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- Trends in remote technology
- NPR rings in the new year

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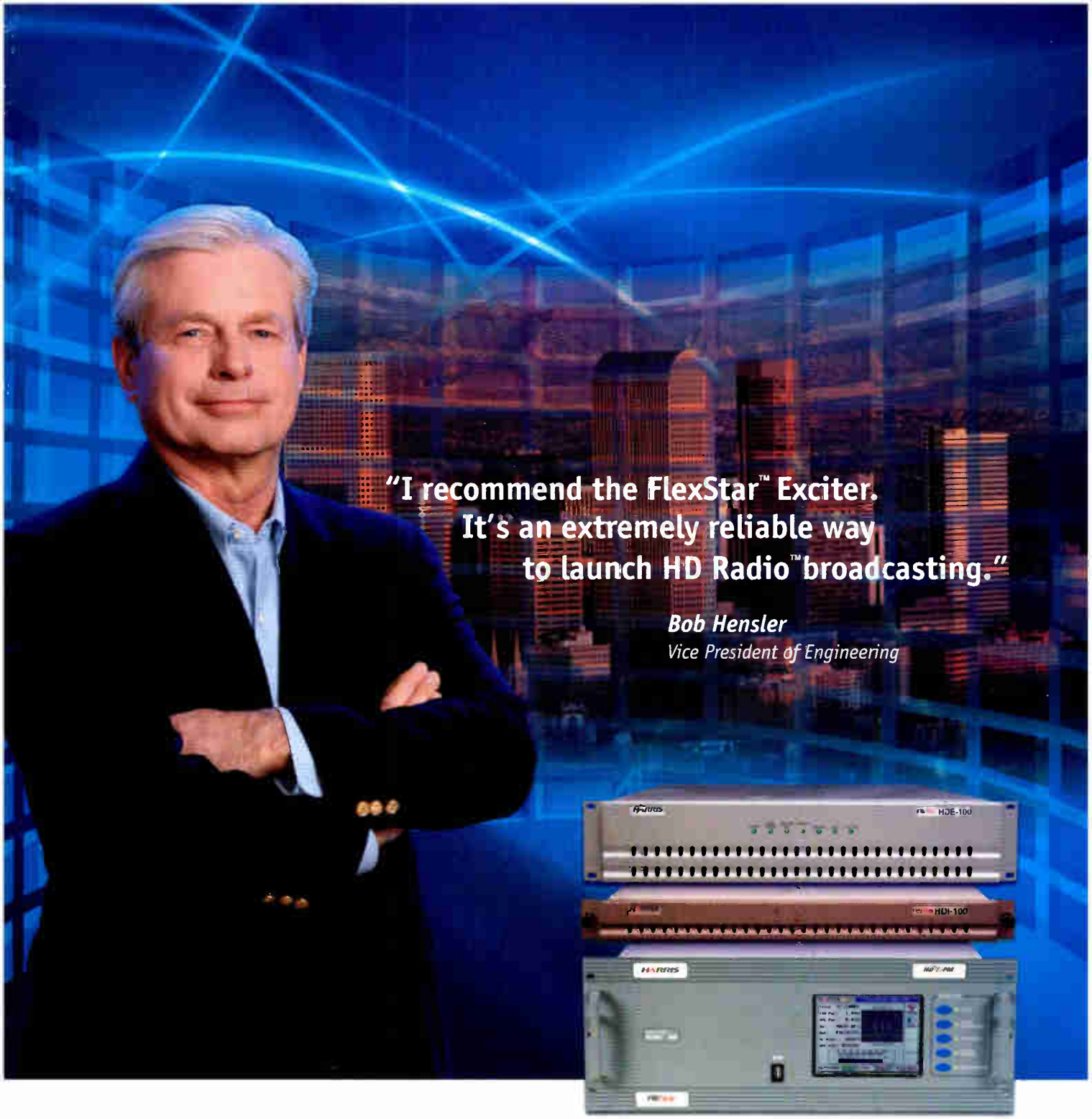

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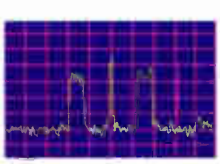

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"We've found Harris' new Exciter, along with the Importer and Exporter, to be very flexible and reliable. There are more inputs on this Exciter than any other brand, allowing flexibility and minimal downtime. Plus, Harris is the first to include iBiquity's Exgine Architecture which gives us a simplified, more reliable installation. With the help of Harris, we now provide more streams and channels to the Denver population without adding transmission sites. I recommend the Harris FlexStar family to other radio groups. It's as easy as new technology can be to operate and helps us accomplish our goals."

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Contents

Radio
THE RADIO TECHNOLOGY LEADER
Radio Magazine
www.beradio.com
February 2006 • Volume 12, Number 2

www.beradio.com

Features

Columns

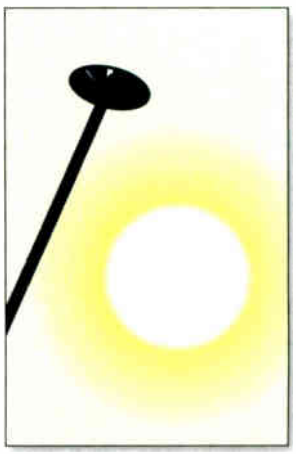
Departments

Find the Mic Sweepstakes Grand Prize Winner for 2005

Congratulations to Randy Norris, assistant chief engineer of Susquehanna Cincinnati. Randy's name was drawn for the grand prize, a Neumann BCM 104 microphone, in the Find the Mic Sweepstakes for 2005.

The Find the Mic Sweepstakes continues every month in *Radio* magazine. See page 6 for details on how to enter this and every month. Find the hidden mic icon on the cover and you could be our next winner.

ON THE COVER:
Remote broadcasts are part of radio's regular routine. However, this month we bring you two remotes that are anything but routine. Cover design by Michael J. Knust.



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Existing G3 customers can upgrade their software to try Audio over IP **free for 30 days**.

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Currents Online

Selected headlines from the past month.

Clear Channel Buys RCS

RCS is also the owner of Media Monitors and Florical, a manufacturer of TV automation software. All the RCS companies are included in the sale.

Google to Acquire Dmarc Broadcasting

Google plans to integrate Dmarc technology into the Google Ad Words platform to create a new radio ad distribution channel for Google advertisers.

HD Digital Radio Alliance Creates Engineering Cooperative

The goal is to provide assistance to all the member stations. Gary Kline, corporate director of engineering for Cumulus, has agreed to lead this group.

HD Digital Radio Alliance Names First 28 Markets for HD2 Rollouts

The alliance notes that there will be about 264 new HD2 channels. The alliance members have also agreed to offer the multicast streams commercial-free during the rollout.

Harris to Open Miami Office

The new office allows Harris to better serve its Central and South American and Caribbean customers.

Broadcast Electronics to Host HD Radio Seminar

The engineering seminars are specifically designed for consulting engineers and will be held Feb. 28 and March 2.

SBE Moves to New Offices

The society moved into its new home on Feb. 3. The new office is a block from the old one.

Site Features

Currents Online Weekly E-mail

Get the *Radio* magazine headlines delivered to your e-mail box every Monday morning. Subscribe today for the latest radio technology headlines.

The DAB Answer Series is Online

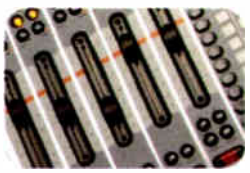
Each quarter, Insight to IBOC covers a specific aspect of digital audio broadcasting. The last installment was in the May issue. The complete content of each issue is available online as well.

Can a broadcast console have a fan club?

"The more I learned about Axia, the more impressed I became with their routing system and consoles, and how well their network topology was designed. We ordered nine studios, and we love it. Our operators keep raving about how easy things are to operate. Even our listeners tell us how good WOR sounds!"

— Thomas R. Ray III, CPBE, Vice President / Corporate Director of Engineering, Buckley Radio

"Axia's Ethernet links are switched connections – no hubs. With guaranteed bandwidth, and some clever clocking mechanisms, latency simply isn't an issue. With regard to cost, we found a significant difference between Axia and the other options we examined. Going with Axia cut our costs by roughly 33%... "



— Ethan Torrey, Chief of Research & Development, Minnesota Public Radio

"We liked Axia consoles so much we installed them in a second studio. Then a third. Then a whole second cluster. And Axia *cost about half* what some companies wanted us to spend. My colleagues are so impressed, they want Axia consoles in their stations, too!"

— Jorge Garza, Chief Engineer Univision Radio, McAllen, Texas

"I've worked with lots of equipment in the past 30 years, and Axia is by far the easiest system to install and get up to speed with. There are just a few cables instead of hundreds; the entire installation – with testing – took just one week."

— Rudy Agus,Chief Engineer, Hi-Favor Broadcasting Los Angeles, California

"The announcers tell us how much they love working with the Axia consoles... It's great to be able to setup and save multiple configurations that can be recalled at a moment's notice. I don't know why we hadn't gone this route earlier. Where we're installing new equipment, we're onboard with Axia."

— Owen Martin, Director of Engineering, Newcap Radio, Alberta, Canada

"The jocks took to the new Axia consoles like fish to water. Show Profiles are their favorite part, because they can all have custom board set-ups. Since the first studio was installed, we've added a new production and interview studio, and we plan on building three more studios. It'll be all Axia, all the way to the transmitter."

— Marc Johnson, Chief Engineer, WEGL-FM Auburn University, Auburn, Alabama

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Missing something

Each year in January, the consumer electronics industry gathers to show everything—and I mean everything—related to this field. The convention itself is huge. Held in Las Vegas, it covers all of the Las Vegas Convention Center, all of the Sands Expo Center and occupies space in several hotels. If you think that NAB convention is big, you should see CES sometime.

The last CES I attended was a few years ago, and I was looking forward to seeing the latest and greatest of everything electronic for the consumer. I was only able to spend one day on the convention floor, which is hardly enough time to see everything, so I focused my attention on one piece of technology: HD Radio.

In January 2005, 21 radio group owners committed to convert more than 2,000 stations to HD Radio. At the end of 2005, the HD Digital Radio Alliance was formed to promote HD Radio through radio broadcasters themselves. By the time 2005 ended, more than 600 stations touted having HD Radio transmissions on the air.

All this attention to HD Radio sounded great. When I began making my plans to visit the CES, I looked forward to seeing the large presence that HD Radio would have relating to all the recent news. I had heard that many manufacturers would display HD Radio receivers, and I anticipated seeing the buzz that HD Radio would finally receive from the attendees at the CES.

Unfortunately, the actual HD Radio presence was bland. I was *looking* for HD Radio and I had trouble finding it. Imagine if I were looking for any new technology, like the consumer press editors from *Wired* and *Rolling Stone* were. I wonder if they actually found it.

I started my CES visit in the CES Innovations Awards exhibit. These are products that are supposed to represent the top technology at the convention, so I thought it was a good place to start. Of the hundreds of products shown there, there was only one that featured HD Radio: the Polk Audio Isonic Entertainment System. Good news for Polk and HD Radio: it won the top award in the Audio Components category. Unfortunately, the mention of HD Radio was just part of its features. HD Radio didn't stand out to me.

I moved on to other parts of the Sands and then the LVCC. I had an exhibitor list of booths showing HD Radio receivers, so I plotted a direct course to see what the showing was like. This is when I realized that if I were not looking for HD Radio I probably would have never found it.

My first stop in the LVCC was the Ibiquity booth. You've seen a similar display at the NAB convention: the white cube in the center with info and a display of HD Radio receivers. This time, there were several vehicles in the booth showing HD Radio technology as well. It was a nice try, but it didn't stand out. CES is a marketing blitz. Every booth has lights, sound and tricked-out cars, and many of them have plenty of other attention-getting decorations.

When I visited the booths of the HD Radio receiver manufacturers, I was disappointed. At most of the booths, the HD Radio unit was tucked in one corner. Most of the booth staffs knew little, if anything, about HD Radio. However, those that knew something were busy pushing their other products.

After the convention I talked to Peter Ferrara, the president of the HD Digital Radio Alliance, about the disappointing presence at CES. He told me that the focus of CES is the opportunity to sit down one-on-one at high levels and have meetings with the manufacturers and help them get further in the game.

I suppose that approach is good as far as getting hardware to the store shelves, but in the meantime, more than 100,000 people still know nothing about HD Radio. CES was a chance to show them that terrestrial radio was just as important today as it ever was. Instead, the attendees are further convinced that digital radio's future is with Sirius and XM, and portable digital audio is with media players and cell phones.

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The value-added engineer

By Kevin McNamara, CNE

It has always been my impression that engineers are some of the most underrated people employed in a station. (To be fair, there are still a handful of owners and managers who appreciate the role occupied by a qualified broadcast engineer, but these are the exception.) This industry-wide attitude has been prevalent for as long as I can remember.

It wasn't always that way. In radio's first 30 years, engineers were held in fairly high regard. During that time, TV was beginning to penetrate some of the larger markets; newspapers were radio's only real competition in respect to news delivery. Radio was busy establishing itself as a reliable and credible medium that could deliver real time news stories and entertainment. It was less focused on the revenue aspects and more toward ensuring that the quality of its on-air product, technical and content, was competitive and the best that they could put forth given their resources and budget. Even in smaller markets, where maybe only one station existed, owners paid attention to the quality of the product. If you ever had the opportunity to dismantle an old facility, you would see evidence of the workmanship—how the wires were bundled carefully with lace, the neatness of the layout and in the documentation prepared (typically full blueprints.)

Engineers were perhaps the larger part of radio's early success: they designed, built and installed the facilities; they ran the audio boards; they did the production; in some cases, they were the air talent and general manager. As the industry matured, it move toward a different operating model. Radio reached, and was increasingly used, by a large portion of the population, garnering a large share of advertising revenues. New stations appeared and competition for those advertising dollars increased. Now stations, while still realizing the need for a reliable technical product, have shifted their focus to developing the on-air product and creating a superior sales force. It was during this period that I believe the role for an engineer was somehow diminished and relegated to a smaller group of people that worked in the background.

In 2006, those attitudes haven't changed a lot, which is ironic because the engineer probably plays a much more important part in the station's operation than ever before. Beyond the traditional responsibilities of maintaining studio and transmitter facilities, engineers are also handling the computers, telephones and data networks, not to mention the occasional request to do carpentry, electrical, plumbing and fixing the station vehicles.

The value you add

Have you ever stopped to think about the added value that you bring to your employer? You may not be required to do all the items listed, but you can be sure that you are doing more than simply maintaining studios and transmitters. I've seen recent salary surveys that place broadcast engineers at or below what you might expect at any number of possible careers where you already have a reasonable level of experience. When considered in these terms, it is clear that a competent broadcast engineer brings a tremendous amount of value to a company.

I'm not convinced, with the current breed of the characters managing radio stations, that you would be able to make a case to your employer that you deserve additional money based on your skill-set, because after all, they're doing you a favor giving you the job in the first place, right?

Identify your skills

Webster's defines the word "skills" as "proficiency, facility or dexterity that is acquired or developed through training or experience."

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I'll guarantee that you have developed skills that you may not have realized have added value to a current or future employer. Take a few minutes to think about the following skills you have no doubt developed beyond the obvious (network administrator, circuit designer, facilities manager). These are all marketable skills, though you might want to consider additional education, training and certifications. Here are a few you may not have considered.

Project manager. As an engineering manager or chief engineer, you have probably been involved with building new or upgrading facilities. In that role, were you involved with the initial design, working with outside vendors (architectural, mechanical, contractors) or managing the successful completion of the project? Project managers are required in all industries and tend to be some of the higher paying professions. You should consider the Project Management Profession (PMP) certification from the Project Management Institute (www.pmi.org). It is the globally recognized organization for project management training and certification.

Procurement manager/purchasing agent. You're probably involved with evaluating, negotiating and purchasing equipment. This is basically the job of a procurement manager. Every company is in the business of purchasing materials and equipment. The Institute for Supply Management (www.ism.ws) offers the Certified Purchasing Manger (CPM) certification, which it claims was the first professional designation for purchasing and supply management.

Project controls analyst. This is also referred to as cost engineering. In the course of planning and working through a project, you are evaluating better, cheaper, faster, stronger, more efficient methods of performing certain tasks, typically resulting in a savings for your employer. This is classic time/value of money analysis. For example, this could be the analysis of necessary resources needed to complete a project vs. the effect time may have on the business or what equipment is necessary to accomplish a certain end. The Association for the Advancement of Cost Engineering (www.aacei.org) offers five certifications in this field.

These are just some of the skills you probably have acquired. I hope this has given you some incentive to more closely evaluate the experience and abilities gained in your present position, and possibly turn them into real added-value strengths that will ensure your future growth.

McNamara is president of Applied Wireless, Cape Coral, FL.

Webcasting royalty fees in play

By Harry Martin

New proceeding has begun to set the music copyright royalty fees that stations streaming on the Internet will pay to record companies and recording artists for 2006-2010. The new fees are not likely to be finalized until late in 2006, but, once set, they will apply retroactively to Jan. 1, 2006.

A total of 41 parties have signed up to participate in the rate proceeding. These include radio broadcast associations, including NPR and the NRB; more than 10 large radio group owners; large Internet-only webcasters not affiliated with on-air radio stations; satellite radio companies; Internet media companies such as Yahoo and AOL; webcasting service companies, which provide a variety of services for large numbers of on-air and Internet-only webcasters; and the two principal combatants: Digital Media Association (DIMA), the trade association for large Internet-only webcasters and big Internet media companies; and Sound Exchange, which represents, collects copyright royalty fees for, and distributes the fees to 1,000 record companies and 12,000 recording artists holding copyrights for 85 percent of the music recordings sold in the United States.

A new start

A three-month negotiation period ended in May 2005 without a settlement between record labels and webcasters. That set the stage for the submission of written fee proposals to the Copyright Royalty Judges (CRJ) in October.

DIMA proposed much lower royalty fees than those currently paid. It proposed that webcasters pay 5.5 percent of revenues, which it said was essentially equal to the royalties webcasters pay to music publishers and songwriters through ASCAP, BMI and SESAC. Currently, only small webcasters pay fees based on a percentage of their revenues. As alternatives, DIMA proposed that webcasters continue to be subject to the current rate structure, which provides for a fixed price per hour of music streamed or a fixed price per song streamed. DIMA proposed a per-hour/per-listener fee of 0.38 cents (compared with the current per-hour fee of 1.17 cents) and a per-song/per-listener fee of 0.025 cents (compared to the current per-song fee of 0.076 cents). Large and small webcasters would pay the same fees.

Sound Exchange countered with a proposal for a large increase in royalty fees. It proposed that webcasters pay the larger of: (1) 30 percent of revenue; (2) 0.0019 cents per-song/per-listener; or (3) a per-hour/per-listener fee of 0.0247 cents for broadcast music simulcasts, 0.0019 cents for non-music broadcast simulcasts, and 0.02945 cents for Internet-only webcasts. An adjustment factor of 25 percent would be added for all webcasts not proven to have been transmitted without any wireless component. For webcasters generating revenues, this would work out to paying Sound Exchange a total of 37.5 percent of revenues.

The on-air broadcasters proposed a flat annual fee, regardless of the number of listeners, for streaming. The fee would be based on the on-air station's market position and BIA revenue rank. In the five largest markets, stations would pay $8,000 annually, mid-size stations $6,500 and small stations $6,000. Fees for stations in smaller markets would be lower, with rates for markets 101 to 200 ranging from $500 to $1,000. Stations webcasting at least 95 percent news, business, talk or sports would pay a lower flat annual fee, ranging from $750 in the top-10 markets to $250 in the smallest markets. Stations webcasting at least 25 percent news, business, talk or sports would be subject to a different fee structure. The minimum fee for partial-year streaming would be $250. All fees would increase 4 percent per year.

If no settlement is reached within a few months, the CRJs will issue a decision.

Martin is immediate-past president of the Federal Communications Bar Association and a member of Fletcher, Heald & Hildreth, Arlington, VA. E-mail martin@fhhlaw.com.

Dateline:

April 1 is the deadline for radio stations, LPFMs and FM translator stations in Delaware and Pennsylvania to file their 2006 renewal applications.

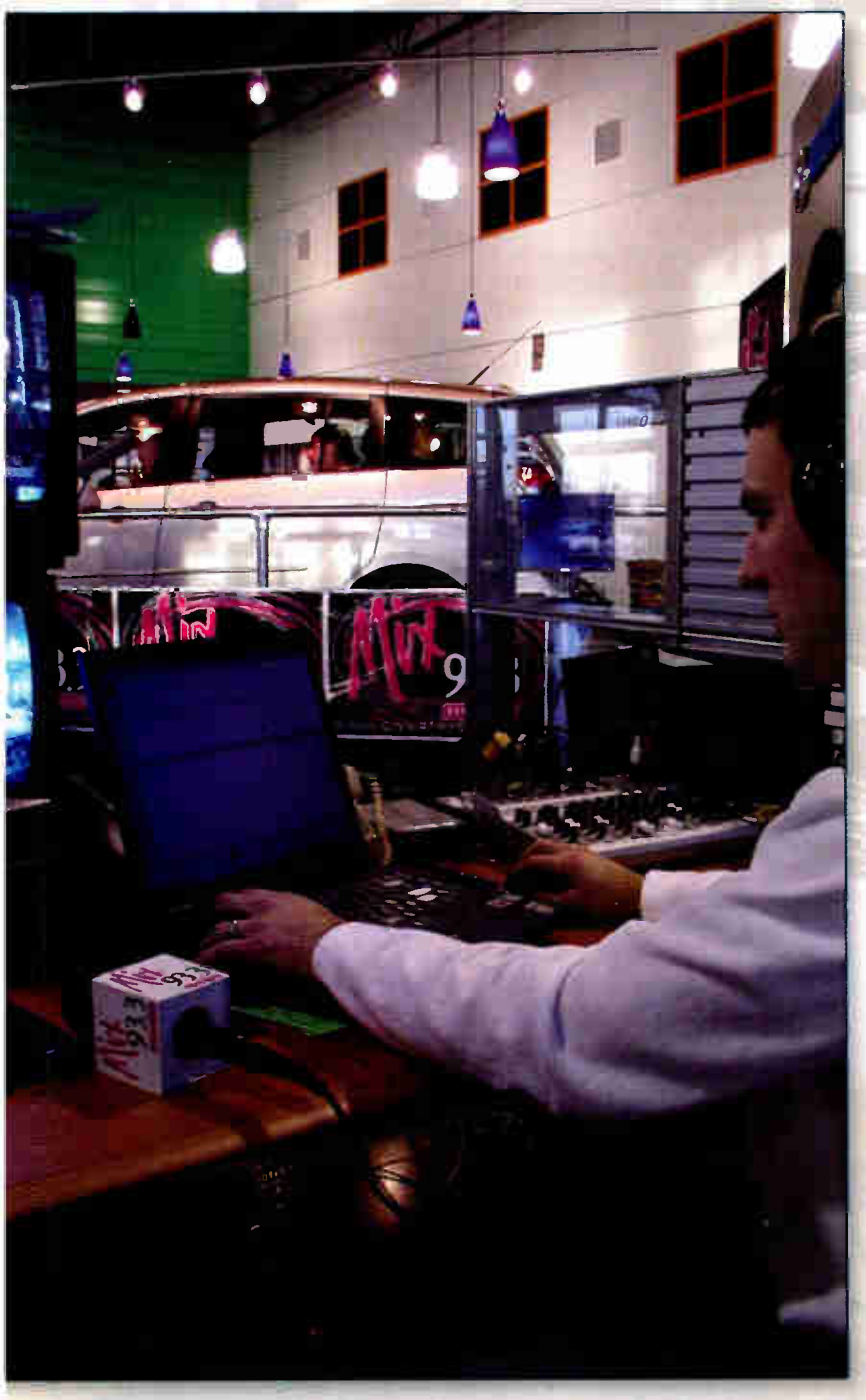
Also by April 1, radio stations (but not LPFMs or FM translators) in Delaware and Pennsylvania must file with the FCC their biennial ownership reports and annual EEO program reports, and place their annual EEO reports in their public files and post them on their websites.

April 1 is the filling date for biennial ownership reports for radio stations in Indiana, Kentucky and Tennessee.

Stations in Texas also must place their annual EEO reports in their pubic files and on their websites by April 1.

Taking the show on the road

When the event is held in unusual places and situations, it's radio at its best.



By Doug Irwin

Successfully creating a remote broadcast is much easier now than it ever was before. As recently as 15 years ago there were only two options for a remote broadcast: buying an audio line (or lines) from the telephone company or using a radio link (probably a 450MHz system). Switched 56 and ISDN were in their infancies, and there was no equipment available to make use of them. For all intents and purposes there was no Internet; no cable or DSL. Go back even farther (a little over 20 years) and you'll recall that to talk with the studio from the remote site we used a telephone (a regular dial-tone) and a long piece of wire to hook it up. A stereo music remote required the station to order two lines, which also required the station engineer to visit the remote site ahead of time to test both lines for continuity, frequency response and phase response. The telephone company used to call this "stereo conditioning."

I'll admit that I don't miss that part at all.

As technology has progressed, the telephone company has found more and more ways to use the same old copper wires buried in the ground so many years ago. In Seattle we still use 8kHz audio lines for the home games of the University of Washington Huskies because it sounds better and it's easy to test remotely. We still use dial-tone for POTS codecs, too. ISDN is ubiquitous; although there is more and more talk of it disappearing. Part of the reason for that, I suppose, is that the telephone company wants to use the same copper wires to carry more and more data, such as DSL. Fortunately, codecs that use DSL and Wi-fi are now available for use.

And don't forget about the old-fashioned radio systems. New versions of the same old analog radio systems are still made and still serve a purpose. Cellular telephone technology has evolved as well and has greater potential for use in carrying out remote broadcasts.

The current state

Currently, Tieline has introduced the I-mix G3, which is a complete remote broadcast package with a built-in mixer. The I-mix has an expansion slot that can accommodate another POTS codec, an ISDN codec or a GSM module. The POTS codec plug-in can be used with the built-in unit to bond two analog phone lines together, providing mono, stereo or dual-mono audio feeds with a 15kHz frequency response. The ISDN codec uses

Insight to IBOC
February 2006 Part of the *Radio* magazine DAB Answer Series

IBOC Installations

While stations transition to HD Radio, there are several decisions that need to be made that relate to generating the digital signal. Separate antennas, high- or low-level combining and other options exist, and the decision to use a particular method is determined by each installation. In some cases, a particular choice may be obvious. For other operations the choice may not be so clear. Radio *magazine asked several stations about the options they chose and why.*

Cox Radio-Tampa WSUN Split-level combining

Roswell Clark, CSRE CBNT MCSE, director of technical operations

Cox Radio-Tampa installed IBOC on three of its six Tampa FM stations during 2005. Plans were considered in general terms in the preceding years and the station took into consideration the eventual installation of HD Radio whenever major items for the stations were purchased.

Despite the best efforts leading up to the actual installation date, changes in technology and remaining limitations in resources at the time of implementation directly affected critical decisions. For WSUN, physical space in the transmitter room was a premium. The station needed to replace a backup transmitter, and there is only one antenna at the site. Fortunately, just prior to the installation, advancements in RF combining methods allowed creative solutions to be pursued. Split-level combining allowed us to keep the existing analog transmitter in service, and the Harris Z HD Radio transmitter supports can also be used in an analog-only mode (called C-mode), which allows it to also serve as a backup analog transmitter.

Another space saver is the Dielectric Dibrid switchless combiner. It takes the place of three discreet switches and the HD Radio combiner. An added benefit is the glitchless transition between modes at the push of a button.

Cumulus Broadcasting, Harrisburg, PA, WNNK Separate antenna

Dave Supplee, regional engineering coordinator

WNNK uses a Dielectric DCR-M interleaved antenna for analog and digital transmission. It features two bays for analog and two bays digital. The separate antenna method for IBOC was chosen for several reasons.

The station needed to replace the main antenna. The old one had failed so it made sense to install something for IBOC at the same time. Tower loading was not an issue because the IBOC antenna portion was not nearly as heavy as the main analog. The station also owns the tower, so there were no lease issues.

The digital antenna is fed with a $^7/_8$" Heliax, which did not add significant tower load, nor was it expensive. The analog antenna uses a 3" Heliax.

Except for low-level combining, all the combined systems require a capital expense of a second transmitter. Generally speaking, power levels over 10kW TPO do not make sense to run low-level because of the inefficiency of the

The Art of Surround

This is part two of the article that appeared in the November 2005 issue of Insight to IBOC.

By Alex Kosiorek

With the latest product announcements for the consumer, it looks like surround-sound broadcasting and HD Radio are making more headway in the radio broadcasting arena. However, there are still many questions to be answered and many tests are underway to address the concerns of surround, which include the challenges of downmixing and the concerns about the three major proponents that are vying for acceptance. It's too early to address the proposed MPEG surround technology, as its standardization is not yet complete and hardware-based encoders/decoders will take some time thereafter to develop.

As you may know, the three major proponents (Dolby Prologic II, Neural Audio 5225 and SRS Labs Circle Surround) take discrete multi-channel surround content and encode the multiple channels of audio into a stereo mix for transmission on standard two-channel delivery systems. The surround-encoded two-channel stereo mix is called a downmix and referred to as Lt/Rt. Conversely, upmix is the term used to describe the surround material that is decoded from the two-channel stereo (Lt/Rt) mix. Because of this downmix/upmix process, none of these systems

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Inside

A special supplement to
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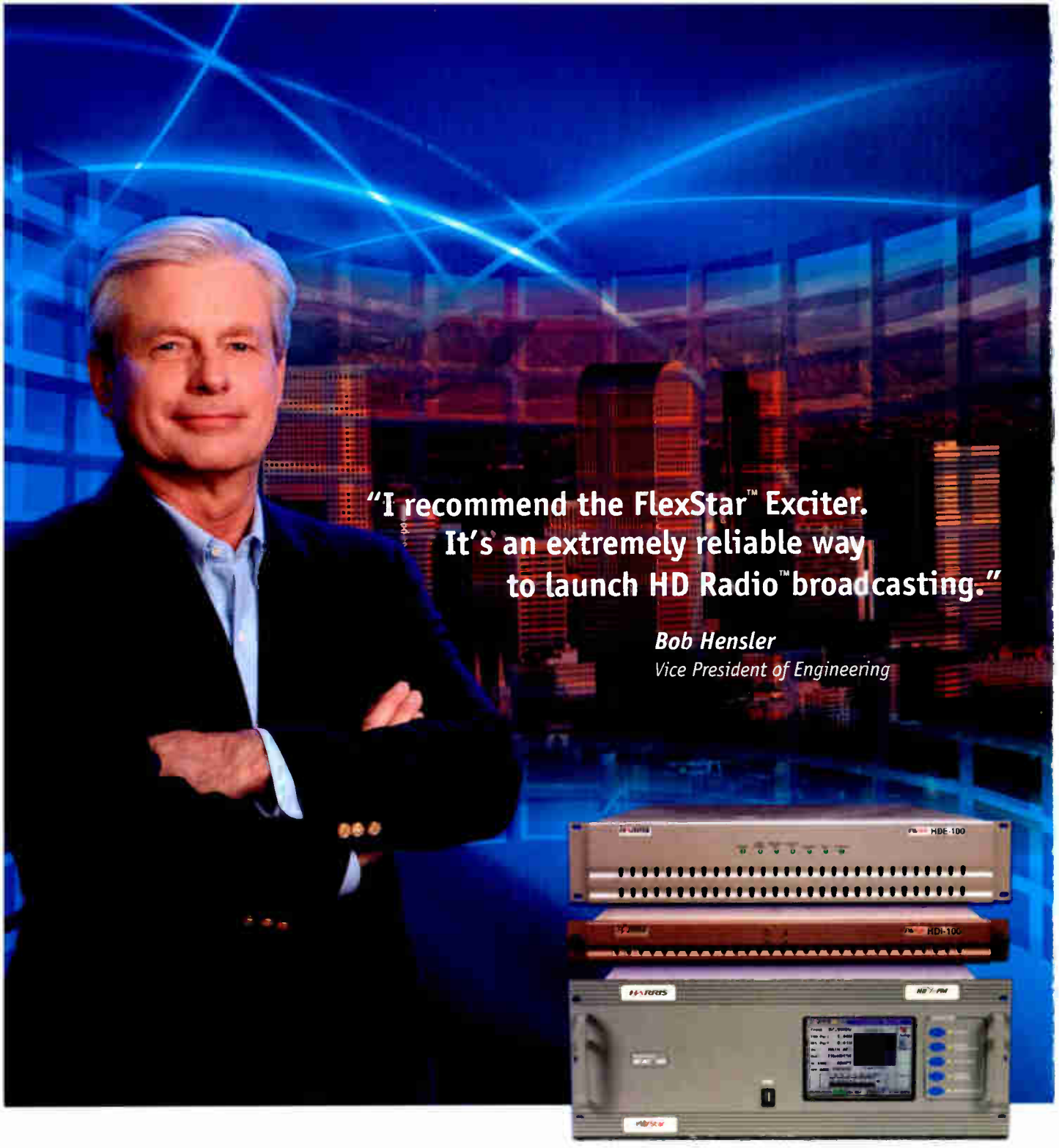

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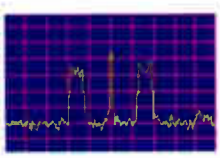

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"We've found Harris' new Exciter, along with the Importer and Exporter, to be very flexible and reliable. There are more inputs on this Exciter than any other brand, allowing flexibility and minimal downtime. Plus, Harris is the first to include iBiquity's Exgine Architecture which gives us a simplified, more reliable installation. With the help of Harris, we now provide more streams and channels to the Denver population without adding transmission sites. I recommend the Harris FlexStar family to other radio groups. It's as easy as new technology can be to operate and helps us accomplish our goals."

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IBOC installations

transmitter. The separate antenna approach is the most efficient—the digital transmitter only needs to overcome the line loss. In this case, the analog TPO is 23kW (on a 25kW transmitter), and the IBOC transmitter runs 240W. As an added benefit, the effect on the ac load and power bill was minimal. Also, the main (now analog) transmitter did not have the headroom to overcome the combiner losses.

I considered Split-level combining at the time, but it was still on the drawing board during our installation.

Cincinnati Public Radio WGUC-FM Low-level combining

Don Danko, CBRE CBNT, VP engineering and operations

The decision for WGUC to adopt and start broadcasting an IBOC signal was a direct result of long-term strategic planning that started before Ibiquity was formed. WGUC uses low-level combining to sum the analog and digital signals before it feeds the final amplifier. This method results in a one-transmitter design to meet the licensed transmitter power output (TPO), and it eliminated the need for a big, external, high-level RF combiner. The benefits of this type of system are less transmitter power consumption, less cooling load and less equipment cost. It's less equipment to install and reduces the space needed within the transmitter room.

Low-level combining was the perfect solution for WGUC. Various factors were considered in this selection but the most import one was WGUC's TPO. WGUC has an effective radiated power of 15kW, but with a five-bay antenna at 880 feet height above average terrain the station is licensed for a TPO of 7.1kW. When the station made the decision to install HD Radio equipment two transmitter manufacturers were shipping an HD Radio exciter and a solid-state transmitter that could produce the necessary power for WGUC to meet its required TPO. We chose equipment from Harris. Site preparation was completed and within two months the new transmitter arrived. The delivery truck pulled into the facility at 8 a.m. on July 26, 2003, and by 5 p.m. that day WGUC was the first public radio station in Ohio to broadcast an HD Radio signal.

The art of surround

continued from page 1

create a true discrete multi-channel upmix identical to that of the original content, however, some subjectively do a better job than others depending on the content and can complete the task of delivering the surround content quite impressively. Additionally, unlike the older versions of these systems, all of the proposed systems provide full bandwidth and stereo imaging to the rear channels.

Two of these technologies, Dolby's and SRS Labs', use a matrix encoding/decoding method that alter channel levels and phase relationships to create the downmix. Neural Audio's 5225 method implements many of these matrix techniques to offer legacy system compatibility, but it also embeds steering information into the downmix to create a reliable upmix. The question that remains is whether or not all these systems are cross-compatible as is in practice today; allowing one to encode with one system and decode with another, providing the consumer with a satisfying surround experience that was originally intended. Last fall, thorough subjective listening tests began to answer this question, with further tests in the next few months to verify the preliminary findings.

Finding destiny

Regardless of which system is used, including the MPEG system, creating a downmix will be inevitable. Though there are valid arguments to use stereo artistic mixes alongside the surround broadcasts, many obstacles would have to be overcome. These include the proliferation of the matrix decoders already in the market and the delivery constraints that will continue to exist. Then there is an often-overlooked complication that the song structure of many of the commercial surround-sound discs simply do not match their artistic stereo counterparts. Bundle that with the time alignment issues of content and blending of analog to digital signals, and it's obvious that downmixing will be in place for some time.

Because of this, carefully watch what occurs with the resultant downmix, regardless if one takes content from commercially available discs or creates his own. Because these systems are taking 5.1 (or sometimes 6.1) channels of discrete surround material and encoding it into two channels of audio, the phase relationships, delays, equalization and other effects that exist in the discrete-channel surround mix can cause comb filtering and in turn, loss of definition of instrumentation and vocals in the downmix. If you are working with classical material that has mostly ambience in the rear channels, the resultant downmix should have few problems. However, many surround titles include full instrumentation directed to all speakers, immersing the

continued on page 6

The *DAB Answer Series* is an ongoing series of supplements that covers the technology of digital audio broadcasting.

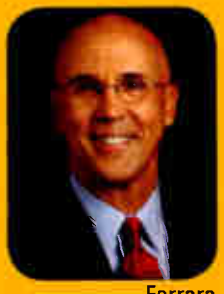
Insight to IBOC - a supplement to Radio *magazine, February 2006,*

Open Mic
Inside the HD Digital Radio Alliance

After the CES convention, *Radio* magazine talked to Peter Ferrara, president of the HD Digital Radio Alliance, about the new group's plans.

Radio: The founding radio groups have committed more than $200 million of on-air inventory to promoting HD Radio. What other advertising is going to be used to promote HD Radio to consumers?

PF: I'm not sure that the Alliance will utilize other media directly, although I think that as we move forward in connection with our retail and automotive partners' advertising, HD Radio will take a presence in that. But for us, radio reaches 96 percent of all Americans every week. I don't really think that we need anything more that has the kind of reach or marketability like our own medium.


Ferrara

Think of it this way: of those other people buy our time to promote their products. We will promote radio on the radio to people listening to radio. It doesn't get much better than that.

Radio: There are concerns that the Alliance is involved in unfair practices by assigning formats to stations. What's really happening?

PF: We want the owners [to join this effort]. This is not an exclusive club. We have everyone in here from the size of CBS and Clear Channel down to two markets for ABC and an independent owner in Philadelphia. The Alliance is open to anyone and everyone who wants to step up to participate in this. And they all should. This is an industry effort. This is not an individual company effort. That's why it exists.

Radio: Are there established deadlines for the Alliance's goals?

PF: I don't think that deadlines would be appropriate. It's very difficult with a new technology and the adoption of a new technology to set a definitive line and say that by *x* date we want to accomplish *y*.

We have a four-prong strategy. The first part is that we have to work with the receiver manufacturers to help them get into the game and develop a radio that is available at a lower price point that will appeal to a broader audience base. The second part is to establish and work in the retail channel. We have to find ways to get these radios on the store shelves in large quantities and in ways that the consumer has easy access to. Right now that does not exist. The third part is the OEM and automotive sector. This is vitally important to the success of HD Radio.

The last part—and arguably the most important—is raising consumer awareness and ultimately consumer demand for HD Radio. That's the real driver of this.

I said to a number of people at CES that it's interesting that the broadcast industry is doing this, because the broadcast industry is the last beneficiary of getting HD Radio into the hands of the consumers. It's the ultimate beneficiary, but the chip makers, the receiver manufacturers, the retailers and the automotive industry will make money before we do. This is a real push for the radio industry to be on a side of the business that is really not our business. If we don't take this approach it's just not going to happen fast enough.

IBOC installations

Cox Radio Miami WFLC, WHQT, WEDR, WHDR
Reverse-fed combiner

Mitch Wein, chief engineer

After 20 years it was time to replace the 10-station Miami FM master antenna system. HD Radio implementation was an integral part of our new system design. After reviewing various system design proposals, the Miami broadcasters—representing five major broadcast companies—voted unanimously for the ERI eight-bay, 32-element, multi-station directional antenna and combiner system. This system provided the most efficient and cost effective transmission scheme for simultaneous IBOC and analog operation with an optimized analog and digital pattern.

The master system is divided into two multiplexed branches with five stations on each branch. The stations are strategically grouped to eliminate the need for group delay compensation modules. Each station injects its IBOC signal via a 7/8" transmission line through a circulator into the dummy load port of its respective analog combiner module. Further enhancement of the IBOC signals was achieved by using ERI constant-impedance bandpass filters with inductive loop coupling, providing a flat frequency response and maximum bandwidth for the reverse-fed digital signal.

The two branches and parallel 6 1/8" transmission lines carrying analog and digital signals are mixed when they reach the antenna power divider. Each power distribution circuit feeds the respective slant left and slant right radiators. This combining scheme permits the use of low-power (200W to 300W) IBOC transmitters to provide comparable analog and digital optimized radiation patterns without additional HVAC, electrical and generator requirements.

In addition to the four Cox stations the antenna also hosts non-Cox stations WMGE, WPOW, WHYI, WMXJ, WMIB and WAMR.

Multicasting.

It's like trying to fit —

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Management has decided to multicast. Which seems like a terrific idea — until you consider just how little bandwidth each channel will get. How will the sound of your station(s) survive these shrinking bitrates? Omnia can help.

New Omnia Multicast with SENSUS™ restores the fullness and depth that bit-reduction steals. Our DSP gurus teamed up with the codec experts at Telos (the folks who introduced broadcasters to MP3 and MPEG AAC). Together, they developed a unique suite of tools to pre-condition audio for HD Radio™ multicasting.

Omnia Multicast with SENSUS codec conditioning, Omnia Bass Management system and distributed look-ahead limiter significantly improves the sound of HD multicast and other bit-reduced streams.

SENSUS technology enhances punch, preserves presence, and reduces artifacts. Even heavily bit-reduced channels (like multicast) can be significantly improved by Omnia running SENSUS. And like all Omnia processors, Omnia Multicast delivers the smooth, clean, pure signature sound that grabs your listeners and holds them hour after hour. No wonder the top stations around the world choose Omnia over all other processor brands.

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The art of surround

continued from page 3

listener in the multi-channel experience, it is possible that the downmix may have problems.

Two things to avoid are delaying the rear channels of any material before passing them on to the encoder, and placing the vocal in the front and rear channels. The Neural Audio 5225 and the upcoming MPEG Surround system use special algorithms that alleviate many of these problems in the downmix quite effectively.

The use of the low frequency effects (LFE) channel is often overlooked. In most downmix scenarios—especially music—the LFE signal is used sparingly if it used at all. The LFE was originally created by the movie industry to provide dramatic effects to the listener. Therefore, if you transfer material and there is extensive use of the LFE channel, monitoring the downmix and even the upmix is crucial. Overuse of the LFE can create too much bass, loss of bass or other undesirable effects, especially on poorly calibrated home theatre systems. The LFE channel should not be used for the bass content of the main speaker channels, but rather allow the bass management of the playback systems to distribute bass appropriately. There are guidelines available from Dolby's and SRS Labs' websites as well as from the Producer's and Engineer's Wing of Recording Academy at Grammy.com.

There are still other issues of debate concerning surround sound encode/decode solutions for HD Radio as well as standard analog broadcast. For instance, the increased amount of L-R (left minus right) energy that the systems are producing and the effect it may have on the analog side of the FM broadcast chain.

Next time, I'll review tests that are underway to address this, provide analysis of the amount of L-R energy each system produces, and a comparison of the different surround encode/decode systems proposed for HD Radio.

Kosiorek is the audio recording, mastering engineer at the Corbett Studio at Cincinnati Public Radio.

***Note**: LFE and bass management are not the same! The LFE channel is part of the playback functions of recorded media such as DVD. Its function and purpose is often mistakenly used for bass management control. Bass management is a separate function that takes bass frequencies from the main surround audio channels and redirects them to the subwoofer, as many smaller monitors are unable to produce low frequencies.*

Steady growth for digital audio

While terrestrial radio continues to develop and market a digital transmission system, other digital audio services, including satellite radio, Internet radio and podcasting, are competing for the same potential listeners. Consumer buying research shows that personal electronics sales will continue to increase in the coming years. Consumer acceptance of HD Radio is a prime concern for stations adopting the technology.

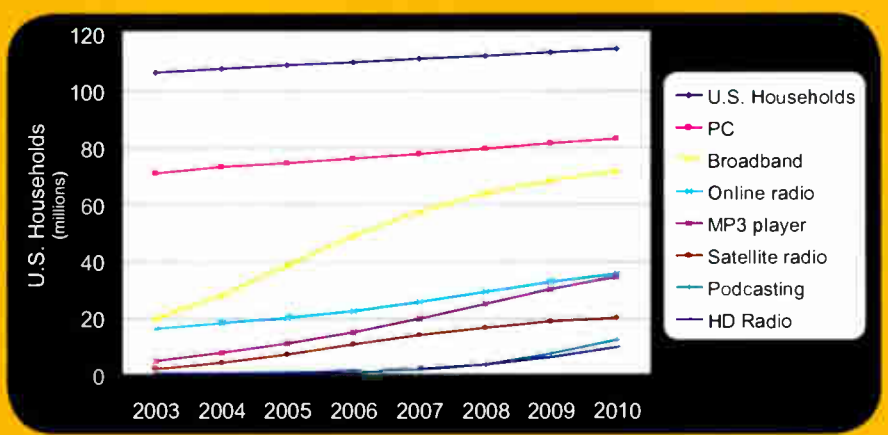

Figure 1. Forecast of U.S. household digital audio adoption.

According to Forrester Research, the number of households that use digital audio in some way will steadily increase over the next four years. Figure 1 compares the adoption of various forms of digital audio within these households, including HD Radio.

Digital audio usage with PCs and Internet radio will track the number of households. Broadband usage is expected to grow at a faster rate, which will likely facilitate the Internet radio, podcasting and media player adoption. Meanwhile, satellite radio's growth will slightly trail the trend.

Podcasting and HD Radio are expected to grow in a similar trend, although they will lag the growth slightly through 2007 before joining pace with it.

Data Source: The Future of Digital Audio, 2005, Forrester Research

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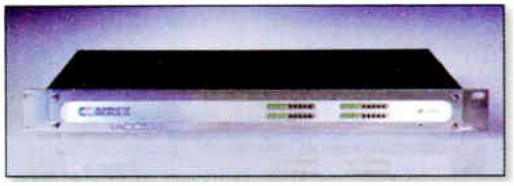
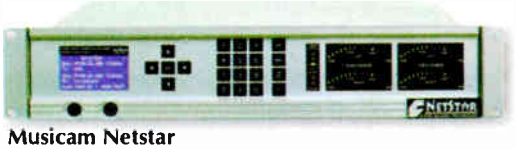
Taking the show on the road

Tieline I-mix G3

G.711, G.722, MPEG Layer 2 or Tieline's own music algorithm. The GSM module provides 7.5kHz of audio bandwidth on the standard GSM network or 15kHz over a high-speed HSCSD GSM network. (The GSM module communicates with a standard POTS codec on the far end.) Tieline's IP software module gives the I-mix the capability to connect to wired or wireless LANs. (To use the I-mix with a Wi-fi network the user simply provides a mini Wi-fi bridge, and then connects it to the I-mix via the RJ45 Ethernet connector.) Audio performance over an IP connection can go as high as 20kHz, stereo, non-compressed, although this requires a data rate of 2.5Mb/s.



Comrex Access



Musicam Netstar

Comrex has many years of experience in building equipment for remotes over plain old telephone circuits, and, not surprisingly, its current line includes all the features and functionality that you would expect. The Matrix is the company's flagship product. The studio end would typically be the rack-mount unit; the Matrix Portable is the unit typically used in the field. It features a remote mixer with one mic-level input, one mic or line level input, a headphone output and a line-level out. Typically the Matrix uses an on-board POTS codec that can provide up to 15kHz of duplex audio response depending on the quality of the POTS connection. However, the user can also add modules to the Matrix such as the Portable ISDN module, the Matrix GSM module or the Matrix Telcell module.

Comrex is also finalizing a new product called Access, which takes advantage of the increasingly diverse set of connection possibilities: POTS, DSL, cable DSL, 802.11x (Wi-fi), 3G data networks, high-speed cellular data networks and the public Internet. It uses the Comrex-developed BRIC (Broadcast Reliable Internet Codec) and will perform at several user-selectable quality levels. HE-AAC and AAC low-delay are also available for use over robust networks.

Musicam is a long-term player in the field of POTS and ISDN codecs. One of several such codecs is the Roadrunner, which is a compact, portable ISDN codec with a built-in mixer. The unit has three-inputs; two at mic level, and one that switches between mic and line level. The unit can deliver 20Hz to 20kHz audio bandwidth with

Stands up to Drive Time.

When your listenership is at its peak and your operators are going full throttle, it's nice to know the Mosaic digital console from Logitek will stand up to heavy use. The Mosaic was designed with extra-rugged panels and frame, which lets you relax even if someone starts getting a little rambunctious with the board. Its sturdy design, easy-to-use controls and advanced features ensure the versatility and operation you need for your facility.

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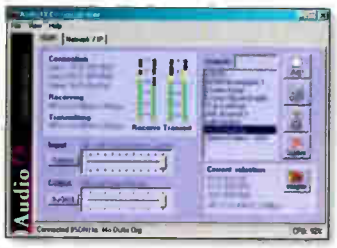

Audio TX Communicator

a SNR of 84dB when using both B channels of the ISDN circuit; it can achieve 15kHz audio bandwidth with only one B channel. The Roadrunner offers the choice of G.722, Musicam enhanced Layer 2 and MPEG Layer 3 algorithms, with connection rates from 56 to 128kb/s.

Musicam also manufactures its own codec that will work via IP: the Netstar. This unit can send and receive high-fidelity audio, contact closures and ancillary data via ISDN, dedicated data lines or IP. It contains the standard algorithms such as G.711, G.722, MPEG Layer 2 and MPEG Layer 3 as well as MPEG AAC and MPEG Layer 4 AAC-low delay. Like the other IP codecs, this unit can deliver uncompressed, 20kHz audio with near-zero delay if the IP connection supports it.

The APT Tokyo is yet another full-featured, multiple algorithm codec. In addition to MPEG Layers 2 and 3, G.711, G.722 and MPEG AAC, it also includes APT proprietary codecs such as Standard Apt-x and Enhanced 16,20 and 24-bit Apt-x. This device features a built-in inverse multiplexer that allows it to use as many as four ISDN circuits, and hence up to 512kb/s data rate. It can also be used over a LAN or WAN, by way of its Ethernet connector or via USB.

AEQ makes several audio codecs, including the Eagle and the Swing. The Swing is a portable codec with a U-interface and S-interface and the standard ability to use one or both B channels of an ISDN circuit. It includes a built-in mixer and headphone amp, and also a digital telephone hybrid. The Eagle is a rack-mount unit that features a dual ISDN interface (U and S); standard algorithms for use with a single B-channel, such as G.711, G.722 and MPEG; the standard capability of bonding both B channels for the full 128kb/s data rate; and the capability to use one B channel for a plain old telephone. It comes with two back-lit displays: one for dialing and one for menu configurations.

Audio TX sells a software package called Communicator that allows the user to turn a PC or a laptop (with an audio card and an ISDN card) into an ISDN codec. The software (compatible with Win 98, NT, Me or XP) includes algorithms for MPEG Layer 2, Layer 3, G.722 and G.711, and can connect with other manufacturers' codecs. The Communicator can also be used over IP through physical connections such as a LAN, Wi-fi and DSL.

The Scoop Reporter E-Z from ATA is another portable remote

Resource Guide

Manufacturers and suppliers of codecs, codec accessories and RPU equipment

AEQ
954-587-7999
www.aeqbroadcast.com

AEV
+39 051 950 350
www.aev.net

ATA Audio
973-659-0555
www.ataaudio.com

Audio Processing Technology (APT)
323-463-2963
www.aptx.com

Comrex
800-237-1776
www.comrex.com

Energy-Onix
888-324-6649
www.energy-onix.com

Harris
800-622-0022
www.broadcast.harris.com

Marti Electronics
217-224-9600
www.martielectronics.com

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www.mayah.com

MDO UK
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www.audiotx.com

Musicam USA
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www.musicamusa.com

Nicom
619-477-6298
www.nicomusa.com

OMB America
800-662-4872
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Orban
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Allen Osborne Associates
805-495-8420
www.aoa-gps.com

Software Authority
877-504-9494
www.softwareauthority.com

Systembase
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Telos Systems
216-241-7225
www.telos-systems.com

TFT
800-347-3383
www.tftinc.com

Tieline Technology
888-211-6989
www.tieline.com

Will-Burt
330-682-7015
www.willburt.com

package, and it has an ISDN and POTS codec built-in. The unit includes a three-input mixer (two mic and one selectable mic/line) and two headphone outputs. MPEG, G.711 and G.722 algorithms are included.

The Orban Opticodec 7000 is a portable device that includes an ISDN codec with the standard algorithms-G.711, G.722, and MPEG Layers 2 and 3. The Opticodec's unique feature is that it includes a built-in digital audio recorder and editing system.

Telos Systems' latest ISDN codec is the Zephyr Xstream, which now includes the MPEG4 AAC low-delay algorithm. The Zephyr Xport is its POTS codec that can be made into an ISDN codec as well with the inclusion of the field-installable ISDN option. The Xport uses AAC Plus audio coding for POTS con-

Taking the show on the road

Orban Opticodec

nections; MPEG AAC low delay for ISDN connections made with an Xstream on the far end; and its G.722 option allows it to communicate with other G.722 codecs as well. The unit offers a built-in mixer with mic and line-level inputs, and independent headphone outputs that can listen to received audio and monitor mixes.

Telos Xstream

Off the wire

Perhaps you are doing a remote 500 yards away from the nearest telephone company demark and there are no POTS lines, ISDN or DSL. Perhaps there are no coffee shops nearby and thus no Wi-fi. Or, maybe you just want to skip wire altogether and use a radio shot for your remote. Well, you're in luck because RPU equipment is still made.

TFT offers the 8888 RPU transmitter and the 8889 RPU receiver. The system includes frequency-agility, selectable deviation on the transmitter (with 20W RF output) and selectable bandwidth on the receiver. The receiver can be controlled remotely with DTMF tones, so that its operating channel and IF bandwidth can be changed. The transmitter includes a built-in mixer with three mic or line-level inputs; a send/return loop for connection to an external audio processor; a built-in peak limiter, and a headphone output for monitoring of the locally mixed audio.

Marti has recently introduced a new RPU transmitter—the SRPT-30. This unit comes with two (factory selectable) frequencies; four front-panel mic level inputs (line level input available on DB connector on the back of the unit) going into its built-in mixer; and up to 30W out. The SR-30 is the current model RPU receiver.

If you get stuck in a situation that there are no phone lines and no way to get an RPU shot out of the remote site, then you could be saved by the Marti Digital Cellcast. It uses a radio link through a digital cellular system for its connection back to the studio; a GSM version is also available. The unit includes a four-channel mixer, with line in and line out connections.

As broadcasters compete with other content providers it is becoming clear that the remote broadcasting is unique to radio. It's a great way to have interactivity with the audience and it often makes clients happy as well. Having a reliable and functionally simple remote system is quite often the key to success of a radio station's engineering department.

Irwin is director of engineering at Clear Channel, Seattle.

Photo on page 22: Greg Sage of KMXV-FM, Kansas City.

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Genuine APHEX

Big, but not so easy

By Mike Pappas

In late September I was asked if I would like to broadcast from New Orleans for the *Toast of the Nation* New Year's Eve event. The idea that New Orleans was going to be in any shape to support a coast-to-coast NPR broadcast was hard to comprehend, but if NPR wanted to do it, I was game.

I flew to New Orleans for the technical walkthrough on Oct. 25. The show was going to be live from the legendary Tipitina's Club. Tipitina's was fully resplendent in a wrap of plywood over the doors. A makeshift spray paint sign announced that NPR was going to broadcast there on New Year's Eve. Despite the outside appearance, the club's inside was in good condition.

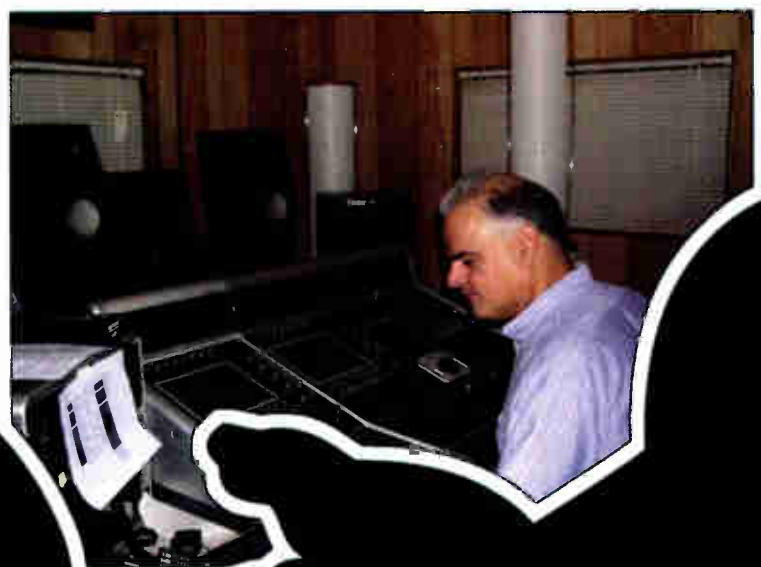
There was a huge amount of logistical work be done to make this happen. First and foremost was figuring out how we were going to transmit the show to NPR master control. Jane Holmes, manager, Remote and Mobile Services at NPR, contacted Bell South and ordered six ISDN lines and one POTS line with symmetrical DSL. As a backup, we planned to use a satellite uplink, but that would increase the costs significantly.

The walkthrough complete, I flew back to Denver with a list of needed items. The first item was a modular office trailer. In the 26 years that NPR's New Year's Eve *Toast of the Nation* had been broadcast, the hosting had always been done from NPR in Washington. This year, NPR wanted us to host the whole network from New Orleans. The trailer would house an announce booth and a place for producers, transmission equipment, communications equipment and a 5.1 surround mix location. Unfortunately, office trailers were in short supply. I was laughed at more than once when I called rental places to rent a trailer. I was told that nothing was available and that no one would commit to a delivery any more than three weeks prior to our event date. I had nightmares that three weeks out we would not be able to rent an office trailer, so my plan B was to rent two motor homes in Denver, load all of our equipment in them and drive them to New Orleans.

Because demand was so high, rental fees for everything were almost 300 percent higher than normal, which stretched an already tight budget to the limit. Additionally, Tipitina's power was marginal and wasn't capable of supporting the broadcast village we were going to build. Finding a generator in an area that was aleady short of generators resulted in more calls to generator rental houses and more laughter. Again, the standard answer was to call three weeks prior to the event to see if anything is available. Plan B was to rent one in Denver and tow it to New Orleans.

Hello telco

In the meantime, Holmes acquired the six ISDN lines and a POTS line with DSL and installed them to the phone pole outside of the club. I had e-mailed her a picture of the phone pole in question to make



sure we didn't have any issues as to which pole I wanted the lines installed on. Everyone laughed at the pole picture, but the lines were installed where I wanted them.

While waiting for genset and modular trailer dates, I needed to obtain a mixing console, codecs, codec preconditioning equipment, surround encoders and a bunch of communications equipment. I had seen the Digico DS01 consoles in action on the James Taylor tour and at the Surround III seminar at the October AES convention. We were going to broadcast three acts from Tipitina's with a short period of time between them, and having a console with total recall and full 5.1 facilities was a must.

I'm not a fan of most digital consoles for several reasons, but the Digico DS00 was the first console that I felt comfortable enough with to risk a show of this level.

Digico was willing to loan one to us, but suggested the DS00 instead because it is better suited for broadcast than the DS01, which is designed for sound reinforcement. Digico shipped the console to KUVO the week before Christmas so we could configure the I/O for the 40 AES-3 inputs and outputs and 16 analog inputs and outputs and test it. We had the I/O installed, the console configured and all the inputs and outputs (digital and analog) tested in a couple of hours.

Harris loaned us a pair of APT Tokyo codecs to feed Washington. I planned on sending three feeds to NPR: announcers on a mono L2 128kb/s feed, music in stereo using the Apt-x enhanced codec at 384kb/s and a backup that I could route to the announcers or the music feed using Apt-x enhanced at 256kb/s. KUVO has an APT Milano, which I planned to use for the music feed and I was going to use one APT Tokyo for the announcers and another for the backup.

Lots of sources

Because we used so many AES-3 sources, I needed lots of AES-3 distribution amplifiers (DA). ATI loaned us a pair of DDA112-XLR AES-3 DAs for transmission. I used my Z-Systems 16.16 router to handle all of the transmission routing.

We also needed wireless mics and IFB equipment, along with additional microphones outside of my collection, so my next call was to Sennheiser and Neumann USA. Sennheiser provided a pile of 3000-series wireless equipment along with SK-5200 hand-held transmitters with Neumann KK105 capsules and in-ear monitoring systems, which we used for IFB.

I needed an additional Neumann KU-100 stereo dummy head (aka Fritz) mic for field sound gathering as my KU-100 was going to be hung in the rafters of Tipitinas. Neumann supplied an additional KU-100 and a pair of KM-184 mics, and Neumann Berlin supplied pairs of TLM-193 and TLM-170 mics. Everything arrived at KUVO on Dec. 19.

Communication was significant for this event. We needed eight IFB channels, three channels of RTS PL with four channels of Telex SSA-424 digital two-wire-to-four-wire hybrids, two stage announce (SA) and a telephone hybrid for communication between the Washington director and New Orleans director. I needed three IFB master panels and a backup. My assistant at KUVO, Will Barnette, went through all of the IFB equipment testing and repairing as needed, along with checking all 12 of the RTS-325 TW PL belt packs and headsets.

The plan for the announcer palace was to make the system totally independent from the rest of the facility. There would be a separate mixer, analog-to-digital (A/D) converter, ISDN codec, Neural Ultralink and AES-3 DA, and this would be stand-alone so a failure in the rest of the facility would not take the announcers off the air. In case of a failure with the announcer codec or ISDN line, I could route the output of the announcer A/D to any of the surviving codecs, and I also had the analog outputs of the Midas Venice 320 console cross-patched into two of the analog inputs of the Digico giving me a couple of ways to make sure that at least we would have announcers if the world came to a halt.

At the other end of the trailer was going to be the 5.1 mix room. We packed all of our equipment including 40 tracks of Direct Stream Digital HD recording on my Genex 9048 with EMM Labs converters and 40 channels of Grace Design 801R and 901R remote-controlled microphone preamps. We figured we would need upwards of six 70GB Ultra 320 Seagate Cheetah III AV-rated hard drives to record the event and Sony AIT III tapes to back it up. We arranged to rent additional EMM Labs converters because I only had 24 track's worth.

The idea was to put the Grace preamp by the stage and run the outputs into the EMM Labs A/D converters. We would feed the DSD outputs of the EMM Labs Converters into the Genex 9048 and take the AES-3 outputs into the Digico. A Rosendahl Digital Audio Clock Server would provide master clock for all converters and the Digico.

Neural Audio provided Ultralink codec preconditioners for all feeds to NPR DC. The most critical of these feeds was the announcer ISDN line. The spoken word is tough on codecs because there is no place to hide the codec artifacts. Additionally, I wanted to use the Neural 5225 system to encode the 5.1 signal.

Finding a home

Three weeks from Dec. 31 we found a modular office trailer and a 40kW silenced generator. I got my first night full night's sleep on Dec. 20 after the contracts were signed and all vendors committed to our delivery schedule.

The truck from KUVO Denver was loaded and left the morning of Dec. 26 and arrived in New Orleans on Dec. 27. I flew to Houston on Dec. 27 and drove to New Orleans, as direct flights were impossible to attain.

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Big, but not so easy

Once in Houston, I called the trailer vendor to make sure everything was set for our trailer to arrive at 10 a.m. at Tipitinas. Things started to go wrong at this point because the trailer vendor realized that our trailer was sitting in Dallas and hadn't been scheduled to be trucked to New Orleans, and there wasn't a driver available to drive it. Of course, the vendor didn't have the trailer size we needed in New Orleans. I began having visions of us mixing the show on the sidewalk in front of Tipitinas and putting the announcers in the back of our rental cube van. Many calls later the vendor found a larger trailer for us to use. The problem now was that the trailer would hang out into the street by a couple of feet. But, at least it's better than mixing on the sidewalk.

The original plan was to park the trailer at 10 a.m. on Dec. 28 and the generator at 11 a.m. The generator showed up at 10 a.m. and the trailer arrived at 11 a.m. This resulted in the generator being sited at the wrong location, which we didn't discover until the trailer arrived. We enlisted as many bodies as we could find to push the 4,000-pound generator to the correct location. It wasn't pretty but we got it in the right spot and nobody got hurt doing it.

The trailer arrived and was parked and leveled. Only then could I walk into it and determine, much to my horror, that the vendor had shipped us a trailer with a different floor plan. The floor plan we needed had an office on each end with an open center section. The one they shipped only had an office at one end leaving us with no place to put the announcers. After several terse calls back and forth to the vendor, they came out the next morning and constructed a wall with a door for the announce position.

We had a tight schedule to complete the announce position

The announcer position in one end of the trailer. It's not the fanciest place but it worked perfectly.

because NPR and WBGO wanted the announcers to feed spots to Washington on Dec. 30. We went ahead and built the announcer palace and hoped that the wall construction would be where we needed it.

Because of the floor plan issues, we had to put the announcers at the end of the trailer nearest to the generator, resulting in a fair amount of acoustical noise. The NPR folks weren't all that happy with the amount of noise the mics picked up.

While I was dealing with the floor-plan issues, Will Barnette and

This trailer housed the broadcast village. The vehicle was slightly wider than originally ordered and stuck into the street.

Dave Kunian constructed the 5.1 mixing room, and John Mikity organized a maintenance area in the back of the cube van and coordinated the cable runs from the trailer to the stage. I powered the ISDN equipment and tested all six ISDN lines. One of the SPIDS was programmed wrong at the central office, so I called Bell South to fix it.

On Dec. 30 we continued to build the various systems. The mic preamps were placed in the club, wired and checked all the way through to the Genex and Digico. I had most of the communication equipment up and running, including the two-wire-to-four-wire hybrids that were interfaced to the Digico so Markos could talk directly to the stage by hitting a talk back button on the console. I also provided a 50W UHF base station with external antenna along with three hand-held radios for roaming.

A balance of power

KUVO has used a Furman IT-1220 balanced power system for the last three years for all events. I have found that balancing power results in a 6dB to 8dB improvement in the noise floor of the system. I had forgotten that the Furman units provide over-voltage protection until about 2 p.m. when the technical power system shut itself off. Initially, I couldn't figure out what had gone wrong because within seconds the technical power was back on line. I noticed that the technical power had turned off but the rest of the trailer was running. I also noticed that the lights had gotten quite bright and when they dimmed the technical power returned. I jammed my Fluke meter probes into an ac outlet in the trailer and measured 120Vac. I set the meter to record minimum/maximum and waited to see what was happening. About 10 minutes later, the technical power went offline again. The multimeter read a max voltage of 175Vac. We had a generator with a major voltage regulator problem.

The good news was that the Furman saved all of the technical equipment because the over-voltage system disconnects the ac if the input exceeds 140Vac. Without this, we might have cooked a bunch of equipment. The generator vendor dispatched a tech to correct the problem, and the generator behaved itself from that point forward. But I never took my eyes off the Fluke, which ran in min/max mode for the next 72 hours.

While I am getting gray hair by the volt with the generator problems, the rest of the crew completes building all the facilities and performs a full check. Friday morning, Dec. 30, rolls around and the ISDN SPID problem is resolved. I can check all the lines with NPR master control. NPR has run out of facilities and we are limited to running the backup at L2 joint 128kb/s instead of

Apt-x enhanced at 258kb/s. Additionally, NPR wants to check the lines using Prima codecs on the announcer and backup. Because the Prima codecs don't have a data handshake, the APT Tokyos have to be manually told that there is a Prima on the other end and then re-booted. We get everything configured and dialed up and everything runs fine without any drop-outs or data problems.

Day of the show

On New Year's Eve and we arrive on-site at 9 a.m. The bands are scheduled to load in at 10 a.m. We are going to record and feed a parade through the streets of New Orleans to Washington. Our crew and the band's crew start building the stage. The plan is to sound check from the last act to the first act. We didn't get a full sound check from the last act, and the second act didn't have a full complement of musicians. Additionally, the first act was missing the main musician for the sound check.

I attach the KU-100 to a 7' pole and feed a Marantz flash recorder and begin recording the brass line in the parade. After the performance, I gave the flash card to Josh Jackson for editing and to FTP to NPR. The DSL, which up to this point had been screamingly fast, is now so slow we can't FTP the file in time. NPR Master dials our ISDN lines and we ship it in real-time until I get a call from NPR asking why the feed is in mono. A check of the APT Tokyo shows that it is connected with G.722. A call to NPR Master and I find out that today they are using Telos Zephyrs instead of the Primas we used on Friday. The Zephyrs have the data handshake but because the Primas don't, we had to manually configure the Tokyos. I reconfigured the Tokyos for auto handshake, reboot, then have Master reconnect. Luckily, we manage to get it there just in time. At 5 p.m. we go live with the announcers to NPR.

We were greeted by this make-shift sign. Fortunately, the club's interior was completely intact.

The doors opened at 8 p.m. and the first act was onstage at 9 p.m. The sound check issues haunted us. The second act decided to sing into the horn mics for the whole set. And the third act sax player wasn't happy with the monitor mix (because he didn't show up to check it during sound check) and it fed back a couple of times.

This is one of those once-in-a-lifetime events and I know that the satisfaction of putting New Orleans back on the map after the devastating hurricane made all the effort worthwhile.

Pappas is chief engineer of KUVO-FM, Denver.

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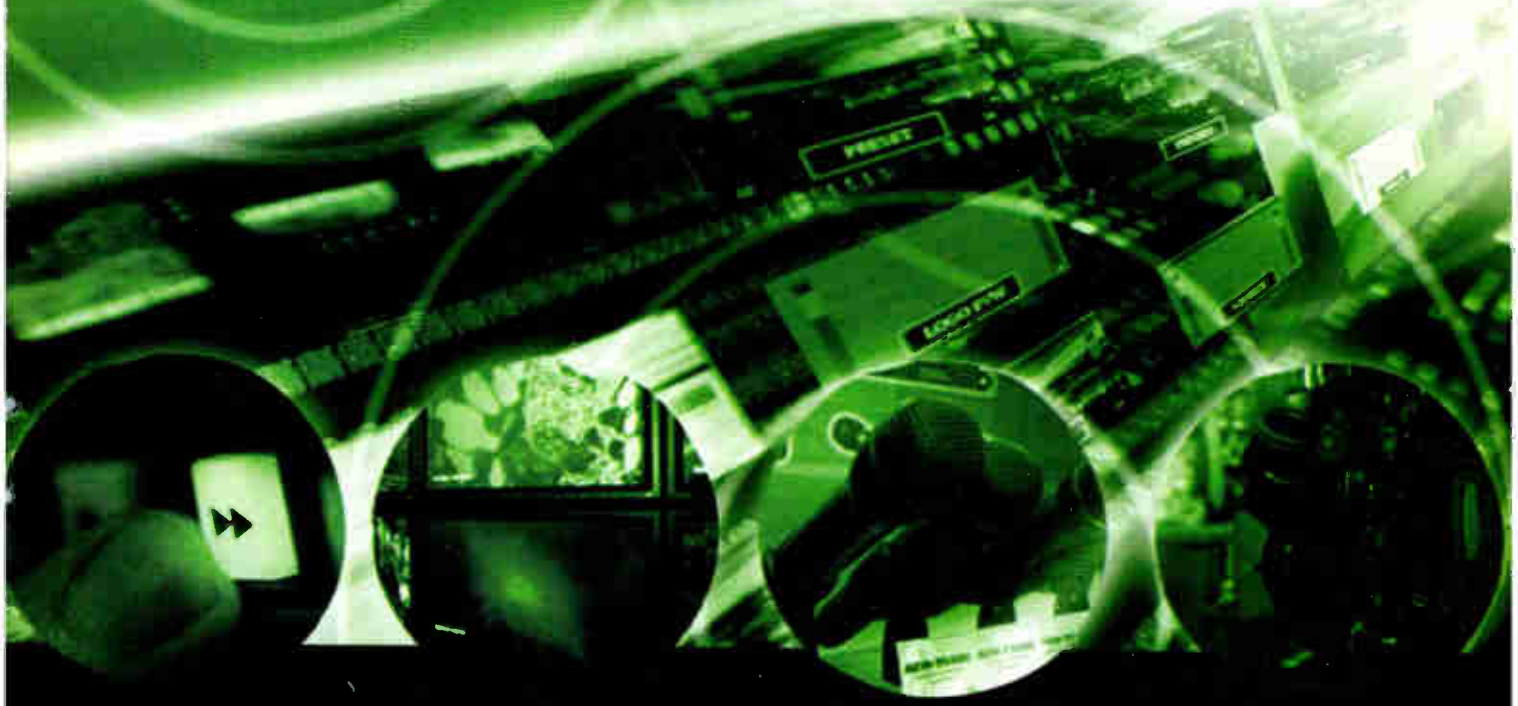

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Preparing for the gold

By Conrad Trautmann, CPBE

Fascinating, fast and freezing, but not frantic.

For two weeks in February, Torino, Italy, is the center of winter sports activity. Westwood One, the radio rights holder for the United States, began planning for this year's coverage during the 2004 Summer Olympics in Athens. While on-site in Greece, we kept a running list of things we wanted to upgrade or change. That list grew to be three pages long. It became an essential guideline for the planning and budgeting process that commenced when we returned from Athens.

We kept the remote kit together and duplicated most of the Athens setup because there was only about a year between the time the equipment returned to the United States and the time staging needed to begin for Torino. In the interim, we stored the equipment off-site so it wouldn't be touched or picked through for other projects. We needed to purchase a few more computers for Torino, but we will re-deploy all of the computers used in Torino throughout Westwood One once they return because by the summer Olympics in 2008 they will surely be obsolete.

During the summer months of 2005 we ordered the equipment that we would need. This included an expansion to the SAS 32KD router from a 64x64 system to a 96x96 system. In Athens, we filled the router and discovered that there were sources that we had not planned for. Most of this added capacity was used for a full effects feed from every venue. Athens was the first time that we had such a feed for every venue since we have covered the Olympics. Previously, we would take the effects feed from a TV feed or simply leave a microphone open courtside. The difference now is that the host broadcaster has a full effects feed. The swish of a skier flying down a hill will be much clearer during the coverage. All of those additional feeds needed extra inputs on the router. In addition, we've expanded our coverage in Torino by adding a radio row. Each of our affiliates now has a dedicated output of the router for its own use.

High regard for quality

Once again, all the audio is produced uncompressed and transmitted to the United States using digital linear audio cards over a T-1 circuit. We purchased new T-1 equipment from Harris Intraplex and are using PT-350 cards for transmission. We purchased Edirol R-1 digital recorders for our reporters to use for interviews, which record WAV files. In Athens, our producers and editors appreciated the speed at which they could transfer a file from a digital recorder to a computer for editing. In the past, they would roll an interview into the computer in real time from DAT or Minidisk. Now it's simply a drag-and-drop procedure. It also improved the quality of our coverage, because we can get to air much faster with interview audio.

As mentioned earlier, our coverage has expanded in Torino with the addition of radio row, in which we host affiliate radio stations on-site at the International Broadcast Center (IBC). We're hosting stations from New York, Los Angeles, Detroit and Washington, among others. Like our setup at the Grammys or the Final Four, we provide each affiliate a full remote setup for each affiliate, which includes a mixer, two microphones, headphones and a computer. The computer has Internet access and a soft-panel that controls an output of the SAS router. This gives each affiliate access to any source on our router. Plus, it has editing software so the affiliate can edit our audio or its own for playback through the mixer. We also provide transmission to and from New York over the T-1. In the United States, a station can dial into a dedicated ISDN codec in New York to retrieve the audio directly for that station.

We built three control rooms and one studio in Torino. One control room is dedicated to our around-the-clock short-form coverage. The second, identical control room acts as an emergency backup to the first and is used for production of the play-by-play coverage of hockey. The last control room is paired with a studio for our long-form daily

Site surveys were completed in November.

Studio A begins to take shape as the equipment is installed.

The transmission racks are connected.

wrap-up show and any miscellaneous production. The control rooms use Logitek Roc 10 consoles, which have been serving us well since they were purchased for our coverage of the 2000 Summer Olympics in Sydney, Australia.

This is the second Olympics for our Enco Dad Pro 32 system. Its debut was in Athens. Being able to load all of our formats in advance, have commercials instantly flow into a schedule and being able to make changes on the fly really added to the efficiency of the production over previous Olympics. The Westwood One commercial traffic system produces an ASCII text file of our log and Enco engineers wrote a routine that allows the log to be imported into the system. The Enco is programmed for each of our three program streams (long-form, short-form and play-by-play) and automated to turn the faders on and off on the audio console and start our sounders at the exact times needed. We synchronize the computer clocks to SMPTE time code from a GPS master clock. Because we are synchronized on time, we set the formats to start the broadcasts exactly on time. It takes control for the announcers, especially on the short-form reports. They don't need to worry about pushing anything except the button to start the commercial at the end of their reports.

First-hand survey

On Nov. 11 and Nov. 12, 2005, Westwood One Vice President of Sports Chris Castleberry and I visited Torino to survey the site of the IBC and the venue sites. That gave us an opportunity to work out any last-minute logistical details prior to shipping our equipment. We spent two days in Torino, the first day visiting the event venues located in the city of Torino and the second visiting the mountain venues.

The city hosts most of the indoor venues, such as the main Olympics Stadium, ice hockey and speed skating. This is where the IBC is located. The IBC is one of the most exciting places to be if you're in the media, because this is literally the hub of all feeds for the Olympics TV and radio coverage to all countries. Walking down the main hallway in the IBC, you pass the broadcast facilities of every major broadcaster in the world. At the IBC, all of the venue feeds are brought back to a main distribution point. From there, the feeds are run through distribution amplifiers and are handed off to the various media organizations. We visited our space in the IBC to make sure that the rooms were built as we specified and to measure the space to make sure our equipment would fit.

During our visits to all the venues we checked the broadcast location. In most cases, we could stand in the spot where our crew will be during the games, which enables us to see the vantage point of the event. This is important for our announcers so we know how they will be able to view the actual events for live coverage purposes. We look for an unobstructed view. We also check access to the broadcast location. In some cases, we may have one announcer covering multiple venues, so access in and out can be important with regard to the timing of getting from one place to another. Also, we check the transportation logistics to make sure our staff knows how to get around. Some of the mountain venues, for instance, are not served by coach buses because of the tight turns in the roads leading up the mountainside. Crews need to transfer from the coach bus to a smaller shuttle to get to where they're going. The mountain venues are at least a one-hour trip west of Torino; a little longer to the farthest venue.

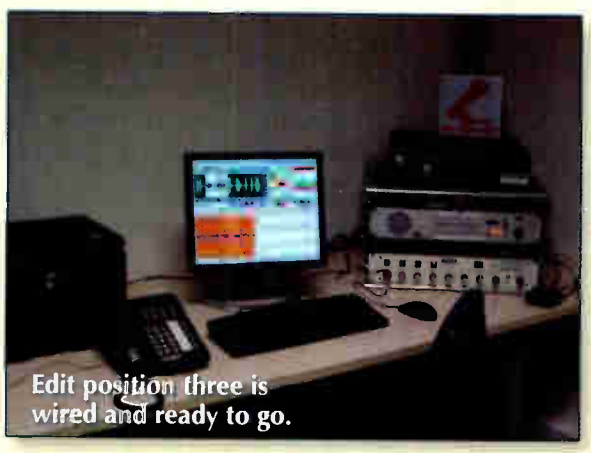
Taking inventory

Our equipment uses 137 road cases and was shipped Dec. 9 for delivery on site to the IBC at the beginning of January. Our engineering team arrived on site Jan. 16 for its 45-day trip. The first two weeks were our setup time to build the studios, run the wires and turn everything on. During the third and fourth week the production staff arrived and learned how to use everything as it began preparation for the opening ceremonies. And then we're live for just over two full weeks. We found our breakdown takes one full day with four people packing.

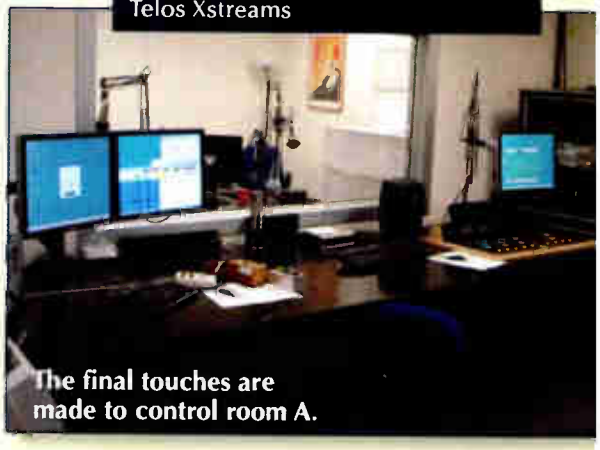
Set up at the IBC during the first two weeks is made easier by prewiring all the equipment before it leaves New York. Almost everything remains in the road

Equipment List

Dell computers
Dixon NM250-MKII
Edirol R-1
Enco Dad Pro 32
Genelec 8020
Harris Intraplex STL Plus
Fostex 6301B
Logitek Roc 10 and Audio Engine
Marantz PMD660
Metrosource software
Rhode NT2
SAS 32KD
Shure SM58
Symetrix 425, 528E
Telos Xstreams



Edit position three is wired and ready to go.



The final touches are made to control room A.

Preparing for the gold

cases once it arrives on site, which makes direct wiring of the equipment in New York possible. Once on site, cables run from the studios back to the transmission room. We used multipair CAT-5 that breaks out to an RJ45 panel in each room and multipair audio cable to Amphenol connectors for the audio runs. The transmission room is located in a room adjacent to our studios in the IBC. Our design approach is to build the space as if it were a radio station. Four studios and the edit workstations all come back to the transmission room via home runs. All of the venues are also brought back to the transmission rooms via four-wire circuits. The host broadcaster manages everything from the venue to the IBC. Each venue has a mixer and headphones that are controlled on site by a technician dedicated to the facility. From there it is sent over the four-wire circuit to us. We transmit a mix minus with IFB from the IBC to the talent, and that is selectable depending on which studio or editor has the program live at that time.

Everything runs in and out of the router that also serves as the intercom system. The main program outputs feed the T-1 equipment to New York. We have metering and monitors across the outputs for a final assurance that we are actually transmitting. Symetrix 425s are placed inline as a final limiter in the chain before it hits the T-1; No processing, just limiting to prevent overshoot and distortion on the line.

Finally, a "barker" is put on the transmission paths from the IBC. It appears as a source on the router that is fed with a consumer MP3 player set to loop. It was the least expensive alternative.

Trautmann is senior vice president of engineering for Westwood One, New York.

Timeline

Planning for the Olympic broadcast begins several months in advance.

6-1-2005 – Equipment list finalized and budget approved during month of June.

7-1-2005 – Equipment ordered. This provides an eight-week window to get everything to NY in time for staging.

8-29-2005 – Equipment in NJ storage unit is transferred to NY Broadcast Center for staging. This provides 11 weeks to set up and test everything prior to shipping.

10-15-2005 – Operations/engineering meeting in NY to review all details of broadcast.

12-4-2005 – Equipment loaded and shipped to Torino. Shipping normally takes six weeks, but nine weeks are to allow for the three holidays: Thanksgiving, Christmas/Hannukah and New Year's.

1-16-2006 – Tech team arrives on site to begin installation. This allows the same amount of time before of opening ceremony that was allotted in Athens, which was perfectly timed.

2-10-2006 – Opening ceremony.

More online

Additional information and photos from the Olympics are online at www.beradio.com

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The Remote Replay provides an up-close look at the technology in use at the remotes featured in *Radio* magazine On Location articles. The highlighted manufacturers are leaders in the industry, and the Remote Replay allows them to showcase their products and services.

Turn to the Remote Replay for the insight on today's leading products and services in use at the top events being covered in radio.

Logitek ROC consoles

From the ROC to the Mosaic, Logitek consoles have staying power. Now attending their fourth Olympic games, our ROC consoles continue providing solid, stable performance. Like the new Mosaic console (pictured with the ROC above), the ROC console is a flexible control surface for the Logitek Audio Engine, a full-featured digital audio router. Logitek consoles are built to last, and even though the ROC is no longer available for sale, its legacy of durability continues with the Mosaic. See for yourself why Logitek is the choice of discriminating broadcasters—both on location and in the studio.

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Audioarts R55E

By Chris Wygal

College radio stations are known for eclectic programming, inexperienced air talent and cappuccino spills on the equipment. And while most control consoles can't do anything about bizarre programming and cappuccino spills, there is a console that's easy to operate and accommodating to green broadcasters: the Audioarts R55E.

In July 2005, Liberty University was ready to revamp the master control room and news room at 90.9 The Light, the student-operated FM facility. The goal was to create two identical control rooms that could go live to air or be used for training. The station trains more than 50 students per semester, so the traffic in and out of each control room is considerably heavy. Within three to four weeks of enrolling, students have their hands on the controls in practice or on the air. Because of the training nature of the facility, the heavy on-air schedule, the need for a low learning curve and the budget consciousness of administrators, a solid small- to medium- market console was in order. When the GM asked what type of control console would best meet the needs of the station, without hesitation I pointed him to the R55E.

Performance at a glance

- Flip-up meterbridge
- Illuminated LED switches
- Logic programming dipswitches
- Two stereo, two mono program buses
- Optional telephone caller input

User friendly

The R55E follows a traditional modular layout that is familiar to seasoned broadcasters and easy for new broadcasters to understand. Assigned buses on each channel include program, audition, mono and pre (a pre-fader output bus). Each channel can be cued to a built-in speaker in the meter bridge. The green LED timer on the bridge aids in keeping stop sets brief, and is triggered by turning the mic channels on. The meter bridge also contains two traditional backlit meter sets. One is dedicated to program, and the other is switchable between the external input and the assign buses. This is a great teaching tool. As soon as the R55E was installed, I had the switched meter on external and the students could see the difference between the raw program output and the processed air feed. When they actually saw what on-air processing looks like I could see lights coming on in several heads.

I happened to be at the studio when the first student started his air shift on the R55E. I was amazed at how quickly he assigned each channel to program for phone calls or for recording. He plugged in his headset, and quickly found the external monitoring assignment and chose to monitor his show off-air. In short, the R55E is intuitive. The student had experience on the facility's old console, but within minutes was ready for his show on the R55E. The clean, modular design offers plenty of assign and monitoring options, but it doesn't overwhelm a board operator.

Engineer friendly

From an installation perspective, I was pleased with the termination and hook-up process. Each input module is connected through supplied DB-25 connectors, which house A and B audio inputs and logic connections. The DB-25 connectors come with pins and a crimp tool. I measured and pigtailed all the DB-25s before installation and finished 12 input modules, two output modules and a line selector module in about four hours. The use of DB-25 connectors makes the entire process fast and easy, plus the modules are simply unplugged if one ever needs to be moved or replaced.

Each module features left and right trimpots just under the meter bridge, so level tweaking is done quickly and easily. Near the trimpots is a set of dipswitches that allow for easy muting, talkback, tally and logic assignment changes. There is no need to dismantle the R55E. All

changes are completed by simply lifting the hinged meter bridge. The modules pop out of the mother board easily. If, for example, you want to move the main mic module simply pop it out and move it (of course, powering down the console first is suggested).

I installed an optionally ordered line selector module for the R55E and hardwired it to the B side of channel 12. Using the selector spares several channels. The station has direct feeds from several facilities around the campus for sports and church broadcasts. These feeds all come into the line selector module. The students just punch up "Vines Center" on the line selector module and the basketball game comes up on channel 12B. Essentially, with the line selector the R55E becomes a 29-input console.

The R55E 12-module chassis takes up less space than the previous console so the students are happy with the added desk space. Instructors are able to familiarize students with the operation of the console in a little less than an hour. Since the installation, I have not received any phone calls about how the console operates, so it's easy to assume that the students have mastered the R55E in a brief amount of time. In addition to the easy learning curve, the console improved the overall sound of the station.

The console has more than met the needs of 90.9 in that the installation was seamless, the students quickly learned how to use it and the administration liked the price. With several available options, the console is customizable, and any medium-market radio station will fall in love with the design concept and service they'll get from the R55E.

Wygal is the programmer, engineer and Web designer for WRVL in Lynchburg, VA.

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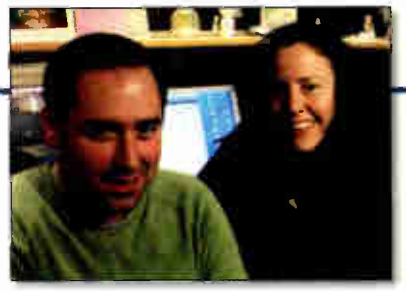

Neural Audio 5225

By Mike DePolo and Lucy St. James

When Radio One first installed HD Radio transmitters for its stations in Philadelphia and began broadcasting a digital signal, the engineers at its stations were impressed by the lack of multipath and increased stereo separation. The question was, "Would this be enough benefit to catch the ears of listeners?" Several Radio One stations were adding 5.1 to their broadcasts, but it wasn't clear how the Philadelphia stations would handle this conversion within their all-analog facility. Beyond that, the group had only recently completed construction on an analog facility, and was not ready for a digital conversion.

Performance at a glance

AES-3 I/O
32kHz to 48kHz sampling rate
Uses watermarking technology
Transports surround with two-channels
Remote control via RS-485 and USB
Accepts external word clock

An engineer's view

After some investigation I spoke with Ken Wallace, the chief engineer from our sister stations in Detroit. He told me that Detroit recently added Neural Audio 5.1 capability to one of its studios. When he told me that the stations had begun producing 5.1 digital content almost immediately after the installation of the Neural processors, while using their existing studio consoles, I was intrigued. I contacted Neural Audio to find out how the Neural system would mesh within our existing stereo facility.

Neural explained that its approach allows producers to work their usual magic with standard editing software (adding a few more channels, of course), and then the Neural system downmixes the content to a watermarked stereo file as the final step. The output of the Neural 5225 Downmix can then be treated as normal stereo for storage on our servers, where it is played back later for broadcast to our listeners. The files also maintain surround encoding for easy portability in exchanging stereo files through e-mail or FTP with our stations in other markets. At the consumer receiver end of the chain, the music and content can be listened to in mono, stereo, matrix surround, or 5.1 surround using the Neural Upmix decoder.

Neural arranged to come to Philadelphia to help with the installation in our production studio. Our studio uses a ProTools Digi002, which natively was not designed for 5.1 production. With the addition of an RME ADI8 Lightpipe to AES converter, we had more than enough channels of I/O to accommodate the extra channels needed for surround sound. We then attached the Neural 5225 Downmix via the RME converter. This configuration allows individual tracks to be routed from Pro Tools to each of the 5.1 audio channels within the Neural 5225 Downmix. The Neural 5225 Downmix then returns the stereo watermarked version of the 5.1 mix that can be recorded onto a separate track in Pro Tools or directly bused to our Wheatstone console for storage in our automation system.

To monitor our newly created 5.1 content, we installed a Neural 5225 Upmix unit. This box was wired to the stereo console monitor outputs and then directly to the Blue Sky amplified speaker system. This was an easy way to monitor 5.1 without defeating the Wheatstone's microphone mute and control room volume control. With the addition of two Neural 5225 boxes and some speakers, we were ready to go.

A producer's view

As production director of Radio One Philadelphia, it took a few minutes to get used to the newly added surround channels. Initially, I created a checklist to remind me of import and I/O settings until I got used to working with six channels rather than two. But it didn't take long for me to understand the added benefit of Neural Surround Sound.

It was clear to me when two of the top sales execs were escorting a couple of ad agency clients though the studios. I had just finished a promo and they were blown away by the energy, motion and movement of the piece. They had no idea that you could create that kind of sound on the radio. Surround Sound gives new life and attention to sweepers, promos and production.

Technically, it is a breeze to set up a session in Pro Tools using Neural Surround Sound. After opening a new session, (I have a template that starts with eight tracks including four mono tracks), I move to the setups menu and open I/O

Setups. In the output mode I open Import Settings. Neural also places a surround.pio setting in Pro Tools, which is then highlighted and opened. Then, I name the outputs in the interface with the corresponding channel.

Setting up sessions

For instance, the center speaker would be the mono voice tracks, the front speakers would be tracks four, five and six, the rear speakers would be track seven—left surround—and track eight—right surround. I pick and choose which tracks are designated with each speaker. You can have as many right and left surround speakers as you need. The only negative for me right now is that my current Pro Tools template only allows mono channels to be routed to the rear surround speakers, but I've been told that this can be easily reconfigured. For now it does, however, work wonders for crowd noises, allowing them to creep up from the rear speakers, just like in a real concert.

After setting up the outputs I add the final track. This is done in Pro Tools by selecting the File menu and choosing Add Track, One Track, Stereo, Aux 1. The input of this track is "Watermark Stereo;" the outputs are one and two. By using this approach, everything that is sent, even to clients, is watermarked with Neural Surround Sound.

Imagine crowd noise, sound effects and production elements moving from front to back and left to right. Sweepers swirl in sound, making the calls stand out. This is the impact programmers will demand and expect from digital radio. It was easy to use and brought an added dimension to my work.

Once digital radio gets off the shelf and in cars, servicing the listeners with surround sound production will be the norm. Having a system that works easily with Pro Tools and delivers incredible sound can give you a running start within digital radio.

DePolo is chief engineer of Radio One Philadelphia, which includes WRNB, WPHI-FM, and WPPZ-FM. St. James is the production director.

Neural Audio

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New Products

By Kari Taylor, senior associate editor

www.beradio.com

CD player
HHB

CDP-88: A 1RU CD player, this unit offers 24-bit Delta Sigma D/A converters, analog and digital connectivity and the ability to sync to Word Clock at any frequency from 32 to 96kHz. Discs are tray-loaded, not via

a slot in the front panel. Compatible with 8cm and 12cm discs, the system plays CD and MP3-CD from CD, CD-R and CD-RW discs, with the capability to play unfinalized CD-R/RW discs and indicate error rates via the front-panel display.

310-319-1111; fax 310-319-1311
www.hhbusa.com; sales@hhbusa.com

CD copying and printing system
Primera Technology

Bravo XR Disc Publisher: This unit automates the process of recording and direct-to-disc printing of 50 CDs or DVDs at a time. A robotic arm transports the discs to the drive to be burned, and then moves the discs into the integrated 4800 dpi color printer. All supplies and the finished discs are accessible from the front of the unit, which allows it to be placed on shelves or mounted in 4RU. Two Bravo XR systems can be stacked and operated from one PC. Each unit includes a copy of Primo DVD burning software from Sonic for PC and Charismac's Discribe Software for Mac users. Sure Thing CD Labeler Primera Edition labeling software is also included for graphic design.

800-797-2772; fax 763-475-6677
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Audio processor
Omnia Audio

Omnia Multicast: The Omnia Multicast audio processor with Sensus technology helps HD Radio broadcasters deliver multicast audio. Sensus is a suite of audio enhancement tools that predicts the effects of the HD Radio codec and counters problems. The processor features a 48kHz, 24-bit audio processing platform with 384kHz internal sampling rate and a three-band dynamic peak limiter with a feed-forward/feedback design and intermodulation distortion reduction, plus wideband AGC. The unit also offers bass management EQ with as much as 12dB of bass boost and accepts digital inputs from 32kHz to 96kHz.

216-241-3343; fax 216-241-4103
www.omniaaudio.com; info@omniaaudio.com

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Stormin Protection Products

Case Ground: This system prevents lightning from coming up the case ground. Attach the black wire to the equipment case ground or metal frame. Attach the red ground wire to the grounding system or the rod attached to the unified grounding system.

888-471-1038; fax 727-548-0867
www.storminprotection.com
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Audio editing software
Adobe Systems

Audition 2.0: In Adobe Audition 2.0, a new low-latency mixing engine with ASIO hardware support allows greater creative flexibility, with real-time effects and input monitoring. Automatic delay compensation provides synchronization while mixing an unlimited number of tracks, including as many as 80 simultaneous input and output devices. The mixer panel allows users to set up the type of routing needed using inputs, outputs, sends and buses. Parameter automation can be recorded and adjusted in the mixer itself, or in the new automation lanes in the timeline. Users can also add 16 sends per channel. Use CPU power more efficiently by creating sends on several tracks that go to a bus with a reverb or other effects applied.

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Sound effects library
Mediatone Music

Noisefuel additions: Each of the Noisefuel products is created by a team of sound design specialists and packaged as one or two CD-ROMs, with content being provided in WAV and MP3 formats. The newest editions to Noisefuel are The Sci-Fi Collection, Foley Footsteps and Transitions, Whooshes and Swipes.

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Contributor Pro-file

Meet the professionals who write for Radio magazine.
This month: On Location, page 38.

Conrad Trautmann III, CPBE
Sr. Vice President, Engineering & Technology
Westwood One Radio Networks
New York

Trautmann oversees radio engineering, telecommunications and Information Technology for Westwood One, which includes Westwood One Radio Network and Metro/Shadow Traffic. He is active with the SBE and is currently serving a term on the national board of directors. He is a past chairman and current treasurer of SBE chapter 15 in New York. He was recognized by the American Society of Business Publication Editors for his November 2000 *Radio* magazine Facility Showcase on Sirius Satellite Radio.

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THE RADIO TECHNOLOGY LEADER

Written by radio professionals
Written for radio professionals

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Sign Off

By Kari Taylor, senior associate editor

www.beradio.com

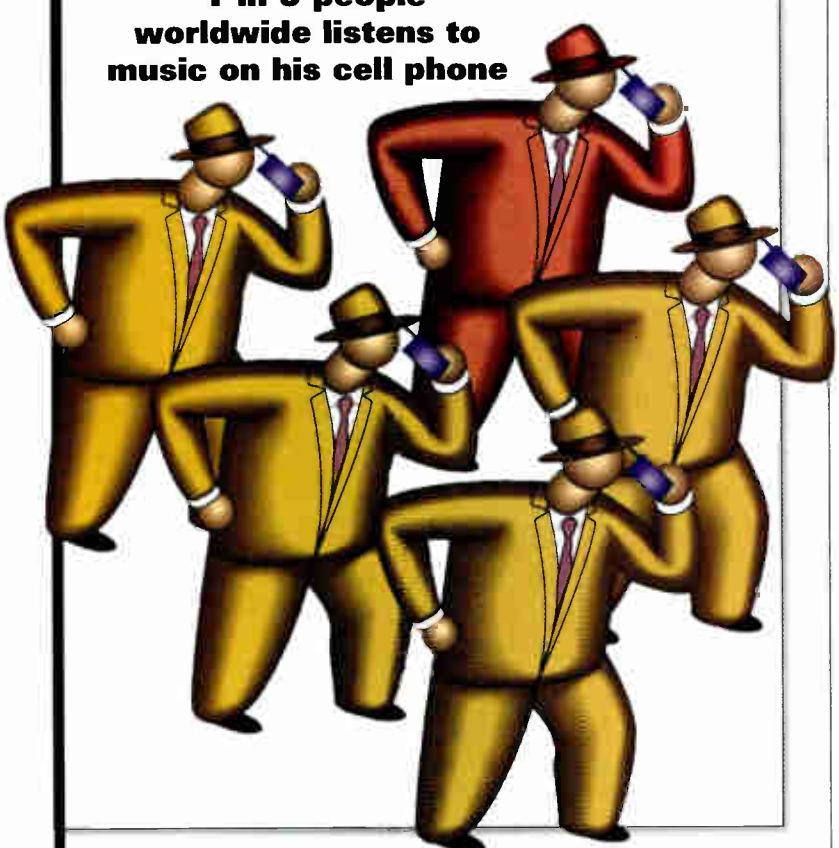
Do you remember?

In 1981, tape loops were common technology for use as a profanity delay. Thus, a snapped tape was a common problem for radio engineers. Eventide's BD955 broadcast delay offered a digital memory to replace the tape loops. The unit's "auto catch-up" feature eliminated the need to fill the delay period. Instead, as the Dump button was pressed, the delay instantly went to zero and the objectionable material was deleted. Then the BD955 automatically rebuilt the delay as the program continued.

When not in use as an obscenity delay, the system could be used as a production tool. Any delay from 6.5 milliseconds to the unit's maximum could be set from the front panel, so the engineer received a variety of reverb, doubling and other vocal and musical production effects. The unit was available with maximum delays of 1.6, 3.2 and 6.4 seconds and with 15kHz or telephone-compatible 7.5kHz response.

Sample and Hold

1 in 5 people worldwide listens to music on his cell phone



Source: TNS Research, www.tns-global.com/gti2005.

That was then

According to a magazine ad for the Zenith tubeless pocket radio, the Royal 500 offered seven transistors, "up to 15 times more volume than radios of equivalent size and up to 30 times more sensitivity to bring in more distant stations." The radio provided 400 hours of battery life from one set of mercury batteries. A user could also operate the radio for a "fraction of a cent an hour" on four long-life penlite batteries.

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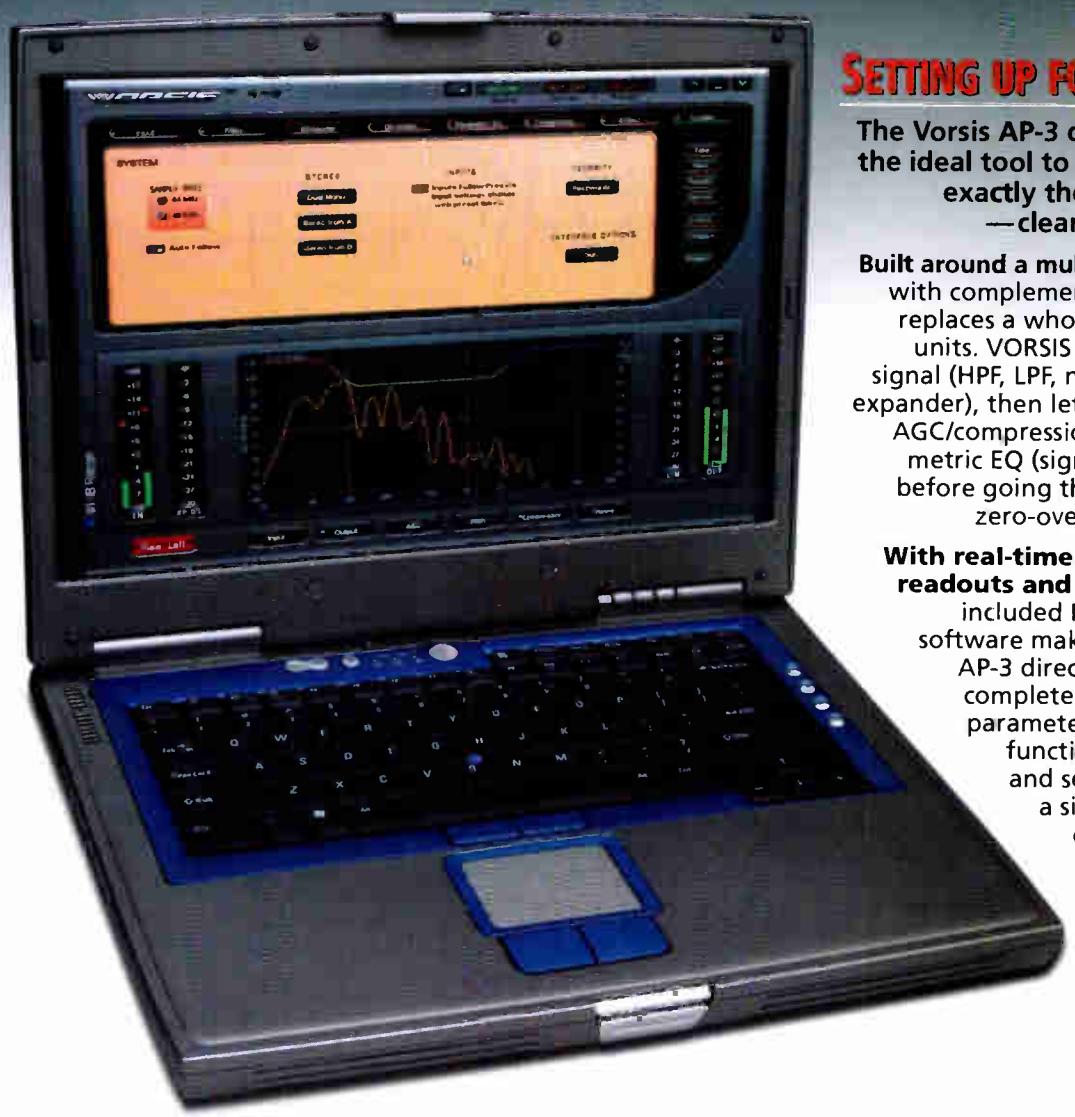

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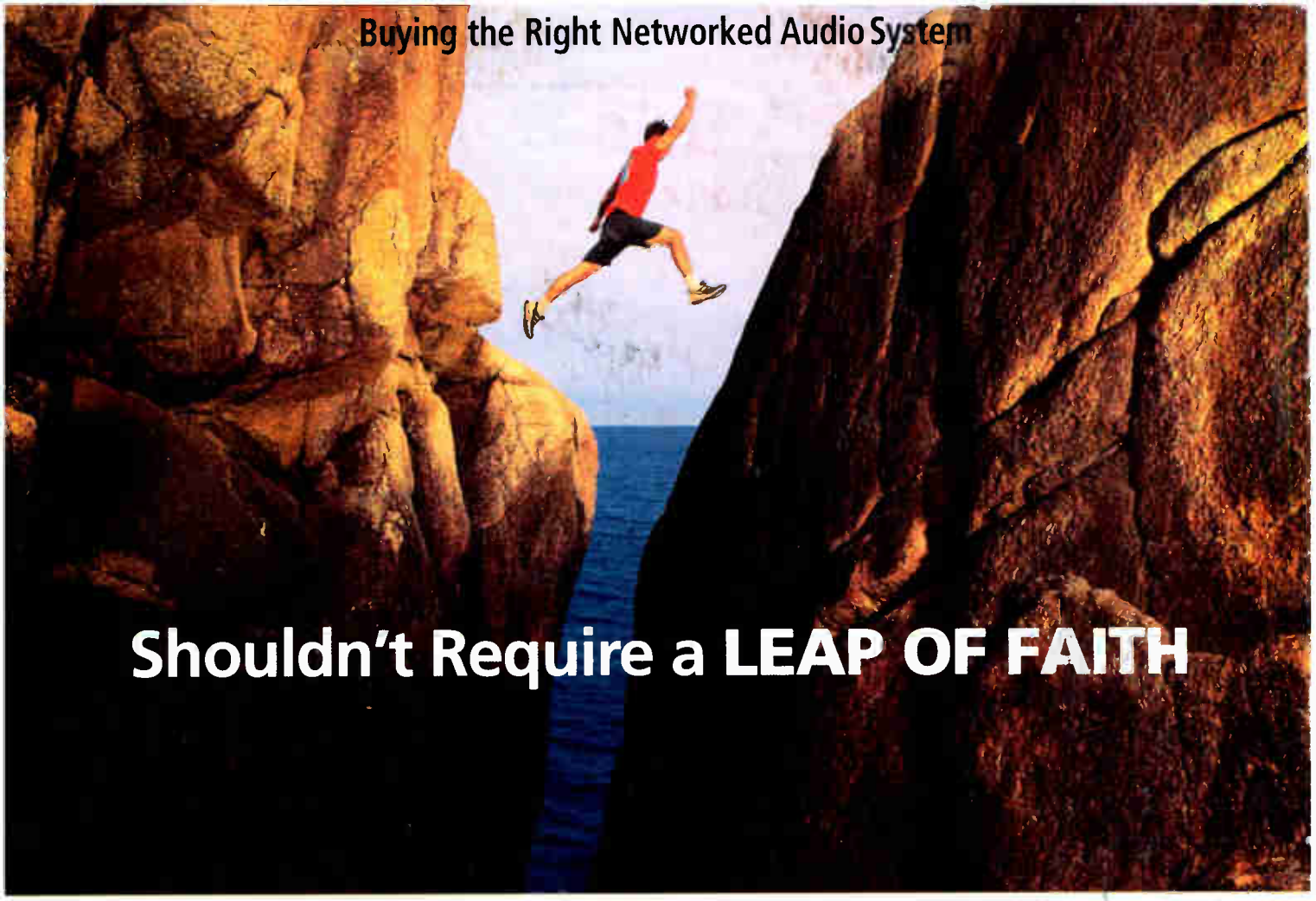

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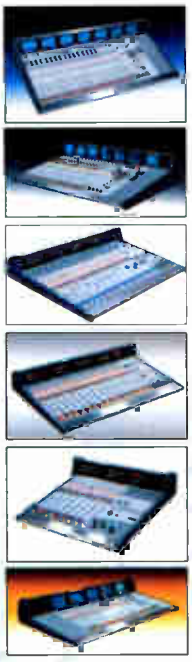

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