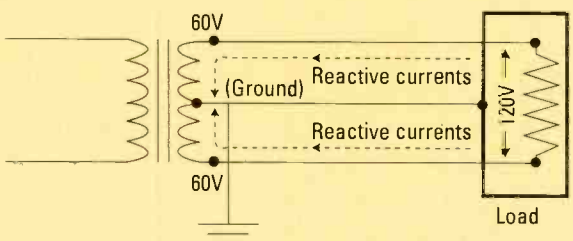
DECEMBER FREEZEFRAME QUESTION

Hum and noise are always a concern in studios. Examine the following power supply schematics. Which of the circuits below will result in the smallest amount of noise and why?

A)



B)



The answer is on page 8

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DEPARTMENTS

DECEMBER FREEZEFRAME ANSWER

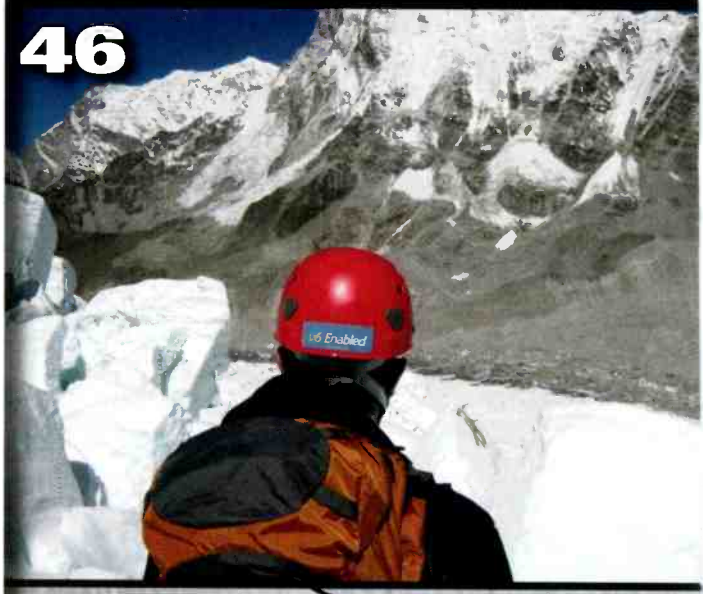
Drawing B will present the lowest noise.

Reason: Drawing A illustrates differential mode wiring. This is the standard power configuration in the United States. The 120VAC is referenced to ground with reactive currents being generated at the top and bottom of the load back and fed back toward the power transformer via the hot wire and the neutral. These currents will eventually combine in the ground wire. As more equipment is turned on, more current flows, and therefore more noise is produced. This configuration is one of the most difficult from which to remove noise.

Drawing B illustrates a balanced power system. In this case, 120VAC is presented from two 60VAC secondary windings with a common center tap to ground. With balanced power, there are balanced reactive currents, which sum to zero at the transformer center tap (ground). The result is less noise.

ON THE COVER:

WBOC-DT's NewsPlex anchor desk is mounted on top of a rotating stage that allows a new background for different segments of the newscast. Photo courtesy Andy Washnik/ CORPRICOM.



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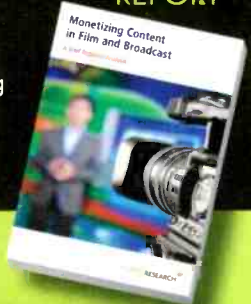

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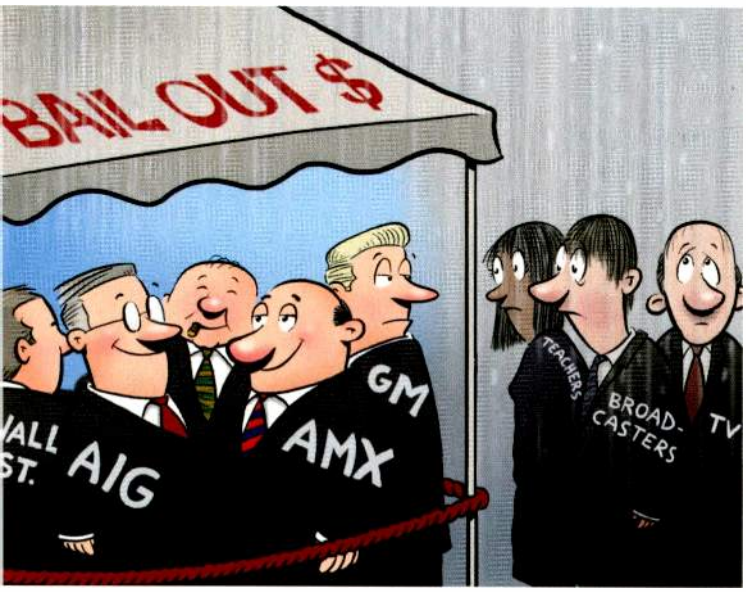
Bailouts and handouts

I'm typing with clinched teeth this morning as the news reports continue nonstop about the automotive industry's demand that taxpayers bail out its poorly managed, high-union-labor-cost industry. One pundit called giving the automakers any bailout simply pouring bad money into a black hole. He continued by asking what do you get after $25 billion? His answer: the same bankrupt, inefficient, high-labor-cost industry, making cars people don't want.



It seems to me that most of the industries clamoring for tax dollars are looking to be saved from their own greed. A recent example shows how one company responded when the government rode in to rescue it from its own bad decisions. The insurance giant, AIG, was called too big to let fail, so in early September, the government loaned AIG $85 billion.

Less than a week after receiving that $85 billion in government bailout money, the company threw a $440,000 party at the St. Regis resort in Los Angeles. This included $23,380 worth of spa treatments for AIG employees.

Congress was apoplectic, quickly demanding testimony. Company managers groveled, apologized, pointed fingers at each other and promised they'd never again waste government-loaned money on company parties.

Bad habits must be hard to change because shortly after the above apology, undercover reporters from Phoenix TV station KNXV found the "broken" insurance carrier again at the party table. This time, AIG held a $343,000 corporate event at the Phoenix Pointe Hilton Squaw Peak Resort. Organizers apparently tried to hide the affair, calling it a meeting for "independent financial advisors" and used no AIG logos in the signage. This party took place just before the U.S. Treasury announced it was increasing the total aid for AIG to $150 billion, saying the original $85 billion loan was putting too much strain on the company. What? How does giving a company $85 billion create too much strain? Please give me some of that strain. It's no wonder there's a waiting line of lobbyists in front of the Department of the Treasury, all with their hands out for taxpayer bailout money.

Which cheesy industries are looking for a free ride? There are the savings and loan associations, and their insurers and community banks. Add to that roster the National Marine Manufacturers Association. After all, if you can't get loans, you can't buy expensive boats. Also include the National Automotive Dealers Association for similar reasons. Then we have Allstate and MetLife, GE Capital and GMAC, and American Express.

Of course, first on the list for government handouts are the big three automakers — Chrysler, Ford and GM. To hear the three automakers' presidents and the UAW representative, the sun may never rise again if these companies are allowed to go bankrupt. At the time this editorial was written, it appeared the automakers were about to be sent packing. If so, I say right on!

The list of those wanting bailouts will certainly grow. In addition to the debt such government bailouts create, they allow politicians to decide who survives and who doesn't. Jeb Mason, the U.S. Treasury's liaison to the business community, said, "The government shouldn't be in the business of picking winners and losers among industries."

But that's exactly what is happening. Lehman Brothers was allowed to go bankrupt, but AIG was saved with $150 billion. My bank goes into foreclosure, but your bank gets billions in bailout money, which it then uses for mergers and acquisition. The government is picking the winners and losers.

Question: So, when will broadcasters get their bailout?
Answer: About the time hell freezes over. BE

Brad Dick

EDITORIAL DIRECTOR

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ATSC standards

Dear editor:

Regarding the September Transition to Digital column, "DTV multichannel transmission," the master guide table (MGT) and the system time table (STT) are essential. If the first is not correctly constructed, a receiver cannot locate the other tables. The STT contents are critical because sending the wrong time will impact any DVR tuning based on event start times and may impact receivers' ability to actually use the event information tables (EITs). Also, because there is a time accuracy requirement, allowing the clock to drift in the PSIP generator equipment can result in a violation of FCC rules.

The PSIP contains the listed structure for the virtual channel, not the program. Second, the video stream descriptor (which is carried in the program map table for each program) does not contain bit rate or aspect ratio information.

While the major channels in the TVCT (in the United States) can be 2-99, the total number of subchannels that can be signaled is more than 100,000. Early experiments to assign subchannels dynamically caused consumer confusion and few broadcasters to alter the lineup during the day.

The IS disbanded some years ago. Its public findings can be found in the IS Findings subsection under Standards on the ATSC Web page.

Art Allison
NAB

Aldo Cugnini responds:

Thanks for making those important points. As a key contributor to the ATSC standards, your comments should always garner deference. Standards are, by necessity, written in terse and (hopefully) exact language, and efforts to generate short abstracts are challenging to the rest of us.

Bit rate and aspect ratio are, of course, carried in the video sequence header, and my final point was intended to generate involvement in the general activities of ATSC.

3-D TV mind control?

Dear editor:

I am in my mid-60s and an engineering manager retiree from what is now Comcast in Broward County, FL. I was responsible for managing much of the 750MHz/860MHz hybrid fiber and coax rebuild construction that began back in 1995.

Your 3-D article "Just when you thought it was safe ..." in the July issue brought back some memories. There was a 1993 made-for-TV mini-series called "Wild Palms" that I became very absorbed in at the time, despite the fact that neither myself nor anyone else was able to follow or understand much of it. In an enigmatic way, it dealt with the introduction of 3-D holographic TV transmission during what I understood would be the 2008 presidential election campaign. The plot, which accorded some pretty sinister motives to the developers/broadcasters and one of the presidential candidates, was suppose to suggest a sci-fi type of mind control plot that never really surfaced. It was only after the series ended that I saw that in the reviews. See *www.imdb.com/title/tt0106175/* or *http://en.wikipedia.org/wiki/Wild_Palms*.

If I get around to it, I may rent the DVD and try watching it again. Anyway, I was just wondering if anyone else who read your back page recalled "Wild Palms?"

Robert J. Matzner
Fort Lauderdale, FL

Anthony Gargano responds:

Glad you enjoyed the column, Robert, but I do not believe 3-D television to be a mind control threat. When 60 million viewers are casting votes on the likes of "American Idol," it seems to me that mind control is already alive and well in 2-D television!

Go MXF!

Dear editor:

I read your article, "File-based delivery," in the November issue. Excellent! It's one of those articles that you clip out and keep, which I did.

It was very well-written, concise and informative. Thanks, and keep up the good work!

William M. Quinn
Chair - SMPTE Nashville Section
Technical sales, DNF Controls

Brad Gilmer responds:

Great to hear from you again. Also, thank you for the kind words regarding my article.

All the best, and happy holidays!

Test Your Knowledge!
See the Freezeframe question of the month on page 6.

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GV THOMSON

The future of DTV

Taste is key to both beer and broadcast.

BY CRAIG BIRKMAIER

The future of digital television is changing, along with the climate, the global economy and global politics. According to Douglas Adams, the author of "The Hitchhiker's Guide to the Galaxy," 42 is the answer to "life, the universe and everything." It has been 42 years since I graduated from Nova High School, where I was infected by this thing we call television.

Perhaps the most significant change I have witnessed in all of these years is the pervasive — some might even say perverse — influence that the mass media has had on our culture. When TV came onto the scene, localism had real meaning. We shopped mostly in local mom-and-pop stores, ate in one-of-a-kind restaurants and drank beer from nearby breweries in local pubs. Actually, beer provides an excellent example of the changes that have taken place in our culture, in large measure through the mass appeal of television.

I would like to share with you a quick story that many of you may already know.

A small group of innovators introduce a new technology that has the ability to entertain and engage people on a massive scale. Advertisers willing to risk money on this untested platform are hard to come by. Content owners are reluctant to embrace it for fear of alienating their existing audiences. And experts hail this new platform as signaling the demise of another.

As some of you may have guessed, this is not only the story of YouTube. The year is 1941, nearly 70 years ago, and CBS has just launched its new television network amidst cries that it means the death of radio.

From the printing press to the blog, from the record player to the iPod, and from the stage to the home theater, the way content has been produced, distributed and consumed in the world is constantly evolving.

—YouTube cofounder Chad Hurley speaking at the MIPCOM Conference in Cannes, France, Oct. 15, 2008

Prior to the Civil War, beer production and consumption was a local affair. After the Civil War, the production of beer became one of America's largest growth industries. In 1915, there were 1345 breweries producing 59.9 million barrels of beer each year. (See "A Concise History of America's Brewing Industry" in "Web links.") Then prohibition turned off the taps.

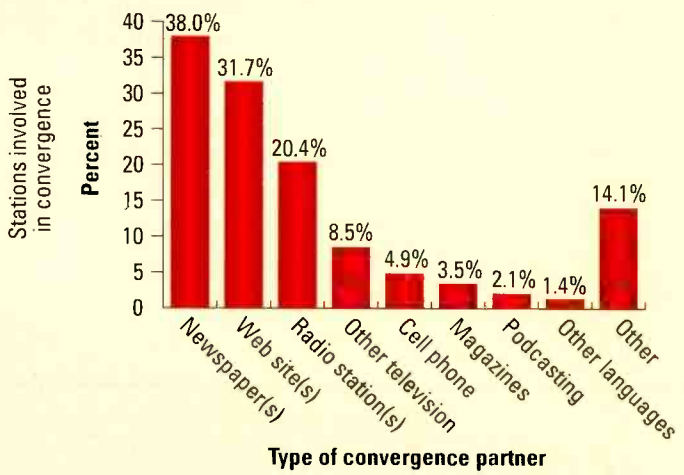
It took decades to rebuild the industry after prohibition. By 1945, as the war ended and television was set to burst upon the scene, there were 468 breweries producing 86.6 million barrels per year. Thanks to TV, this picture changed dramatically.

An article on BeerHistory.com describes the role that television played in the consolidation of the U.S. beer industry: "With National Prohibition still fresh in memory, brewers were initially wary of peddling their beers on the air ... But early apprehension was soon overtaken by the realization that television offered beer makers something tremendously valuable and unique: the ability to target the beer drinker right at the barstool. The American tavern, after all, was the first home of television. In Chicago, for example, taverns accounted for half of all sales of television sets in

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

TV news stations increasingly involved with convergence

Thirty-eight percent of stations swap content with newspapers.



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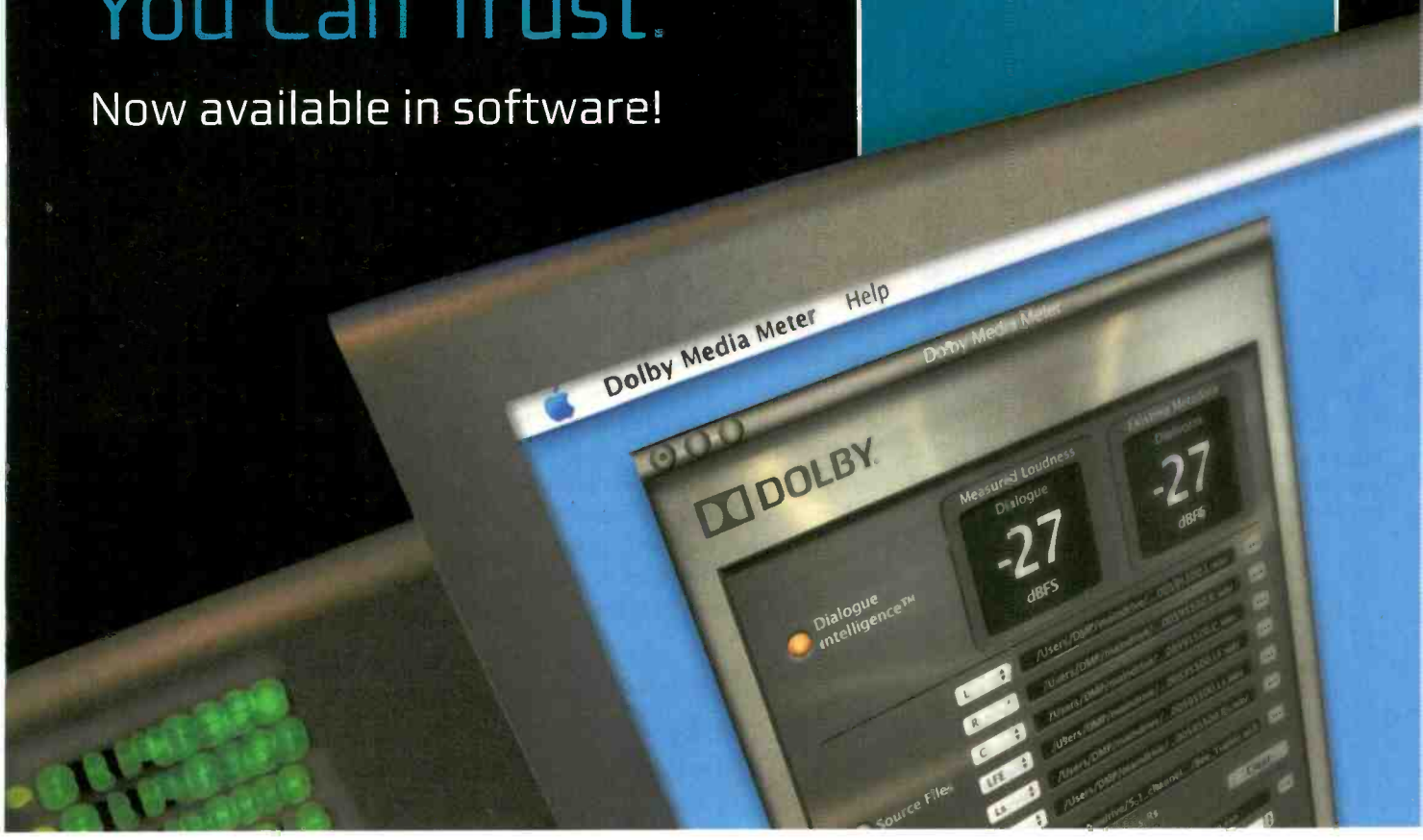

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1947. Had any tavern keeper initially doubted the revolutionary importance of TV to his trade, he was surely converted after the 1947 World Series.

Protestors did more than end prohibition. They also made possible the marriage of the local bar and the TV.

Telecasts of the seven games between the Dodgers and the Yankees made for standing-room-only crowds in taverns throughout New York City."

Bud-wei-ser

By 1980, there were only 101 breweries in the United States producing 188.4 million barrels of beer each year. Three companies — Anheuser-Busch, Miller and Coors — dominated the American beer scene, and their TV advertising wars became famous. Miller built a franchise on "Great Taste ... Less Filling." Coors became legendary thanks to the movie "Smokey and the Bandit." And Budweiser turned TV ads into content that was, and still is, more entertaining than most of the programs that it sponsors. (Do people really watch the Super Bowl for the game?)

But these huge national brands did something perverse to beer; they eliminated the content. Highly drinkable, but flavorful lagers gave way to light beers; ales all but disappeared.

Meanwhile TV helped homogenize the rest of our culture. National fast food and restaurant chains largely displaced the mom-and-pop operations. The same thing happened to retailers and grocery stores. So much for the rich cultural difference that gave each state and city its unique character.

Then, something interesting started to happen to TV and beer. In the 1980s, cable began to compete with over-the-air broadcasters. The big three television networks became the big four, and Time Warner led the rush to niche content by creating a range of cable TV channels focused on special interests and demographic groups. Consumers voted for program choice, and those ugly outdoor TV antennas started to disappear.

In 1995, the Budweiser frogs Super Bowl commercial became one of the most popular beer ads in history. (See "Web links.")

At the same time cable TV began to take over the distribution of TV content, the U.S. craft beer industry experienced a rebirth with the growth of Anchor Steam and the launch of Sierra Nevada and The Boston Beer Company (Samuel Adams). A new generation of Americans discovered real beer, and the craft brewing industry began to grow.

Today, the craft beer segment is growing at an annual rate of 17 percent. The large breweries are barely growing at all. In 2007, there were 1420 craft breweries, 20 large noncraft breweries and 23 other noncraft breweries.

Miller and Coors merged and were then purchased by Canada's Molson, which was acquired by international conglomerate SAB. Recently, the stockholders of Anheuser-Busch approved the sale of the largest U.S. brewer to Belgium's In-Bev.

So long, and thanks for all the fish

The fourth book in the Hitchhikers Guide series, "So Long and Thanks for All the Fish," set the stage for the 2005 movie remake of the BBC radio series. In the book, man is not the most intelligent creature on Earth. We rank third. Second are the dolphins, who try to warn us of the pending obliteration of Earth for a hyperspatial expressway. To fully understand this, watch the opening of the Hitchhiker's Guide movie on YouTube. (See "Web links.")

TV helped homogenize our culture. Then, something interesting started to happen. Cable began to compete with OTA.

For more than a decade, I have been warning the broadcast industry of the pending obliteration of its franchise at the hands of a real world hyperspatial expressway — the Internet. In the United States, about 10 billion videos are viewed monthly via the Internet. Every minute, 13 hours of content is uploaded to YouTube.

This has not been lost on the media conglomerates that provide the high-value content that has allowed over-the-air broadcasting to remain viable in a world dominated by the multichannel distribution oligopoly — cable and DBS. Virtually all prime-time TV content can now be accessed

Web links

- YouTube founder compares online video to nascent TV market
  www.techcrunch.com/2008/10/16/youtube-founder-compares-online-video-to-nascent-tv-market/
- "A Concise History of America's Brewing Industry"
  http://eh.net/encyclopedia/article/stack.brewing.industry.history.us
- "Beer and Television: Perfectly Tuned In"
  www.beerhistory.com/library/holdings/beer_commercials.shtml
- Budweiser frogs commercial
  www.youtube.com/watch?v=pVcbaslb8lQ
- "So Long and Thanks for All the Fish"
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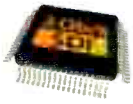

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online, on demand. What's more, the commercial load in the online versions is substantially lower than that in the broadcast versions. Or viewers can buy commercial-free versions of these programs from iTunes or Amazon.

The real problem with over-the-air TV is that appointment TV is all but dead. Program adjacency, once the foundation of prime-time scheduling, is now meaningless in a world dominated by channel surfing and Web surfing. Broadcasters can still pull in large audiences for live events, but some of the most important content franchises are beginning to abandon broadcast TV in favor of cable, which uses the revenue from monthly subscriber fees to outbid the broadcast networks for high value content. The College Football Bowl Championship Series will move to ESPN in 2011.

Unfortunately, most broadcasters have done little to prepare themselves for the day that they move into third place in the content distribution chain behind the multichannel services and the Internet. If it makes you feel better, the multichannel services are not likely to survive the real DTV transition either.

If it makes you feel better, the multichannel services are not likely to survive the real DTV transition either.

On-demand and downloaded content via the Internet is where the future of DTV lies. Cable may remain in the game as a provider of broadband pipes, but it and the telcos will face new competition in this area. That competition may turn the TV white spaces into the next big digital broadcast medium.

The most important attribute of OTA broadcasting is that it is a wireless medium. In a world where wireless communications has all but eliminated the need for a wired telephones, one can see a large opportunity for a modernized wireless digital content delivery infrastructure. The mobile DTV standard, currently nearing finalization by the ATSC, offers a glimmer of hope to TV broadcasters. But there are many obstacles along this path to the future.

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content. Simulcasting of the primary programming of a station is not likely to grow the audience, and there are many unanswered questions about the rights to carry this content in a mobile service. Live sports could be a significant mobile TV franchise, but the economics may not work out for delivery of this content as an advertiser supported free-to-air service. Broadcasters could focus on the creation of local content; however, economic viability is tenuous here as well.

The most promising aspect of the transition to Internet-based DTV is the opportunity for the craft of content creation to flourish once again, just as the craft of brewing has been revitalized in recent years. YouTube relies heavily upon content created by independent producers; you could call it the mom-and-pop video business. As we shift to search engines to find content of interest, the playing field will be leveled a bit in favor of independent producers, who are now being squeezed out by the big media conglomerates. This is already happening with music; video can't be too far behind.

My 42 years around television has been an incredible experience. With 30 consecutive NAB conventions under my belt, it's time to try something new. But retirement is not an option. So, I am embarking on a new career.

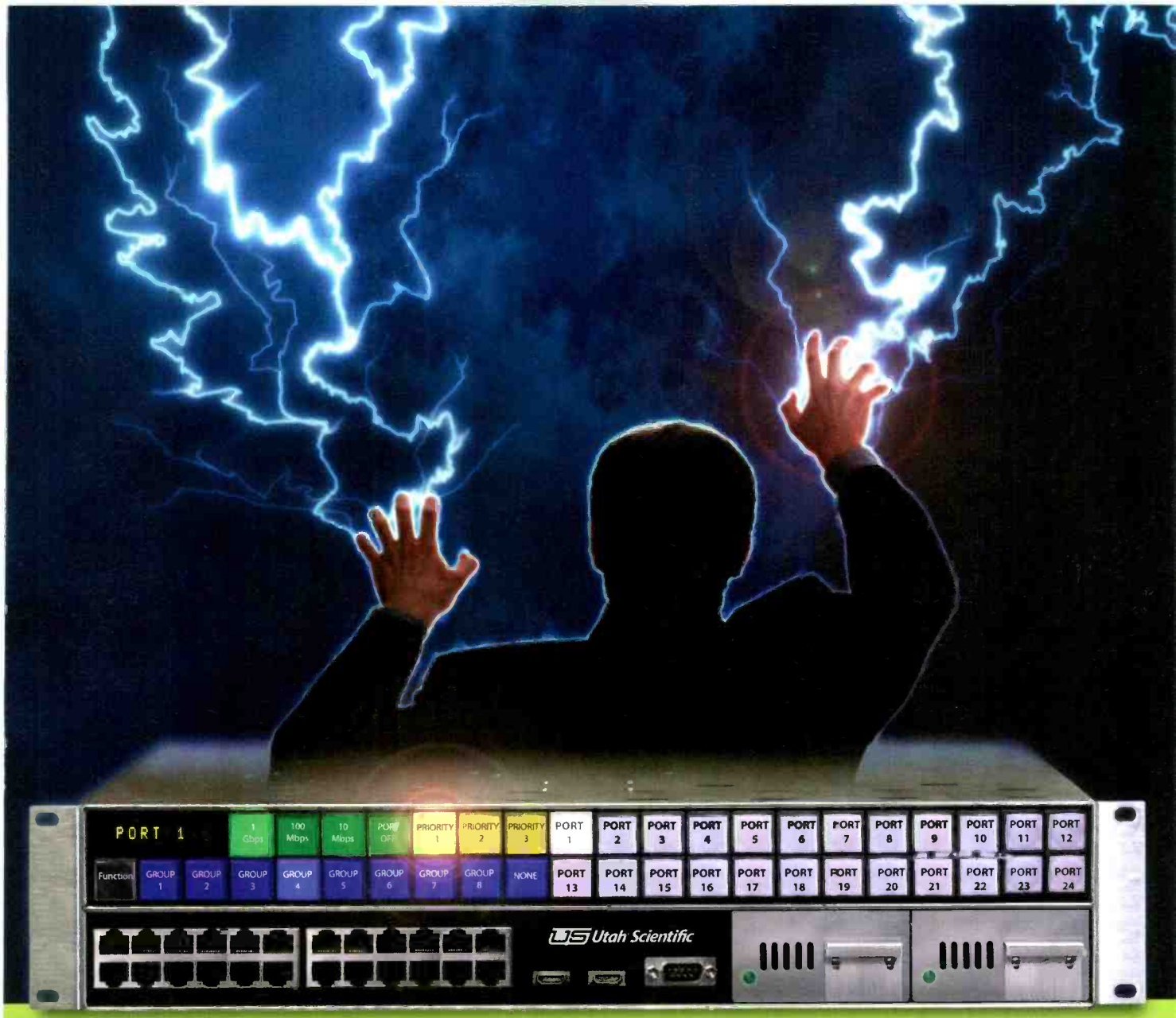
The most promising aspect of Internet-based DTV is the opportunity for the craft of content creation to flourish once again.

In January, The Swamphead Brewery will begin the production of high-quality craft beers in Gainesville, FL. As the head brewer, I look forward to the challenges of building a new business creating beers filled with compelling content.

For those who want to be part of the future of digital television, I suggest a similar path. To borrow a phrase from our mass media pop culture: It's the content, stupid! BE

Craig Birkmaier is a technology consultant at Pcube Labs.

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



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DTV countdown tips

Stations must meet minimum DTV education guidelines.

BY HARRY C. MARTIN

Stations that selected option two from the NAB's consumer education plan menu must continue to air at least one of the following per day until the transition on Feb. 17:

- *Graphic display.* A graphic superimposed during programming content reminds viewers there are "x number of days" until the transition and visually instructs them to call a toll-free number and/or visit a Web site for details. The length of time displayed may be from five to 15 seconds, at the discretion of the station.
- *Animated graphic.* A moving or animated graphic provides a countdown reminder that there are "x number of days" until the transition and visually instructs viewers to call a toll-free number and/or visit a Web site for details. Again, the length must be between five and 15 seconds.
- *Graphic and audio display.* This option consists of either a still or an animated graphic display that includes an added audio component and lasts from five to 15 seconds.
- *Longer form reminders.* Stations can choose from a variety of longer form options to communicate the countdown message. One example is a segment where viewers call in to a phone bank and ask knowledgeable people questions about the transition.

Stations choosing the other consumer education options have increased obligations as the time draws closer to the transition, but without the specific additional types of announcements.

Consumer ed specifics

As of Oct. 1, stations that chose option one had to increase the number of PSAs and crawls they must air in each quarter of the day to three each.

As of Nov. 1, noncommercial stations operating under option three were expected to increase the amount of DTV consumer education time to at least 180 seconds per day and 22.5 minutes per month (between 6 p.m. and midnight).

Commercial stations operating under option two and noncommercial stations that chose option three must air, between 8 a.m. and 11:35 p.m., at least one 30-minute informational program about the DTV transition by Feb. 16. Many stations may have already fulfilled this obligation, but for those that have not, the time in which to do so is drawing shorter. Stations must air such programming on both their analog and primary digital programming streams. The program may air simultaneously on both, but this is not required. The important thing is that there is a separate 30-minute informational programming requirement for each channel. Both channels may air the same 30-minute program, either simultaneously or at different times, or they may air different programs on each channel, if they choose.

If a station wants to permanently reduce or terminate either its analog or pretransition digital service, it must notify both the commission and its viewers.

During the last 90 days before transition, if a station wants to permanently reduce or terminate either its analog or pretransition digital service, it must notify both the commission and its viewers at least 30 days in advance of the termination of analog service. The FCC notification must be done electronically. Viewer notifications should contain specific information including, but not limited to, the station's call sign, the community of license and the date of termination of analog broadcasting. Announcements must be broadcast four times per day, including once in prime time. BE

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

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

Dateline

- Feb. 1 is the deadline for TV stations in the following states to file their biennial ownership reports: Arkansas, Louisiana, Mississippi, New Jersey and New York.
- Feb. 1 is the deadline for TV stations and Class A TV stations in the following states to place their 2008 EEO public file reports in their public files and post them on their Web sites: Arkansas, Kansas, Louisiana, Mississippi, Nebraska, New Jersey, New York and Oklahoma. LPTV stations originating programming in these states, which are not required to have public files, must post these reports on their Web sites and keep them in their station records.

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Preparing for analog cutoff

Follow these steps for a smooth transition.

BY ALDO CUGNINI

With the DTV analog cutoff just two months away, work by the FCC, NAB, broadcasters and cable groups is bringing issues to light that need to be resolved for a smooth transition. Back in March, congressmen and FCC commissioners voiced their recommendation that broadcasters in some markets transition to all-digital service before the transition date. Since then, there have been various efforts to better understand transition issues, including an early switch in Wilmington, NC, and simulations in other markets.

Tests provide early heads-up

The FCC identified 80 markets in which a significant portion of viewers receive OTA broadcasts. These include major markets such as Chicago, New York City and Washington, D.C. As a result, the FCC and broadcasters have been intensifying test runs and educational campaigns in those markets. Various broadcasters have been conducting transition simulations or soft tests, whereby a simulated noisy picture is broadcast on the analog transmission, with a clean picture on the digital transmission. One such simulation has also been accompanied by fail and pass graphics on the respective signals, giving viewers an easy way to ascertain their readiness.

These tests have already brought up an extremely important aspect of the transition: that proper cooperative planning is imperative between broadcasters and the community cable operators carrying the broadcasters' signals. In one of these tests, false positives were experienced when a cable operator incorrectly retransmitted the analog fail message.

Detailed planning will be necessary to ensure uninterrupted reception and proper rebroadcast of OTA signals on multichannel video programming distributor (MVPD) systems. Earlier this year, the NAB, MSTV and various cable associations issued a "Coordination Reference Handbook," which laid out key steps to insure a successful transition. The underlying message is to establish clear and open communications between broadcasters and their local MVPDs on various technical and logistical issues.

The message is to establish clear and open communications between broadcasters and local MVPDs on logistical issues.

Transition technical issues must be resolved soon

First and foremost is to ensure that the current retransmission infrastructure operates correctly after the analog signal is terminated. In many respects, the task is similar to that of interoperating with a translator facility, but with the added burden that many of the operating parameters are not directly under the broadcaster's control. Each broadcaster, after contacting every MVPD carrying its station, must also identify the location of every local receive site, translator or cable headend in the communities served by those receive sites. With MVPDs now including fiber and telco delivery of OTA signals, the number of coordinating sites has correspondingly increased. A critical issue is whether any of those receive sites will be affected by changes to broadcast antenna patterns, multipath or channel assignment.

In addition, because some MVPDs

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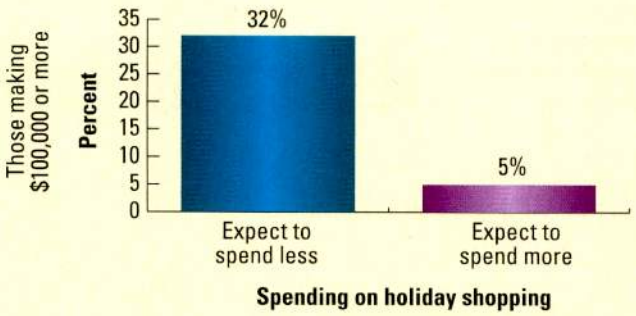

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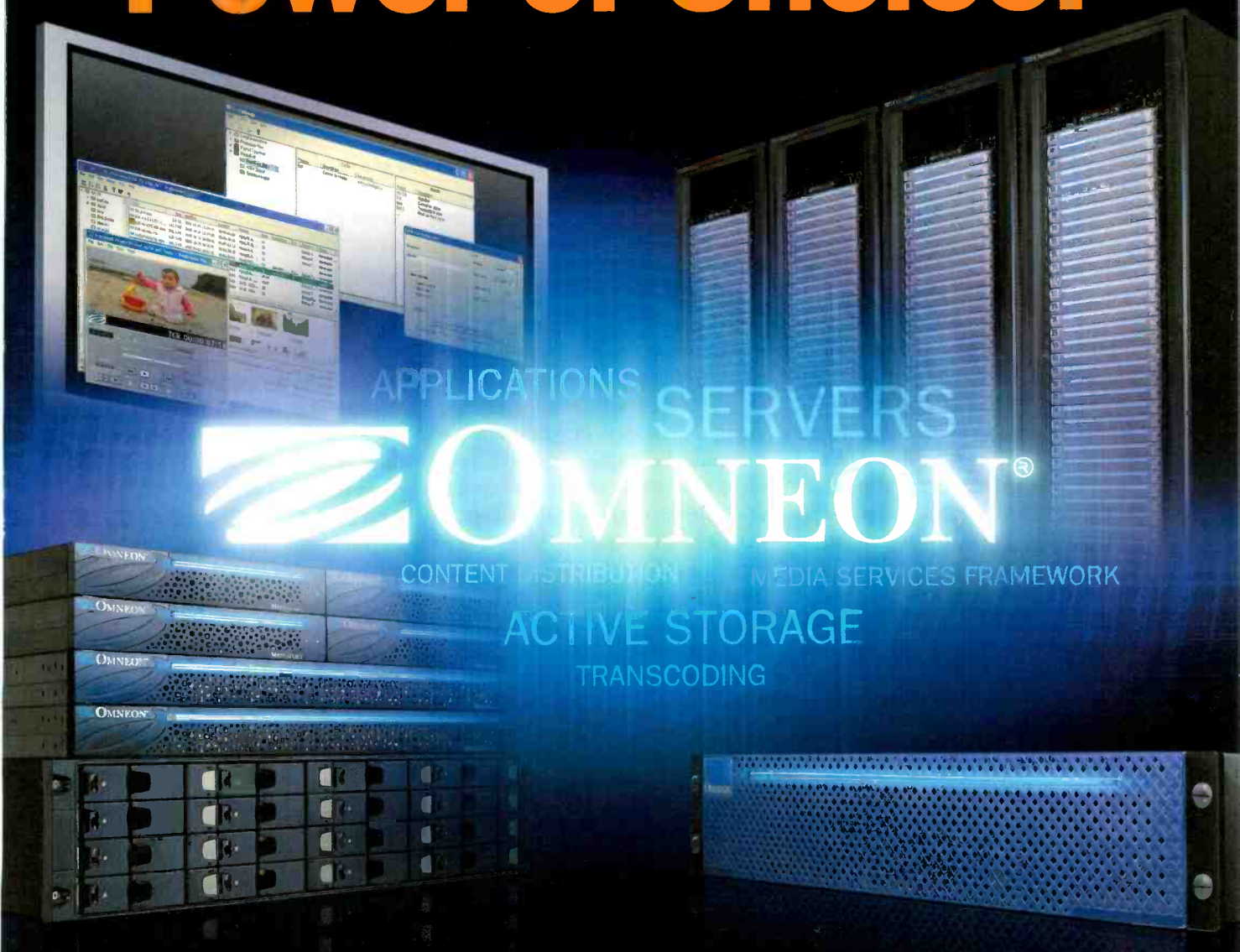

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will use IPTV to carry video, the corresponding number of signal conversions may become quite complex, especially when combinations of analog and digital video may be provided. Broadcasters should equip a good monitoring facility with the various types of subscriber terminal equipment so they can predict and monitor the compatibility of such devices with operational changes, even after the transition. For those broadcasters already on their final digital channel assignment, MVPDs have the option of switching their receivers before the transition date, possibly reducing the difficulty of transition coordination.

MVPDs will need to process broadcasters' PSIP and other signal information correctly. ATSC receivers and downconverters must be set up properly, and the appropriate ancillary data must be decoded and either re-encoded or processed to the new target signals. Broadcasters should also completely understand how MVPDs will process virtual channel numbering and Emergency Alert System (EAS) messages, as well as content advisory (V-chip) information and other program related data (e.g., Nielsen AMOL Data). Broadcasters and MVPDs also need to coordinate the handling of multiple audio programs (e.g., second languages, descriptive audio), so that these can be carried appropriately on the target systems.

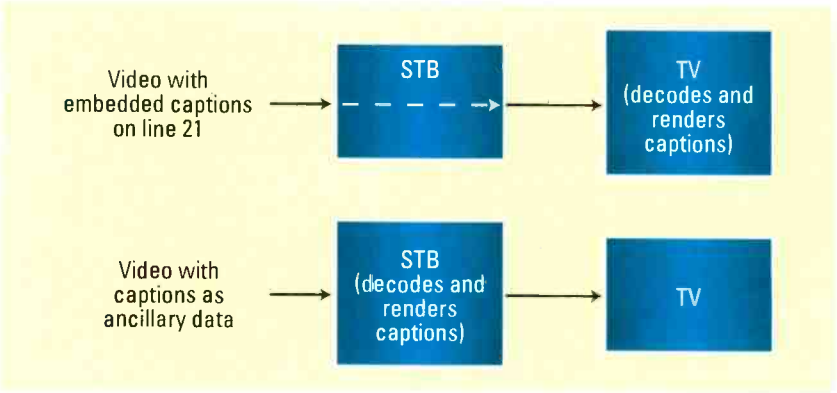

Figure 1. Captions can be processed by one of two means.

Closed captioning carries with it some unique issues. Both EIA-608 and EIA-708 captioning must be sent on ATSC transmissions for all non-exempt captioned programming, so it should be verified that the cable plant as a whole will make captions available correctly to subscribers. In the past, an all-analog plant would simply pass the entire NTSC signal from source to subscriber, keeping the line-21 captions intact. Today's situation, with digital sources and mixed analog-digital cable plants, is more complex. EIA-608 captions can be re-encoded onto line 21, but EIA-708 (DTVCC) captions require different processing, as they are, in some sense, a superset of EIA-608. As always, broadcasters and MVPDs must ensure compliance with FCC regulations on correct carriage of closed captions. (See Figure 1.)

Broadcasters should coordinate the use of active format description (AFD) with their local MVPDs so the operator's receiving equipment can properly reformat images. (See Figure 2 on page 28.) AFD enables DTV receivers to automatically switch aspect ratios when signaled in the bit stream. Currently, broadcasters are not required to carry AFD. However, it is in their best interest to do so because viewers may not have the ability to change the aspect ratio of a signal that has been downconverted to analog by a service provider.

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The NAB and broadcasters have created the AFD Ready initiative to promote and drive the deployment of AFD-compatible receiving equipment, including cable headend receivers and downconverter devices. More than 20 manufacturers support the initiative, and products are currently available.

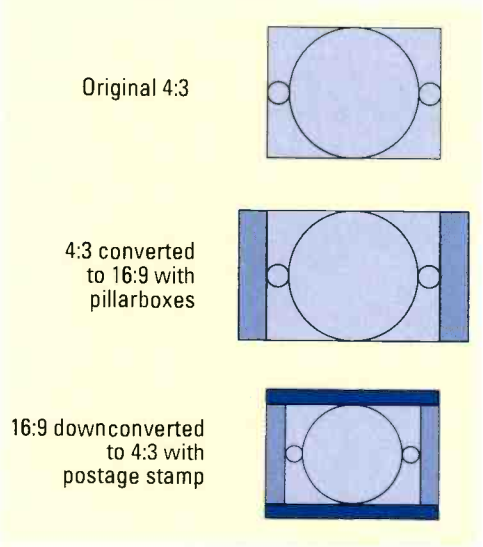

Figure 2. AFD can help avoid postage stamp video.

If it is not possible to use AFD, then the broadcasters and MVPDs should coordinate the method of handling the downconversion, either by center cut of the image or by letterboxing. Similarly, broadcasters should make sure that the MVPDs' video processing equipment correctly respects the SMPTE clean aperture when reformatting video. Otherwise, extraneous nonvideo material (e.g., ancillary data) may become visible on subscriber TVs.

Broadcast audiences must be informed

It cannot be stressed enough how important it is for broadcasters to educate their audiences as often as possible leading up to — and after — the transition date. This should include simple links to Web sites to address what consumers must do to continue watching broadcast television. One part of this message has been largely overlooked: Consumers should rescan their DTVs and DTV converter boxes on or after the transition date, as many broadcasters will move to a different DTV channel assignment at that time. Converters and DTVs will not do this automatically, so some channels may disappear from the receivers after the transition date.

A further complication is the recent proposed congressional bill that would require stations to broadcast a barker message on the pretransition analog channel temporarily after Feb. 17. Should the bill become law, it will require additional MVPD coordination and viewer notification.

Some broadcasters will also stay on a temporary DTV channel — and may not switch to their permanent one — for up to an additional 12 months beyond the transition date. It is likewise important for those broadcasters to inform their audiences about the need to rescan their DTV receivers upon the final channel move.

The NAB has requested that its members put a voluntary four-week hold on talks surrounding retransmission-consent deals around the time of the DTV switchover. This quiet period is meant to limit "potential confusion in the marketplace" as viewers get up to speed with their new DTV receiving equipment or other aspects of the transition. This could also have the side benefit of moving any infrastructure reconfiguration to outside of the critical transition time, potentially decreasing the concentration of the technical effort. BE

Aldo Cugnini is a consultant in the digital television industry.

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

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Remote administration

If you are an accidental system administrator, here are some tools that can help.

BY BRAD GILMER

If you woke up one day and realized you're doing a job different from what you started, you might be an accidental system administrator. An accidental system administrator is a broadcast engineer who spends all of his or her time administering computer systems in the broadcast environment. Because many of us in this position started out working as broadcast engineers, we may have missed out on useful tools that can help us do our accidental jobs. The following remote system administration tools can make your life easier. (Note: I know the Mac has tools similar to what I discuss here. I talk about Windows and UNIX since I am familiar with those systems.)

Remote desktop tools

Since the early days of computing, there have been utilities that allow users to access their computers from a remote location. GoToMyPC and pcAnywhere are two common examples. A user can not only gain access to files and other resources on a remote computer, but these utilities enable users to operate the remote computer as if they were sitting in front of it. This can be a great help if you need to do something at a work computer while somewhere else. It is also a helpful tool if you need to access a computer somewhere at the station while you are working at your desk.

In Windows XP and later, Microsoft includes a tool called Remote Desktop, which allows you to access and administer a remote server from your desktop. This is an extremely handy tool that I use all the time on my Windows servers. In fact, my servers do not have monitors or keyboards. I normally access them via Remote Desktop from my office computer.

People who operate UNIX systems have had remote access for years via the command line interface. I prefer to access these servers via Secure Shell (SSH) using RSA authentication. My favorite — and free — client for remote console access of UNIX systems is PuTTY.

Be careful not to use telnet over the Internet. Everything you type is sent in the clear. Anyone using a packet capture program can easily see everything you type. I disable all telnet functionality on my servers.

Some people prefer using the X Window System to administer Linux systems compared with the command line interface. While not as easy to configure as Windows Remote Desktop, it is possible to run a remote X Window session that provides remote access to your Linux system using a GUI interface.

System health

Another set of helpful tools monitors the health of your servers and allows you to perform basic functions such as turning the servers off and turning them back on again. I confess to only having experience with IBM e-Series servers. Other enterprise-class server manufacturers provide similar functionality.

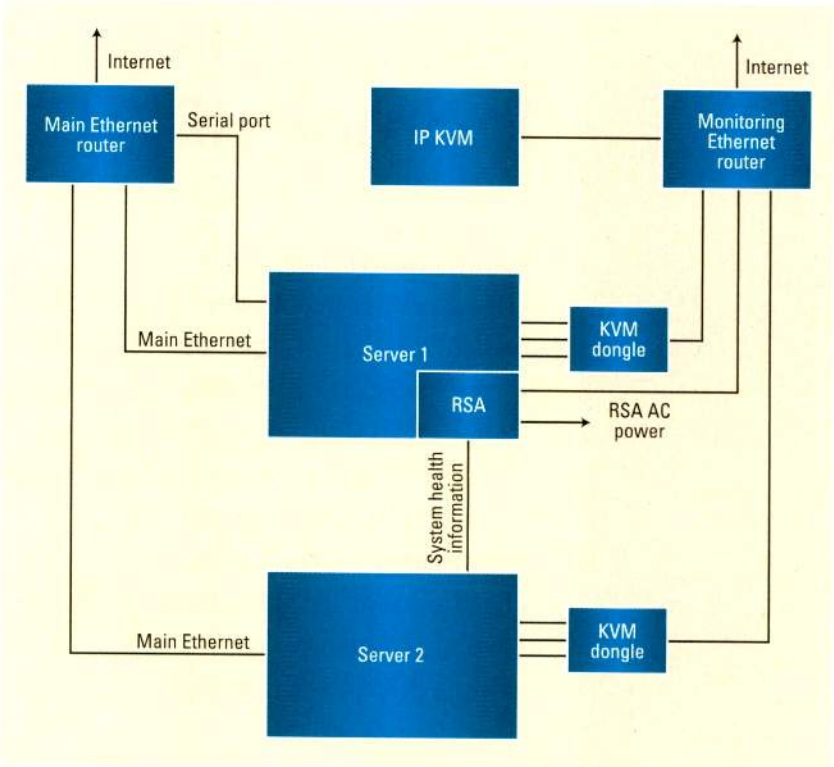

Figure 1. A separate monitoring Ethernet network allows you to monitor and maintain servers even when power or Ethernet connectivity to the main servers is lost. You can access the servers and network components many different ways, providing flexibility in dealing with various problems.

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Remote system health tools monitor things such as CPU temperatures, fan RPM and power supply voltages. When a limit is exceeded, the monitor software sends an e-mail notification. As Figure 1 on page 30 shows, the IBM Remote Supervisor Adapter provides a high-level green light, red light status for all the connected servers. One can drill down to a specific server and then down to monitored parameters to learn more about a fault.

Disk array monitoring

Unless the RAID array is remotely monitored, there is no way for a maintenance person to know that a drive has been lost without physically inspecting the disk status lights on the front of the RAID array. If a second drive fails before the first failed drive is replaced, all data on the entire array is lost.

I use the IBM Director and IBM ServeRAID Manager to monitor the health of my RAID arrays. These software packages monitor a host of parameters on the system, including individual drives in the RAID array. If any drive fails, the system notifies me by e-mail immediately.

IP KVM switches

Another trick in the bag of remote administration tools is the IP KVM switch. A KVM switch allows the user to connect one keyboard, monitor and mouse to several computers. Broadcasters have used them for years where desktop space is scarce. An IP KVM switch does the same thing as a regular KVM switch, but instead of connecting a keyboard, monitor and mouse to the switch output, you hook up an Ethernet connection. Then connect to the IP KVM switch through the desktop computer using special software. With this software, you can switch between the different remote computer consoles just as if you were using a local wired KVM switch.

In this system, there is a small box (a KVM dongle) that has an Ethernet connector and keyboard, video and mouse cables coming out of it. These cables connect to the computer to be controlled. The Ethernet connector joins the dongle to the monitoring Ethernet network. The IP KVM switch itself connects to the LAN and ultimately to the Internet. You connect to the IP KVM switch by running special virtual console software on the desktop computer. The virtual console provides access to the server as if your remote computer were connected to the server directly. Response over this link is slow, but if you are having problems, this may be a last resort in correcting issues because, in some operating systems, critical error messages may only appear on the local computer console.

Another trick in the bag of remote administration tools is the IP KVM switch.

Router and switch remote access

You may need to access routers and switches to perform maintenance. It is common to access these devices using telnet. Usually this is safe because the telnet connection can only be accessed via a VPN, which is an encrypted link between the remote user and the router. As a backup, connect a cable between the serial port on the router or switch and one of your servers. Then, if you are unable to use telnet, you can access your server remotely and use a serial communications program such as hyperterm to connect to the router.

Putting it all together

As Figure 1 shows, I strongly suggest you create a separate monitoring Ethernet network with its own switch and a separate connection to the Internet. Also, ensure that this network is fed from a power source that is different from the servers and main Ethernet switch. Likewise, if the health monitoring hardware supports it, run these devices from separate power.

With the configuration shown in Figure 1, if the circuit breaker or UPS powering the servers has a problem, you will still be able to access the monitoring network. In fact, the RSA in an IBM server will contact you if the server it is monitoring has lost power, even though the RSA is physically located in the failed server. If, however, you have run the RSA off of the same power as the main server, then the RSA will lose power as well, and you will not receive a notification.

Having a separate monitoring network saved me many times when there were problems with the primary Ethernet connection to my servers. Because the monitoring network runs on a separate LAN, I can access the console on the server and reconfigure the Ethernet settings on the main server Ethernet connection without making a trip back in to the office.

This article is not meant as a tutorial on remote monitoring, but as an introduction so that you can be aware of the possibilities that exist. Your favorite hardware vendor may have different remote monitoring solutions. I encourage you to explore these solutions and to implement them in your facility. This will make your job as an accidental system administrator easier, and it will make you more efficient and effective. BE

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

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Selecting the right audio console

It's important to match the console to the task.

BY BENNETT LILES

Whether it's for a newly constructed broadcast or video production facility or an upgrade to an existing studio, selecting a studio production audio mixer is a significant investment, and once the installation is done, there's no going back.

Purpose

The basic key to selecting the right audio board for the job is, quite simply, to know exactly what that job is. And there are as many different scenarios as there are control rooms in the broadcast industry. However, following some basic tenets greatly enhances your chances for ongoing success.

Of course, the widest selection is possible during initial construction planning. In an existing room, it comes down to whether you're willing to knock out a few things and do some woodwork. If no modifications are possible, the choices fall only within the outside dimensions of the mixer surface and the rack space necessary to house any support hardware. It is in this last situation where production operators typically clash with the contract installers trying to save cable and other hardware costs while the operators are concerned about what can be reached and from where.

Add to this the fact that in many control rooms, the audio board is frequently doing double duty, first recording a show and then requiring a reconfiguration for posting that show or another production right away. Live and post are two different environments. (See Figures 1 and 2.) In post production, things can be done carefully so they're just right, like a surgical procedure in a big hospital. But in live TV sound, the technique is more like that of a field MASH unit. Hit the music; hit the mics; roll the credits; and bang, we're out.

There are some great features on the digital mixers, such as using digitally controlled amplifiers to turn the input faders into an equalizer and switching their control from inputs to outputs. But if you're only doing live and live-to-tape production, chances are these expensive features won't be needed.

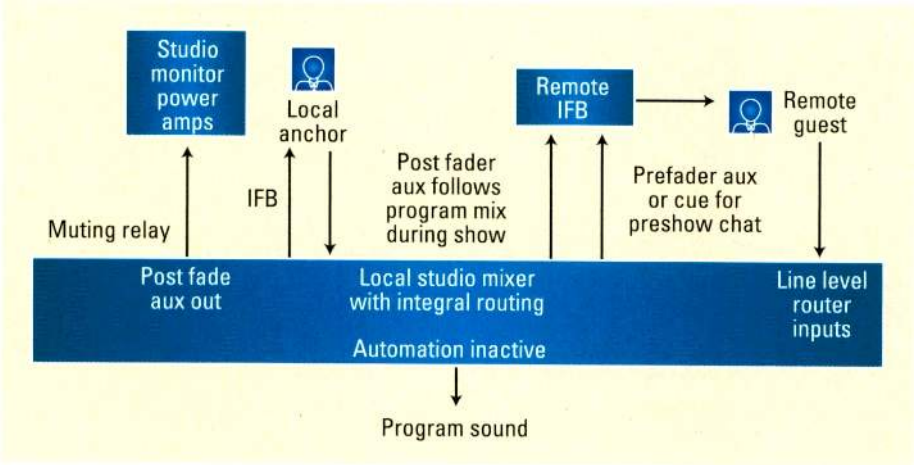

Figure 1. A local studio mixer configured for live production

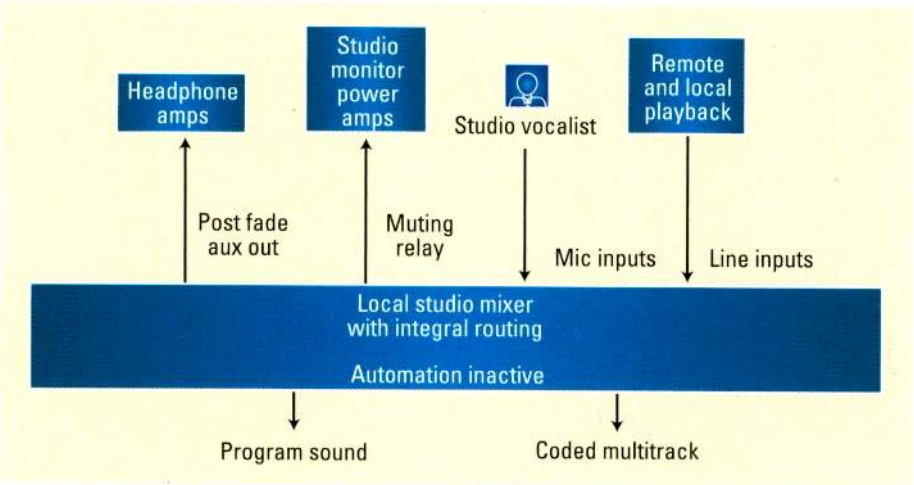

Figure 2. A local studio mixer configured for post production

The past and the future

Analog mixers have a long history in TV control rooms, and they will still be found there for a good while, but the comparative price issue between analog and digital mixers melted away a decade ago when the small digital project boards hit full market speed. But now, even with many more tools available, the bedrock issue is still a thorough understanding of what specific things the mixer is going

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to do. Beyond this, how it can be augmented with hardware and software to accomplish future missions is important. Digital boards maintain two huge advantages in this regard. They can be totally reconfigured in seconds, and software upgrades can add substantially to capabilities over time. The three primary fields of consideration are: control surface, signal processing and input/output capability.

Some questions to ask when looking at digital boards: In the event of a power glitch, how fast does a digital board reboot? Can a dual-redundant power supply take over without any interruption in the program sound? If one fader bay should fail, how quickly can the control surface be reconfigured around that problem? The reconfiguration should, at the same time, reroute inputs and outputs while setting all channel strip processing to duplicate that on the previously used strips.

Another feature that is frequently overlooked until the moment it's needed is the cue buttons function. Are these latching or momentary contact only? Momentary contact and after fader level is typically appropriate for mixing live music to isolate the instruments while dimming the program mix.

But for live multicity interconnects with guests participating from remote studios, a latching prefader cue function can help when the host would like to talk briefly with remote guests before the program, while at the same time, the master control engineers want tone and bars on the line for the uplink. Mute busses can be useful for this, and prefade auxiliary outputs are also handy if they can be controlled in unison so that selected mics are sent to mix-minus feeds and IFB inputs without going online. Then, with one button push, the IFB feeds are all switched to follow the line mix for the show. On analog boards, VCA faders are made to order for this so that multiple mics and line sound sources can be centrally mixed on subs without on-camera guests hearing rewinding tapes or distracting conversations in their IFB earpieces.

Another feature that is frequently overlooked until the moment it's needed is the cue buttons function. Are these latching or momentary contact only?

Going live

Input routing control on the mixer is a feature that expands its usefulness substantially, particularly if it can use a standard protocol to work in concert with the station video router. If live music is a frequent job, the quality and type of mic preamps is of prime importance along with the length and smoothness of the faders. At least 100mm fader length is needed for live music mixing.

Prefader metering on each input channel strip can also be useful in a TV studio production board for quick visual confirmation of signal presence on individual channels without any button pushes. General-purpose interfaces for machine control can also help in allowing the operator's hands to stay on the board most of the time instead of poking around racks, a useful thing in mixing a live news open with a music bed or montage playing under a series of in and out remote mics.

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When the local studio is being used as a source into a live show anchored elsewhere, there may be a need to program the monitor feed to the producer, director and TD in their room to carry the local host mic continuously in one speaker with the mix minus feed from the anchor station in the other control room speaker. A digital board can be easily set up for this through a pre-fade auxiliary output or direct channel out. It's important to maintain the flexibility in video control room monitoring either through electronic or manual patching for this type of monitoring configuration.

Live studio audiences introduce a whole new equation to the setup. Depending on the show format, the mics can be split in the studio with a separate PA operator, or direct outs that might normally be used for feeding stage monitor mixers can be fed back to the PA board in the studio. However, of course, any change to the control room board's attenuator pads could affect both. For simpler formats, a post-fader aux mix can feed a power amp in the studio but this requires a careful level check prior to show time. When this is the method used, plenty of switchable prepost aux outputs will be a must for the control room mixer.

With the coming of digital audio network technologies carrying multiple channels of uncompressed, bi-directional pulse code modulation sound on twisted pair cable, a mixing console with slots for Ethernet modules is a must. The latest development on these has slide-in modules that are multiprotocol.

Advanced planning

The idea of using a digital board with such advanced capabilities may be a little scary for a production manager realizing that at times when the A-team is off, there might be simpler productions with less experienced people manning the control room gear. But that's the best reason for having recallable setups. This way, if the junior league operators get into trouble, they only need to hit one magic button to get the board back to where it was.

This is particularly good for the EQ settings, which is where a lot of inexperienced audio operators get themselves into trouble. Yes, EQ knobs do turn to the left. I/O should be modular and expandable without requiring the purchase of loads of extra boxes to mix and match digital and analog outboard gear. Integrated routing is fundamental, and there should be support for digital formats, including SDIF, TDIF and AES/EBU.

A removable recording medium is also a basic factor to be considered, especially if this mixer will be one of a group of the same make and model. The ability to move the setup parameters to another control room is a tremendous time-saving asset.

If the board is also going to be used for post production, automation features must be included, and most digital boards can be reconfigured quickly for this, including the integrated rerouting necessary. The routing is somewhat different for TV control rooms because your mixer may be chasing remote machines that are being used for video posting at the same time. In this situation, monitoring and automation features must work together in the saved setup.

Careful consideration of the mission and whether every conceivable production and post-production scenario falls within the configurability of the mixer is the key to making it work. BE

Bennett Liles is a writer and TV production engineer in the Atlanta area.

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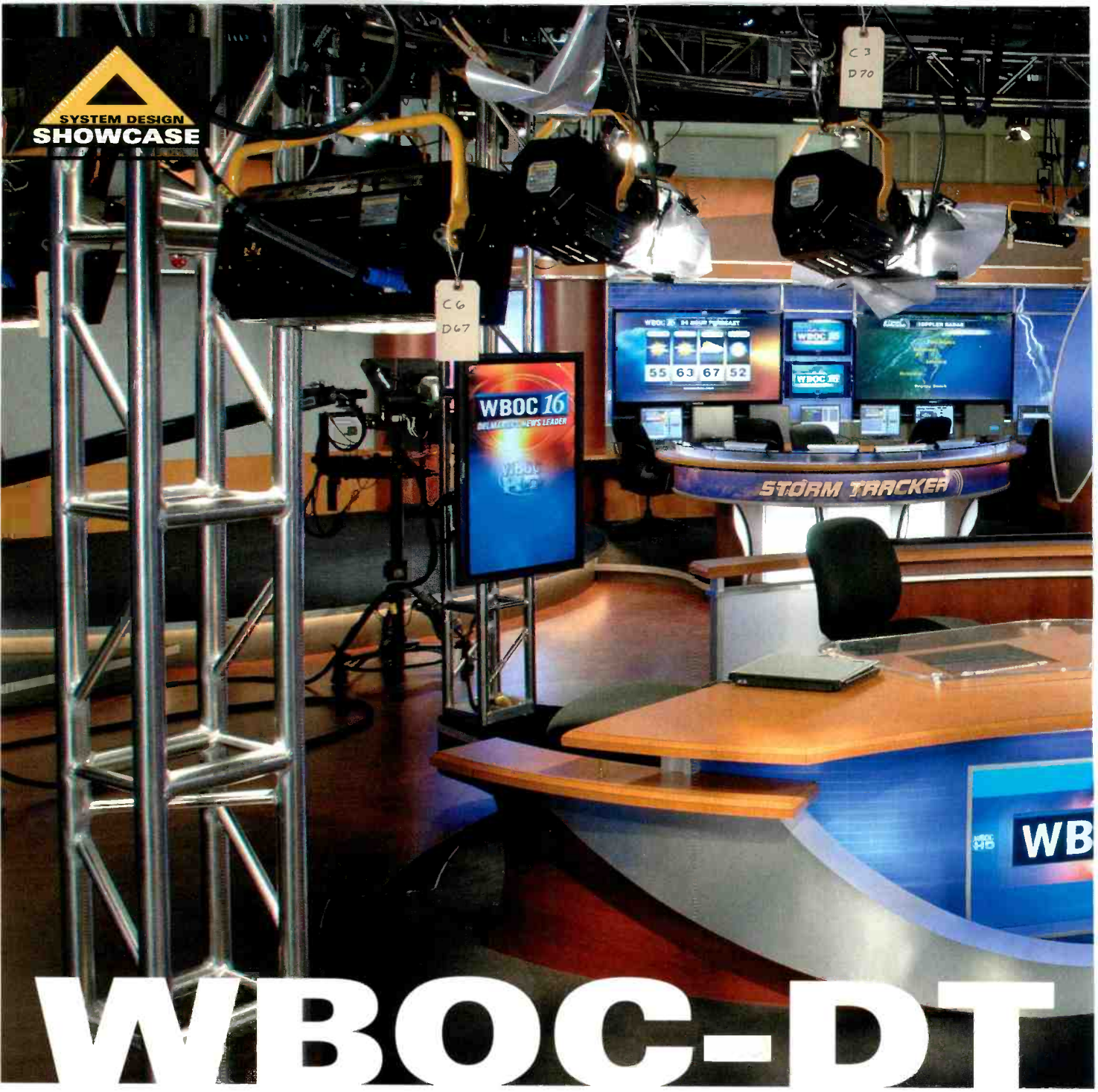

WBOC-DT presents HD news

In 2006, the task at hand for chief engineer Dan Panichella and his team at the independently owned WBOC-DT was daunting, although similar to what many engineers are faced with these days: upgrade an existing hybrid analog/digital plant to an all-digital infrastructure as cheaply as possible, and make sure it's future-proof and includes redundancy for reliable 24/7 operation. But it was not to be just any operation. The year before, the station contracted local architect Becker Morgan Group and set designer FX Group of Ocoee, FL, to create an 11,000sq-ft NewsPlex behind the existing station. The new facility would feature at its heart a 300-degree, carousel-like main desk, riser and lighting grid, the brainchild of FX creative director Bill Brown.

Collaborating with WBOC news director John Dearing, FX senior designer Glenn Anderson developed the unique, news-in-the-round concept whereby the open newsroom,

WBOC-DT's NewsPlex anchor desk is mounted on top of a rotating stage that allows a new background for different segments of the newscast. Photos courtesy Andy Washnik/CORPRICOM.

in the round

BY MICHAEL GROTTICELLI

edit suites, production studio, control room and weather center all double as newscast backdrops. The new, open facility would also promote a collaborative work environment that was nonexistent in the old building.

To complicate things further for Panicella, about a third of the way into the SD digital migration project, he and his Draper Holdings Business Trust managers recognized that the cost for HD technology was only slightly more expensive. With the help of systems integrator The Systems Group, based in Hoboken, NJ, the CBS and FOX network-affiliated station began installing HD equipment in May 2008. On August 26, the Salisbury, MD-based station went on-air with its local newscasts in HD. WBOC-DT was the first in its market — and the first in the state of Maryland — to do so.

To house the new equipment, the station constructed a new 11,000sq-ft building, located adjacent to its existing broadcast facilities. Belden RG11

The station's new master control suite is securely linked to the old part of the building with Belden RG11 cabling, which helps to move signals back and forth.

The WBOC newsroom, which features editors working on Apple Final Cut Pro HD workstations, is often seen during newscasts, with reporters presenting stories from their desks.

Technology at work

Apple
- Final Cut Pro HD workstations
- Final Cut server

Associated Press ENPS newsroom computer system
Belden cable
De Sisti Lighting
- Magis 650W fresnels
- Delux 2 and Delux 4 fluorescent soft lights

ETC
- Source Fours lighting
- SmartFade 2496 console

Evertz
- Modular boards
- MVP multiview system

Fujinon HD lenses
Hitachi cameras
JonyJib crane
Klotz Digital audio board
Lectrosonics wireless mics
Omneon MediaPort HD servers
Panasonic
- DVCPRO cameras and decks
- Plasma monitors

Pro-Bel
- Freeway SDI and Sirius HD routers

Sanyo SD rear-screen projectors
Sony ECM76 microphones
Sundance Digital automation sys.
Thomson Grass Valley Ignite sys.

cabling provides tie lines between the old part of building and the new facilities to help move signals back and forth between master control and the new production facilities. Internally, there's also more than 10mi of RJ-11 HD coax cable.

The new building features a bustling newsroom, edit suites, a production studio and a control room, which are all situated in a wide open and camera-friendly design that allows multiple angles to be captured from throughout the set and newsroom environment. It also promotes a collaborative work atmosphere among the staff that was not present in the old building. Like the old building, the new plant produces local news content for WBOC, the CBS affiliate (channel 16) and the FOX 21 channel. Both are now broadcasting in HDTV.

A new foundation

Previously, the station used a collection of analog routers and tape-based DVCPRO edit systems and cameras, as well as other obsolete production equipment — with a few pieces of digital processing gear thrown in. The new building includes a Thomson Grass Valley Ignite system with robotic cameras, a rotating anchor desk/stage, two multichannel Omneon servers, dozens of Evertz modular boards and an Evertz MVP multiview software system for its monitor wall in the control room.

The control room also features two Panasonic tape decks that are controlled by the Ignite system. In the case of breaking news, the crew inserts a tape, and the footage is played directly out of the Ignite system to air. Upconversion is performed with an Evertz card linked to the output of the VTRs.

The station continues to use an existing analog Pro-Bel Eclipse router (112 x 96) and a smaller (64 x 64) Pro-Bel Freeway SDI router. As part of the upgrade, however, the Eclipse has been expanded and a new Pro-Bel Sirius 64 x 64 HD router installed to handle HD signals. Audio is mixed with a Klotz Digital audio board that's built into the Ignite integrated production system. There are also seven Apple Final Cut Pro HD edit suites to cut HD packages. The final result is an HD QuickTime file.

The new NewsPlex studio employs four Thomson Grass Valley Ignite robotic cameras. A manually operated JonyJib crane with a Hitachi HV-D5W HD camera atop its 12ft arm captures relationships between areas during bumper shots. Another Hitachi HD camera is mounted in the grid. The studio also features a Panasonic handheld camera on a tripod that's used to shoot around the studio.

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The new weather studio, designed by the FX Group, features the latest in HD forecasting technology and ample space for the presenters to walk around the set.

Panichella said the station needed a building that would incorporate the newsroom and technical facilities in a common area. Before, these areas were separated by numerous walls and hallways. Content was previously played out from an SD Omneon server. Producers and reporters were often seen running down the hall toward the control room. Now there is a shared environment, where producers interact with anchors and the technical crew in ways they never did before.

In the field, the station maintains 15 ENG DVCPRO analog cameras. The resulting analog images are upconverted using Final Cut Pro software. When budgets permit, the tape-based cameras will be replaced with Sony XDCAM HD camcorders next year.

Cutting to the chase

News packages can be turned around in near real time. Images from the field are ingested directly into a local storage drive attached to a Final Cut Pro workstation for each editor. The station has established a file-based workflow whereby all of the editors work on dedicated storage arrays. They are not networked together yet; that will come next year in the form of an Apple Xsan system. Currently, they share content via a Final Cut server. SD images are upconverted within the Final Cut Pro software, where side panels are added to fill in the wide (16:9) aspect ratio of HD.

Finished files are transferred to three channels of Omneon MediaPort HD servers via the station's ENPS newsroom computer system, for playout. The Omneon server is used like three VTRs to store the various news clips. An existing Pro-Bel 320 master control switcher, which continues to be located in the old building, feeds the CBS and FOX affiliates. Syndicated programming will also continue to originate from the old building, where 30 incoming satellite feeds from Telesat are recorded with the help of a Sundance Digital automation system.

Live production in the NewsPlex is handled with the Ignite HD system via a virtual control panel. This panel allows directors to hot punch a video source when necessary. Some upconversion is also performed inside the Kayak switcher section of the Ignite system. Employees trained on the Ignite system for seven weeks and picked it up quickly. Since then, there have been few technical errors, and the station's six hours of daily newscasts looks cleaner than ever.

The glassed-in control room includes the Evertz MVP system and a monitor wall made up of three 50in Panasonic plasmas screens with multiple inputs. There are also more than 50 widescreen monitors of varying sizes throughout the new building. They display a wide variety of live images, from outdoor remote camera feeds to incoming program channels.

News in the round

Some stations use a news wheel to play out programming. At WBOC, the news is presented literally on a wheel. The FX Group-designed anchor desk is located on a platform rotated by a programmable, motor-driven gear system similar to those used to rotate cars at auto trade shows. It's a motor-driven gear system that moves a circular platform, much like a carousel operates.

When the production teams want to change backgrounds, as they do three times each day, the riser rotates on its center axis with its fixed, trellis-like lighting grid above. Eric Haugen, FX lighting designer, populated the grid with De Sisti Magis 650W fresnels

Design team

WBOC-DT
- Dan Panichella, chief engineer
- Greg Gay, IT manager
- Jeffrey Disharoon, technical operations manager
- John Hopkins, project manager
- John Dearing, news director

FX Group
- Bill Brown, creative director
- Glenn Anderson, senior designer
- Joel Biske, graphics designer
- Eric Haugen, lighting designer

The Systems Group
- Paul Rogalinski, project manager
- Christian Dam, design supervisor
- Matt Marino, site supervisor

for keys/backlights, as well as Delux 2 and Delux 4 fluourescent soft lights for fills. The set is accented with ETC Source Fours, and the dimming and control consists of Dove grid-mounted shoebox dimmers controlled by an ETC SmartFade 2496 console.

The only equipment that has to be physically moved to new corresponding positions are the cameras. After they are repositioned to precise floor marks, station directors quickly tweak the TMEs sent to the Ignite system to fine-tune framing and focus.

The NewsPlex design uses true working areas as backgrounds. They include a state-of-the-art weather set, frosted background set where editors can be seen working on the other side, the assignment desk (made slightly higher to soundproof the reporter area behind it), a working control room set, and a production/standup area featuring two Sanyo SD rear screen projectors masked for 16:9. The newsroom is often seen on screen during newscasts, with reporters presenting stories from their desks.

In the studio, the station employs Lectrosonics wireless mics on its news talent and Sony ECM76 hardwired microphones for backup. The station uses a 13:9 aspect ratio for the Kayak switcher's internal upconversion, which fills the screen on most HDTV sets.

Achieving their hi-def goal

After years of working with legacy equipment in various stages of functionality and age, the new building gave Panichella and his team a chance to start from scratch and build a 21st-century facility that gets news to air faster and eliminates many manual and redundant processes.

The studio is at the center of the facility, and the edit and control rooms feed off that. The assignment desk serves as a buffer between the studio and the newsroom. This concentric nature of the new studio facilitates a smooth workflow that has made the staff more productive.

In the end, the station has made the most of its available resources, and management could not be more pleased with how smoothly the transition occurred. Ratings are up due to HD broadcasting. Broadcasts are watched in Maryland, Delaware and parts of Virginia on cable (Comcast, Charter and Mediacom), telco (Verizon) and over the air, with an Axcera single-tube IOT transmitter (maximized at 635kW ERP) located in Laurel, DE, about 10mi away. Not bad for a station in the 144th DMA. BE

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

IPv6 is coming

You cannot afford to ignore this technology.

BY CIPRIAN POPOVICIU

The Internet Protocol (IP) provides the leading and most rapidly growing infrastructure for today's communications services. Through innovation, its best effort nature was complemented with functionality that enabled IP to evolve from delivering data to delivering voice and video communications as well. This convergence of services opened up the door to further enhancements through the integration of seemingly disjointed services into a common framework that enhances the user experience as well as the user's work efficiency, learning and entertainment experiences.

Spurred by the Internet, the adoption of IP, in its current version IPv4, grew at rates never experienced by any other technology. As expected, yet often times ignored, this growth consumed the most fundamental resource of the protocol, its address space. Despite ingenious and sometimes costly engineering extensions combined with stricter address allocation policies, the consumption of IPv4 addresses continues to accelerate, and we now expect the global address space to be exhausted sometime around 2010. The most worrisome fact is that we only got started with the adoption of IP. The Internet and IPv4 haven't even reached the 22 percent of the world's population.

IPv6 is everywhere, including on sensors taken up Mt. Everest by Ciprian Popoviciu.

The emergence of a new category of IP-enabled devices, such as sensors, readers and actuators, will lead to significantly higher demand for IP addresses. So the natural question is: Where do we go from here?

Spurred by the Internet, the adoption of IP grew at rates never experienced by any other technology.

The transition to IPv6

The Internet Engineering Task Force (IETF) foresaw the challenge of a limited address space more than a decade ago and started working on a replacement for IPv4. The IETF wanted to develop a replacement with plenty of addressing

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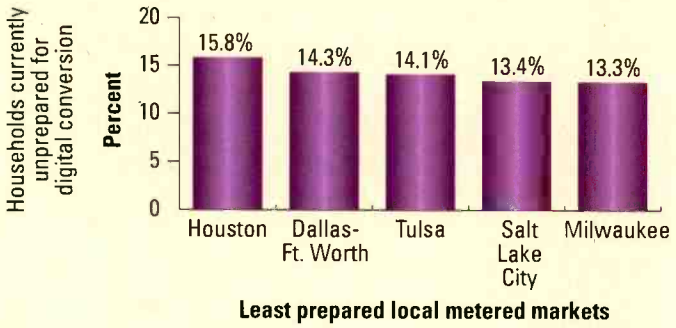

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resources so it would last a long time. This protocol is called IPv6. While the adoption of IPv6 was postponed for many years due to engineering workarounds that put IPv4 on life-support, we are now getting close to an inevitable transition.

The only choice left is to decide when we should transition, considering all the risks and costs related to early vs. late adoption. Either way, broadcasters must face the need to start planning, deploying and operating IPv6-based infrastructures.

With more content distribution services being delivered over IP, it is important to understand the evolution of IP infrastructures that support them.

What is IPv6?

The most important things to remember about IPv6 are:

- *IPv6 is an evolution of IP, not a revolution.* In this sense, if you are familiar with IPv4, you will, for the most part, feel comfortable with IPv6. The IETF simply added more resources to the protocol, dealt with some lessons learned from operating IPv4 and left most everything else in place.
- *IPv6 and IPv4 do not interoperate.* Do not think for a moment that you will turn on IPv6 in your network and it will simply augment the current infrastructure. The two protocols can talk to each other only through a translation gateway.
- *IPv6 has many more IP addresses than IPv4.* IETF expanded the IP address from 32 bits in IPv4 to 128 bits in IPv6, which leads to a significantly higher address space. By comparison, it is said that IPv6 has an address for every proton in the universe.

At the time this article is published, the main driver for IPv6 adoption remains its large address space. Many other supporting arguments were conjured in the past; however, none of them demonstrated significant return on investment (ROI). The natural focus on ROI is sometimes detrimental in analyzing the need to work on an IPv6 strategy. IPv6 is a foundational technology that makes it more difficult to build a strong ROI case.

Moreover, it is more appropriate to look at IPv6 in terms of what we stand to lose by not planning and deploying it rather than what we stand to gain. Waiting for too long leads to significantly higher deployment costs. These costs can be avoided through early planning.

How IPv6 affects you

What makes IPv6 a matter of interest to broadcast engineering? With more content distribution services being delivered over IP, it is important to understand the evolution of the IP infrastructures that support them. The need to migrate to IPv6 must be addressed by preparing the networks for the new protocol. In fact, some large service providers leverage IPv6 deployments to deliver audio and video content, including HD video, over IPv6 multicast.

The choice of IPv6 is not based on a dramatic advantage it has over IPv4 but rather because of its addressing resources, which enable a cleaner, easy-to-scale infrastructure. The important thing to note, however, is that broadcast services are being offered over IPv6, and their numbers are likely to increase.

What you can do

There are several things that any infrastructure manager should do even if he doesn't feel an immediate need to deploy IPv6.

First, increase the IPv6 competence of staff. Training is an important step toward getting ready for an IPv6 deployment. Starting early will reduce costs, and it will provide the expertise needed to plan the deployment. Make sure training is targeted.

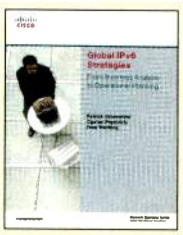
Second, update equipment purchasing requirements. For all new purchases, both hardware and software, place clear IPv6 requirements. This will help significantly reduce the deployment costs as equipment and applications are readied for IPv6 through the regular refresh process. In fact, add an IPv6 dimension to all the ongoing IT projects as they provide an opportunity to upgrade the infrastructure to support IPv6.

Third, evaluate the IPv6 readiness of the infrastructure, both hardware and software. This will provide a clear picture of some of the potential challenges during an IPv6 deployment.

Finally, plan the IPv6 deployment. Start planning early because it will enable you to make the most of this transition.

The most important thing to remember is that it is not a matter of whether IPv6 is coming or not; it is a matter of when. With the rapid exhaustion of the IPv4 address space, this might be sooner than you expect. Do not let IPv6 be a costly surprise. BE

Ciprian Popoviciu, PhD, CCIE, is a technical leader within the Networked Solutions Integration Test Engineering group at Cisco Systems. He is also a senior member of the IEEE.



Ciprian Popoviciu is co-author of "Global IPv6 Strategies," available from Cisco Press. For more information, visit www.globalipv6strategies.com.

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It may be time to abandon coax.

BY PHIL CIANCI

Use of fiber-optic technology in broadcast infrastructures is increasing at an overwhelming rate. Equipment manufacturers are including fiber interfaces for SDI and network connections in new equipment; routing systems are using optical switching matrices in their latest 3Gb/s generation of products; and SMPTE 311, hybrid fiber-optic cables are replacing triax for cameras.

Until recently, fiber-optic technology has been significantly more expensive than a copper equivalent, placing it out of the financial reach of many new systems. But widespread deployment by the telco industry has brought the price down.

Today, two- and six-strand fiber cable prices are on par with the broadcast industry workhorse 1694A coaxial cable. It is time to evaluate fiber technology as a cost-effective alternative to coax.

Signals, fibers and cables

Fiber-optic systems consist of a light transmitter, LASER or LED; an optical medium, glass or composite; and a photodetector receiver.

A variety of light-emitting technologies are used in transmitters: Fabry-Perot lasers or distributed feedback (DFB) lasers are used in long-haul and high data-rate applications; vertical-cavity surface-emitting lasers (VCSELs) are suitable for shorter-range applications such as GigE and Fibre Channel; and light emitting diodes (LEDs) are used for short to moderate transmission distances. LEDs are the least expensive transmitters but have limited data capacity.

Two- and six-strand fiber cable prices are on par with the broadcast workhorse 1694A coaxial cable.

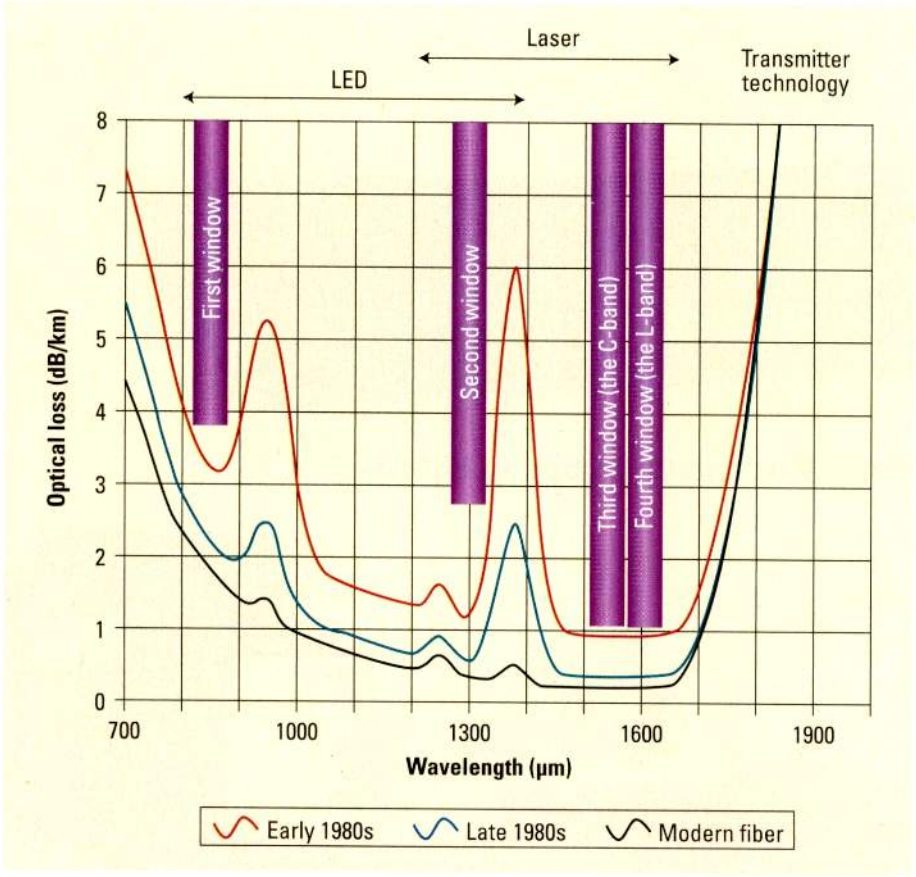

Figure 1. The improvement of fiber-optic wavelength "windows" and transmitter technology since the early 1980s has led to the reduction of optical loss.

Figure 1 shows the improvement over the last few decades of fiber-optic wavelength windows. Appropriate transmitter technology is also indicated for each window.

Two types of photodetectors, avalanche photodiode (APD) and positive-intrinsic-negative (PIN), convert photons of light to electrons. Because of the small number of photons received, amplification is necessary to recover data and produce a usable signal. APD amplification is internal, while the amplification is external for PIN detectors.

Fiber-optic systems use a variety of signal multiplexing techniques. Time-division multiplexing (TDM) assigns data packets to time slots and is used in long-haul infrastructures, while wave-division multiplexing (WDM) enables multiple wavelengths of light to share a single fiber. In first-generation deployments, WDM technology supported just two wavelengths, also referred to as "lambdas," usually 1310nm and 1550nm.

As fiber-optic technologies improved, it became possible to transmit more than two lambdas simultaneously over a single fiber strand. This

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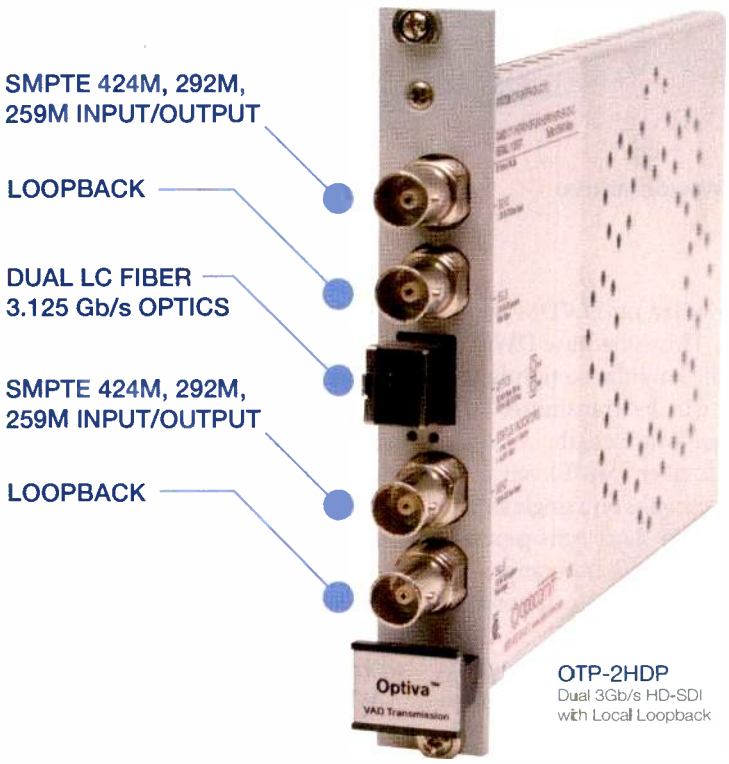

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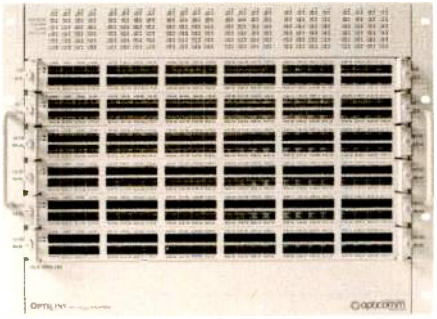

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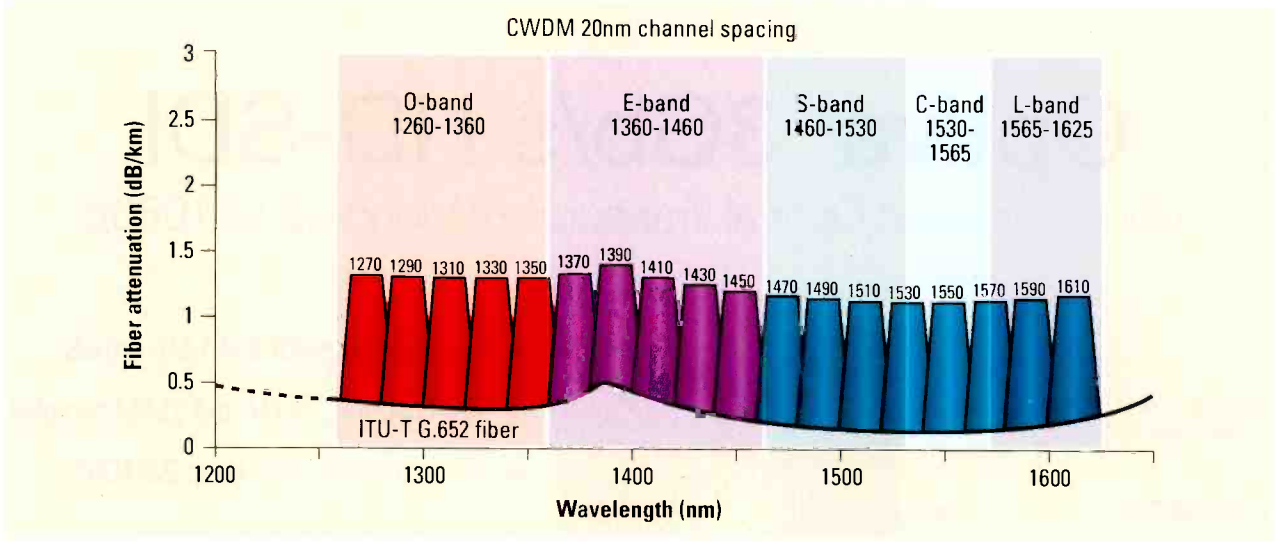

Figure 2. CWDM spaces channels 20nm apart.

resulted in the development of coarse wave-division multiplexing (CWDM) and dense wave-division multiplexing (DWDM). CWDM spaces channels 20nm apart, while DWDM uses narrow channel spacing, frequently 0.8nm or 1.6nm. Figures 2 and 3 illustrate implementations of each technique as specified in ITU-T standards.

Single-mode fiber (SMF) carries a single wavelength of light and is suited for long runs, such as between buildings, venues and broadcast sites (STL, TSL, intra- and intercity links), and as risers in facilities. SMF cables are yellow, and the fiber cores are 8.5µ in diameter. Something of an oxymoron, SMF is best suited for DWDM implementations. This is because DWDMs pack multiple lambdas so tightly that the bundle can be transmitted as a "virtual single" wavelength.

Multimode fiber (MMF) can carry multiple wavelengths on a single strand. They are used in short runs generally inside a building and are orange. The thicker core, 50µ or 62.5µ, supports the wide bandwidth of CWDM.

Single-mode fiber technology is more expensive to implement than multimode. Lasers must be precisely tuned and cannot use the less expensive LED transmitters found in CWDM links.

Making a connection

Optical fibers require precise connectors. Two techniques currently are in widespread use: angled physical contact (APC) and ultra physical contact (UPC).

APC connects 8-degree cut fibers and is appropriate for high data-rate SMF links. UPC fibers have a rounded finish that allows fibers to touch on a high point near the MMF fiber core where light travels.

When cables are mated to connectors at the factory, signal loss is less than 0.2dB, the cables are ready to install, they are guaranteed, and they can be returned if defective. In

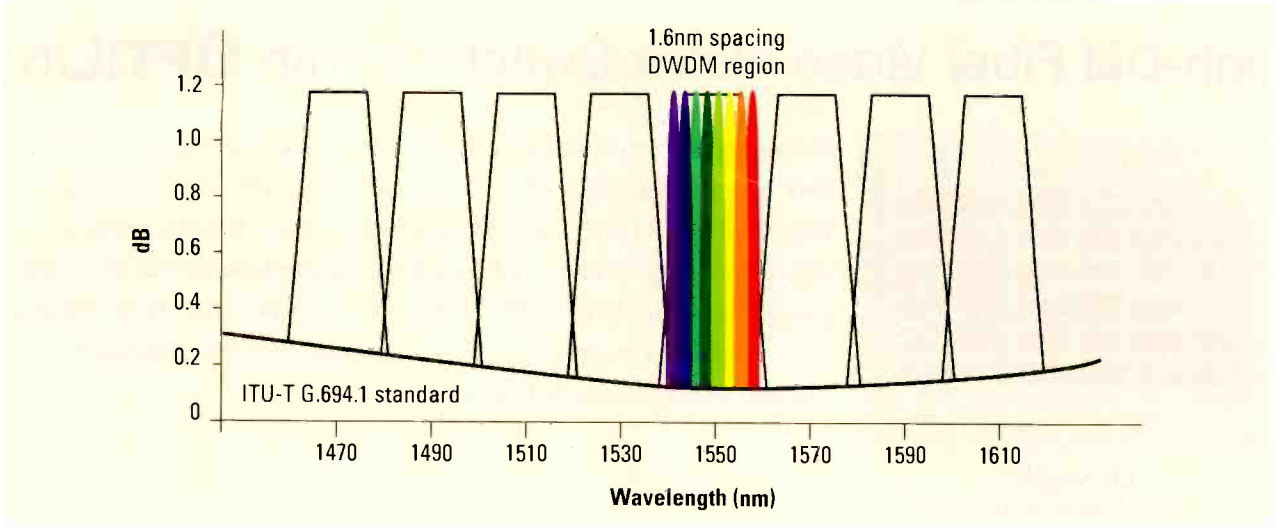

Figure 3. DWDM uses narrow channel spacing, frequently 0.8nm or 1.6nm, as shown here.

comparison, do-it-yourself connector field terminations typically suffer a 0.5dB to 0.75dB signal loss, take time to install and will have to be repaired if faulty.

Installation and testing: Handle with care

Installing and testing optical networks requires adherence to a long list of recommended practices.

Cables:

- Observe minimum bend radius, 20X the cable diameter under tension during pulling and 10X when not. Also observe cable pulling tension, 100lbs to 200lbs for indoor cable and upward of 600lbs for outdoor.
- Loosely fasten cable ties to avoid microbends that can degrade performance. (See Figure 4.)
- Use properly color-coded cables; place labels in easy-to-read locations.
- Stack cables no deeper than 2in in "fiber-only" cable guides.
- Proper dressing in racks and risers will help prevent accidental damage. Plan for slack and patch cable storage.
- Single-mode cables should be tested after installation but before splicing or termination, and again after to confirm the cable was not damaged during installation.

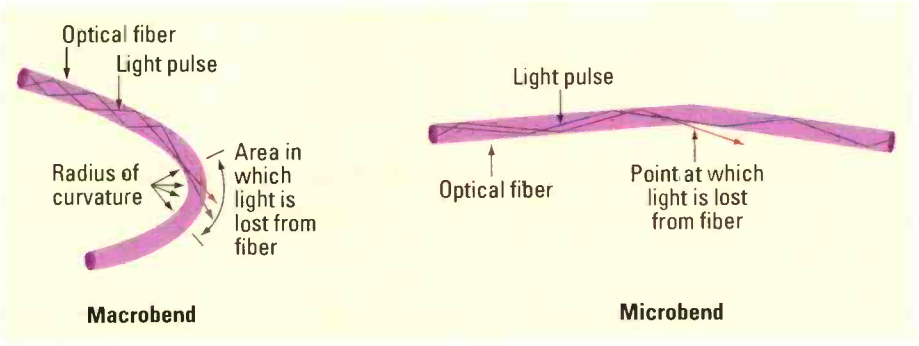

Figure 4. Fiber-optic cable performance is degraded by macrobends, a failure to observe minimum bend radius. Smaller microbends, caused by cable ties or improper handling, can also impair the optical light path.

Connectors:

- Keep dust caps on all connectors.
- Clean all connectors after removing dust caps and before connecting to transceivers or connectors. Solvents specifically developed for fiber cleaning are now available.
- Don't touch the terminations.
- Mate the cable and the connector as

soon as possible.

- Place the dust caps in a small plastic bag and tape inside the cabinet for future use.

Testing:

- Measure transmitter power, receiver sensitivity and optical loss.
- Use tested patch cords of the same fiber type as the installed cabling with a known attenuation at the appropriate wavelength.

Safety is no accident

Working with fiber optics requires strict adherence to safety practices. Many of the hazards are not obvious. Even a microsecond of exposure to a fiber light beam can cause permanent eye damage. Never work on an active fiber.

Trimming, stripping or cutting fibers can create small glass fragments that are light enough to float in air. They can penetrate the skin and become embedded, causing irritation, and if ingested, fibers can cause internal damage.

Chemicals and solvents used in cleaning and splicing fiber optics can also be hazardous.

Safety practices:

- Workers performing splicing or termination should wear safety glasses with side shields.
- All food and beverages should be kept out of the work area. Wear disposable aprons to keep fiber particles off clothing. Check clothing for pieces of stray fiber; remove them with double-sided tape.
- Wash hands thoroughly before touching eyes, especially if wearing contact lenses.
- Read all instructional material before handling chemicals.
- All cut fiber pieces should be disposed of properly along with any used chemicals and containers. A disposable container that can be tightly closed should be used for fiber scraps.

Maintaining fiber installations

Fiber-optic networks generally do not require periodic maintenance. Inspection or maintenance can cause damage or allow dirt to get into components; however, outdoor installations are susceptible to mechanical and environmental damage and should be carefully inspected regularly.

Fiber installation documentation packages should include transmission wavelength, cable color, cable number, section length and the location of splices or terminations. The optical loss, measured during testing, should be recorded on the as-builts, and spare fibers should be noted. Power

figures, both calculated and measured, along with installer contact information, should be included.

A new, improved cable

With the increased use of fiber for telco TV installations, the need arose for fiber cables that can withstand outdoor environments and tight residential installation spaces. The result is the development of bend-optimized fiber.

Specifically designed to minimize the effects of increased attenuation resulting from cable bends, bend-optimized fiber, as shown in Figure 4 on page 53, can be coiled into loops and tied in bundles with a 10mm loop radius; wavelengths between 1260nm and 1625nm are supported.

Benefits

The need for higher data rates will increase. One of the problems with coaxial cables is that as signal data rates have increased, the usable length of cable runs has decreased. Because optical fiber can support higher data rates, its use can help provide some measure of future-proofing for a facility.

Also, because fiber-optic cables are smaller in diameter, they require less cable tray space. This additional space allows "dark fiber" to be pulled during cable installation and reserved for future use.

The amount of fiber cables required for a given number of signals is significantly less than for an equivalent coax installation. For example, in campus and metro network topologies, a CDWM fiber can carry 16 HD-SDI signals over a single fiber for up to 40km. Similar reduction of cable numbers can be realized by using fiber instead of coax in broadcast centers.

With 1000ft of 1694A and 1000ft of dual-strand fiber both priced at about $300 and 1000ft of 12-fiber cable at $550, fiber deployments are viable, affordable solutions — despite the added cost for optical connectors, patch cables and skilled installation technicians.

Finally, total cost of ownership for fiber installation may be less than that of coax. An "enlightened" design philosophy should evaluate the long-term benefits of using fiber-optic technology in any new system design. **BE**

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

TV production spaces, part II

When designing lighting, power and electrical systems, consider these issues.

BY ANTONIO ARGIBAY, AIA

At the heart of all TV production spaces are the electrical systems. Whether selecting systems for illumination, cameras or microphones, it is essential to understand the options available in order to select the most effective systems for your project. This article will address three primary components: lighting, low-voltage wiring and utility power.

Production lighting rigging systems

The ceiling of a TV studio is a confusing mixture of wires and lights, with no apparent order. With experience, you begin to understand the benefits, limits and applicability of the different methods of supporting the production lighting or rigging. There are four types of lighting systems: dead hung, counterweight, catwalk and motorized. (See Figure 1.)

Dead hung

Dead hung systems are the most commonly used today and the least expensive to install. They consist of a 1 1/2in pipe grid, spaced at regular intervals between 4ft to 5ft. One set of pipes is supported from the structure above it by 1/2in rods, at intervals matching the grid. The other set of parallel pipes is installed on the underside and perpendicular to the supporting pipes creating the grid. The lighting strips, or battens, for the dimming circuits are clamped to the piping or to the rod supports. The clear benefits of dead hung systems include:

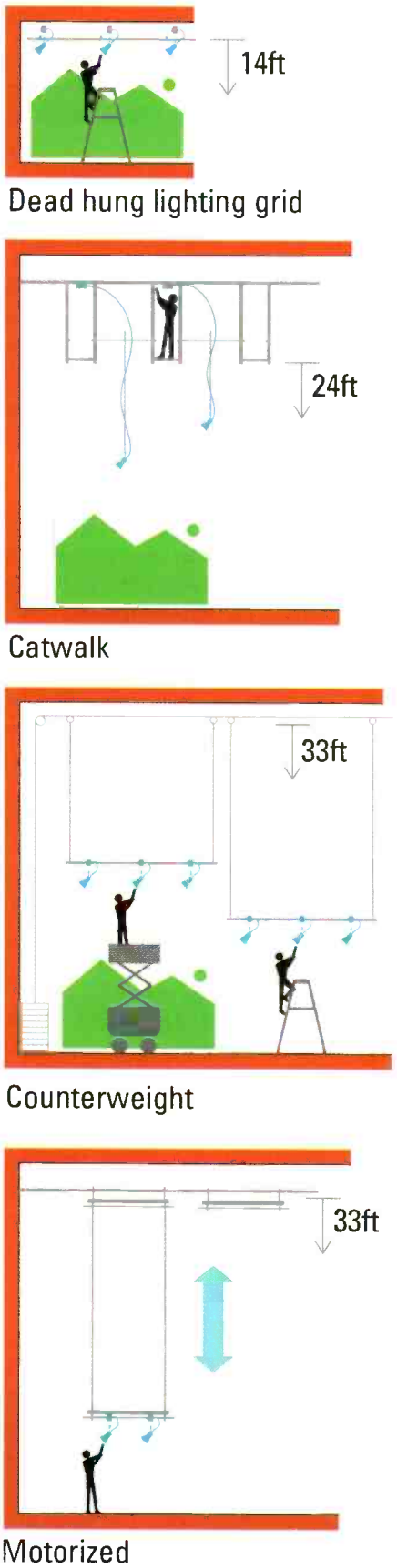

Figure 1. The four different types of rigging systems

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- They are inexpensive.
- They require little skill to plan and install.
- They are flexible and don't require maintenance.

However, they have limitations:

- Their flexibility is limited to low grids (14ft range) and to productions that require few lighting changes.
- For grids higher than 14ft, ladders are impractical. Genie lifts or other lift devices are generally required. These are difficult to maneuver around a set and may require bridging, moving sets or compromising a lighting plan to provide access.
- These systems can be extremely time-consuming, thus inefficient for a production in which the need to access lighting instruments is frequent.

Counterweight

Counterweight systems involve the installation of a parallel piping system, with pipes spaced approximately 4ft from each other and broken into segments of 15ft to 20ft along its distance, which is the width of the studio. One wall, for the whole studio length, is devoted to the counterweights; ropes and the catwalk above are used for loading the weights. These systems have been in use for many years and were derived from theatrical technology. The benefits include:

- Lights can be lowered to the studio floor to load the lighting instruments.
- Lighting can be lowered for adjustments with manageable access of a ladder or genie lift.
- As a system for accessing the lighting support, it is relatively inexpensive.

However, there are limitations:

- It requires maintenance and inspection, including periodic reroping.
- Cross-piping (linking two parallel light supports with a short, independent pipe) is problematic.
- With tall sets, it is not easy to lower the lighting support to easy reach.

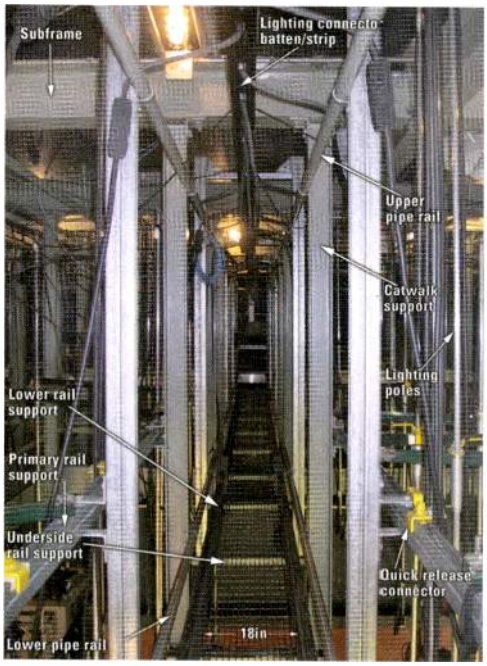


Figure 2. An example of a catwalk system

Catwalks

Catwalk systems consist of parallel walkways, typically 18in across, with in-between openings that allow the lighting instruments to be lowered and controlled from above. (See Figure 2.) The lighting connector strip, above each row of catwalks, runs the whole catwalk length. Lighting instruments are mounted on telescopic poles, and the poles are clamped to steel supports along the railing or spanning the openings.

They are accessed by stairs, typically located outside the studio. Catwalks are used only in studios with high ceilings (35ft or more), as the bottom of the catwalks is usually installed at approximately 24ft, requiring another 10ft to 12ft above to maneuver the poles.

Catwalk benefits include:

- The system provides complete flexibility for locating lighting.
- Instruments are always accessible from above, and technicians never have to move scenic elements to reach lighting adjustments.
- It is extremely quick. As technicians are working above, actors, talent and directors can block scenes and do other studio preproduction tasks.

- It does not require maintenance.
- For scenic-intensive productions, such as soap operas, or for studios that need to move scenic elements often — and quickly — this system allows technicians to move on two levels, providing the quickest setup turnaround. However, all of this comes at a cost:
- It is a heavy system, typically adding 35lbs per square foot to the structure.
- Catwalk systems require custom design by a professional.
- The system is relatively expensive and takes quite a bit of time to fabricate and install.

Motorized and hybrid

Motorized rigging systems have evolved in recent years. Their reliability, cost and versatility make them part of many production rigging solutions. Motorized solutions range from individual hoist luminaries to self-climbers with integrated lighting battens to fully motorized studio rigging systems. Typically, each motorized lighting batten is attached to a parallel track that supports each end of the batten. The batten then moves horizontally, like a train on tracks, back and forth, as required, for a range of 5ft in either direction. The latest motorized units don't require to move parallel to each other — or even perpendicular to the track. Other motorized systems include the raising and lowering of rectangular truss structures with lighting.

Benefits of motorized systems are:

- Many motorized solutions are part of upgrading existing dead hung systems, thus creating a hybrid.
- They require little maintenance.
- They necessitate less gross ceiling height to get a net production ceiling height.
- They can be incrementally installed and expanded as part of a planned upgrade.
- Fully motorized systems can include horizontal tracking so that lighting can be put exactly where it's wanted.
- They are reliable and easily integrated with DMX controls that may already be in use.

However, motorized systems require the following considerations:

- They need substantial vendor support. Be sure you can get both parts and maintenance.
- They still are relatively expensive.
- Motorized systems require a structural subframe or another similar element attached to the systems' structural rails.
- Mechanical things require some maintenance and break down. Carefully select the manufacturer and the supply chain, along with ironclad guarantees.

The lighting system

All lighting connected to the rigging

is powered by lighting battens, also called connector strips. They are labeled with individual dimmer circuits and distributed in a balanced manner throughout the studio. The designer of this electrical system has to work hand-in-hand with the designer of the production lighting system to create a flexible, balanced distribution system.

Lighting power distribution and control

In the United States, when power is delivered to the entrance point by the utility, the first step is to provide an isolation transformer (ΔY), which takes the 480V distribution voltage in delta (Δ) and transforms it to 120V-208V in Y. This helps to prevent harmonics from feeding back to the utility. From the isolation transformer, power goes to distribution boards, which feed power via a main electrical wireway to smaller, individual branches for each lighting batten/connector strip in the studio. The individual branch electrical wireways end in a terminal box where the lighting battens are connected.

The lighting batten, usually a premanufactured and prewired element with the lighting connectors specified, is ready for connection in the field to an existing terminal box. Each outlet corresponds to a numbered dimmer circuit. Typically, they are 20A outlets with three (depending on the length) 60A outlets for the bigger lights (6000W). Numbering is traditionally done with the lower numbers for the 20A circuits, such as 42 through 90, and using larger numbers, such as 601, 602 and 603, reserved for the 60A outlets.

The number of ceiling dimming circuits installed is an important consideration when planning the studio. One per 15sq ft is reasonable; however, there can be greater or lesser densities based on preference or need. Floor-level circuits should be provided at one-third points along walls. Install four 20A lighting connections and one 60A connector. On the short walls, center another cluster of four 20A outlets. In studios where variety and musical shows are common and follow spots are required, provide a 100A outlet for each studio. Minimum #10 AWG conductors are needed to feed the 20A lighting dimming circuits. The lighting batten ground wire should run back to the panels/common ground location; use a minimum #8 AWG wire.

Here are two final thoughts regarding the power for the lighting systems. First, all dimmer circuits require a dedicated neutral, and failure to provide it will result in the electronic hum typically associated with shared neutrals. Second, all electrical loads must be balanced. This requires location planning of dimming circuits so that loads are evenly distributed over the electrical phases throughout the production area. Always consult a production lighting designer.

Low-voltage distribution

All TV studios require the installation of low-voltage broadcast cabling paths. Every studio needs boxes with video and audio terminals to which cameras, microphones and other broadcast equipment are connected. These boxes must be fed with a variety of cables, which, in turn, find their way to a production control area. Of these, only microphone cables must be kept in an electrical conduit all the way from the box to its final termination. The conduit provides additional shielding, and prevents intrusive electrical interference and noise.

The locations of these boxes are optional and are chosen for convenience based on the studio size and the productions that are planned. In smaller studios, install them so they can cover a radius of 30ft. In larger studios, such as sound stages designed for flexibility and a variety of productions, the radius can be increased to 50ft. In specialized production spaces, the placement should be closely coordinated for easy technicians' access and to accommodate the placement of scenic elements.

Be sure all the boxes are properly incorporated into your overall facility's wire management strategy. All drawings and plans should indicate the location of the boxes, cable trays and conduits.

Studio lighting is controlled through low-voltage DMX controls that require empty conduits and boxes for the installation of the control wiring. DMX boxes are typically

provided at the ends of the studios and adjacent to the personnel doors. Additional locations are likely and will depend on specific applications.

Other considerations

One overlooked part of a studio lighting system is the need for work lights or house lights. These are used during studio maintenance, sets installation and for general lighting. Use fluorescent-based luminaries with as few lumens as possible per size of the light. The smaller the light, the less chance it will be on top of a production light. High-intensity discharge (HID) lighting can be used, but due to the long warm-up period, you would be well-advised to understand its implications. Incandescent 500W and more lights are also used in studios of various heights, but they are more expensive to operate and need more frequent bulb replacement than ballasted fixtures.

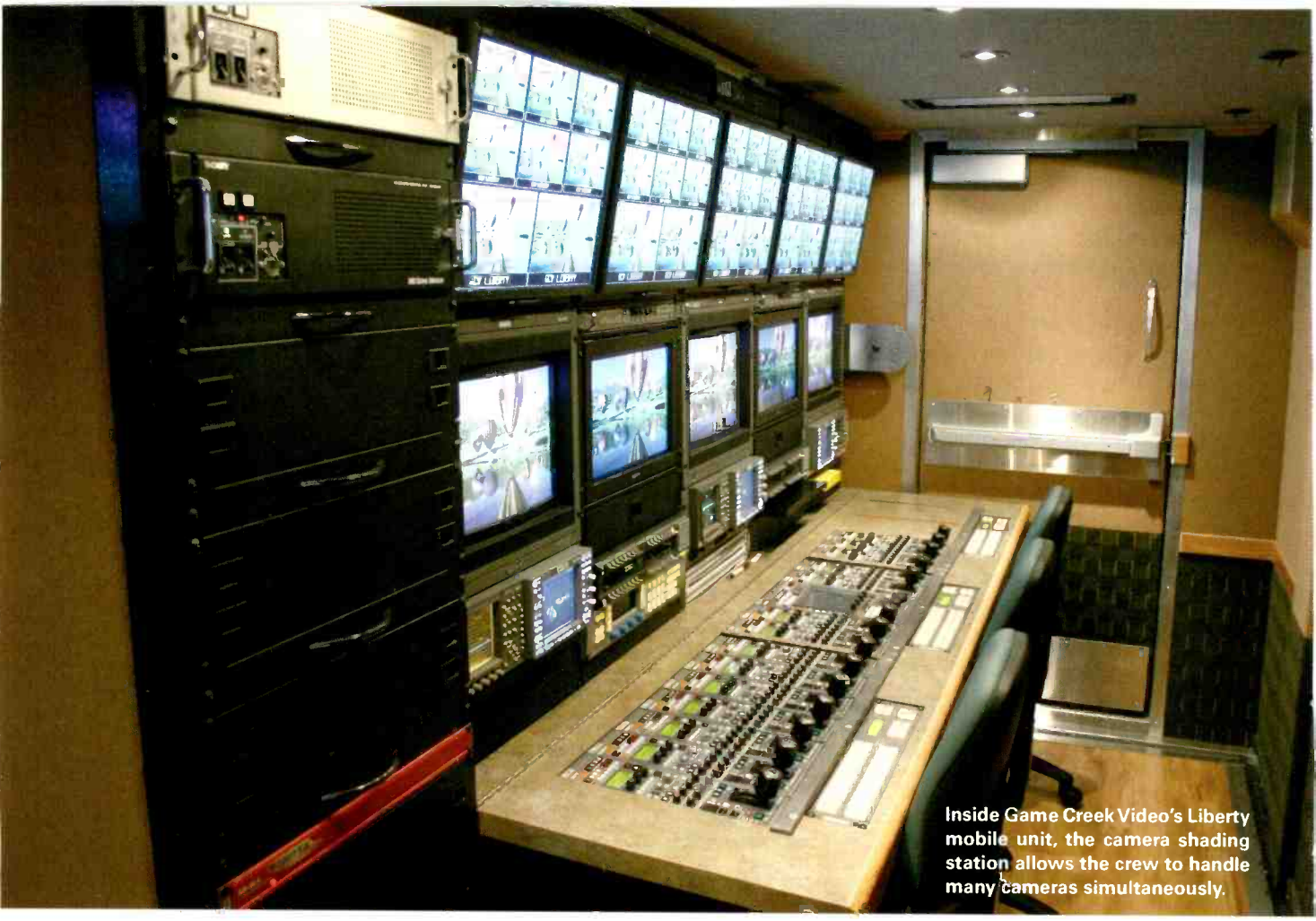
Additionally, building codes require egress signage and lighting. The first has to be closely coordinated with the set design and studio production. Designing the emergency lighting usually involves selecting a group of house lights and placing them on an emergency circuit that is backed up by a generator or battery system.

As a final note, production spaces must be provided with standard utility 120V power to operate tools and to power set elements, such as TV monitors, set lights, etc. This, too, should be planned for flexibility and coordinated with the other studio requirements. Also, it is customary to provide a company switch of 200A (or as-required amperage) 120V-208V for main power distribution. This service has circuit breakers and a series of cam and lug connectors on the bottom, which, in the better models, are behind a door that prevents tampering or accidental disconnects. They should be equipped with an external safety disconnect switch for safety.

In closing

This article provided an introduction to the most salient issues regarding electrical design of a production space. The tasks of designing a system fall largely upon an electrical engineer — someone who may understand his profession well but who often lacks any experience in the issues discussed in this article. It is important that the production manager, lighting designer, engineering department and architect all work hand-in-hand to satisfy the specific requirements of your project. **BE**

Antonio Argibay, AIA, is a principal of Meridian Design.



Inside Game Creek Video's Liberty mobile unit, the camera shading station allows the crew to handle many cameras simultaneously.

Camera shading basics

How to make cameras match

TONY MANARD

Chances are that somewhere this very moment an engineer has been called into the control room five minutes before a live broadcast because the director noticed that one of the cameras "just doesn't quite look like the other ones." Perhaps it is simply an issue of black level or iris. Maybe somebody has been fiddling with the knobs, and the gamma settings have been changed. Regardless, the person responsible for painting or shading the cameras has to respond quickly.

Camera shading is the task of making multiple cameras match, providing a picture that is pleasing to the viewer. Camera shading situations range from the highly controlled environment of the broadcast studio to the sometimes less-than-ideal remote broadcast. Other variables that conspire to make our jobs more interesting are time constraints and the availability of test equipment.

Even though modern cameras have made vast improvements over earlier models, they have also introduced a host of additional features and settings.

Even though modern cameras have made vast improvements over earlier models, they have also introduced a host of additional features and settings. For our purposes, we will look at what it takes to match cameras and shade them for a pleasant picture with a minimum of test equipment and in a timely manner. Beyond extensive setups that are typically performed when new cameras are commissioned and left alone, there are a few parameters that should be

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Presented by Al Kovalick
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checked and adjusted to fit the given lighting situation. The focus here is to get up and running quickly.

Tools of the trade

Effective camera shading requires a few basic tools. (See Figure 1.) A camera shading rig should consist of a calibrated reference monitor, a waveform/vectorscope and a switcher to go between the camera control unit (CCU) outputs. It is also a good idea to put the production switcher's preview and program outputs on the switcher to see if the signal is being altered through the rest of the camera chain.

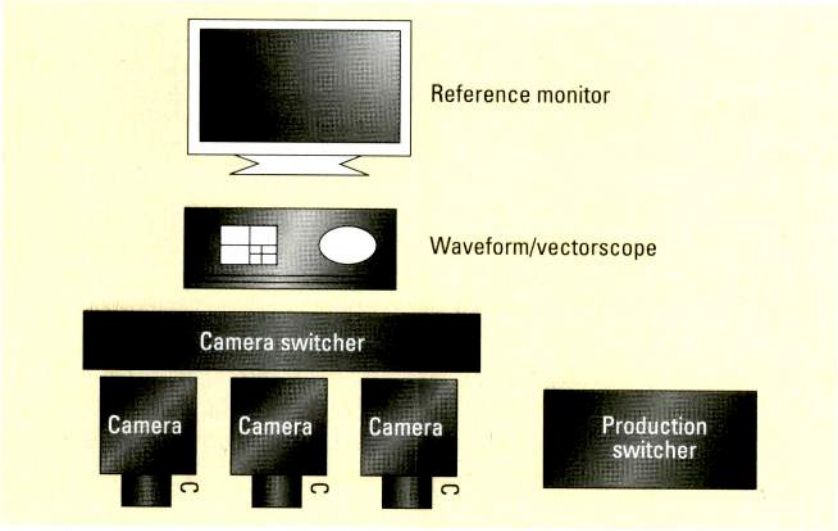

Figure 1. Typical engineering setup for camera shading

A reference monitor

There must be one monitor that the cameras are referenced on. In an ideal situation, the color, brightness and contrast values of all the monitors in a facility are calibrated to produce exact and consistent picture reproduction. In reality, this is rarely the case.

The engineering reference monitor has traditionally been a high-quality CRT in the 13in to 21in range, although LCD monitors are starting to make significant inroads. By choosing one monitor as the reference and calibrating it to a known good set of color bars, you can save yourself a lot of second guessing as you look at the picture on different monitors.

Reference monitor calibration

A tried and true method for calibrating a monitor involves using 75 percent SMPTE color bars and the blue-only feature, if the monitor supports it. Begin by sending color bars to the monitor, typically from one of the CCUs.

Examine the three black bars toward the lower right-hand corner of the screen. This is known as the picture lineup generation equipment (PLUGE). The first bar is 3.5 IRE or about -4 percent video, the second bar is 7.5 percent video or 0 percent video (sometimes called pedestal or black setup), and the third bar is at 11.5 IRE or 4 percent video. Turn the brightness up until all three bars are distinctly visible. Now turn the brightness down until the 3.5 IRE bar and the 7.5 IRE bar are no longer distinguishable from one another. This will give you the proper brightness level.

If the monitor has a blue-only feature, activate it now. This feature deactivates the red and green signals, leaving you with a monochrome reproduction of the color bar signal. The bars are set up in such a way that the long bar on the bottom and the short bar just below it will appear at the same luminance level when the color circuitry is set up properly.

Manufacturers use different terms, such as phase or hue, chroma or saturation, but these are the handles you will adjust to get the top and bottom bars as close to one another as possible. The chroma or saturation controls the outer bars, and the phase or tint controls the inner bars. Adjust the contrast for even steps of luminance change between the alternating gray bars at the top of the screen. In the case of monitors without the blue-only function, you may look at the monitor through a blue filter or gel. Check out SMPTE Engineering Guideline EG 1-1990 for a more thorough explanation of the color bar signal.

Waveform/vectorscope

Using the same color bars from the CCU, check the calibration of your waveform monitor and vectorscope. Set the waveform monitor to one or two horizontal lines with the line select turned off. The second white bar at the bottom of the screen should show at 100 percent video with the picture lineup group showing up at 3.5 IRE, 7.5 IRE and 11.5 IRE, respectively. (See Figure 2.) On the vectorscope, the dots should land within each of the color boxes.

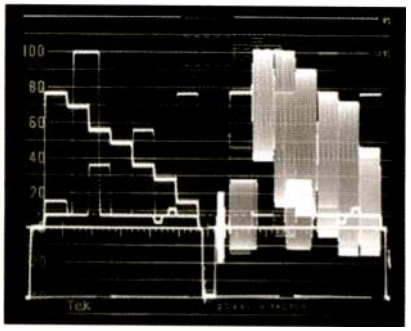

Figure 2. Example of SMPTE bars on waveform monitor. The first horizontal line is filtered for luminance only. The second includes chroma.

Charts and test patterns

Although it is best to perform these alignments with a set of dedicated test charts, it is not always practical. For

the purpose of the kind of on-the-fly setups we are discussing here, an 11-step grayscale chip chart and a back-focus chart will do nicely. Also be aware that white cards are produced that offer corrections for warmer skin tones and difficult lighting situations. If you find yourself in a variety of lighting situations, a few of these application specific cards would be a good addition to your arsenal.

If no chart is available or the placement of the cameras makes charting them impractical, find a source of white, such as a billboard or canvas, and balance all of the cameras to that. The key is consistency so that each camera reproduces the same scene with the same colors, even if it is not 100 percent accurate to what the eye sees.

Setting up the cameras

Setting up the cameras properly is more than half the battle of camera shading. Use a white card or, better yet, an 11-step grayscale chip chart. Line up a full frame shot of the card on each camera. With each camera pointed at the chart, close the camera iris, and set the master black level at the 7.5 IRE or pedestal level on the waveform monitor. Open up the iris until the white card or highest luminance level of the chip chart is at about 90 percent video. We set this at less than 100 percent to avoid any effect on the signal from the auto knee circuitry. Perform an auto black balance and an auto white balance from the CCU. Although sometimes the black balance is skipped, it is a good idea to perform this step because many cameras use this procedure to map around any dead pixels on the CCD.

If the auto black and white procedures complete satisfactorily, look at the output signal on your vectorscope. The dot should be at the center of the circle for each camera because the white card or chip chart contains no chroma information. If you only have a waveform monitor, this can be checked by using the luminance filter. Because there is no chroma information, the waveform should look the same with the chroma turned on or off. If you still have chroma information or the dot does not paint to the center, then you may have to switch to a manual white balance and use the CCU's red and blue color adjustments to paint out any chroma. Most CCUs allow for color adjustment for both black and white, so check this again with the iris almost completely closed.

If no chart is available, find a source of white. The key is consistency, so that each camera reproduces the same scene with the same colors, even if is not 100 percent accurate to what the eye sees.

Using the 11-step grayscale chip chart, you can check the gamma crossing. Because the camera CCDs are not subject to the same limitations of our eyes and display devices, gamma correction must be applied to the image. The 11 steps of the chart are logarithmic, but become linear when gamma correction is applied. This is to ensure linear color reproduction through the range of luminance values. The signal represents a stepped X on the waveform monitor. The steps should be linear with the crossing taking place in the middle of the X. (See Figure 3.)

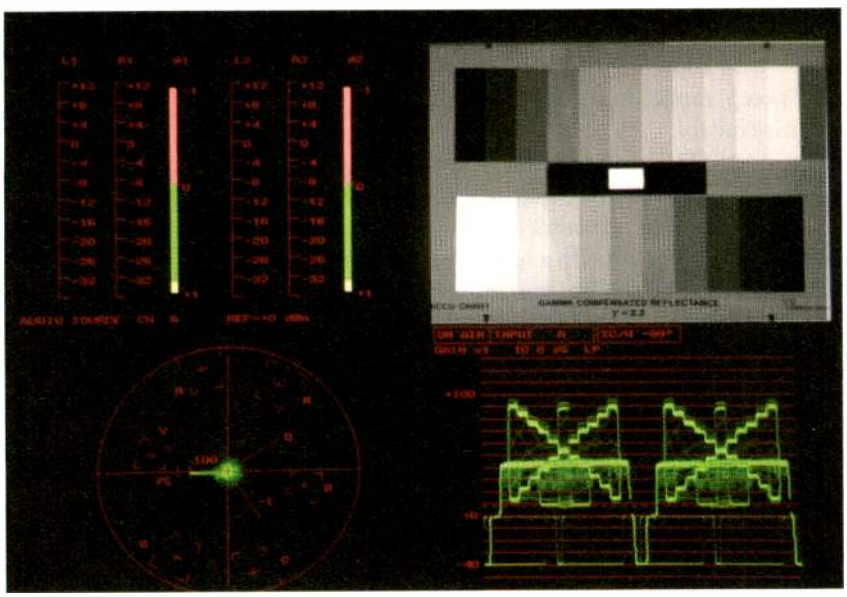

Figure 3. Using the grayscale chip chart as the source, note the gamma crossings in the lower right of the figure.

Back focus

Although back focus adjustments are not necessarily considered camera shading, they are critical to getting clear pictures. A back focus check should be performed anytime the cameras are moved, a lens is changed or removed, or whenever it is suspect. A back focus chart comes with most broadcast lenses, but can be performed with common objects on location.

Focus on an object that will show details (like a sign with lettering) at the farthest point of the lens zoom. Pull the zoom back; the focus should remain constant throughout the travel of the zoom. If it does not, loosen

the screw at the ring closest to where the lens mounts to the camera body (often this is the ring with the macro), and adjust this ring for focus. Zoom back in to the original object, focus again, and then zoom out again. Perform this procedure until focus remains consistent through the zoom travel. Back focus should be performed with the iris all the way open, for minimum depth of field. In bright light environments, a neutral density filter may have to be employed.

Shading the scene

With the camera properly matched for white balance and gamma, it is time to start shading. In the case of people's faces, the general convention is to set the iris where the face is at about 75 IRE to 80 IRE. This is variable because of other elements in the scene.

Examine the black levels. The master black level functions somewhat like a contrast control on a monitor. If it is set too low, details in dark areas will be lost. This is known as crushing black. If it is too high, it will provide poor contrast to the higher levels of luminance, and blacks will appear gray.

A good starting point is to place any black items in the scene at or just below the 7.5 IRE video pedestal and adjust from there. A word of advice: Set a black level for all of the cameras, and stick to it. When switching between cameras differences in blacks are obvious. This requires looking at the scope and the calibrated monitor to arrive at a happy medium.

Be careful about bright items like white shirts blowing out or going above 100 percent video and clipping. If this happens, you may have to adjust the knee circuitry's threshold. The knee circuit decreases amplification at levels approaching 100 percent video in much the same way as an audio compressor works.

If you are shading in a controlled lighting situation like a studio, try to adjust the light levels so that your iris is around F stop 2.8. This will give you range to adjust up or down without having to use filters or gain. If, on the other hand, you are shooting in a dark theatre or at an outdoor event, there are a host of tools in the modern camera to adjust for this.

Most cameras now come with a basic filter wheel built in. Neutral density filters reduce luminance levels without affecting color temperature. Other filters account for differences in color temperature for various light sources such as sunlight or fluorescents.

Modern cameras offer the ability to save individual setups or scenes. The saved file will include white balance information for a given setup.

Gain can be applied for low light situations, but should be used sparingly because it adds noise to the signal. Also be aware that many CCU controllers allow the operator to set the sweep range and sensitivity of the iris control.

In a studio setting where only subtle adjustments are being made, limited range and sensitivity of the controls can be helpful. In a less controlled lighting situation, maximum sensitivity and range of adjustment may be called for.

Save your settings

Modern cameras also offer the ability to save individual setups or scenes. The saved file will include white balance information for a given setup. A good example of this would be for an evening baseball game where the cameras start out on a filter for sunlight that is switched out as the sun goes down; a saved setup can be recalled that includes the white balance for the camera without the filter so it does not have to be balanced again.

Another handy function of saved setups is for skin detail. Many modern cameras allow detail for a given hue to be decreased without affecting other elements of the picture. Skin details for individuals can be saved and recalled at will. Another consideration is using the preset white balance that is set in almost all cameras at the factory. In cases where cameras are matching models from the same manufacturer, this can be a viable option for lighting situations that include a number of different colored scenes where getting a good white balance across the spectrum is not practical.

In the end, camera shading is almost as much art as science. Dramatic use of color and black levels can create a look that is appropriate for the production. When time allows, don't be afraid to explore the camera's settings to see what is there.

Many modern cameras include presets that mimic different looks and film emulsions, affording a custom look with a minimum amount of guesswork. Be sure to save a standard setup that you can recall if things get too far out of whack. The possibilities are almost limitless. **BE**

Tony Manard, CBTE, is a broadcast engineer based in Memphis, TN.

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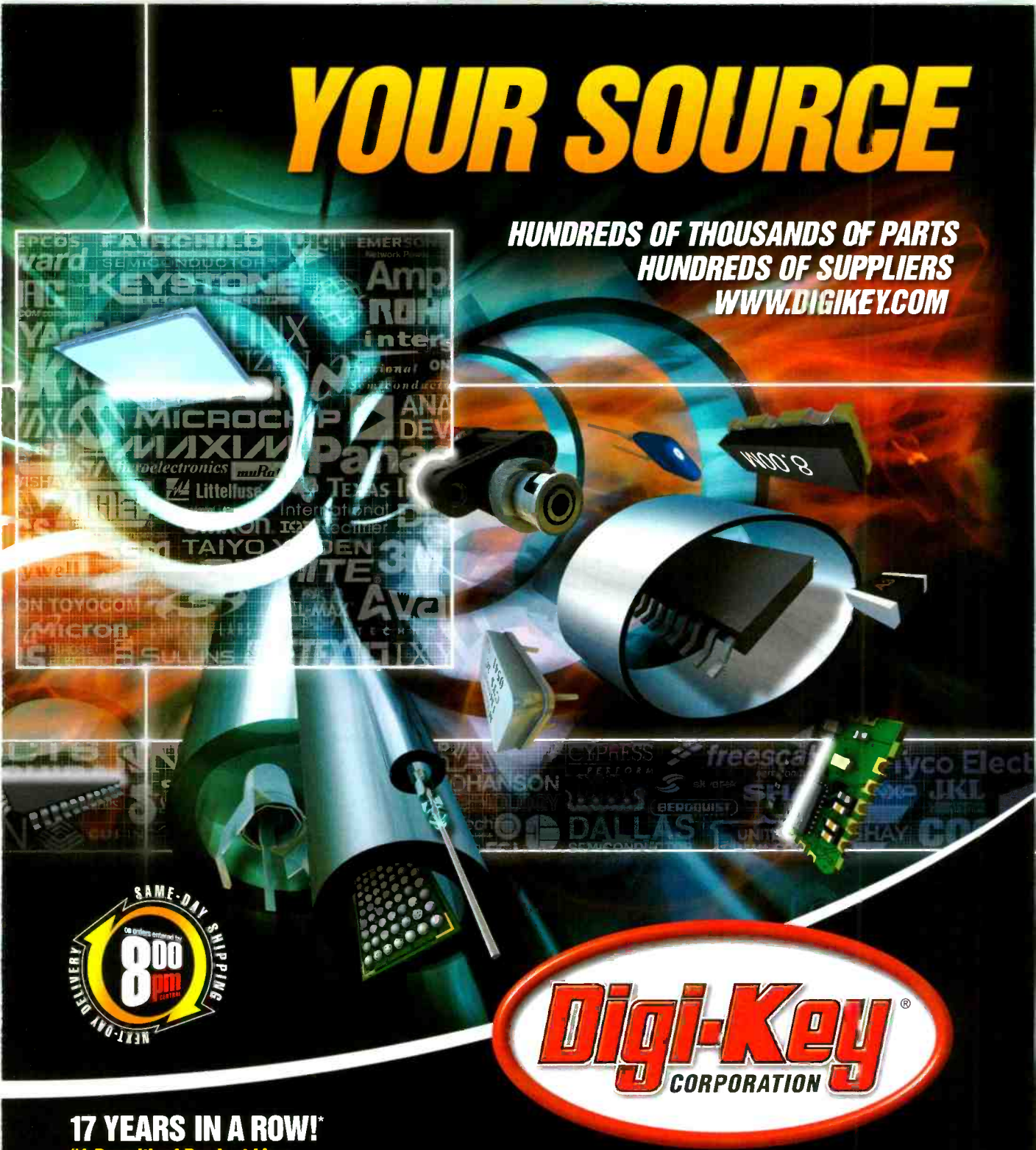

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International CES Takes Center Stage In January

JOE DESPOSITO | EDITOR IN CHIEF

The second week of January is a special time for the consumer electronics (CE) industry. This is when the International CES®, the largest tradeshow of its kind, rolls into Las Vegas with more than 130,000 attendees, including 6000 or so engineers.

If you've attended this spectacle before, you probably listened to Bill Gates of Microsoft give the preshow keynote on a Sunday night at The Venetian. International CES will start on a Thursday this year, though, so the preshow keynote will be on Wednesday night.

BIGGER AND BETTER

I first attended International CES back in 1981 when I was a new technical editor at *Popular Electronics* magazine. The show was big even then, but it's so much bigger now. As this show has grown, so have the official show venues.

You can find most of the exhibits at the Las Vegas Convention Center (LVCC), especially those of the big CE companies like Sony, Microsoft, Motorola, Panasonic, and Samsung. The keynotes have found a home in The Venetian. Many exhibits will be right next door at the Sands Expo and Convention Center. And, the International Gateway and International Insider Series will be held at the Las Vegas Hilton.

Due to its expansive layout, planning is a must. Start with the maps on the International CES Web site, *CESweb.org/exhibits/facilities*, which will help you understand the layout of each venue. You should secure a map of the Las Vegas strip as well. You also can find a good interactive map at the Las Vegas Monorail Web site, *www.lvmonorail.com*, which shows the locations of the monorail stops and the major hotels on the strip.

How do you tackle a show as large as CES? We'll try to make you an informed International CES show attendee in the following pages, but here are some tips to get you started. As mentioned, this year the keynotes begin on a Wednesday evening—January 7. Microsoft will kick off the show again this year, this time with CEO Steve Ballmer making the presentation. Considering Microsoft's key role in the industry, you will need to get in line early. If you show up at the last minute, all the seats may be gone.

GETTING AROUND

While the keynotes will be held in The Venetian, the TechZones will be housed in a few different locations, mainly the LVCC, South Hall and the Sands Expo and Convention Center. You can take the free Sands/Venetian Express from the Sands/Venetian to the LVCC, running every 10 minutes. But buses have to wait in traffic like any other vehicle, so a five-minute trip can easily stretch to fifteen or twenty.

Another option is the monorail. While we don't recommend it for the Sands/Venetian, it does stop at the LVCC and the Hilton. Order monorail tickets in advance on *CESweb.org* by December 24 to receive a 20% discount and get a one-day ticket for the monorail for $9.60. New this year is a seven-day convention pass for $60.

The monorail is a great option for getting straight to the LVCC if you are staying at one of the hotels with a monorail stop, but there are also free hotel shuttle busses from official CES hotels to both the LVCC and the Sands/Venetian. These shuttles can take you to the show every morning and home every night.

Start your Thursday with the opening keynote at The Venetian. Then, depending on what you want to see, you may want to head to the LVCC or over to the Sands, which you can walk to from The Venetian. One of the main attractions at the Sands is the emerging technology exhibits.

The International CES organizers believe engineers attending the show will find these exhibits particularly interesting, and I agree. The list of TechZones looks intriguing, and there should be something to satisfy the interests of everyone. While you're at the Sands, I'd also recommend visiting the Innovations 2009 Design and Engineering Showcase.

Keynotes, exhibits, and TechZones are the foundation of the show, but there's more for engineers to see at the 2009 International CES. For example, a gala event each year is the Technology & Engineering Emmy® Awards. Keep in mind that this event will be on the same evening as the preshow keynote, January 7. More information can be found at *CESweb.org/awards/techEmmys.asp*.

I also recommend "Going Green: More Than a Label," moderated by Ron Schneiderman of *Electronic Design*. The session will be Thursday at noon in the LVCC North Hall, Room N254.

See Yourself In The Digital Economy

The power is unmistakable, the influence global. If you're in the consumer electronics business, nothing compares to the International CES®. Connect with key players and decision makers who are ready to deal. Influence the media that influence the industry. Preview the market movers in technology and content. If there's only one show on your 2009 calendar, make it CES. It's the trade-only event that drives the digital economy. **Register now at CESweb.org**.

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CES Keynotes Sport A New Look

JOE DESPOSITO | EDITOR IN CHIEF

STEVE BALLMER, CEO of Microsoft, will provide the kickoff keynote address on the evening of January 7.

GARY SHAPIRO, president and CEO of CEA, will open the show with a timely keynote examining the state of the industry.

SIR HOWARD STRINGER, chairman and CEO of Sony Corp., will have lots to say about Sony's ubiquitous CE products.

ALAN MULALLY, president and CEO of Ford Motor Company, will describe how Ford has become an infotainment leader.

CRAIG BARRETT, Intel chairman, will be part of the second annual Technology and Emerging Countries Program (TEC).

JOHN CHAMBERS, CEO of Cisco, will look at how technology can change the Third World as part of the TEC program.

I'm a big fan of keynote addresses at any tradeshow I go to. But my favorite ones by far are those of the International CES. This show invariably draws the top executives from consumer electronics and other companies around the globe. For example, Bill Gates of Microsoft provided the preshow keynote speech at CES for many years.

The keynotes give engineers the lay of the land for consumer electronics for the rest of the year and then some, which can greatly help in their own strategic planning. For example, in last year's keynotes, attendees got a vision of what the future might be like with gadgets such as a handheld device that translates your speech into a foreign language in real time or a cell phone with camera recognition that can provide information about whatever you may be pointing at.

All of the keynote speeches will take place in the Palazzo Ballroom of The Venetian. If this will be your first time at CES, I recommend taking the Sands/Venetian Express from the LVCC to the Sands/Venetian and follow the signs.

EXPERTS SPEAK OUT

CES has revamped the list of keynote speakers this year, but has stuck with Microsoft for the preshow keynote at 6:30 p.m. on Wednesday evening, January 7. This is usually a big event and the seats are free, but there is a limited amount so get there early. Microsoft CEO Steve Ballmer gets the call this year, and I'm sure he will be joined by quite a number of Microsoft spokespeople plus a few media stars to help him make his points about Microsoft's vision of the consumer electronics future.

The keynotes continue as the first order of business when the show opens on Thursday, January 8. Gary Shapiro, president and CEO of the Consumer Electronics Association (CEA)®, which produces CES, will kick off the morning keynote at 8:30 a.m. with his state of the industry address. This talk should be especially interesting considering all the turmoil in the financial markets this year. How will the current economic climate affect the consumer electronics industry in 2009? How will the switch to digital television in February 2009 affect the industry? Expect him to have the answers to these questions and more in his speech.

After his talk, Shapiro will introduce Sir Howard Stringer, chairman and CEO of Sony Corp. Sony, of course, is active in all facets of consumer electronics, from its Vaio computers to its Bravia HDTVs to its impressive collection of Handycam video recorders and Walkman video and music players. Stringer is also corporate head of Sony's Entertainment Business, so don't be surprised if he brings up to the stage some big names in movies and music to help liven up his keynote. It wasn't too many years ago that Drew Barrymore made an appearance at a Sony CES keynote.

On tap for Thursday afternoon's keynote at 4:30 p.m. is Alan Mulally, president and CEO of Ford Motor Company. You probably know that Ford has been a leader in automotive infotainment along with its partner, Microsoft, in bringing to market the voice-activated Ford Sync mobile phone and digital music system. I wouldn't be surprised if New York Yankee superstar shortstop and Ford spokesperson Derek Jeter makes an appearance on stage.

THE GLOBAL ECONOMY

On Friday afternoon, January 9, starting at 1 p.m., Intel chairman Craig Barrett and Cisco chairman and CEO John Chambers will speak as part of the second annual Technology and Emerging Countries Program (TEC), which focuses on the role technology plays to further economic growth. Barrett will be the opening TEC keynote speaker. Expect more about Intel Atom-based netbooks at this keynote and how these low-priced computers can be a game changer in emerging countries.

Barrett's keynote will be followed at 2 p.m. by a TEC panel discussion entitled "Reaching the Promise of Universal Access to Technology: Creating the Global Tech Ecosystem." The thought here is that universal access to technology is the catalyst to greater knowledge, more vibrant marketplaces, and growing standards of living. When combined with finance, energy, and expertise, technology is the component that can accelerate economic development and create opportunity.

At 3 p.m., Chambers will give the closing TEC keynote. Last year's CES was the first time I witnessed a demonstration of the Cisco telepresence system. Chambers may show how this kind of technology can assist in communication and education in emerging countries.

CES Awards And CE Spotlights Salute Excellence And Inspiration

JOHN ARKONTAKY | ASSOCIATE EDITOR

There are always tons of technology and products packed into CES, but perhaps the only way to be sure you catch the best products and designs is by scoping out the awards ceremonies and the CE Spotlights.

This year, CES will open the floor to four awards programs: the International CES Innovations 2009 Design and Engineering Awards, the CNET Best of CES Awards, the esteemed Technology & Engineering Emmy Awards, and the Global Media Awards™.

Meanwhile, the baby boomer, child development, gaming, and wireless markets are of the utmost importance to CE distributors. CE Spotlights pool together the companies leading the charge in reaching out to these essential demographics and others as well. CES has also sprinkled TechZones around the exhibit halls focused on marquee digital technology. There's a little bit of something for everyone, from design winners to the best products. Don't miss out on this year's awards and spotlights at CES.

INNOVATIONS 2009 DESIGN AND ENGINEERING AWARDS SHOWCASE

The Innovations Design and Engineering Awards recognize the best products in more than 30 categories. Like events past, this year's honorees have outdone themselves in taking the next step in CE ingenuity, and CEA has selected the top innovations poised to shake up the CE market.

Get a head start on your design ideas or sneak a peek at what will be on everyone's shopping list down the road. You can check out the awards display at the Innovations 2009 Design and Engineering Showcase at the Sands, Booth #72062. Also, the Best of Innovations, products that scored over 90% approval ratings by the judge's panel, will be on display at the Innovations Showcase in the Grand Lobby of the Las Vegas Convention Center (LVCC).

CNET BEST OF CES AWARDS

The experts at CNET will take up the task of selecting the best products on display at CES. Categories include Best of Show, People's Voice Award, selected by an online constituency, and 10 trophies for individual markets. Categories include digital photo and video, car technology, cell phones and smartphones, computers and hardware, gaming, GPS, home audio, home video, MP3 and video players, and television. Come see what the experts anoint as the show's cream of the crop.

GLOBAL MEDIA AWARDS

Global Media Awards

Presented by

NATIONAL ACADEMY OF TELEVISION ARTS & SCIENCES

CEA Consumer Electronics Association

CEA and the National Academy of Television Arts and Sciences (NATAS) are teaming up to launch the first Global Media Awards. This contest honors the best technology and content programming in advertising, Web site or Internet, repurposed linear or traditional content, long form or short form, platform, and user experience or program guides. CEA and NATAS look to kick off this new award program in style as this year's winners will be announced at the inaugural banquet at The Venetian in Las Vegas on January 8, 2009.

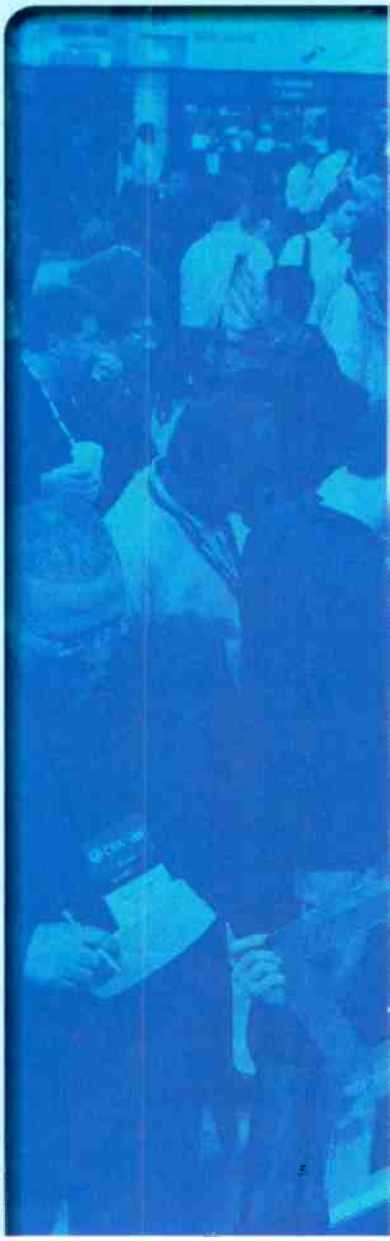
THE TECHNOLOGY & ENGINEERING EMMY AWARDS

NATIONAL ACADEMY OF TELEVISION ARTS & SCIENCES

Three years in the running, the Emmy Awards for technology and engineering will be awarded at CES. The Emmy Awards immortalize individuals, technical organizations, or companies developing keystone technology or implementing standardization that brings forth noteworthy improvements to existing methods or have altered the course of current methods altogether. See all the winners during an evening ceremony on Wednesday, January 7, at The Venetian.

CE SPOTLIGHTS

Jumping on the bandwagon of the booming



gaming market? Then check out what's coming down the pipeline at the Gaming Showcase. Hardware, software, and products like online PC and HD games are only a taste of the excitement and progress behind video games—and the Gaming Showcase has its finger on the pulse of all the major innovations.

GAMING SHOWCASE

You can also check out the Underground Gaming Series (UGS), a pro-grade gaming tournament held for two reasons: to hold competitive tournaments for all skill levels and market gaming popularity and technology. You can visit companies such as Dynaflex, Electric Spin, Paleo Entertainment, SimCraft, and others at the Gaming Showcase in the LVCC, South Hall 2.

Asking your kids to help debug your computer? It's no surprise. Children are growing up with sophisticated technology now more than ever—and at earlier ages than ever. This spotlight explores how the digital technology kids use from infancy mold them into electronic whizzes at a virtually innate level.

Retailers, content providers, distributors, game developers, educators, policy makers, CE manufacturers, parents, brothers, and sisters are all welcomed to join the discussion on how the ever-advancing tools children play with shape the future. Kids@Play will be located at the Sands.

Silvers Summit
Technology For Life

The Silvers Summit spotlight is geared toward baby boomers. What technology keeps this generation engaged and in touch with constantly evolving electronics? What do they enjoy most? Distributors, journalists, research firms, and manufacturers will demonstrate and elaborate on the baby boomer demographic and the products they're using to maximize the benefits of digital technology. The Silvers Summit spotlight will be in the Sands.

WirelessWorld

The Wireless World spotlight will present the entire vertical market of the wireless industry from design and manufacturing to distribution. You can check out the exhibitors in LVCC, South Hall 3.

CONTENT@CES

Content@CES is the best spot to meet and greet some of the biggest companies at CES. There will be meeting rooms and a lounge available for attendees to come and pick the brains of some of the leading companies in the digital market today. Content@CES will be in the LVCC, Central Hall.

Digital Imaging
SHOWCASE

Plenty of digital imaging companies will be on hand at the Digital Imaging Showcase to show off their proprietary digital imaging solutions and CE products. This exhibit will be in the LVCC, South Hall 3.

LBS

This spotlight focuses on the technology behind delivering data to mobile devices and the companies behind those services. Here you can learn how data is transferring to an in-car GPS, or how mobile services and devices are customized for the end-user based on location. Location Based Services will be in the LVCC, South Hall 4.

EXPERIENCE CEA

Experience CEA is the best way for attendees to see what CEA is all about. Check out CEA's initiatives leading up to the digital television transition in February 2009, CEAPAC, market research, and standards. CEA is also looking to advance consumer technology while addressing issues like free trade, energy conservation and recycling, and better member benefits. For CEA members, there will be food and beverages available in the CEA member lounges, and amenities such as HDTV and laptop stations will be available. You can find the Experience CEA booth in the LVCC, Grand Lobby.

TechZone

More than a dozen TechZone stations will spread out across all the exhibit halls at CES. Catch up on the big discussions that are shaping technology in niche markets like robotics, green design, displays, wireless mobility, i-Stage, USB, GSMA, HDMI, ZigBee, and HomePlug. There also will be a few zones you might not expect. For instance, Stevie Wonder will headline an exhibit focusing on technology for the vision-impaired. The amount of information offered at these stations will be enough to keep you zoned in for days. Don't miss out.

SUSTAINABLE PLANET

Combining the advances in the Technology & Emerging Countries TechZone and the Greener Gadgets TechZone, the Sustainable Planet Spotlight will look at how the next wave of innovation can work with the environment, not against it, especially in developing countries that need earth-friendly solutions for their rapidly expanding infrastructures. You can find Sustainable Planet in the LVCC, North Hall.

Improve Your Knowledge And Know-How At The CES Sessions

The axiom "knowledge is power" certainly applies to the 2009 International CES. Boasting the consumer technology industry's largest educational forum, this year's program delivers more than 200 conference sessions with over 500 expert speakers, covering the hottest topics and trends shaping today's design decisions. (This just in: the Industry Insider series will be returning. Check the CES site at *CESweb.org* for late-breaking news on who will be featured.)

ROGER ENGELKE | ISSUE EDITOR

CES KNOWLEDGE TRACKS

Insert "Inside" between the words **"Knowledge Tracks,"** because that's what these sessions bring to those in attendance—the scoop on everything new in nine different arenas. Tracks that should hold particular interest to EEs include: **Digital Imaging; Emerging Technology; Home Entertainment and Lifestyle Technologies; In-Vehicle Technology; Issues and Attitudes; Technology and the Environment;** and the catch-all **Just the Facts: Research, Reports and Revelation.**

Innovations in Digital Imaging seemingly arrive on a daily basis, giving sessions in this track the "must-attend" label. Sessions of particular interest to engineers (held in the LVCC, South Hall) include "The Digital Shoebox: New Options for Consumers" (Jan. 8) and "Digital Imaging: Beyond the Megapixel" (Jan. 9).

The **Emerging Technology** track serves up "New Developments in Digital Storage," which offers a summary of events from the Storage Visions Conference (Jan. 9, LVCC, South Hall). Two other self-evidently named panels in this track, both on Jan. 10, are "Emerging CE Technology—A Preview of the IEEE ICCE's Most Interesting Technologies" (LVCC, North Hall) and "Planning for an IPv6 World in 2010" (LVCC, South Hall).

Home Entertainment and Lifestyle Technologies is always massively popular, and its 16 sessions over a three-day span do not disappoint. Television alone gets a lot of play, with sessions such as "Teaching the TV to be Internet Savvy" and "How Will We See 3D TV?" Other hot topics that engineers will want to check out in this track include robotics, the digital home, emerging display technologies, and GPS.

One intriguingly titled session is "The Shifting Generation: Accommodating Viewers Who Want Time Shifting, Place Shifting, and Even Device Shifting" (Jan. 8, LVCC, North Hall). Moderated by MSNBC columnist Suzanne Choney, it focuses on the new challenges created by DVRs and other devices that allow viewers to shift the place where they watch recordings or move content to another device.

A trend getting lots of attention is the focus of the session "Tru2way Here and Now" (Jan. 10, LVCC, South Hall). Many cable operators and CE companies have committed to broad support for tru2way devices, which pave the way to receive all cable services without a leased set-top box.

Nowadays, advances in **In-Vehicle Technology** have moved into the fast lane, but this track won't leave you in the dust. Automotive communications, security, navigation, safety, and entertainment all go under the microscope. Sessions (Jan. 8-10, LVCC, North Hall) include "Next-Gen Car Navigation: Recalculating!" and "How Transportation Technology Can Limit the Impact of Future Climate Change."

Intellectual-property law. Content distribution. Digital rights management. Green. Our industry teems with these hot-button topics, making **Issues and Attitudes** one to check off on the calendar. Totaling 14 sessions, the three-day track (Jan. 8-10) tackles a variety of topics, from "Home Automation for the Mass Market" to "DTV—Bringing Down the Curtain on Analog." Startup companies may find the "Finding Money in a Bad Economy" session particularly attractive.

Getting greener is an underlying pulse within the industry. The **Technology and the Environment** track's sessions (Jan. 8-9, LVCC, North Hall) examine some of the latest trends, such as "Better Batteries and a Greener Charger" and "Recycling Discarded Electronics: Best Practices."

Just the Facts: Research, Reports and Revelation brings together experts in market research and analytics from ABI Research, CEA, Compete, Creative Strategies, GfK Marketing Services, iSuppli, Nielsen, and the NPD Group. Spread across nine sessions (Jan. 8-10, split between two venues, the LVCC, North Hall, and The Venetian), they will share information and insights on the R&D and analysis being performed to support new directions in the industry.

CES SUPERSESSIONS

This year, CES delivers eight provocative **SuperSessions**, hosted by a diverse group of industry experts and organizations. Included among these information-packed, down-to-earth, and free sessions are:

"What Will They Think of Next? Consumer Electronics in 2025" (Jan. 8, LVCC, North Hall) This session, moderated by *Forbes* assistant managing editor Bruce Upbin, asks what the next 25 years will hold for the CE industry.

"Wireless Meets Consumer Electronics: The Fundamental Shift to Mobility" (Jan. 8, LVCC, North Hall) Moderator Rajeev Shand, wireless managing director and senior equity research analyst for Rutberg & Co., and four senior executive panelists from the wireless and consumer worlds discuss how and whether mobility represents the next major opportunity for our industry. So, do you think always-on connectivity and location-aware capabilities will change the consumer electronics industry?

"Next Big Thing SuperSession: CNET Reveals the Next Big Thing in CE" (Jan. 8, LVCC, North Hall) CNET's editor-at-large Brian Cooley and other expert editors from the CE industry reveal the trends, emerging categories, and must-have products for the coming year in this audience-interactive session.

"Connect2Car: The Automobile's Convergence with Consumer Electronics" (Jan. 8, LVCC, North Hall) A group of industry experts discovers and defines the consumer solutions for entertainment and information in the automobile, co-organized by the Convergence Transportation Electronics Association (CTEA) and SAE International.

"Big Thinkers and Disruptive Technologies—Today's Thought Leaders, Tomorrow's Technologies" (Jan. 9, LVCC, North Hall) As the title states, big thinkers from the CE, computer, media, and telecom worlds will assemble for discourse on the innovations that loom on the horizon and their impact on our digital lives. Tim Bajaran, president of Creative Systems Inc., moderates the session.

"Last Gadget Standing" (Jan. 10, LVCC, North Hall) The "Oscars of Technology" showcases 10 of the hottest products chosen by experts from the NetShelter Technology Media network. See live demos of these products and vote for the best. Robin Raskin, founder of Living in Digital Times LLC, moderates the event.

CES PARTNER PROGRAMS

This year, 22 different **CES Partner Programs** are on tap, hosted by 20 organizations. Several of these extensive programs particularly suit today's EEs, cutting a diverse cross-section of the industry.

The **IEEE International Conference on Consumer Electronics (ICCE)** once again convenes at CES, in the LVCC, North Hall. Spanning six days (Jan. 9-14), the conference has lined up four keynotes, six technology tutorials, and many other technical presentations on a broad array of hot topics from human-interface design and camera technologies to video-distribution systems and display-driver electronics.

JEDEC hosts the session "Understanding Moisture/Reflow Sensitivity for IC Packages: Achieving Pb-Free Assembly Classification and Handling" (Jan. 8, LVCC, South Hall). It provides background information on moisture/reflow effects and digs into the J-STD-020 and J-STD-033 specs.

The Fourth Generation Mobile Forum (4GMF) identifies the most promising opportunities ahead for developers, OEMs, and other organizations that are involved in the emerging 4G consumer marketplace (Jan. 10-11, LVCC, North Hall). Keynotes, panel discussions, and private CEO showcases on global 4G convergence and its lasting effects highlight the forum.

The Consumer Robotics Industry Development Program, an all-day program held in The Venetian (except for one session) on January 10, brings together industry experts in a series of sessions that discuss new robotics applications and where the overall industry is headed. Topics range from the nuts-and-bolts "Features and Functions for Consumer Robotics Products" to the more esoteric "Telepresence Robots."

CES Mobile Entertainment reveals the next generation of technologies, devices, and platforms that will make their mark in the explosive mobile marketplace. The two-day program comprises nine sessions (Jan. 7 and 8 in the LVCC, North Hall), covering topics such as "The Mobile Web: The Future of Applications, Commerce, GPS, Communication and Content" and "Reinventing the Mobile Device and Mobile Network—Integrating the Full PC Experience into a Personal Communications Device."

Looking to get DHTI+ certified? **The CEA-CompTIA Digital Home Technology Integrator+ (DHTI+) Certification Review Workshop** (Jan. 8, LVCC, South Hall) provides an in-depth review of home subsystems (audio/video, telephone/VoIP, etc.) to arm you with the knowledge needed to study for the certification test.

When It Comes To Design, Get In The Zone—TechZone, That Is

RICHARD GAWEL | MANAGING EDITOR

All eyes are on Vegas when the International CES comes to town, and the 2009 show will be no different, with plenty of celebrities and all the hottest gadgets.

But you're a designer! You need the latest info to create the next wave of groundbreaking innovations—maybe in time for the 2010 event. Located throughout the entire show floor, this year's CES TechZones will spotlight market-specific technology so you can be part of the buzz at next year's show.

Everything has a screen these days, and you'll see them all in the Advanced Display Technologies TechZone, sponsored by DisplaySearch and located in LVCC, South Hall 1. Attendees will see the latest a-Si TFTs, LCDs, LTPS TFT LCDs, AMOLEDs, PMOLEDs, and PDPs, as well as flexible, reflective, and 3D displays targeting a wide variety of applications, from mobile phones to large-screen televisions.

Also, check out the DisplayPort TechZone sponsored by the Video Electronics Standards Association, located in the Sands Expo and Convention Center. The technologies spotlighted here enable a common interface approach across internal and external display connections. The standard also makes high-quality audio available to the display device over the same cable and video signal for true plug-and-play capabilities.

The environment is on everybody's mind—and list of consumer demands—these days. To make your designs more earth-friendly, head on over to the Greener Gadgets TechZone in the LVCC, North Hall. These pioneering technologies benefit the environment as well as the sustainability of the global economy by helping the consumer electronics industry reduce its environmental footprint via alternative energy, recycled materials, and biodegradable packaging.

Another key consumer demand? Mobile broadband. Sponsored by the GSM Association, The GSMA TechZone in LVCC, South Hall 4 will reveal the sheer diversity and scale of devices that provide anytime, anywhere access to the Web, from embedded notebooks to smart phones. These products will only become more prevalent as we move closer to a wireless society.

You'll find the stuff that entertainment dreams are made of in the HDMI TechZone, located in LVCC, South Hall 1. The High-Definition Multimedia Interface is the world standard for connecting consumer products and devices, enabling cutting-edge home theater systems with a single, intelligent cable. The zone will feature high-definition video and audio manufacturers, high-definition hardware manufacturers, and high-definition service providers, as well as signal processors and semiconductors.

Cable may be the king of network connectivity, but there are other options. The HomePlug Alliance will make a case for its technology in the HomePlug TechZone in LVCC, South Hall 2. Representatives of service and content, retail, hardware, software, silicon, and technology companies will be on

hand to demonstrate the availability and adoption of cost-effective, interoperable, and standards-based home powerline networks and products.

New this year, the i-Stage TechZone will feature the exhibitors who participated in the i-Stage competition on October 20, which pit not-yet-released gaming, social media, mobile retail, security, telecom, 3D video, and other products from established companies and up-and-comers alike against each other. So which disruptive technologies took home the title? Find out in this TechZone, which can be found in the Sands.

It will look like something out of a sci-fi movie, but it's all real and ready for you to use in your next design. Sponsored by Robotics Trends, the Robotics TechZone in the Sands will feature automatons of every variety, from playful toys to serious machines with security applications. Engineers can get inspiration for their next design and meet prospective customers as well in the burgeoning consumer robotics market—and make some mechanical friends, too.

He's a musical genius. Did you know that he's a technical genius too? Get down with Stevie Wonder and Friends at the Sands, hosted by the Sendero Group, the National Federation of the Blind, and Intel Health. Check out electronics that the blind can use in contrast with many they cannot. More importantly, learn how minor design improvements can add millions of blind and visually impaired customers to your markets.

And if you're looking for other new markets, look to the Third World. The Technology and Emerging Countries TechZone in LVCC, North Hall will offer pioneering technologies that contribute to the social and cultural development of underdeveloped and developing countries. Find out how the high-tech industry is facilitating educational, social, and entrepreneurial capacity in growing economies, opening these regions up to consumer electronics advances.

Quick—name one product that doesn't use USB. Can't think of one, can you? This ubiquitous technology makes plug and play a reality and accommodates our busy lifestyles as we juggle PCs and their peripherals, notebooks, cell phones, cameras, and many other digital gadgets. And further improvements and interconnectivity are on the way. Find out more at the USB TechZone, presented by USB-IF, in LVCC, South Hall 3.

Speaking of wireless, someone has to manage the business end of things. The Wireless Distribution TechZone in LVCC, South Hall 4 will feature distributors representing all of the major wireless carriers and manufacturers of handsets and accessories that provide the products, services, and applications that can positively impact your business.

For even more wireless innovation, visit Wireless Mobility Brought to You by Qualcomm in LVCC, South Hall 3. This TechZone will feature demonstrations of the latest advances in the mobile enterprise, such as mobile payments and seamless and secure office connections. Also, look for the hottest social networking, gaming, location awareness and public safety, and even health and fitness applications.

The ZigBee Alliance will present the ZigBee TechZone in LVCC, South Hall 1. This wireless standard puts control right in the consumer's hands anywhere they are, from lighting and HVAC applications to appliances and security. ZigBee technology enables low-cost sensor technology in devices like timers and remote controls that's easy to install and ideal for the home.

With this comprehensive program, the TechZones at the 2009 International CES offer something for every designer. For more information, go to *CESweb.org/TechZones*.

Robots Crowd The Aisles In Las Vegas

BILL WONG | EMBEDDED/SYSTEMS/SOFTWARE EDITOR

Just about everyone has heard about Spirit and Opportunity, the robots that keep on trucking across the surface of Mars. And of course, there was last summer's hit movie *WALL-E*, about a lovable little waste-collecting robot.

Well, you don't have to go to Mars or the multiplex to meet a real robot. Just keep your eyes open in the aisles of the Robotics TechZone, sponsored by Robotics Trends, at the Sands. Robots may not be everywhere, but you should watch where you step anyway. While many are large, some are small, and they all will be showing off for the crowds.

ROBOT HANDYMEN

Robots have moved into the mainstream. You can find them in stores, from lawnmowing marvels to robots that do the dirty work, like iRobot's Looj *(Fig. 1)*. This tracked gutter-buster whips its way through gunk and leaves to leave almost nothing in its wake. This portable, battery-powered robot only does one thing, but it does it well.

Of course, you also can check out the latest iRobot Roomba vacuum cleaner and its competition. An industrial-strength Roomba will highlight iRobot's Professional Series, whose models are designed for heavy traffic areas and can handle larger spaces than their siblings. There is even a Pet Series for houses like mine where stray kitty litter is the norm.

Also, iRobot offers industrial and military options. The portable PackBot will be on display, but I'm looking forward to seeing the Warrior x700. This monster can support 150-lb payloads, making it ideal for heavy-duty applications like explosive ordnance disposal (EOD), reconnaissance, and firefighting *(Fig. 2)*. It also can handle rough terrain and even climb stairs.

Is it a toy or a tool? That's the question when it comes to WowWee's Rovio *(Fig. 3)*. This three-wheeled marvel's wireless webcam delivers telepresence capabilities. It can be controlled from almost any PC and employs Evolution Robotics' Northstar navigation system. An infrared-based positioning system helps track the Rovio's location within a room, and that isn't an easy thing to do.

Check out Hagisonic's booth for the latest in navigation systems for robots or just about any other mobile device. Its StarGazer system localization sensor and module for intelligent robots is supported by Microsoft's Robot Developer Studio. There will also be a range of other products, including ultrasonic range finders. Both types of devices tend to be handy for service robots.

PERSONAL ASSISTANTS

Robots also are finding more use in personal assistance applications, and many will show up at CES in a range of shapes and sizes. Most are still in the experimental stage, but they are becoming more robust. Or if you're just looking for a beer, stop by OLogic's booth and take a look at the "butler." This 3-ft high, two-wheeled assistant can carry all sorts of things.

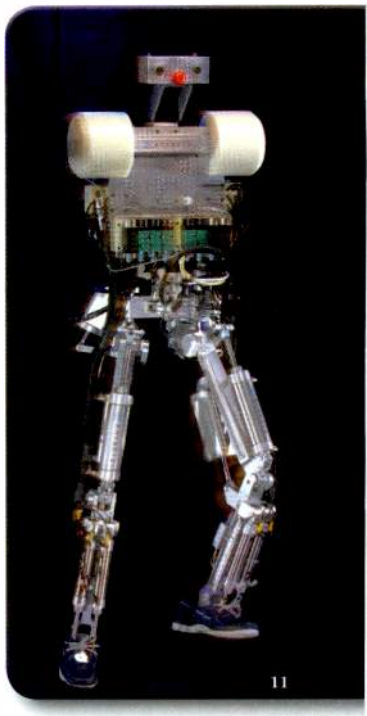
We'll have to see if Anybot's sophisticated Dexter articulated service robot will grace us with its presence *(Fig. 4)*. You'll know if you bump into Dexter, since this walking biped is almost 6 ft tall and weighs 135 lbs. Meanwhile, Korean-based Yujin Robot should have even more interesting service-based robots on display, if last year's offerings are any indication. This company covers a range of robotic products from industrial to educational. I bet one of the company's Plus A robots will be keeping its booth clean.

So if you are looking for robots to play, robots to work, or robots to research, the 2009 International CES will have something for you. Just be polite if you bump into one.

1. Nobody likes cleaning the gutters. It's messy and dangerous. So why not let iRobot's Looj do the work?

2. The iRobot Warrior x700 can shoulder 150-lb payloads and tackle heavy-duty applications.

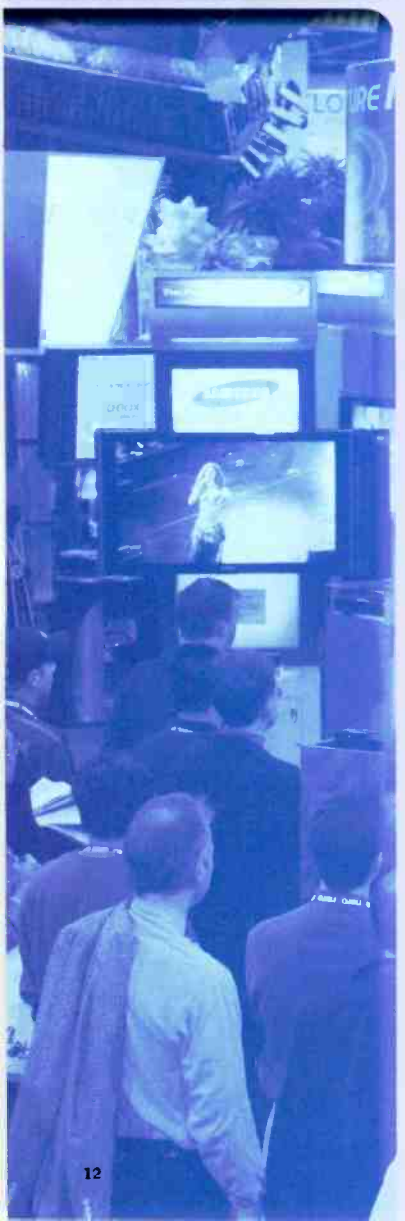
3. With the WowWee Rovio, users can roll a webcam anywhere they want to go and watch the footage over the Internet.



4. Anybot's Dexter may be walking the aisles right next to you at the show. But if you bump into him, he'll regain his balance. Since he's almost 6 ft tall, though, you might not!

Cut The Cord With WiMedia

LOUIS E. FRENZEL | COMMUNICATIONS/TEST EDITOR



If you're anxious to see the latest in wireless technologies and find out how you can use them in your next design, then the International CES is the place to be—especially for the latest in Ultra-Wideband (UWB) products. This short-range technology provides speeds up to 480 Mbits/s at up to 10 m.

UWB has been around a few years, but it hasn't gotten much traction as a widespread wireless technology yet. It has taken a while to firm up the standard and put out chips that can be embedded into other products. Several factors have contributed to this slow-to-market wireless option.

One of these is the challenge of making OFDM chip sets that cover the 3.1- to 10.6-GHz band allocated to UWB by the FCC. The early products focused on the three lower bands from 3.1 to 4.7 GHz. Many such chip sets were created, and today, most of the main semiconductor vendors are offering second-generation products, mostly in full CMOS but a few yet with biCMOS SiGe.

Another factor has been the high price of these chip sets. Of course, like all other solid-state devices, prices will begin to drop as volume increases. That volume has been growing slowly, but there is a clear sign of greater adoption.

The confusing and conflicting worldwide spectrum allocations for UWB also limit adoption. These allocations vary widely from country to country so it has been hard to make chip sets that fit all countries. On top of that, there are still countries trying to firm up their UWB assignments.

Only one group of bands is valid worldwide, but that may be changing as new rules and regulations come out of Asia and Europe. A new technology called Detect and Avoid (DAA) also may help as it is adopted, as it enables UWB products to avoid conflicts with other services in the same spectrum. Most new chip sets incorporate DAA.

1. In Staccato Communications' vision of a wireless living room, UWB connects the set-top box, TV, DVR, surroundsound 5.1, and even digital cameras.

As these challenges are met, the big problem is getting greater visibility for the technology. That has been the job of the WiMedia Alliance, the organization that sets the standards, performs certification tests for product compatibility, and promotes the technology. With the standard firmly in place and many certified products, WiMedia's job is primarily educational, letting the engineering community know just what UWB offers.

UWB is a great wireless technology, as it has one of the highest data rates of any of the current crop of wireless standards. It can handle up to 480 Mbits/s at ranges of about 2 to 3 m. The max range is about 10 m, but speed typically drops to less than 100 Mbits/s at that range. Yet that is still faster than most other offerings. Range is limited by the very low power requirement of –41.3 dBm/Hz of bandwidth, which is what keeps UWB signals from interfering with other overlapping services in the spectrum.

2. The Gefen HDMI Extender is a wireless HDMI interface that lets HDTV users replace their cable with a radio good for up to 10 m. The transmitter (left) and multiple input/multiple output (MIMO) receiver (right) use Tzero Technologies chips.

Currently, the greatest use of WiMedia UWB is wireless USB dongles and hubs. It works great as a cable replacement. The USB Implementer's Forum standard protocol rides on the WiMedia MAC and PHY. Dozens of WiMedia USB products are out there now, and you should see some new ones at CES. Even some laptop manufacturers are embedding wireless USB.

UWB is also being adopted in a variety of wireless video products *(Fig. 1)*. UWB can be used to connect the set-top box to the HDTV set and to the digital video recorder. Even wireless HDMI is available *(Fig. 2)*. Audio is another application, with products now available for connecting surroundsound 5.1 components around the room. Even digital cameras and camcorders now use UWB to connect without wires.

The PoE Designer's Guide focuses on what design engineers need to know about Power Over Ethernet–a protocol for transmitting power and data signals over standard local-area network (LAN) infrastructure.

The *Guide* comprises an engineering analysis by technical editors of Penton Media's Electronic Design Group of the standards' Requirements. It also includes a subset of market-analysis data from VDC's 2008 Power over Ethernet study.

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Clear-Com's Concert

The software-based intercom system extends production communication beyond the four walls.

BY CRAIG FREDERICKSON

Network-centric communications have set a new precedent in the way broadcast production teams intercommunicate. The delivery of music, cellular phones, television broadcasts and most forms of media have now transitioned into the IP digital domain.

Voice communication for broadcast and live production is also making the same natural progression into IP, leveraging high-bandwidth and cost-effective private and public networks to extend the communication infrastructure beyond the four walls of broadcast facilities. Voice over Internet Protocol (VoIP) offers many benefits that can complement traditional telephonic communications for intercom applications. Long-distance calls or conference bridges with other production members working in distant facilities are no longer a concern, and the cost of communicating becomes significantly reduced.

Designed with this in mind, Clear-Com's Concert provides a secure, low-latency, software-based intercom system for such applications. The solution changes the production workflow by expanding communication capabilities to remote or extended crew members who traditionally had no access to intercom units from their work locations. The system provides a convenient and seamless communication solution through an Internet-ready device (i.e., desktop computer or laptop) and a high-quality headset, desktop microphone or speaker. (See Figure 1.)

Production members who are away from the traditional hardwired intercoms can remain connected while working in remote locations, such as OB vans, hotels or home offices. Freelance journalists or traveling reporters, for example, can use the solution to talk or text-chat with post-production editors located at headquarters. A team of statisticians can conference in and boil down needed facts to an operator in a live broadcast, while production executives may also conference in on a production without requiring installation of a hardware panel.

Beyond traditional intercoms

The intercom solution offers simpler controls, more flexibility and complete security while providing similar features and functions to many traditional hardware-based

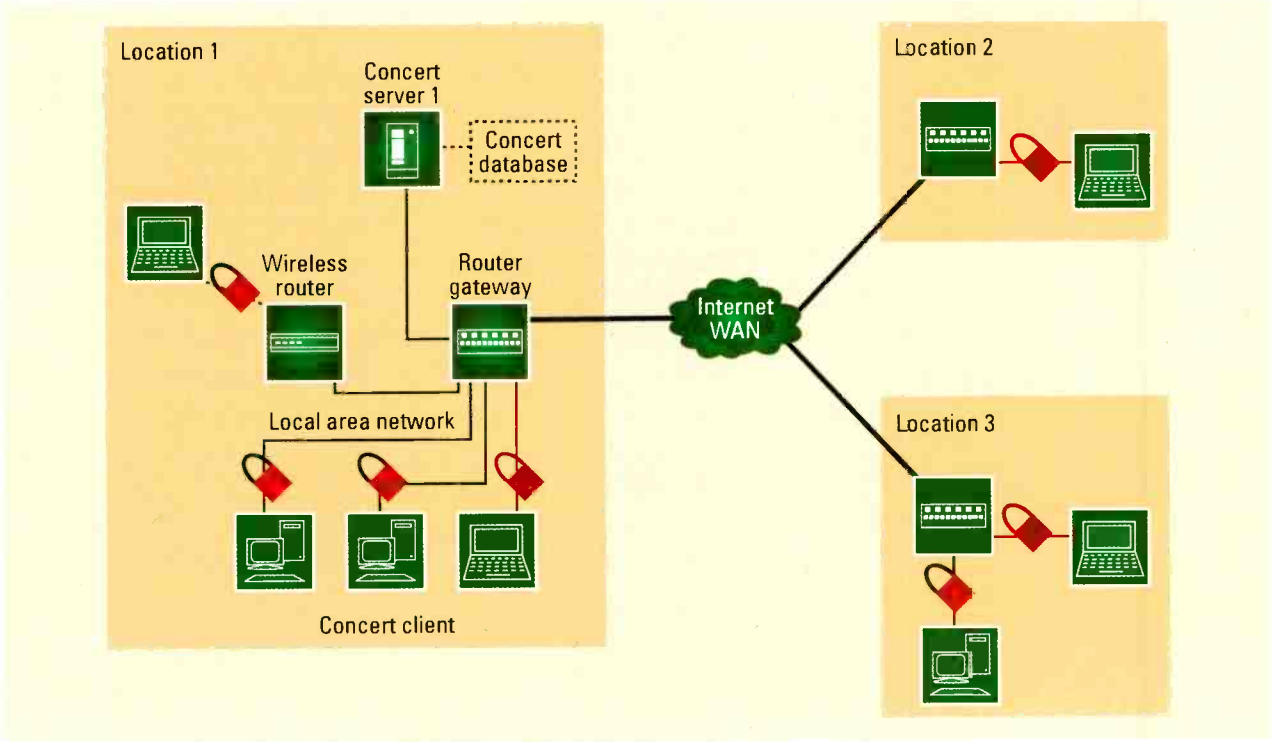

Figure 1. Single-server application with local and remote sites

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intercom systems.

Users can establish point-to-point or group communication efficiently with simple point-and-click controls. An intuitive interface facilitates ad-hoc communications with easy drag-and-drop functionality and makes the user the conductor of his or her own audio conference with the ability to build new conferences, talk groups and private text message exchanges within seconds. Even more compelling for the broadcast user is the fact that its robust architecture allows up to 200 participants and up to 12 sessions to take place simultaneously.

Its architecture allows up to 200 participants and up to 12 sessions to take place simultaneously.

A Presence Awareness detection feature monitors and prompts changes to user availability at any given time. Each user can update his or her own availability status so that other users know, for example, when not to disturb.

Users can initiate text-based communication via a messaging function. Text messaging is a quick way to enter into dialog with other intercom participants without interrupting the existing communication.

With this system, each user has a defined role that determines which conferences or communication channels he or she can access. This means that such functions as technical, security, production and executive can each have their own private conference area as well as admittance to more general conferences.

Under the cover

The system is based on a client/server architecture through the facility's secure server. The client resides on the user's PC, allowing the participation in a conference or ad-hoc person-to-person communication. Servers use a common database in order to ensure that all members can be seen from any client.

Designed for a multiserver environment, extra servers can be added to share the audio routing load or provide additional levels of redundancy as customers' communication needs grow. Each server is capable of supporting thousands of users. The intercom solution operates on a standard IT server running the Linux operating system.

AES 128-bit security is used to encrypt all data (audio and text) within the intercom environment. AES is a block cipher encryption standard that offers highly secure communications without the need to set up complicated virtual private network (VPN) schemes.

Using a unique routing scheme that provides highly efficient, highly scalable audio routing across multiple nodes, the system can grow to support large (potentially thousands) of users without degrading audio quality. In a multisite server environment, for example, each server controls the audio routing within its local area network (LAN) (or wide area if a remote client is logged into that server). This offers the best audio performance in the local network, and only long distance wide area network (WAN) sessions have the added latency of the external telecom network (typically an additional 25ms to 50ms).

Being a VoIP solution, the Concert technology has just scraped the surface of intercom possibilities, while preserving the level of audio quality and extending the user reach of traditional intercoms. More importantly, it drastically changes the dynamics of broadcast productions in unprecedented ways. BE

Craig Frederickson is the product manager of Concert and all IP communication solutions at Clear-Com Communication Systems.

Grass Valley's REV PRO

The digital media drive's capabilities have been extended.

BY SCOTT SHEEHAN

When Grass Valley introduced the REV PRO digital media drive and removable media in 2005, it offered broadcasters and A/V professionals the ability to access and leverage IT-based technologies.

With a capacity of 35GB, a sustained data rate of 110Mb/s supporting dual streaming for simultaneous read/write, and superb reliability and durability, the removable hard disk-based media and drives combine the nonlinear advantages of a traditional hard disk drive with the portability and cost-effectiveness of videotape.

The company's Infinity series of products uses the media to capture, transport and share content within a true file-based workflow. Once projects have been completed, the media can be shared, archived, used to ingest final content to playout servers or used to transport content via express mail in a tape-like manner.

The storage system's unique two-part design offers the durability of solid-state media combined with the affordability of today's magnetic-based tape media. This combination offers a removable media that can be transported without the fear of head damage or the data loss commonly associated with standard hard drives.

The right fit

At NAB2008, Grass Valley introduced two versions of REV PRO for the second generation of the Infinity digital media camcorder — the DMC 1000/20. The media is now available in XP or ER versions, which allows customers to choose between high performance or high capacity, depending on their application. (See Table 1.)

XP is designed for up to 2X real-time HD performance with multistream support, providing in-the-field editing without the need to ingest. ER is optimized for large data storage capacity and captures time at a great value.

Both XP and ER are designed for specific uses. Those users whose primary concerns are media cost and performance tied to short recording times, such as ENG, will choose XP media. Users whose main concern is long recording times with a lower cost per GB of storage, such as EFP and corporate, will choose ER.

While this new generation significantly enhances the format, there are compatibilities with the first generation REV 35. REV 35 media (both professional REV PRO and the consumer version) is compatible with new-generation REV PRO drives for both read (real time or faster) and writes (slower than real time). Those with REV 35 media will read their existing content more often than they need to write or add material to their old media. However, the new ER and XP media is not compatible with existing REV 35 drives.

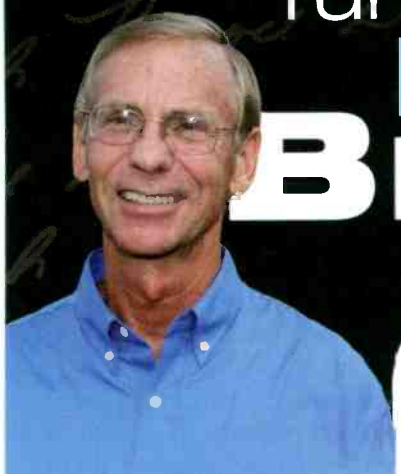
The platform offers a random access, nonlinear format with an expected shelf life of more than 30 years. An erasing/shredding feature allows the media to be repurposed with confidence that old material cannot be accessed. Multisegment caching allows the media to be used in place in an NLE. There is no need for a time-consuming ingest step, or internal disk management, because two streams can be read or written simultaneously (depending on overall bandwidth). Multilevel password support protects material during transport. Users can retrieve the data with a master password in case they lose or forget their password. BE

	Single-stream performance (Mb/s)	Dual-stream performance (Mb/s)	Capacity (GB)	Media price	Price per GB	SD @ 25Mb/s recording time (minutes)	HD @ 75Mb/s recording time (minutes)
ER, optimized for extended record times	130-240	2 x 65	65	$80	$1.23	>240	>80
XP, optimized for extra performance	170-240	2 x 85	40	$70	$1.75	>140	>50
REV PRO (35GB)	110-204	2 x 55	35	$68	$1.93	>120	>45

Table 1. REV PRO media options

Scott Sheehan is director of marketing for new and emerging markets for Grass Valley.

Tune into Brad on Broadcast



for an inside take on the industry's hottest topics

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Aviom's Pro16

The audio distribution system is at the heart of "American Idol's" audio network.

BY ANDRES ARANGO

When ATK Audiotek of Valencia, CA, was called upon for the seventh consecutive year to design an audio network for "American Idol," we were faced with the task of creating a system capable of handling amateur singers performing with a professional band, and judges exchanging dialogue and interacting with a host — all within a noisy, live-performance environment.

It was a big project, but we were up to the challenge. Having worked on many live, high-profile events such as the Grammys and the Academy Awards, which, like "American Idol," took place at Hollywood's Kodak Theatre, we understand that in this type of environment, communication between all involved is the key to making it work. A missed cue can throw off the flow of an entire show, so the proper audio networking technology is essential to keep a broadcast on track.

New year, new challenge

From one season to the next, the intricacy of the sound system grows, and this past year set designers and producers presented a new challenge. The seventh season of "American Idol" debuted to much fanfare, a large, new two-story set the likes of which had not been seen before on the show.

For the first time in the show's history, conductor Rickey Minor, who is also the band's bass player, was separated from the other musicians in a second-story balcony across from the band. This new configuration offered drama and excitement to the program. It also made having an effective and efficient communication network even more vital to the production.

For years, we had been using an Orchestra Conductor System developed by a manufacturer that no longer makes or supports the product. However, age and extensive use began to take a toll, and the system started shorting out. In addition, band members were asking for more customized mixes than the three-channel system could provide. The aging system had to be made usable, and the question was: How? The answer: Aviom's Pro16 audio distribution system.

We had just finished using the Pro16 system along with the company's personal mixing technology on production of a reality show similar to "American Idol." It was then that engineers began realizing that the technology could have benefits and applications far beyond monitoring mixing. The mixer units are compact and sturdy. In addition, they run on Cat 5 cables, so the wiring job — and, therefore, installation — is easy.

Easily create customized mixes

The system in use today in the Kodak Theatre is based on the old Orchestra Conductor System but provides added functionality. Arranged into two individual zones — one for the band and one for the drummer — Minor and the director can initiate communication using Clear-Com Party-line AB-100 and Studio Technologies 233 Announcer Consoles as the main interfaces.

The band zone is equipped with an Aviom A-16R rack-mount mixer, which the monitor engineer controls. Not only can the engineer

The band's drummer uses Aviom's A-16II personal mixer, which he can control himself. In addition, several other band members use the mixer for monitor control.

easily control the band's levels, but also he can adjust the volume of Minor's voice as it comes through to the band. If it's too soft, the band will miss cues. If it's too loud, it can disrupt their ability to play. The drummer is using a standalone Aviom A-16II standalone mixer, which he can control himself. Clear-Com's PS-464 powers Tweecomm headset units.

A missed cue can throw off the flow of an entire show, so the proper audio networking technology is essential to keep a show on track.

Several other band members are using the A-16II for monitor control as well. At first, they were somewhat hesitant using a product that was unfamiliar to them, but the players have embraced the system. They appreciate the fact that they have more control over their levels, and there was only a small learning curve.

With our old system, only three mixes could come through, leaving the mixer to create 12 separate mixes. Because the Aviom system can deliver up to 16 channels, we are able to offer the band members 16 different stems to select and mix together to fit their needs.

Flexible setup

The system was flexible enough to move from the small set during the first rounds of the show to the new, big stage with simple wiring adjustments and the addition of several boxes. All we did was add announcer boxes and lengthen the Cat 5 cable running between the different components that make up the system.

As we enter the show's eighth season with a new set of amateur performers along with celebrity guest performers, each with their own audio requirements, we faced even more challenges. But with a solid communications system, we have the confidence that we are able to face any situation. Our use of this equipment for "American Idol" is just the beginning. As production demands for live broadcasts increase, we will be looking at new ways to refine the system and adapt it for future events. BE

Andres Arango is a staff engineer for ATK Audiotek.

Archive systems

Manage content carefully to enable future revenue opportunties.

BY JOHN LUFF

Any bank will tell you that not losing its customer's money is its first responsibility, current conditions not withstanding. So why is it that for decades, broadcasters' strategy was to shelve copies in long-term storage with little plan for preservation, and often insufficient care to prevent loss of content of historical and economic value?

In a 1997 article called "The Loss of early video recordings: The Nixon-Khrushchev 'Kitchen Debate'," in "The Abbey Newsletter," Jim Lindner wrote, "The total loss of hundreds of millions of dollars worth of 'visual assets' seems inconceivable. From a business perspective alone, how could such a huge inventory of product that could be marketed for many years, creating a significant cash flow, be permanently lost?" Lindner was writing about the loss of original recordings of the Nixon-Khrushchev "Kitchen Debate." Many other celebrated losses occurred, including NASA's critical tapes containing video footage of the Apollo 11 mission.

Both of these situations describe the loss of footage stored on tapes and put away in boxes on shelves without meticulous, accurate records kept in a long-term database. Every TV station can point to lapses in its management of the content it creates. ("I thought I hit play, not erase ...") But nothing is more fundamental than preserving and cataloging in a world where content is increasingly repurposed to maximize revenue in complicated business models.

The impediments are many. Often the price of a system designed to archive content is deemed too high to be affordable, though lost content and loss of opportunity for additional revenue is hard to quantify. Sometimes the cost of converting existing content to digital is too high due to the labor-intensive process of retreiving content and entering metadata that will make it searchable.

Strategies for backing up content

In the last decade, the cost of archiving has dropped significantly. While some software vendors of archive management systems charge an annual fee for the number of terabytes under managment, others only charge for the number of slots that are managed in the robotic tape drive. Tapes stored out of the robot but in the database do not incur the annual license cost. In addition, the growth in IT's use of archive systems and the implementation of other media archives, such as in prepress and other content repositories, has helped drive the cost of archive systems for broadcast down to more manageable levels. An entry-level archive can now be acquired for about the same cost as a videotape recorder of 10 years ago.

One has to be careful when speaking about archives in a generic sense because many strategies abound. For example, the news department may archive all of the cut stories on videotape at the end of each news day. This article will focus on archives designed to preserve content automatically. The most common use of digital archives is in backing up interstitials and long-form content stored on a playout server, or automated archive workflow in a nonlinear news environment. However, the same system can be used to back up a library of promotions in another location and the content from the news department, making each library accessible

Broadcasters that store videotape without a plan for preserving or managing it could lose out on future revenue opportunties where the content could be repurposed. Photo courtesy John Benson.

to the originating department.

When a system becomes more complicated, it requires a more thoughtful set of business rules for archiving. At the time of implementation, the software vendor works with all departments to write the business procedures that will move content to the archive automatically. For example, a watch folder might be established in news to which all content that needs to be protected is copied at the end of each day.

Of course this requires two types of discipline. First, the operational procedure to move the files to the watch folder must be established and routinely performed. Missing a day complicates management of the content. Second, the procedure has to be carefully thought through to ensure that only the content needed in the long term is archived.

Few things are more dysfunctional than an archive loaded up with content that could have been deleted years ago. It's tempting to use the archive space, moving useless content from clogged hard drives to a system that seems limitless. As the saying goes, the size of the library goes up as the number of square feet of desk space assigned to producers goes up. An archive cannot fix poor management practices. Implementing an archive management system does, however, point to the problems in a current strategy, or lack thereof, and allow for an orderly and effective workflow to be put in place.

Few things are more dysfunctional than an archive loaded up with content that could have been deleted years ago. An archive cannot fix poor management practices.

Let's assume you've decided to archive future content. What should you do with the content deteriorating on the shelves? If it has potential value, it should be converted to a digital format and archived while the players for the legacy content still exist. Millions of hours of helical scan recordings exist that can no longer be recovered due to the lack of working players. Similarly, the enormous libraries of quad videotape will be unplayable in a few years for the same reasons. Extremely valuable libraries of TV news film exist in many stations. However without film chains, it is unlikely anything will be done to preserve the potential value of the images.

Unless you have the means to play the media, the concept of conversion is expensive, including the likely need for an outside service to get involved. Think serious cost. Some manufacturers have tackled this problem, providing automated workflows to allow ingest of content that might otherwise be lost forever.

There is one last matter to understand. The preservation problem is not permanently solved by moving to a digital archive. At some point in the future, that content will need to be moved from the physical media it is on today to something newer. That might be in 10 years or 50 years, but it will happen. At each transition, the opportunity to lose content exists, but with a well planned archive strategy, you can prevent the loss of content from which your revenue is derived. BE

John Luff is a broadcast technology consultant.

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

Slate v7.1 — Broadcast Pix

Software upgrade activates an optional DVI/VGA I/O card on all Slate HD models to provide up to two DVI/VGA I/Os; enables control of Panasonic robotic cameras and enhancements to the system's built-in multiview monitor; provides luma key support; adds support for external video with key inputs from external graphics systems; provides up to four copies of each output and three of each input for display on a Slate system with multiple monitors attached.

978-600-1100
www.broadcastpix.com

NV8280 — NVISION

Large-matrix (288 x 576) digital multiformat router offers same advanced functionality as the NV8576 but in a smaller footprint for midsize broadcasters; features multiformat routing (3Gb/s, HD-SDI, SD-SDI, AES), N-on-1 redundant crosspoint protection for zero downtime, linear expansion technology and signal integrity over coaxial cable or optical; Plus version has a 288 x 288 matrix that expands to 576 x 576 within two frames.

530-265-1000; *www.nvision.tv*

dummyPLUG — Neutrik

Rubber cover protects connectors in the unmated condition, including Neutrik two- and four-pole speakON chassis and powerCON chassis connectors; covers unused inputs, helping to avoid any confusion or missed wiring during setup.

732-901-9488; *www.neutrik.com*

ElipZ — Anton/Bauer

Package includes ElipZ 10K battery, ElightZ on-camera light and EgripZ camera support; battery delivers all-day operation for a typical 10W handheld camera; under-camera mounting design allows one face to quickly attach to the camera through a shoe-type mount; 6V on-camera light draws 10W and features a two-stage, adjustable arm; camera support attaches easily to any camera as well as other supports with a 1/4-20 mounting screw below.

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

QFX Quadbox — QuStream

Copper-to-fiber conversion modules provide increased port density; are part of the QFX fiber extender series; support up to four SDI, HD-SDI or 3G-SDI signals using a 3Gb/s optical transport per fiber port; offer broadcast-quality coax-to-fiber transmission paths in a single box or 1RU setup using two SFP duplex small form factor pluggable modules; compliant with SMPTE 259M, 292M, 372M and 424M.

416-385-2323; *www.qustream.com*

HXR-MC1 — Sony

HD compact POV camera and solid-state recorder combination; the camera's design separates its head from the control unit/recorder; gives users more flexibility to capture shots in video applications where increased mobility is required beyond the use of traditional handheld or shoulder-mount cameras; records up to six hours of HD content onto a 16GB Memory Stick; offers full 1920 x 1080 resolution; features Sony's ClearVid CMOS sensor system enhanced by Exmor technology.

201-930-7330
www.sony.com/professional

Newscaster DR 2 — Nucomm

Diversity receiver features a split box design; receives UHF digital signals in the 150MHz to 850MHz band; works with external block downconverters and can be supplied with those that can receive frequencies of 1.99GHz to 7.1GHz; receives up to four RF inputs from the external block downconverter, allowing for the use of four high-gain sector antennas; includes an integrated COFDM demodulator, an MPEG-2 HD/SD decoder, internal power supply, integrated spectrum analyzer and on-screen display.

908-852-3700; *www.nucomm.com*

MiniBlox 4262A/4262D — ISIS Group

Audio de-embedders automatically determine whether a digital input signal is 3G, HD or SD-SDI and then output broadcast-quality analog or digital audio; 4262A dual stereo analog de-embedder extracts two balanced stereo analog audio pairs from any group in data space of a 3G/HD/SD data stream; provides analog outputs; employs high-quality 24-bit DACs; features adjustable, full-scale output levels to meet international standards; 4262D quad AES de-embedder extracts four AES streams from data space of 3G/HD/SD data stream; provides AES outputs; can extract audio from any two embedded groups.

888-622-4747; *www.isis-group.com*

SmartVision — Thomson

Version six of the VOD server features a new family of streaming accelerators; offers a total streaming capacity of up to 16Gb/s; each video server unit is now able to record more than 200 TV channels, which can be time-shifted to a large number of subscribers; allows farms of NDVR servers to be stacked to deliver additional streaming performance; integration into existing architectures can be achieved either through ISA/ADI interfaces for cable networks or by interfacing with Thomson's SmartVision CDN via Web services.

818-239-2349; *www.thomson.net*

HD3-P — JDSU

Handheld display probe helps prevent contaminated fiber; gives technicians handling optical fiber a dedicated microscope for patch-cord inspections while providing a probe microscope to inspect the bulkhead connector port; the combination of the two microscopes makes it unnecessary to change inspection tips on the probe; features a 1.8in TFT LCD screen; comes standard with the GripSwitch power saver mode.

408-546-5000; *www.jdsu.com*

FSB 4 — Sachtler

Fluid head's payload reaches 8.8lb; well-suited for users of HDV cameras; features an aluminum housing, three-step damping and five-step counterbalance; incorporates Sachtler's SpeedBalance technology, enabling fast, precise handling; has an integrated flat base fitting; interfaces with tripods with 75mm bowls.

845-268-0100; *www.sachtler.com*

1T-TG-620 — TV One

HDMI test generator verifies correct operation of audio and video when working with HD or PC displays; can test any device using HDMI, PC or DVI-D inputs using several different types of signals; supports PC resolutions up to WUXGA/60 and HD resolutions up to 1080p; embeds either a 1kHz internally generated audio sine wave or externally generated audio signal into digital bit stream to verify HDMI audio; can test HDCP functionality to verify video, audio and security components.

800-721-4044; *www.tvone.com*

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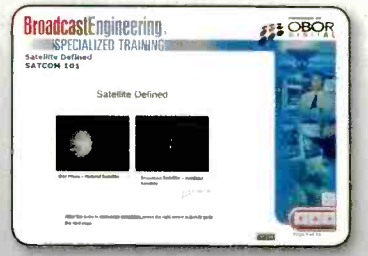

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To apply, send resume and cover letter with salary requirements to:
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Thirteen/WNET New York
450 West 33rd Street, 6th Floor
New York, NY 10001-2605
E-mail: jobs@thirteen.org
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Broadcast Engineering, December 2008, Vol. 50, No. 12 (ISSN 0007-1994) is published monthly and mailed free to qualified persons by Penton Media, Inc. 9800 Metcalf Ave., Overland Park, KS 66212-2216. Periodicals postage paid at Shawnee Mission, KS, and additional mailing offices. Canadian Post Publications Mail Agreement No. 40612608. Canada return address: Bleuchip International, P.O. Box 25542, London, ON N6C 6B2. POSTMASTER: Send address changes to Broadcast Engineering, P.O. Box 2100, Skokie, IL 60076-7800 USA. CORRESPONDENCE: Editorial and Advertising: 9800 Metcalf, Overland Park, KS 66212-2216 Phone: 913-341-1300; Edit. fax: 913-967-1905. Advert. fax: 913-967-1904.

I hate to be the Grinch

It's time to prepare for a challenging New Year.

BY ANTHONY R. GARGANO

Having spent the bulk of a career on the equipment supply side of the broadcast industry, I have been through a number of business cycles. One lesson learned early on from industry legend and one of my mentors, Charlie Steinberg, was his theory that the broadcast industry was a leading indicator for the overall economy. For most companies, at the first sign of revenue slowdown, invariably, when it is time for cuts, advertising spending is the budget line item that draws the first blood. Reducing advertising spending is the least impactful to headcount and departmental spending plans.

As the national economy starts slipping slowly into an economic contraction, it is advertising that takes the hit and, as a result, so does the broadcast industry. The production and post segments feel it first. As there are fewer new commercials being created, the existing ones will get longer runs, and new ads will be shot with much tighter budgets. This is quickly followed by the impact to the broadcaster segment, with a few extra PSAs to fill avails, though with decreased revenue levels. Decreasing revenue in these key content creation and distribution segments leads to reductions in their own capital expenditures, thus negatively impacting broadcast equipment suppliers as equipment is neither replaced nor upgraded — all in all an unpleasant chain reaction. By the time jobless reports are reflecting upticks in unemployment, the economy is already in a full-fledged downturn, and our industry will have been been in recession for some time.

The indicators were already there early in 2008. In February, the Television Bureau for Advertising released its analysis of estimates supplied by TNS Media Intelligence/CMR, showing that broadcast advertising spending in 2007 was down 4.4 percent compared with 2006. As 2006 was a midterm election year, most attributed the drop in 2007 to the lack of political spending. Worrisome, however, should have been the fact that in the fourth quarter of 2007 spending by the top 10 advertisers, none of which represented political spending, was down 19 percent compared with the prior year.

For all segments of our industry, 2009 is shaping up to be a difficult year. Oh, yes, Happy New Year.

The signs were there a year ago and continued into this year. Recent Television Bureau for Advertising figures for 2008 indicate that total broadcast ad revenue will be down slightly versus 2007. And, bear in mind that 2008 had a tsunami of ad spending for both the Olympics and the presidential race, two events that didn't contribute to revenue in 2007.

As we head into 2009, analysts' projections for broadcast ad spending vary from pessimistic to almost doomsday. The pessimistic side projects a range of broadcast ad revenue decreases from 2.7 percent to 6 percent, according to industry analysts at Wachovia and UBS, respectively. The doomsday projection comes from Goldman Sachs' Mark Wienkes, who estimates 2009 advertising revenue to drop by 17 percent at the local station level and by 10 percent at the broadcast networks.

Now let's take a look at some facts and figures. Political spending on broadcast advertising is projected to come in at $2.5 billion to $3 billion for 2008, up substantially from the $1.7 billion spent in the 2004 and $2.1 billion in the 2006 election years. NBC reported Olympics advertising in 2008 totaled more than $1 billion. Thus, even before factoring in the erosion of broadcast advertising by cable and the Internet, and, what at this writing is the second most severe downturn in U.S. economic history, 2009 starts out with a $4 billion Olympics and election deficit or 6 percent down against the Plunkett Research projection of $66.6 billion for 2008 in broadcast ad revenue. Perhaps then the Goldman Sachs projection isn't quite as radical as it first appears.

OK, you ask, what is all this economic folderol doing in what is ostensibly a technical journal? It is to help set the stage for what is going to be an extremely difficult year. The more dramatic the reduction in ad revenue, the greater the impact it may have on you. Engineering departments could be cut even further; capital equipment budgets might be slashed. This leads to challenging situations. Engineering directors could face increasing maintenance requirements for equipment that lacks the funding to be replaced and reduced resources with which to accomplish the task.

For all segments of our industry 2009 is shaping up to be a difficult year, so batten down the hatches. Oh, yes, Happy New Year. BE

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

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

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