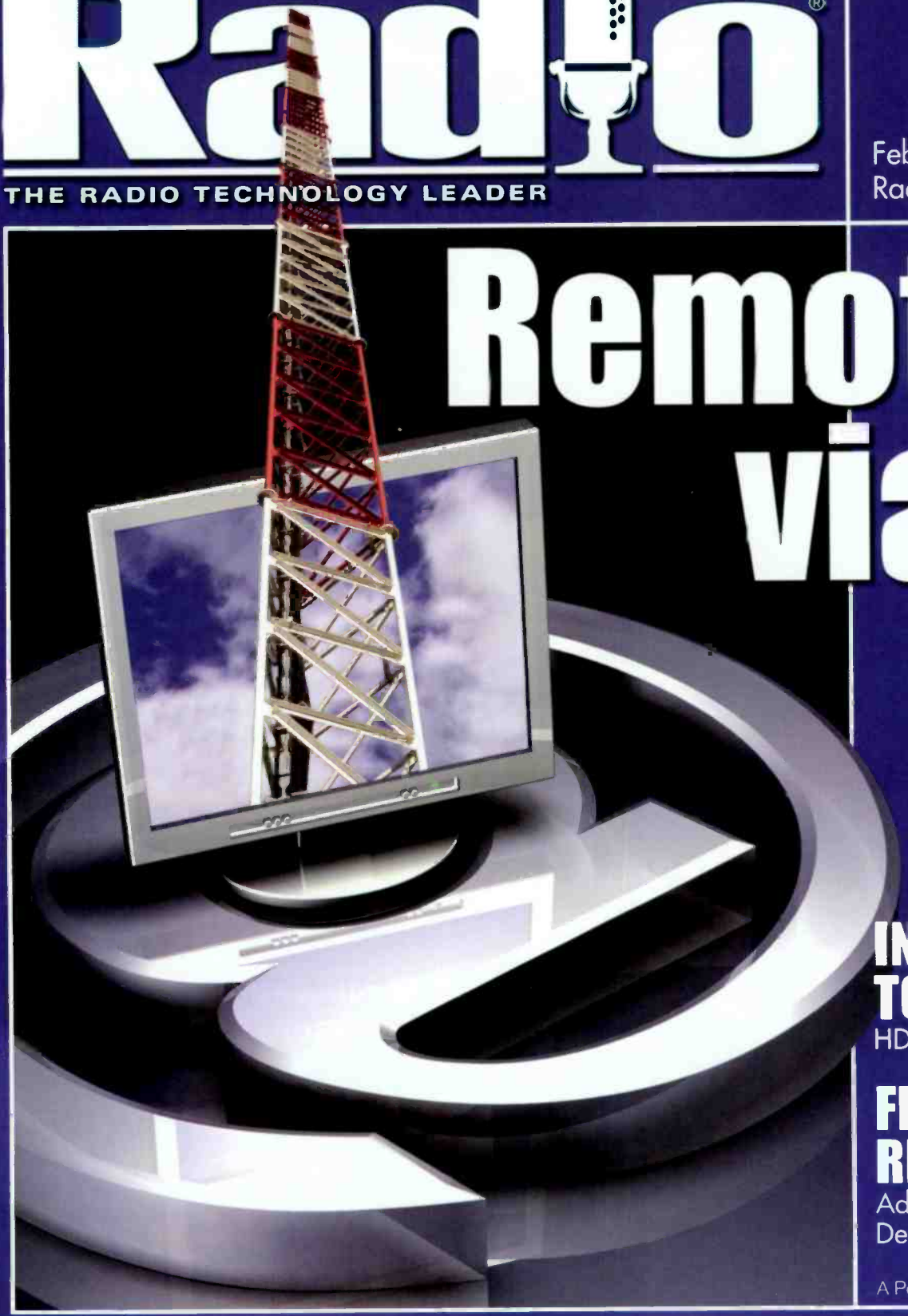
Radio®
THE RADIO TECHNOLOGY LEADER
February 2008
RadioMagOnline.com

# Remotes via IP



## INSIGHT TO IBOC
HD Radio Coverage

## FIELD REPORTS
Adobe Audition 3.0
Denon DN-C640

A Penton Media Publication

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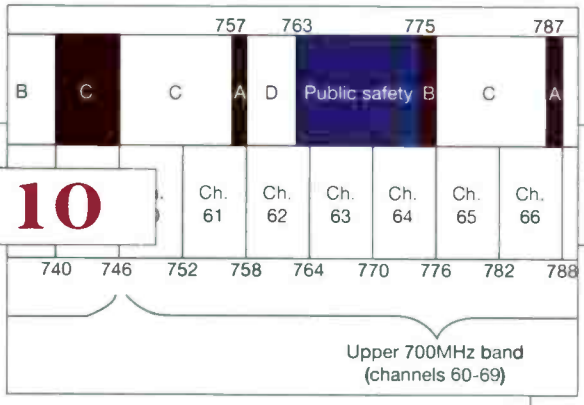
# CONTENTS

28

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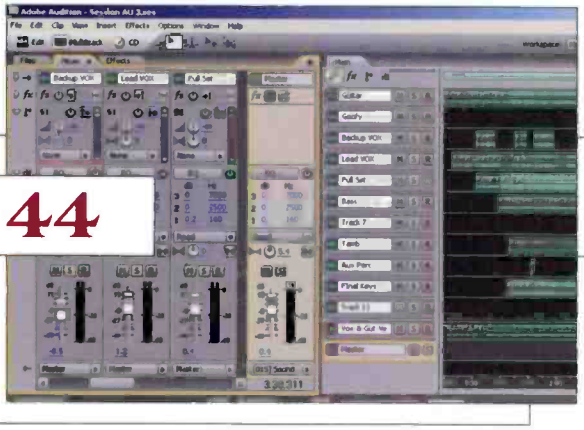

44

## Features



## Columns



## Departments



### ON THE COVER

With the wide availability of broadband, it's about time we took advantage of its capabilities for remote broadcasts. Read how on page 22. Cover design by Michael J. Knust.

# Wireless Broadband Internet Remotes

*"The first time out with the Tieline was a brilliantly simple experience for everyone involved. For lack of a better phrase, the codec just worked."*

- **Christian Vang**
  **Chief Engineer**
  **Clear Channel St. Louis**


*"The codecs sounded great. My management was very, very impressed with the demos"*

- **Grady Jeffreys,**
  **Technical Manager,**
  **Mackay Communications**

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# Currents Online

Selected headlines from the past month.


## Omnia.8x and One FM Now Shipping

The new processors offer tools for increased processing control and options for multicast broadcasting.

## NAMM Review: What's for Radio?

Several portable recorders made their debut at the music show.

## New HQ for APT

Codec manufacturer APT moved into new facilities on Jan. 25 to accommodate the company's growth.

## Balsys Companies, Systems Store Relocate to Larger Spaces

The larger facility is near the previous site, and Systems Store now has a walk-in store.

## APRE Seeks Engineering Award Nominees

The award will be presented at the annual engineering dinner on April 11 during the public Radio Engineering Conference in Las Vegas.

## Logitek Sets Users Group Meeting

Save the date: April 13 at the Flamingo Hotel from 2-4 p.m.

## V-Soft Communications to Host Training Seminar in Las Vegas

And also save April 12 and 13 at the Excalibur Hotel and Casino.

## Dielectric Adds Popescu to Engineering Team

Catalin Popescu is responsible for the preparation of technical specifications for TV, FM, and mobile media RF systems for Dielectric worldwide.



# Site Features

## What's on Your Mind?

## TALKBACK

*Radio* magazine has launched a blog, and we want to hear from you. Talkback is your chance to comment on articles, news items and general radio industry events.

## E-mail Newsletters Keep You Informed

The *Radio* magazine website is updated daily, and our e-mail newsletters make it easy to stay in touch. Subscribe to Currents, Digital Radio Update, New Products Extra!, the NAB Insider or NAB Radio Update today.

## Industry Events

The *Radio* magazine Industry Events section lists upcoming conventions and conferences.

## Engineer's Notebook

We continue to add to our collection of tips and tricks.

## Advertiser Links

Access Web links to the advertisers in the February issue.


Quality. Convenience. Comfort.
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# The new digital radio

The annual Consumer Electronics Show was held in January, and as expected, HD Radio provided a larger presence than previous years. This is true, at least, in the Ibiquity booth. There were HD Radio receivers in various exhibits around the convention, but their presence was not much more obvious than in previous years. Still, there are more HD Radio receivers being manufactured, and it appears the word is getting out.

The big news for HD Radio was that a portable chipset was finally unveiled – at least for FM. This is one significant part of the HD Radio rollout that has been noticeably absent. Once implemented, it will provide a necessary element for HD Radio acceptance, putting a digital radio receiver in just about any portable device. Then it's up to Ibiquity and the HD Digital Radio Alliance to have them included in cell phones and media players.

Another HD Radio technology being heavily touted was Itunes tagging. Announced last year, tagging provides a conduit between the radio station and music sales via an Ipod. When this was announced, I saw this as a suitable "if you can't beat them, join them" response. Media players are here to stay, and integration with radio is a natural bridge. Don't fight the trend, learn to use it and adapt as necessary.

The first real tagging demonstrations were shown at CES. I have seen some post-show reports, and it appears this has been noticed on the consumer side. That's good for HD Radio. Unfortunately, tagging doesn't appear to be going anywhere with radio stations.

I know several stations that embraced the idea, and quickly moved to update their automation systems and HD Radio transmission hardware to accommodate the technology before the end of 2007. These stations also contacted Apple to obtain the necessary coding to tie it together. They also placed orders for tagging-ready radios so they could test the system and even provide some listener incentives. These stations still can't use the technology.

One contact told me that Apple has yet to provide the details to provide the tagging information. In addition, the tagging-capable receivers have been on back order for months. The last expected delivery date was the end of January.

Building the new system and adding features takes time, but we continue to experience slow progress in the development and rollout. An announcement is made and excitement is high, and then we wait. And wait.

Meanwhile, CES moves on with new choices and enhanced features for consumers. Media players and communication devices add more features all the time. Internet radio devices are more common and user-friendly than ever. Ubiquitous wireless broadband looks to be just around the corner.

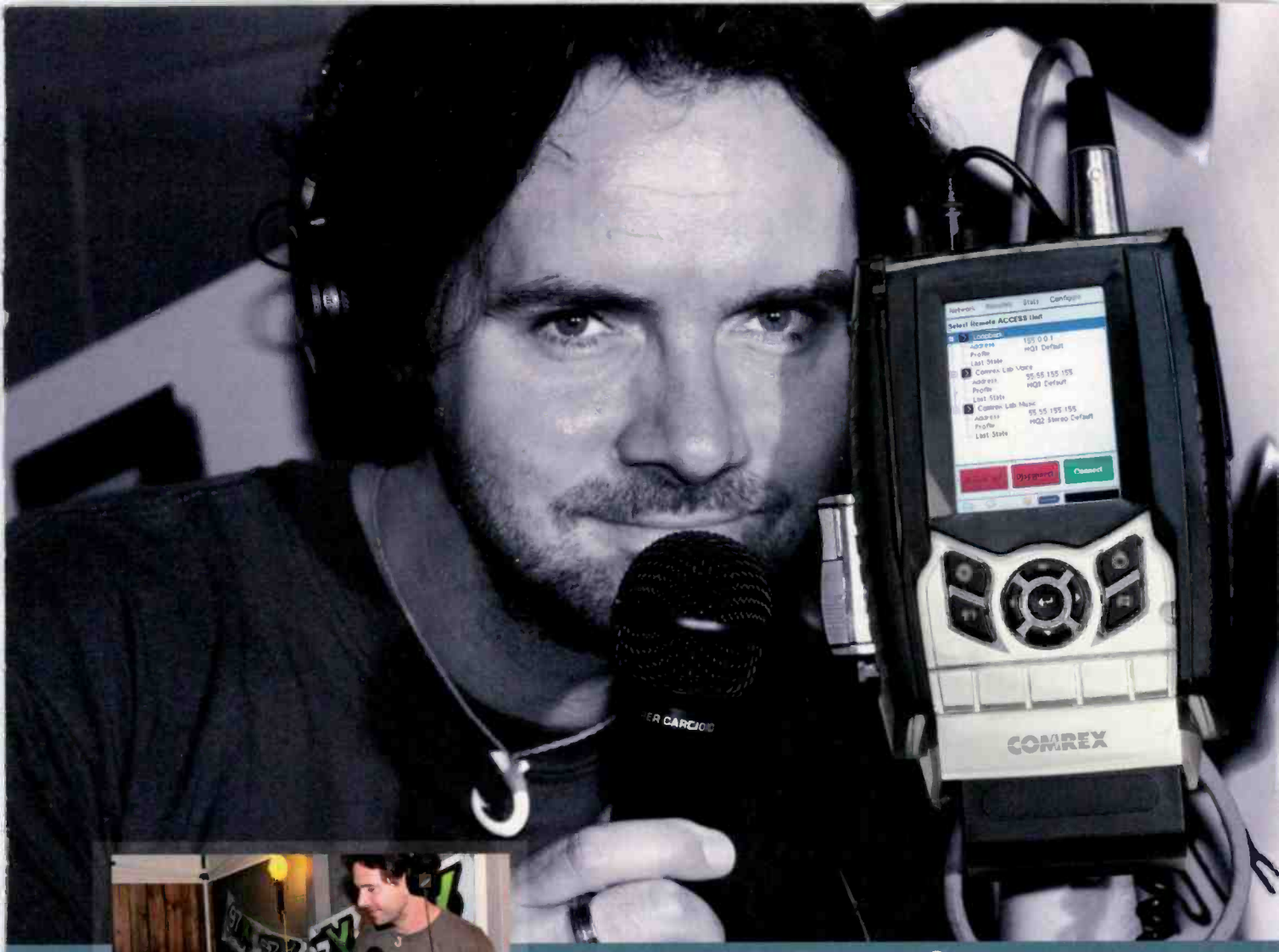
Sprint has begun a soft launch of its Wimax wireless broadband service, called Xohm (pronounced "zome"), in Baltimore; Washington, DC; and Chicago. Soft launch means only Sprint employees have been given network access so far, which allows the company to evaluate and test the service before making it available to the public later this year at a cost of between $30 and $40 per month.

Xohm promises broadband speeds as high as 70Mb/s with a service contour of up to 50km. What sets the service apart from current broadband offerings is that Sprint promises to make Xohm chipsets available to OEMs for the development and marketing of media-specific platforms, such as mobile IP video and Internet radio applications.

So while the traditional approach to digital radio moves forward, alternate possibilities to deliver radio digitally continue to emerge. This may be the new digital radio.

Chris Scherer

*What's your opinion? Send it to radio@RadioMagOnline.com*




*Shark, shown interviewing BERT MCCRACKEN, lead singer for THE USED, says: "When Comrex told me that their internal code name for ACCESS was "THE NEXT BIG THING" I got it right away. This IS BIG – I was live, on the air, in places I could NEVER have gone with regular old technology. THANKS COMREX!"*

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COMREX

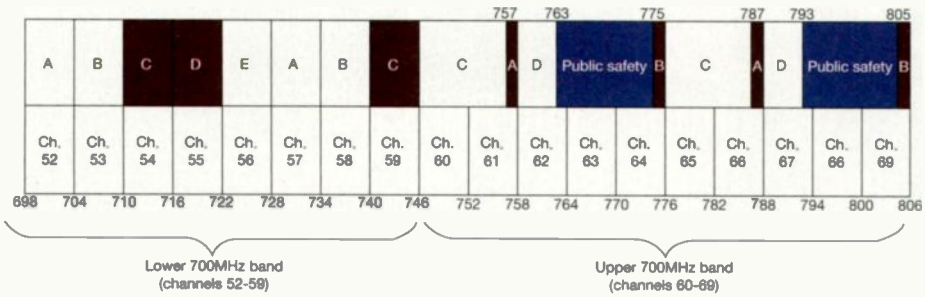
# Radio broadcasting and 700MHz

By Kevin McNamara, CNE

The FCC is auctioning what may be the most important spectrum allocations of our time. This portion of spectrum will be available as a result of the FCC mandate for traditional analog broadcast television to migrate to the new digital HDTV system by Feb. 17, 2009, specifically the portion previously occupied by channels 60-69. As of this writing, the auction has raised more than $6 billion and is expected to approach $10 billion before it ends. One reason this spectrum is so valuable is that it will likely be the last new spectrum made available in the U.S. for land-based mobile telecom applications.

## Coverage area

Unlike the power, height and adjacent-channel interference criteria used to determine the class of operation of a traditional broadcast station, wireless licenses are issued based on a specific geographic area. In the wireless world, there are several types of licenses issued that cover local, regional or national footprints. It is important to understand how the bids are formulated based on the level of coverage.




**The revised 700MHz band plan for commercial use.**

*Cellular Market Area (CMA)* – This represents the smallest geographic area in which a wireless license is issued. The CMA is comprised of two geographic areas: Metropolitan Statistical (MSA), including 306 local areas; and Rural Service (RSA), defining 428 local areas. In total, there are 734 CMAs throughout the U.S. and possessions.

*Economic Area (EA)* – Created by the Department of Commerce, this divides the U.S. and possessions into 172 areas that vary in size depending on certain economic criteria. Generally, the size of these areas decreases in proximity to larger cities.

*Regional Economic Area Grouping (REAG)* – Comprises the 172 EA and four additional geographic areas. These have been combined into 12 geographic areas covering the U.S. and will be bid as a package of 12 licenses if the reserves are met in the first round.

In addition, the 700MHz auction will also issue one nationwide license to a successful bidder.

## Licenses to be auctioned

The current auction, Auction 73, will issue five blocks of licenses. Each block is labeled A through E and defines a specific range of operating frequencies, available bandwidth, frequency pairing and geographic area. As many as five licenses can be issued to any one area. I would expect all five blocks to be grabbed in at least the top 100 markets.

In addition to the commercial licenses, there is 24MHz of spectrum dedicated to the development of a national public safety network, 12MHz for narrowband operation and 12MHz of wideband operation.

## The major bidders

The FCC has mandated that bids remain anonymous; however, we do know who was included because of the rigorous financial prescreening process. In the end, 214 companies were deemed qualified to bid in the first round. Among the notable telecom players, Verizon Wireless, AT&T Wireless, Cox and Cricket topped the list. Chevron Oil was also included.

The most interesting entrant into the auction is Google, who has committed to bid up to $4.6 billion for C block licenses. Google and other bidders lobbied the FCC to permit open access on the C block. The FCC agreed under the condition the C block fetches a minimum of $4.6 billion, otherwise the block will be re-bid without the ability for open access.

The 700MHz band provides better coverage and ability to penetrate buildings than the current 850 and 1900MHz spectrum used by mobile telephone/data networks and the (unlicensed) 2400 and 5800MHz spectrum used for wireless Ethernet. The lower frequency also permits a wider coverage area per site versus that required for a traditional (850/1900) cell site. To put this in perspective, one 700MHz site could cover the equivalent area now covered by four traditional cell sites.

In economic terms, the cost to deploy a 700MHz system over a traditional mobile telephone network nationally could save billions of dollars due to the need for fewer sites, lower cost to provision and lower maintenance/operation costs.

For maps of each geographic area and more detailed information on spectrum allocations and auction results, visit the Auction 73 Web page at http://wireless.fcc.gov/auctions/default.htm?job=auction_factsheet&id=73.

## Expected technologies

These allocations permit bandwidth from 6 to 22MHz depending on the block awarded. Anything could be possible: voice, data, audio, video, data casting, remote monitoring, telemation, wholesale rental of spectrum, etc.; the possibilities are endless.

These bandwidths are sufficient to create a platform capable of supporting any of the current and emerging technologies. Other than some of the proposed proprietary schemes, GSM, UMTS and Wimax are natural fits for this application. I would expect it marketed as some form of advanced mobile data network. Much of the success for this service will hinge on having the proper network interface, typically a telephone handset, PC card or external router.

## The impact to broadcasters

You need to watch this! The potential effect to traditional and satellite broadcasters can be significant since completely new platforms will be deployed, which are capable of delivering a higher level of voice, data, video and audio program delivery along with the ability to be fully interactive with the end-user. Apple is planning a version of the Iphone that will work for this service. Other manufacturers are expected to release handsets that give users the ability to provide telephone, data and full Internet access through the network. We are on the leading edge of finally having a single device that fulfills all our information and entertainment needs.

There are already providers offering various news and music formats nationally, but there might also be opportunity for savvy broadcasters to partner with these services providing local content, etc.

Remember, these services are not prohibited from seeking local or national advertising revenue; as a pay service they are also free of language/content restrictions. A potential owner such as Google already has a well-developed national sales team to support its Web operation; do you think it would be difficult for them to expand that sales effort to wireless?

Stay tuned.

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

# LPFM rules and proposals released

By Harry Martin

The full text of the Commission's decision on its new LPFM rules was released in December along with details on the agency's proposed rules for this fledgling service.

The news is generally good if you are an LPFM licensee, but bad for FM licensees who plan to make facilities changes that threaten displacement of an existing LPFM station.

The changes address a number of ownership and transferability questions. But the more controversial aspects are on the technical side. The Commission has afforded LPFM stations considerably greater protection from full-service stations than had previously been the case, and has proposed even more protection and regulatory flexibility that is advantageous to LPFM licensees.

## Adopted changes

*Ownership* – Under the new rules, the FCC will permit LPFM licensees to change the composition of their boards using a short-form pro forma application even when changes are sudden and involve more than 50 percent of the board. The Commission will now permit LPFM stations to be assigned provided: the price is no more than the depreciated fair market value of the station's physical equipment and facilities, the buyer is qualified to hold an LPFM license and the station has been owned and operated for at least three years. The Commission also has re-imposed the one-station limit on LPFM ownership and the requirement that station ownership be local.

*Interference protection from later-authorized full-service stations* – Subject to a complicated set of qualifications, an application for a new or modified full-service FM station (commercial or noncommercial) gets protection against any earlier-filed LPFM application (or earlier authorized LPFM facility) on the same channel, first-adjacent channel or IF channel to the full-service station. But this only applies if the interference from the LPFM is both predicted to occur and actually does occur within the full-service station's 3.16mV/m contour or, the full-service station's community of license or any area of the full-service station's community of license that is predicted to receive at least a 1mV/m signal. Displacement of existing LPFM stations to accommodate move-ins by second-adjacent channel full-power station will be subject to restrictions that did not exist under the old rules.

*Treatment of Translators* – To assure that the 7,000 still-pending translator applications from the 2003 window do not impede the progress of LPFM, the Commission has imposed an after-the-fact cap of 10 on translator applications filed in the window.

## Proposed changes

In the closing portion of its decision, the Commission solicits comments on the following technical proposals aimed at improving the viability of the LPFM service: codifying the interim procedure (alluded to above) for waivers of second-adjacent short-spacing rules to avoid displacement; requiring an encroaching full-power station to assume certain technical, financial and notice obligations if implementation of the proposal could impact an LPFM station; replacing the current mileage separation allocation rules for LPFM with a contour overlap scheme similar to that used for translators; and revisiting the co-equal status of translators vis-à-vis LPFM in the FCC's allocations hierarchy.

*Martin is a 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 submission of biennial ownership reports by radio stations in Delaware, Indiana, Kentucky, Pennsylvania and Tennessee.

On April 1, radio stations with more than 10 full-time employees located in Indiana, Kentucky or Tennessee must electronically file their Broadcast EEO Mid-Term Reports (Form 397) with the FCC.

Also on or before April 1, radio stations in the following states must place their annual EEO Reports in their pubic files: Delaware, Indiana, Kentucky, Tennessee, Texas and Pennsylvania.

Insight to IBOC
February 2008 Part of the *Radio* magazine DAB Answer Series

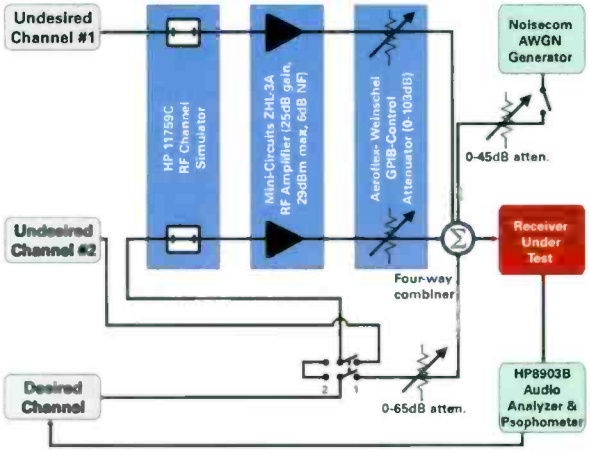
# NPR Sheds Light on HD Radio Coverage

*By Mark Krieger*

For every radio station that signs on with a new IBOC digital hybrid signal, you can pretty well bet there's at least one person who's likely to spend a lot of time behind the wheel of a vehicle with an HD Radio, driving criss-cross patterns across the market in an effort to empirically determine how well the digital signal matches up with the pre-existing analog coverage. Until now, that person would almost certainly have been an engineer. But with HD Radio products beginning to find their way to consumers and station owners looking for a return on their digital investments, you can bet this scenario is about to change in a big way. As HD Radio integrates with the existing business model, station owners, programmers and clients will all want to know where their new digital signal will be heard.

## Reliable coverage modeling

As a singular entity, probably no radio group has invested more time and effort in trying to fully understand and develop the potential of IBOC digital radio than National Public Radio. Through its engineering department and NPR Labs division, this organization has made a substantial investment in HD Radio, so it's no surprise they began looking for an accurate way to calculate digital service areas early on during the technology's deployment.




**The test setup used by NPR Labs.**

From the beginning of the HD Radio rollout, most engineers assumed that an FM digital hybrid signal with the specified 20dB D/A ratio fed to a common antenna would provide digital service contours likely to mimic those of the station's analog coverage, albeit with a slight reduction in total service area. Thus, as with analog FM signals, field strength would be the principal predictor of digital service coverage. But the roles fading, multipath and interference might play in disrupting digital reception was not clearly understood or appreciated. As anecdotal reports of unexpected variance in digital coverage began to surface among NPR member stations, a need to better understand reception issues became apparent.

With this in mind, attempts to evaluate IBOC digital coverage at multiple sites began as early as 2004, using a portable test rack consisting of an HD

## 2008 CES: More HD Radio Than Ever

*By Conrad Trautmann, CPBE*

The 2008 International Consumer Electronics Show took place at the Las Vegas Convention Center Jan. 6-11. Using every square inch of the three halls at the LVCC, it overflowed to the Sands Convention Center and into the ballroom at the Las Vegas Hilton hotel as well. Unlike the NAB convention where the show floor is set up in nice, neat categories like radio, television, satellite and media, products related to radio at the CES were spread out across all the venues. Car stereos were primarily located in the North Hall, Ipod accessories and Internet radio were at the Sands and AM/FM radios could be found in all of the halls.

Ibiquity exhibited at the show with a large booth surrounded by orange curtains that hung floor to ceiling. I spent some time with Joe D'Angelo of Ibiquity, who showed me around. Several technologies were on display, including Itunes tagging, a new chip by Samsung for portable HD Radio use, conditional access of the secondary digital channels and MSN Direct HD.

The new Samsung chip makes FM HD Radio a reality for portable devices. On display at the show was a small HD Radio receiver and also a prototype mobile phone with the HD Radio chip in it. Both could only receive FM at the time.

*continued on page 3*

**Inside**



*A special supplement to*
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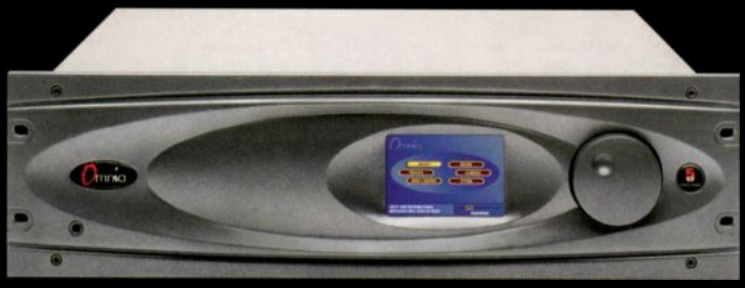
# OMNIA-5EX HD+AM

## LAUNCH YOUR HD AND UPGRADE YOUR AM SIMULTANEOUSLY



There's a reason why more of the world's powerhouse AM radio stations have turned to Omnia processing...It just sounds better! Additionally, Omnia continues to lead the industry with constant innovation. We pioneered the first non-aliasing digital clipper. (Some still feel it's the only one!) We introduced combo processing for HD-AM broadcast – dedicated processing for conventional AM, as well as a separate processor for HD Radio.

Omnia.5EX HD+AM has a powerful toolbox. 5-Band limiting for conventional analog transmission, along with a powerful oversampled, distortion-controlled, non-aliasing clipper that delivers loud, clean, and competitive audio. Output filtering that is suited for NRSC, ITU, or HD Radio requirements.

Processing for HD Radio/DRM is smooth and clean, thanks to a precision look-ahead limiter that reduces unwanted intermodulation distortion (IMD). This enables one box to generate two incredible sounding signals.

And for convenience, Omnia.5EXi HD+AM offers built-in Diversity Delay, which reduces redundancy, and points of failure in your transmitter plant. (BTW: It was our idea to put the Diversity Delay in the audio processor.)

Analog or digital, it doesn't matter. With Omnia.5EX, your signal will be remarkably clean and clear, with punch and presence that makes AM radio come alive!

## INNOVATIVE OMNIA ENGINEERING: WHERE AM AND HD COME ALIVE!

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# NPR

Radio car receiver, field strength monitoring equipment and a GPS-equipped laptop computer to record data while radials form various IBOC transmitter locations.

In a paper delivered at the 2006 NAB Broadcast Engineering Conference, an NPR Labs study of digital coverage involving 26 different IBOC hybrid FM signals clearly demonstrated that field strength by itself was not a an accurate predictor of digital service area. Wide variation existed in the amount of digital signal required for reliable acquisition among the stations sampled.

Clearly, existing analog coverage models were not going to work for HD Radio, and further research was needed.

## Better measurement systems

Among the salient issues that became evident during NPR's early mobile signal surveys were intervening variables imposed by unique RF environments and limitations in the measurement platform. So when the Corporation for Public Broadcasting (CPB) released an RFP in early 2006 to research and document predicted digital coverage for around 850 public radio stations, it was already understood that developing a functional model would require new technology and a comprehensive approach. NPR Labs won that grant, and an enormous technical undertaking began

One unknown was the performance characteristics of the HD Radio receivers themselves. While the available choice in digital receivers was somewhat limited in 2004, an increasing number of products were coming to market. Characterizing an average receiver required the creation of a fixed test bed that could repeatedly manipulate complex variables with the unit under test. The NPR Labs team responded with the construction of a system that could vary desired signal FS, independent levels of co-channel and adjacent channel interference, and simulate Rayleigh (multipath) fading. With such a spread of variables, automated testing and data collection were essential to the process.

Changes in the mobile measurement platform were also needed. A standardized monopole antenna with integral ground plane was fabricated for attachment to test vehicles, greatly reducing pattern/gain variations presented by the mag-mount antenna used in earlier studies. Multiple field strength monitors were added to

The ground plane antenna used on the test vehicle.

Photo courtesy NPR Labs



Photo by Gary Kline

**FM HD Radio chips for portable applications were shown for the first time.**

Conditional access is the ability to turn an HD Radio channel into a subscription channel. A demonstration of this, using a station that was configured to run the main analog channel and three digital channels, was on display at the booth. Analog and the main digital were set up as normal. HD3 and HD4, however, were set up with conditional access, where HD3 was authorized and HD4 wasn't. For stations that have programming they think listeners will pay for, this technology will allow them to restrict what listeners hear based on a subscription model.

Finally, Ibiquity has the ability to support MSN Direct into car radio navigation systems providing real-time traffic to the system.

Beyond the Ibiquity booth, there was not really a strong HD Radio presence. In fact, one of the largest booths for radios was Eton. It easily had 50 radios on display and unfortunately, not one of them was equipped to receive HD Radio. I was told that HD Radio is "in development."

## Beyond digital radio

Portable navigation devices were everywhere I looked. And while you might not think this has a direct application or effect on the radio business, it may very well as devices continue to converge. Case in point is the MSN Direct and Ibiquity partnership. For personal and in-car navigation, lists of restaurant and store locations are already available based on the user's current location. The next logical step is to provide location codes to navigation devices from the radio as commercials play. What this means for radio stations is that spots will need to carry geo-coded data (latitude and longitude information).

*continued on page 4*

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

## CES Review

*continued from page 3*

Then, as the spot plays, the GPS can tell the user where the store or restaurant location is and direct them to it. Microsoft demonstrated MSN Direct service at its booth, which many stations across the U.S. are transmitting using RBDS subcarriers. MSN transmits real-time traffic data to GPS devices, which can then use that information to route a user around an accident.

Photo by Gary Kline

**Ibiquity showed more HD Radio receivers than ever before at CES2008.**

Internet radios were in many booths and seem to be gaining momentum. I found three vendors in the Sands and two more on the floor of the South Hall. They use an Internet database of active streaming stations to provide the device with a worldwide directory. The user can search for a station by call letters, name, location or format. Testing the radio at the Oxx Digital booth, it was possible to tune in WINS in New York in a matter of seconds and hear the station's live stream standing on the floor in the convention center. The quality was better than listening on the AM dial in NY. The database provided more than 9,000 stations to choose from. From discussions with the vendors, I was told that Internet radio has already gained hold in Europe and that we should see more of the big box stores in the U.S. selling them this year. All the vendors had radios equipped with Wi-fi connections, allowing them to be mobile and not need a physical connection to the Internet.

Another technology about to gain hold in 2008 is Wimax. Wimax is a worldwide standard (802.16) that applies to broadband wireless Internet. Intel had a demonstration of this technology with two Formula 1 simulator cars on the show floor attached to a computer using Wimax that were controlling two model race cars outside the convention center. The model cars had video cameras mounted to them and provided the simulator drivers with full-motion video back to a large screen monitor so they could see where they were driving the models. Both drivers drove a lap around the track. Clearly, doing something this sophisticated needed a lot of bandwidth. The Wimax provided video plus control live and real time, with no delay.

Chatting with the folks from Sprint's Xohm divi-

*continued on page 6*

# NPR

allow simultaneous measurement of the desired carrier, as well as those on two adjacent channels. With these improvements, detailed measurement data sets needed to verify modeling performance became available.

Once the new technology and methodologies became operational, the research team was left with the massive task of data collection and analysis that would provide the basis for predictive modeling of hybrid IBOC digital coverage.

## The emerging model

After testing and characterizing 15 different HD Radio receivers, the data suggested that much of the variability in IBOC digital service coverage can be accounted for by a couple key variables. While field strength of digital carriers is an obvious factor, it was determined that first adjacent channel interference plays a major role in determining whether a desired digital signal will be successfully captured and decoded. Most notably, it was observed that while FM IBOC digital signals can survive a considerable amount of interference from either an upper or lower first-adjacent channel, simultaneous interference both above and below can degrade receiver performance by as much as an additional 10dB beyond that of a single interferer.

The test sequence also established parameters for the interplay between desired signal levels, co-channel interference and fading/multipath variables.

Based on the extensive data set generated by receiver tests, NPR succeeded in developing a predictive computer model for IBOC digital coverage. In order to test the programs utility, a new set of measurements was taken for WJFK in Manassas, VA, using the improved mobile test platform. A comparison of the predictive versus measured data showed a very strong correlation of 94 percent between data sets, affirming the model's ability to anticipate coverage based on signal and terrain data for both the station under study and first-adjacent channel stations. Since that time 10 more stations have been used as points of comparison between measured and modeled coverage, with correlations ranging between 85 and 95 percent.

## Outcomes

The fruition of NPR Lab's effort to build an FM IBOC digital coverage model had its debut at an IEEE presentation in Washington, DC, last October, as John Kean presented a paper detailing his group's work. A complete portfolio of predicted coverage for approximately 850 public radio stations, as well as publication of receiver test data, are forthcoming.

*Krieger,* Radio *magazine's technical consultant on digital radio, is the director/general manager of WJCU-FM, and a contract engineer in Cleveland.*

*An in-depth examination of the work done by NPR Labs on the HD Radio coverage project in online: http://www.nprlabs.org/publications/reports/20071129_MeasurementandModelingofHDRadioCoverage_JCK.pdf.*

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## CES Review

*continued from page 4*

**Internet radio showed signs of gaining momentum at CES.**

sion, I learned that Sprint already has test markets running with the technology and is planning a nationwide rollout beginning in April 2008. Xohm's system will provide 2 to 4Mb/s of download speed and 1 to 1.5Mb/s of upload speed. This is certainly fast enough to provide mobile streaming, including audio and video. Xohm's intention is to provide coverage equal to its cellular coverage.

How does Wimax affect radio broadcasters? The most obvious is the ability to provide Internet streams to mobile devices such as car radios, navigation systems and telephones. The Internet radio manufacturers described above could market their radios as fully portable if they can pick up the Wimax signal.

Another application is wireless control of remote transmitter sites. Wimax is a full, two-way Internet connection, so it can provide a return path for monitoring. Another application could be for remote broadcasting. Companies like Comrex already have systems that use the current EVDO high-speed wireless of telephone vendors like Verizon and Sprint.

Imagine what you could do with 1.5Mb/s or full T-1 speeds in both directions on a remote. It eliminates the need to order a DSL or cable drop on a remote and allows you to be mobile.

*Conrad Trautmann is SVP engineering and technology at Westwood One, New York.*



# Sample and Hold

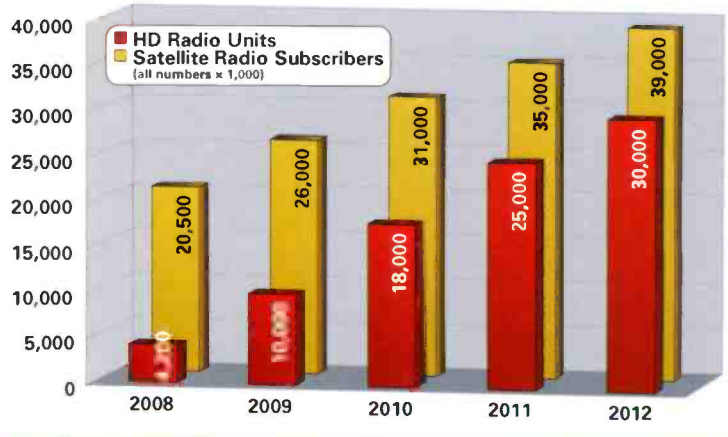
## Reaching Parity with Satellite Radio

*By Chriss Scherer, editor*

Satellite radio has the edge over HD Radio. It's been available longer, and it had a huge marketing push across multiple types of media since its inception. Still, some headway has been made in the broadcaster rollout and consumer acceptance of HD Radio over the past two years.

In January, Parks Associates released a report that predicts that 30 million households will have some form of HD Radio receiver in use by 2012. That same report predicts that satellite radio will be in 39 million homes by that same time. While not at an equal step with satellite, the prediction puts the two forms of digital radio at the closest they have ever been.

**Next Generation Radio Unit/Subscriber Forecast**




The report, titled Music to Consumers' Ears: Next Generation Radio, plots a steady increase for both forms of radio over the next five years. HD Radio shows the bigger prediction leaps. The figures nearly double in 2008 and 2009.

The study also identifies listening habits between the two services, saying that satellite users tend to use the service in mobile settings, while HD Radio users favor HD Radio listening in the home.

*Source: Parks Associates Music to Consumers' Ears: Next Generation Radio, www.parksassociates.com*

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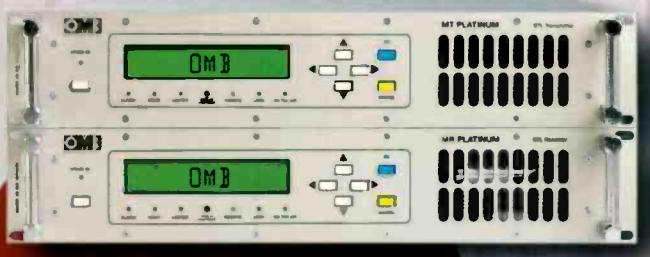
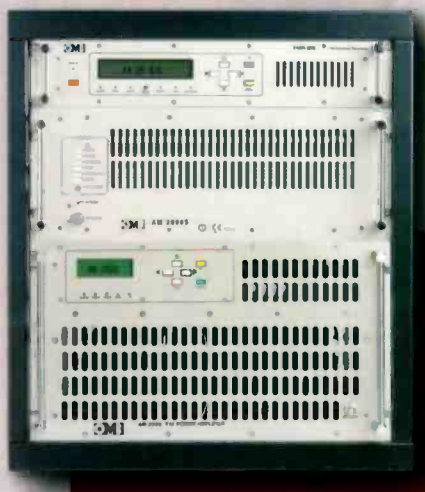


## MT/MR PLATINUM >1GHz

is a high-performance Studio-to-Transmitter Link. It is made up of the 5W MT transmitter externally synthesized in 10MHz sub-bands with a step of 100KHz, and the MR double conversion receiver, that is externally synthesized, too. The MT is microprocessor controlled, and includes LCD display for the visualization of the most relevant transmission parameters (frequency (6-digit), forward and reflected power, modulation level), balanced Mono, Stereo (MPX). The MR receiver has the same visualization system as the transmitter. It includes balanced Mono and Stereo (MPX) outputs. Furthermore, the MT/MR Platinum STL includes a jumper in order to get a proper operation with digital signals.



## EM 2000

is a 2000W FM transmitter made up of the EM 25 DIG exciter (or EM 20/30 exciter) and the AM 2000 FM amplifier. AM 2000 includes eight 300W high-efficiency MOSFET technology amplifying modules, fed by 2 independent switching power supplies, which are made to withstand the working conditions. The amplifiying modules work independently thanks to a power combining structure that provides high isolation between them.

## EM 10000

is a 10000W FM transmitter made up of the EM 250 COMPACT DIG exciter and three control units which combine the power of six AM 2000 FM amplifiers. AM 2000 includes eight 300W high-efficiency MOSFET technology amplifying modules, fed by 2 independent switching power supplies, which are made to withstand the working conditions. The amplifiying modules works independently thanks to a power combining structure that provides high isolation between them.

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# Remotes via IP

## Broadband is everywhere, so why not use it for remotes?

By Doug Irwin, CPBE AMD



In the January Trends in Technology I discussed the difference between TDM and IP in the context of a station's STL system. I asserted that with a LAN extension to the transmitter site or even a WAN with known and controllable characteristics it made sense to consider IP for an STL system (most certainly for backup systems). It may seem logical to apply the same thought to a remote broadcast, but remote broadcasting is really a different ball game. The nature of remote broadcasts is that they are always somewhat risky. Everyone knows that you are walking on a tightrope without a net below. We are all willing to accept a certain amount of risk when it comes to executing a remote; indeed, when you pull it off against the odds, it makes the winning result that much sweeter.

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# Remotes via IP


**The APT Worldcast Eclipse features GUI user access.**


**The CCS Suprima has IP, ISDN and X.21/V.35 connectivity.**


**Phoenix from AEQ features front panel or USB user access.**

The means by which you could carry out a remote broadcast used to be fairly limited. You could contact the telephone provider to see if it could drop a broadcast loop at the proposed location. Whether they could or not was often predicated on whether or not there was enough time to do so. If the line was dropped in time, the results could be good (if you got a good installer) or they could be not so good, for a variety of reasons.

If you were lucky enough to have a licensed RPU channel and the proper equipment, then likely you could pull off remotes fairly easily, though quite often the audio quality wasn't that great. A "remote" really sounded like it was remote, in most cases. Interference from other users of the shared radio channels was always the wildcard to be wary of.

In the early 1990s, when ISDN started to see widespread use, the ordering issues were similar. The telephone provider had to be able to actually deliver ISDN at the proposed site, and there had to be enough time before the remote date to get the line installed and tested. The good thing about ISDN is that (assuming you have a good connection) you know what audio quality to expect ahead of time. Because ISDN provides a full-duplex connection, mix-minus and talkback could be provided to the remote site too, which was a nice improvement in functionality.

## Current limitations

At my station, we use ISDN frequently for remotes, but I know the future of remote broadcasting is wrapped up in the almost ubiquitous nature of the Internet. We don't make use of RPU, and I have found most programmers have been spoiled by the audio quality we get with ISDN codecs. The audio quality of RPU has become unacceptable in most cases. We're preparing ourselves for the inevitability of using the Internet for remotes, and you probably should as well.

Using the Internet for remotes, though, really represents a paradigm shift. Up to this point, the means by which audio was sent back to the station from the remote

| Codec | Connectivity | Size | Audio I/O | User Access | MPEG 1/2 layer 2/3 |
|---|---|---|---|---|---|
| ***APT Worldcast Eclipse*** aptx.com | IP, ISDN, X.21/V.35 | 1RU | analog or AES-3 | GUI | Y |
| ***Musicam Suprima*** musicamusa.com | IP, ISDN X.21/V.35 | 1RU | analog or AES-3 | Web Browser | Y |
| ***AEQ Phoenix*** aeqbroadcast.com | IP, ISDN X.21/V.35 | 1RU | analog or AES-3 | Front Panel, USB | Y |
| ***Audio TX STL-IP*** www.audiotx.com | IP | 1RU | analog or AES-3 | Web Browser | Y |
| ***Telos Iport*** telos-systems.com | IP | 2RU | analog or AES-3 | Web Browser | Y |
| ***Comrex Access*** comrex.com | IP | 1RU | analog or AES-3 | Web Browser | N |
| ***Tieline IP*** tieline.com | IP, optional ISDN | 2RU | analog | Front Panel, USB | Layer 2 |

site was yours and yours alone (with the exception of those shared RPU frequencies). The audio quality was a function of the bandwidth – and the bandwidth was known ahead of time. Now, in making use of an Internet connection, you will contend with an unknown number of users, each of who will occupy varying amounts of bandwidth at random times, all through a pipeline with a fixed maximum bandwidth for its shared users. Sounds a little scary, but not surprisingly, many manufacturers of broadcast remote equipment have studied and attacked the problems associated with this shared usage successfully. Let's examine some of those problems.

When contending with other users for bandwidth in a bandwidth-limited system, there is an advantage in minimizing your own bandwidth requirements. For this reason, codecs that use the Internet for connectivity make use of many of the same audio compression schemes we've become familiar with that work over synchronous networks (such as ISDN or TDM).

However, the packet-switched nature of the Internet (as opposed to the circuit-switched nature of the PSTN) complicates the situation considerably. The data stream that represents the audio output of the encoder is broken into pieces – called packets – and each packet has additional information appended prior to its injection into the network. That packet overhead is the same on a per-packet basis, so changing the packet size affects the overall bandwidth needed to move the packets.

Say you have an audio encoder with an output of 128kb/s, or 16 kilobytes every second (16KB/s). Now, say you break that data stream into 800-byte pieces; add overhead of (for example) 100 bytes to each of the 800 bytes of payload. So, now you've generated packets that add up to 18KB/s, for an increase in required bandwidth of 12.5 percent. Or, say you break the data up in to packets of 200 bytes; add 100 bytes per packet of overhead. Now the bandwidth requirement is 24KB/s, or a 50 percent increase over the size of the encoder output by itself.


**The Telos Iport features a 2RU form factor.**


**Access, from Comrex has optional AAC.**

**The Tieline IP codec is just one IP product from the company, which features Tieline Voice and Tieline Music algorithms.**

| Supported Encoding Algorithms | | | | | Maximum Audio Frequency | Variable Packet Size | FEC | Packet Jitter Buffer |
|---|---|---|---|---|---|---|---|---|
| AAC | G.722 | Linear | Apt-x | other/proprietary | | | | |
| Y | Y | Y | Y | - | 24kHz | Y | N | Y |
| Y | Y | Y | Y | - | 24kHz | Y | N | Y |
| Y | Y | Y | N | - | 20kHz | Y during setup | N | Y |
| Y | Y | Y | N | - | 48kHz | N | Y | Y |
| Y | N | N | N | - | 20kHz | N | N | N |
| optional | N | N | N | 3RIC HQ1, HQ2 | 15kHz | Y | Y | Y |
| N | Y | Y | N | Tieline Voice, Tieline Music, Tieline Music Plus | 20kHz | Y | Y | Y |

# Remotes via IP

## Bits or bytes?

There are 8 bits in 1 byte.
How do you remember the abbreviation?

b = bits
B = Bytes

The larger unit has the larger letter. Also, the multiplier kilo is abbreviated as k with one exception: When it precedes the abbreviation for byte.
Hence, kb = kilobits and KB = kilobytes.

An unfortunate characteristic of the Internet is that sometimes these packets are lost along the way, for various reasons. Ideally, you would want the packet size to be large because, as I just demonstrated, the overall bandwidth requirement is reduced. However, if one of those large packets is lost, then a substantial amount of the encoded audio data will be missing at the far end.

One aspect then, considered to be important in gaining success in transmitting audio across the Internet, is the ability to alter the packet size on the sending end, so that different network conditions can be met, and the effect of dropouts can be minimized. Some of the units actually adjust the packet size dynamically based on changing network conditions. In any case, the user needs to be able to adjust the packet size so the best compromise between packet size and overall bandwidth can be met.

Inevitably, some packets will still be lost though, and there are other mechanisms designed to further minimize the negative effects of packet loss. One such method is known as forward error correction (FEC). FEC is basically the addition of redundant packets to the data stream – the idea being that these redundant bits will effectively take the place of the packets that somehow end up missing at the far end. One can easily see that the addition of too many redundant packets could possibly create a problem in and of itself with respect to network congestion. Therefore, like packet size, the amount of FEC should be adjustable by the user, to best meet network conditions.

Oh, but it doesn't end there friends. The nature of the Internet also means the packets getting to the receive end may be late, or even out of order. For an audio stream, this is obviously a problem – one addressed by way of a packet jitter buffer. This buffer stores received packets for a certain amount of time, allowing late packets to catch up; out of order packets can also be re-sequenced prior to being sent to the audio decoder. The obvious problem here is that the buffer adds delay time, generally considered bad when doing remotes. Therefore, once again, a compromise must be struck between problems in the audio caused by late or out of sequence packets, and the amount of delay that can be dealt with at the remote site.

## Putting it all together

So let me summarize the problems with Internet transmission of audio and the techniques used to minimize them. First, there is network congestion, or plain lack of bandwidth. That issue is tackled by minimizing the necessary bandwidth, by using a lossy codec (or in the case of APT, making use of ADPCM) and striking a correct balance between bandwidth and packet size. Loss of packets is addressed to the extent practicable by FEC. Packet jitter is addressed with a jitter buffer.

All that said, network security is yet another issue. Your LAN is likely attached to a router that allows users on your network to access the Internet. The connections made through this router originate behind it – on the LAN side. The router will allow access to the Internet, and in turn it expects a response from the far end. But think about it: If you are in the field, and trying to connect to an IP codec connected to your network, and the router serves as a firewall, the connection will be refused. As far as that router is concerned, an intrusion is being attempted.

There are several ways around this. The first is to inform the network administrator that for the new IP codec to work, certain ports need to be open on the firewall, so the IP codec in the field can set up communication between itself and the studio codec. If your network architecture includes a DMZ, your network admin may allow you to place the IP codec on that subnet instead.

The second way is a bit more complicated; consider this if your network administer doesn't want to play ball with you. A proxy server can be used as an intermediary. This proxy server is located outside the firewall. A session can be initiated by the studio codec to this proxy server; the proxy records the IP address (among other things) of the studio codec and actually maintains the connection thereafter. From the field, you connect to the proxy server, and it redirects the packet data to the studio codec, through the same connection it has kept open.

And there is a final way to do this, which may be the easiest way. Have an Internet connection put into the studio (like DSL or cable) and reserve its use for just the IP codec. Leave it completely isolated from the LAN, so you can forsake those network security issues. One problem with this method is that your Internet provider may not provide you with a static IP address. Either pick one that does, or make sure you know if and when the IP address has changed before you head out into the field.

Making use of the Internet for remotes can be looked at as a double-edged sword; while one has to take the time to learn about a whole new technology (and undoubtedly be tripped up a few times along the way), the universe of locations from which remotes can be done opens up dramatically. I for one believe that good remotes can make for good radio; and I'm quite sure that, 5 to 10 years out, the trepidation experienced in going out to do an IP remote for the first time will have long since evaporated.

*Irwin is the chief engineer of WKTU-FM, New York City.*

By Mike Shane, CBRE,
and Chriss Scherer, editor

# Salem Omaha rebuilds

## Three stations make a large technology leap

Photo by Scott Foster

**Studio A, which can be used for production or on-air on any of the stations, looks into studio C.**

Photo by Scott Foster

**Master production looks into the KGBI air studio.**

Salem Communications owns three stations that serve the Omaha market: KCRO-AM, KGBI-FM and KOTK-AM. Each station has a history that goes back many years, and the stations' previous studios had seen a major part of that history. Salem acquired the three stations in 2004 and 2005, and it was known early on that new facilities were a necessity.

Before the rebuild, the three stations were operating from two studio locations. Each location was built to house one stand-alone station. The newer facility, suite 202 in the Burt Street Professional Building, was built in 2004 for KCRO, which had occupied its previous facility in midtown Omaha for 25 years. The all-analog facility served the talk radio format with three studios.

On the other hand, KGBI's former facility was not so new. Located on the near-downtown campus of the previous owner, Grace University, the facilities dated to the 1970s, while the building itself dated to at least the 1950s.

Before Salem bought KGBI and KCRO, the FM was noncommercial and the AM had one sales person. Salem added a sales staff, which needed office space. The first sales office was established – unsuccessfully – in KGBI and then shoehorned into the offices at KCRO. Because of lease considerations, the two stations continued to operate in their separate facilities.

Then Salem bought KOTK in late 2005. This third station needed a home. Knowing that a rebuild was certain, KOTK was operated out of the same control room as KCRO. While not an ideal situation, Salem made it work while waiting for space to become available at the Burt Street Professional Building.

When the adjacent suite, suite 201, was vacated in June 2006, planning and design began. The entire project was divided into three phases. Phase one was to clear the new space so construction could begin. Although it was known that the new space would be available, prior access to the space was limited. Once Salem had access, the biggest labor-intensive part of the project began.

## Major cleanup

A previous tenant in the new space was a division of AT&T, which at one

# Salem Omaha **rebuilds**

Photo by Jim Leedham

**The master control racks house equipment that is accessible to operators as needed.**

Photo by Scott Foster

**Studio C is primarily used as a talk studio and for voice tracking.**

Photo by Scott Foster

**Studio A looks into studio C where Roger Manning voice tracks.**

Photo by Jim Leedham

**The KGBI air studio and the production studio are stand-up consoles.**

time occupied the entire second floor. Chief Engineer Jim Leedham discovered a great deal of old wiring left behind in the ceiling. While it was tempting to simply cut the old cable out of the way and start fresh, Leedham took the precaution to ensure there were no live circuits still in place. This careful step proved to be a wise course of action as some in-use cables were found.

Construction began in December 2006. The new studios were located in this expanded area.

Phase two was a logistical move to temporarily relocate the office and sales staff from suite 202 so it could be cleared. Fortunately, alternate office space was available in the same office building. Once suite 202 was cleared, phase three kicked in. New offices and a new reception area were constructed and the two suites were merged into one larger space. The final step was moving the office and sales staff back from its temporary location. The new facility maintained its designation as suite 202.

The AM stations were cut over together in late March 2007, and the FM moved in almost two months later. While a studio rebuild project is a significant undertaking on its own, KGBI also built a new transmitter site at the WOWT-TV facility in northwest Omaha. For the FM, the studio and transmitter site cut over were done simultaneously, which simplified the transfer. The old studio fed the old transmitter while the new studio fed the new transmitter. Turn one off and turn the other one on. The old transmitter site serves as a back-up.

Six studios now serve the three stations. Five of the studios are fully equipped with studio equipment, while the sixth is a talk studio with mics and telephone control interface. The heart of the facility is centered around a Logitek Audio Engine system with Remora surfaces and an Enco DAD automation system.

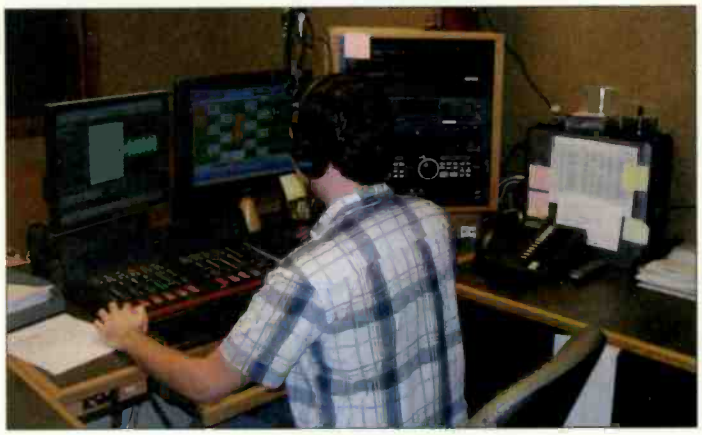


Photo by Jim Leedham

**Nick Buras edits an audio file in air studio B.**

## To the future

As much as possible, the audio paths are digital. The Enco and Logitek systems are interconnected digitally. The Enco audio servers also provide an analog output to the Broadcast Tools switchers, which also receive an analog feed from the Logitek Audio Engine. This provides the stations a backup path in case of a router failure. In time, the analog elements can easily be replaced with digital paths.

From the Broadcast Tools switchers, the program chain feeds a limiter and is conveyed to the various transmitter sites through telephone company leased lines. The AMs use 8kHz analog audio loops, while the FM has a nailed-down ISDN service. One disadvantage of the Burt Street studio site is that it does not have a line-of-sight RF path to any of the transmitters.

The AM stations receive a great deal of satellite-delivered programming, so there are a host of satellite receivers in the engineering/server

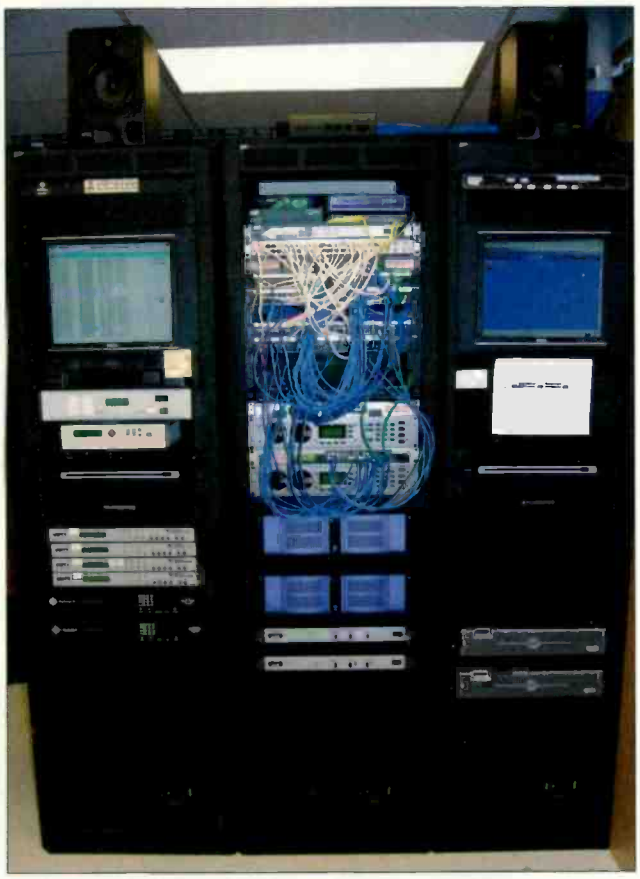


Photo by Jim Leedham

**The engineering racks house the satellite receivers and Logitek and Enco servers.**

# Salem Omaha **rebuilds**

room. Receivers include four Wegener Unitys (a staple in Christian broadcasting), two Starguides for news/talk KOTK, and space for the awaited Ambos satellite FTP (S-FTP) receiver. This smaller rack room also houses servers for the Enco and Logitek systems.

Personnel from Salem corporate and contractors performed most of the studio buildout while Leedham was busy building the new transmitter and also dealing with a major theft at one of the AM sites about a month before the AMs were to move into the new studios.

The three stations now enjoy a new-found level of redundancy and signal routing flexibility, not to mention added peace of mind. The old facilities were locked in time in a stand-alone configuration, while the new facilities should provide countless options to accommodate future changes and expansion.

*Shane is operations manager of KCRO-AM and KOTK-AM, Omaha, NE. Salem Omaha Chief Engineer Jim Leedham also contributed to this article.*

## More online

Additional photos and a floor plan are included with this article online at *www.RadioMagOnline.com*

## Equipment List

360 Systems Short Cut
Adobe Audition
Air Tools 6000
APC 1200 UPS
Aphex 320A Compellor
Broadcast Tools SS16 x 4
Cisco Systems 3750
Comrex Hotline, Matrix, Nexus
Crown D-75A
Dell Optiplex 745
Electro-Voice RE-20
Enberg BA-6
Enco DAD Pro
Graham Studios furniture
HHB Burn IT Plus
JBL Control 5
Logitek Remora 18, Remora 10
Lucid Gen x192
Marantz PMD 340
Rolls RS80
Sage Endec, Receiver
Sony MDR-7506, MDS-E58
Stanton C-500
Starguide II, Starguide III
Symetrix 528E
Teac W-600R
Telos 1x6, 2x12, One by One, Zephyr Xstream
TFT 911
Unity satellite receivers

attached a picture in white contact me for more info. big_plans #221542

## STEADY SEEKING LADY

I am looking for a male partner (38-50)who is willing to be exclusive with me for a long term relationship. Not asking for marriage. I am of average build, dark hair, brown eyes and am an Indian female. I have a wonderful job and attend some classes a couple of nights a week. I have two kids who stay at home with me. They are very precious to me. And they are not going to be a hindrance to our dating. I have a full and busy life. Therefore, the expectation is to see each other on a steady basis, and at the same time, being flexible. precious_me #331252

## I LOVE MUSIC. YOU LOVE ME

I'm an indie/hipster girl who adores music and going to clubs and shows. Some of the bands that I'm into are Interpol, The Arcade Fire, Blonde Redhead, Bauhaus, The Smiths, Morrissey, etc. I'm into indie rock, electronica, punk, pretty much anything. I drink and smoke occasionally. I'm 21, 5'8", light-skin, dark brown hair/eyes. I work, am well-educated, funny, spontaneous, nice. #2215234

# 299665

## HANDSOME RAKE

Out of work leaf raker/bagger seeks whimsical beauty with un-kempt auburn or chestnut hair, cool coarse hands and a penchant for whistling. mellow_mo, 28, #101318

## LET'S CONNECT

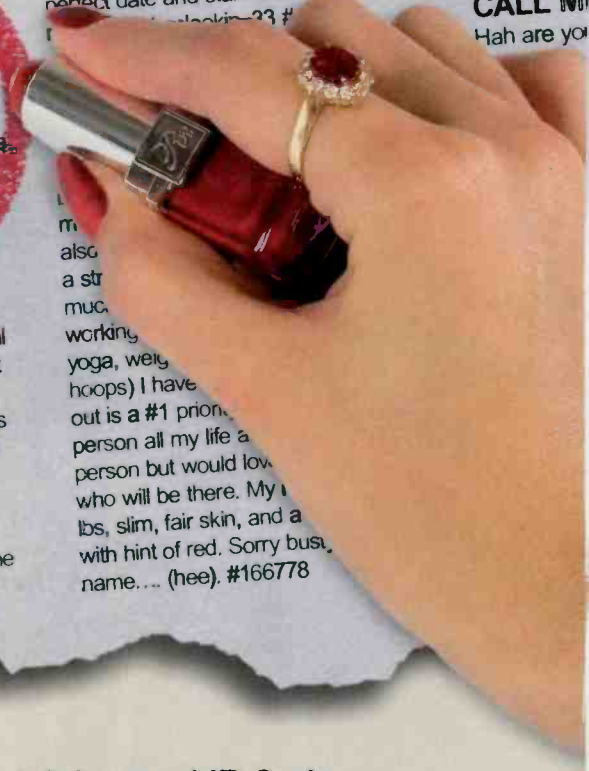
Radio engineer seeks stable long distance relationship. Need to connect immediately. Everywhere I go, I see broadband internet, but I just never hook-up. I need to meet that special someone that will plug me in so I can be heard. Must be reliable, connect easily, forgive errors and adapt to change. Should come from a good family. easy_going #101352

## SIMPLICITY HERE

Simply put, I'm looking for a fun, casual relationship with only one person. That means one person for me and one person for you. :-) Every woman wants to feel safe with a partner, whether it's serious or not. It's key to her feeling comfortable to express her more intimate nature. I don't ask for much other than to hang out, enjoy your time with me and be available to chill.

## MR. RIGHT

I'm actually posting this on behalf of a friend. Since she's been single she hasn't found the right guy and I'm doing this in hopes of helping her find Mr.Right. After you and I talk, if you are chosen then you will get to go on a date with her and who knows, it could be the perfect date and start of a new



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NEW TELOS ACT (AGILE CONNECTION TECHNOLOGY): Z/IP brings automatic on-the-fly bitrate adjustment to IP codecs - a first. The Z/IP constantly monitors the network and sets its bitrate to the optimum value. A dynamic adaptive receive buffer also responds automatically to network conditions, minimizing the effects of the varying bandwidth and jitter that occur on real-world networks.

EFFECTIVE PACKET LOSS CONCEALMENT: The Internet usually has packet loss on audio streams, often ranging up to a few percent. The new AAC-ELD codec combined with ACT can conceal this loss, making for smooth audio even with rough network conditions.

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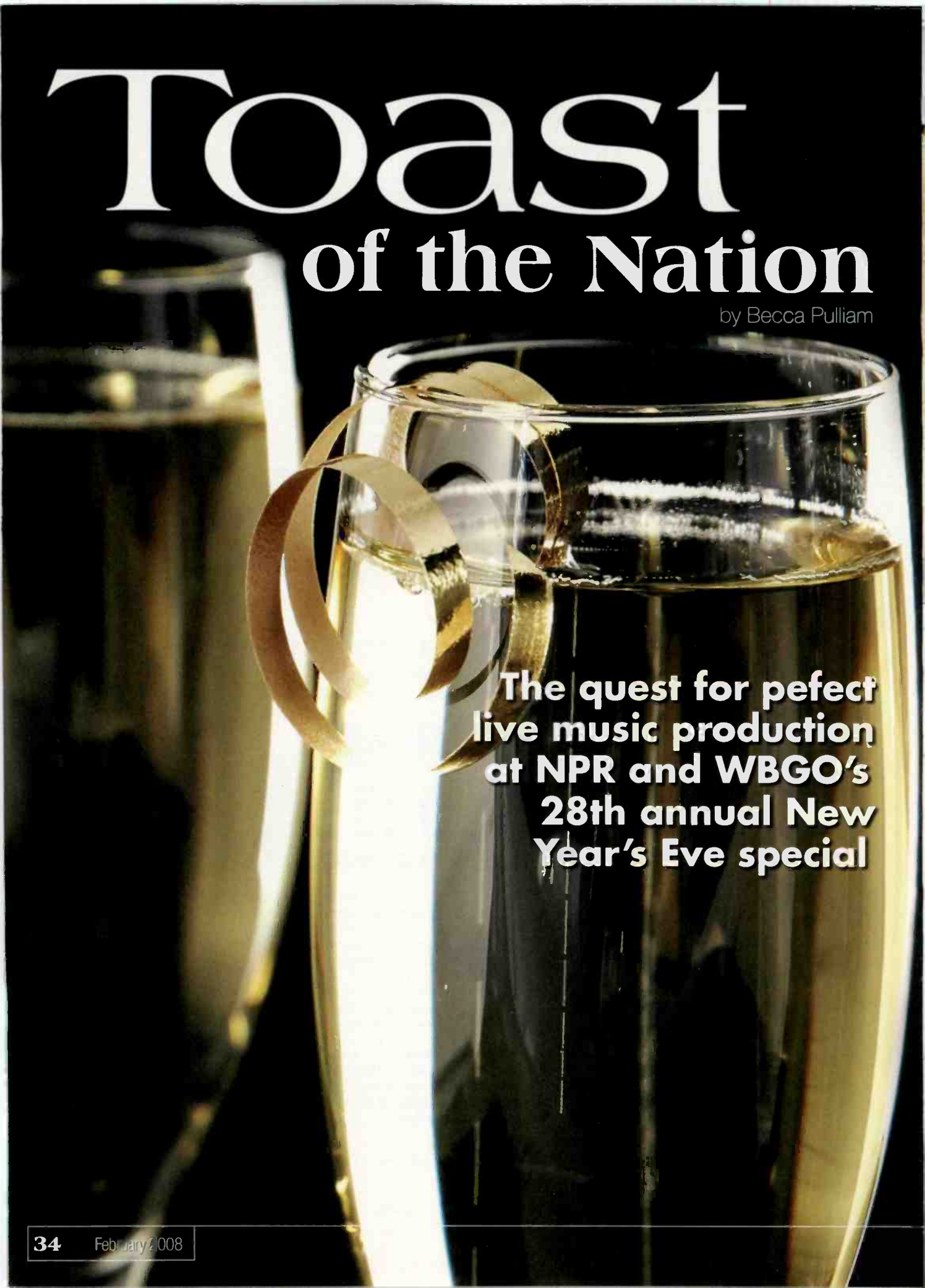
# Toast of the Nation

by Becca Pulliam



**The quest for pefect live music production at NPR and WBGO's 28th annual New Year's Eve special**

As a radio producer, I strive to provide the best listening experience for the audience. One of the best ways to do that is to create something unique – so one-of-a-kind and compelling that people seek it out. I think that is what we are accomplishing with NPR's annual live New Year's Eve special, Toast of the Nation (TON).

In my 20 years with NPR's Toast of the Nation, it has grown from live jazz presentations from three different locations to the six venues for this year – in Boston; New York; Washington, DC; Minneapolis; Denver and San Francisco.

The key is to schedule great talent at a great jazz/blues venue, and then to have the best producers and audio people at these locations. I have been extremely lucky because all the people that help produce and mix the show are long-time participants.

We want our listeners to experience Toast as one program. When the broadcast moves from location to location, we don't want the audience to feel a jarring change. Our Boston venue is the David Friend Recital Hall at Berklee College of Music, while our new West Coast venue, Yoshi's in San Francisco, is a 400-seat nightclub. But the audio teams managed the sound so that we created one program out of many parts.

Each year we like to augment our program, or add a new wrinkle to the broadcast. For our 2007 version, we added 5.1 surround sound from San Francisco and Denver with the encouragement and assistance of Neural Audio.

I was able to listen to both events, and the sound was just fantastic. Phil Edwards, the mix engineer from Yoshi's, did a fabulous job. I really felt like I was in the middle of the event surrounded by the partygoers blowing their horns and celebrating. The Denver club, the Dazzle Restaurant and Lounge, was smaller and our Denver mix engineer Duke Markos and technical director Mike Pappas managed to capture the intimacy, energy of the crowd and vibrancy of the group, the Convergence Sextet, with 5.1. You have not heard it all until you've heard Convergence's reggae version of Auld Lang Syne.

There is so much great live music across the country to choose from that this kind of live special should be done more often! Our listeners deserve it.

*Pulliam is the senior producer of Toast of the Nation.*

## Yoshi's

***San Francisco***

### Phil Edwards, mixing engineer

When Becca said she heard everything with the 5.1 stereo mix, she sure did. That's because a mix is a dynamic thing, changing all the time. You can't capture everything, but you want to hear almost all the details you can possibly put into it. What you end up doing is filling holes. When something falls out of the mix, you find it and grab it. If something pops up you grab that, too. When the horns come in, the drums usually disappear and you have to ride the mix. We had a very dynamic vocalist on New Year's Eve, and when she got soft she fell under the mix, so I had to ride gain on her. As a matter of fact, we were riding gain on just about everything. Bass is about the only thing that didn't move, and oddly enough the rhythm guitar needed very little attention.

When it came to setting up for 5.1 broadcast, there really wasn't a big difference between the stereo mix. You just set up more mics for more audience ambience. We had three mics across the front of the stage and we put two microphones in the back of the room. We panned them that way and had audience front and back more or less. We also did a kind of coincidental pair in the back that folded down very, very nicely. We ran a total of five channels.

We listened mostly to the Neural Audio watermarked 2.0 mix. So when we occasionally switched to the Neural 5.1 broadcast, it was a lovely surprise. The Neural Surround Downmix does an exceptional job transparently, which makes one less thing you have to worry about during a production which is a great thing.

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# Toast of the Nation

## Dakota Jazz Club

*Minneapolis*

### Dayna Calderon, NPR field producer

**Three additional keyboards were added to the band setup at the last minute, but they were accommodated.**

Another important thing incorporated into the preparation process for a live event is ongoing communication with the musical group or featured performer. You need to find out what they will be playing, pronunciation of names, what instruments they will be using, what they will need from you to produce their best product – you are basically looking for the kind of input that makes everyone's job easier. In fact, for this presentation by Nachito Herrera, we had three keyboards added at the last minute on a small stage and we were able to work things out. We had a rehearsal and sound check, the midnight countdown, and went through the opening and talked through the station IDs. Most groups haven't done something like this before and talking with them gives them a real feeling of ownership.

# Berklee College of Music

*David Friend Recital Hall, Boston*

## Antonio Oliart, NPR technical director/WGBH Boston

On the whole, our event went off without a hitch. We did, however, have to build a control room from scratch in a conference room next to the recital hall. We used two Yamaha DM1000 consoles to do the mix. We also recorded into an Nuendo system (multitrack) for later postproduction. We used Shoeps MK series or Neumann (TLM170, TLM103 and KM100 series) microphones. The signal from the microphones were split so the PA could have access to the same microphones that I used.

The venue was a small recital hall (held 100 people) and the ambiance during the performance was lively and festive. The challenge mixing the show was getting clarity from all the instruments (the Danilo Perez Trio and Big Band has 28 members). This is the fourth year in a row that we have produced Toast of the Nation from this venue. Every year the band gets bigger!

Finally, for the transmission the feed was sent via ISDN using a Prima at 256kb/s MPEG Layer 3 stereo, and as a backup we had a Telos Xstream running at 128kb/s AAC.

**Some last-minute checks before the show begins.**

**With 28 performers, the Danilo Perez Trio and Big Band presented a challenge to the Boston production team.**

# Toast of the Nation

## Jazz Standard

***27th Street, New York City***

### David Tallacksen, NPR technical director/NYC venue

Our broadcast from the Jazz Standard in New York City went mostly as planned, thanks to great preparation from our broadcast team. A month before the broadcast, I met at the site for a survey with the event and broadcast producers, as well as with Steve Remote of Aurasonic, who provided the mix truck. We spent a few hours talking through how everything would be handled, from power access to running the audio and com (including video) lines from the performance space, through the kitchen and out to the truck.

Unfortunately, I also went back three times after that, to deal with a non-operational ISDN circuit (one of three ordered). Despite several visits from Verizon techs, we were never able to get it functioning, and thus were limited to a 128kb/s primary feed and a 128kb/s backup to NPR in Washington, DC.

**The New York broadcast operation center was this remote truck – a former bread delivery truck.**

Jim Anderson's music mix was created on a Midas Verona 320 console, using True Systems Precision8 mic pres and a complement of outboard equipment. Recording was to Alesis HD24XR and CD two-track. The mix was fed to the Neustar for N-CLAS preconditioning and A-to-D conversion, then AES into our APT Toyko. A second (backup) feed went directly to a Telos Zephyr Express.

# Dazzle Restaurant

*Denver*

## Mike Pappas, NPR technical director/Denver

Presenting in surround really makes the experience so much better. Jazz typically lends itself to doing surround, because you generally have a real audience and real musicians. It is not heavily post-produced. We have a tendency to be pretty conservative on how we mix jazz so soloists don't go whipping around the room. There is a wide dynamic range, which can be a challenge when you want to gather all the nuances.

For our 5.1 broadcast at our Denver venue, our crew (including mixer Duke Markos) prepared the event setup with 5.1 in mind, including using a Neumann KU100 (Fritz for short) head mic for the rear channels. The Einstein mixing console in the truck wasn't provisioned for doing surround, so Duke and I had to work our way around it. We sat down and talked out how we were going to create a center channel. So the first thing we did was figure out what would normally go into the center channel, such as the announcer, band leader and whatever was centered in the stage (in this case, the trumpet player and bass). In the left and right channels, we put everything else and set it so there was a hole to put the center channel in.

The downmix was created in the truck with a Neural Surround Downmix. The output from the console was converted through an A-to-D Converter into digital and fed in the Neural Downmix, which took the 5.1 mix and made it into watermarked stereo. The watermarked stereo was sent to a Neural NeuStar 4.0 for leveling and codec pre-conditioning, which fed the broadcast to the primary and backup ISDN links to NPR.

The Neural surround technology creates a very good downmix that inspires confidence although during the production we monitor both the 5.1 mix and the stereo downmix periodically for quality control.

# TECHtips

www.RadioMagOnline.com

## Tips, tricks, hints and more

By John Landry, CSRE

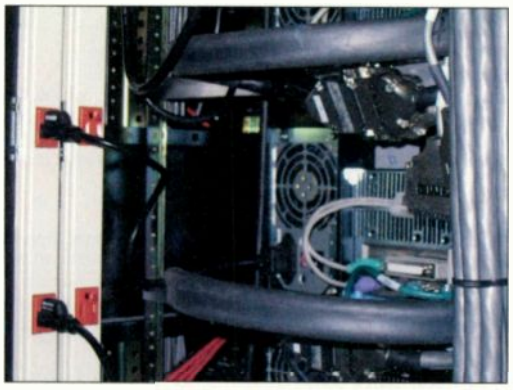
### Wart remover

The wall-wart power supply is a common problem. These are more common than ever because manufacturers don't have to obtain registrations for the power supply in a device, and they can buy the supplies in bulk. Both steps save money. Unfortunately, unless the outlet strip outlets are spaced far apart, one wart will cover at least two or three outlets. One solution is to use very short extension cords. These cords are marketed for this use and are about 6" long. They are available through electronics suppliers and many consumer electronics stores and home improvement centers.

Some power strips will turn the outlets 90 degrees so the warts sit side-by-side. This can also preserve some of the potentially wasted space. Even so, another problem can arise. The weight of the warts can pull themselves out of the strips. Furman has a solution to this with its Pluglock. Brackets on the power strip hold the wart firmly in place.


### The spaghetti alternative

Did you ever notice that when you get a new piece of equipment, it always comes with a 6' long IEC power cord? And when you mount it in the rack, the outlet strip is right at the back of the chassis, you have at least 3' and maybe even 6' too many? It turns into an unsightly mess. There is a solution.

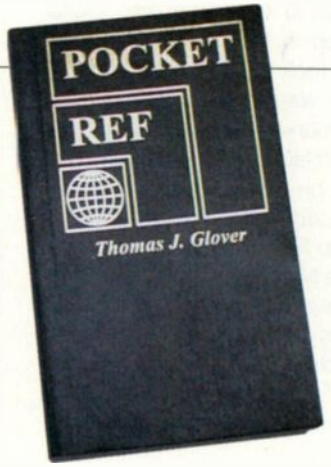


Short IEC power cords are available. I have purchased 2' and 3' IEC cords as needed (Volex 17041A-B1-10 and 17000A-B1-10), especially in a crowded rack. Lengths as short as 1' are available. Most electronic suppliers, such as Newark and Mouser carry them. Other manufacturers make them as well, and variations such as right-angle ends are also helpful.

But what do you do with the leftover 6' cords? Snip off the IEC end and make them extension cords. Or snip off both ends and make them speaker cords. If you really have the time available, cut the cord to the proper length and install your own power plug for about the same cost.

### Send a tip, win a book

Tech Tips has been running for several months now, and we appreciate the ideas that have already been submitted. Some have been used in this column, while others have been posted to the Engineer's Notebook section of the *Radio* magazine website (radiomagonline.com/notebook). We want to hear your ideas, and we have something to offer you as well. Ideas submitted for Tech Tips or the Engineer's Notebook now through April 30 will be entered into a drawing to receive a copy of the *Pocket Ref* by Thomas J. Glover. This handy book is loaded with useful data and formulas for just about anything you can image. Send your ideas to radio@RadioMagOnline.com today.




*Landry is an audio maintenance engineer at CBS Radio/ Westwood One, New York.*

**Do you have a tech tip? Send it to us at radio@RadioMagOnline.com**

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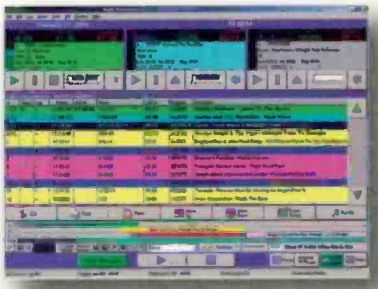

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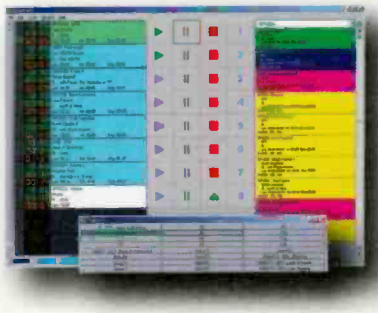

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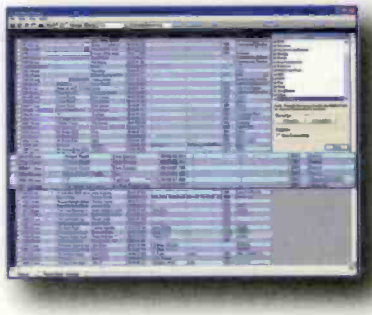

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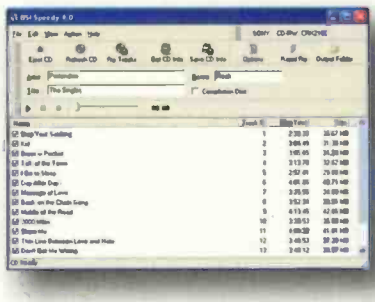
## CD Ripping



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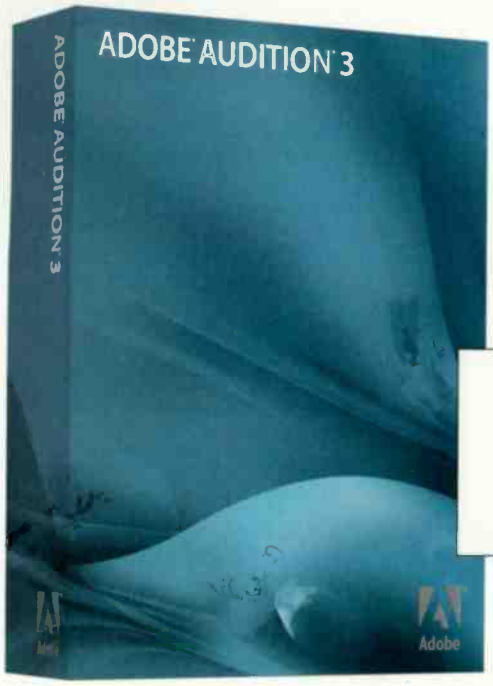



# Adobe Audition 3.0

By Chris Wygal

The old adage "you get what you pay for," is for the most part true. However, this saying is de-bunked by Adobe Audition 3, released in November 2007. Without a doubt, the new software suite gives five-figure production results at a three-figure price (less than $400). Plus, it doesn't require an over-achieving audiophile!

## A little history

Most folks in the radio industry know something about Cool Edit Pro. Cool Edit was originally developed by Syntrillium in the 1990s, offering affordable and flexible desktop audio editing. In 2003, Adobe acquired Syntrillium and replaced Cool Edit Pro with Audition 1.5, essentially adding the spectral display. Later, Audition 2.0 gave users an overhauled mixing engine with the added features of sends and buses, putting studio routing techniques on-screen. Now, Audition 3 includes a MIDI sequencer, added editing efficiencies and spectral tools that are a bigger part of the audio crafting arsenal.

## Performance at a glance

Improved editing features

Supports VST effects plug-ins

VST Izotope plug-in package

Loopology music library

New MIDI sequencer

## What it looks like

Audition 3 is primarily divided into three views: waveform editing, CD and multitrack. Waveform edit view uses a destructive method when editing files. For example, if reverb effects are applied and saved, the file is permanently changed. Waveform edit view is handy when recording a simple voice-over clip. Multitrack view on the other hand, displays multiple tracks and file changes are non-destructive, allowing for increased flexibility. Multitrack view is used to include music beds and sound effects, for example, with a voice track. Sends and buses route effects and other processes in real-time using VST (Virtual Studio Technology) and familiar multitracking techniques like punching in are available. Audition 3's dockable panels, such as the time display, transport buttons and zoom controls make all user-defined displays available on screen. Both edit view and multitrack view have their own dockable panels, depending on which features the user wishes to have open. CD View provides a handy interface for assembling and burning CDs.

A major accomplishment of Audition 3 is the simulation of familiar studio recording techniques. Most sound engineers are accustomed to patching and recording equipment. Audition 3 puts the entire studio on the screens (a dual-monitor configuration is highly suggested). In conjunction with the VST effects, sends, buses and channel strips are loaded onto the mixer panel in multitrack view. The channel strip is similar to a channel strip on a standard mixing console.

## Making it easier

New users to Audition 3 will notice a very intuitive layout. The goal in Audition 3's development was to achieve a more efficient workflow. For example, since most envelope editing only creates fades and crossfades, Audition 3 has introduced dedicated fade handles in addition to the traditional volume envelopes, to quickly apply a fade to a single track, or automatically crossfade between two clips in multitrack view. Top/Tail view, (in the waveform edit view) only displays the first and last 10 seconds of a clip. This is useful when working on intros and outros.

The Save All Audio As function allows the user to save multiple files into the same destination folder, using the same naming template and file format in one step. This feature is perfect at the end of a session when several unsaved files need to be collected, using a specific naming strategy, into one common folder. Audition 3 also makes extracting

or ripping audio from CDs a snap, eliminating the need to real-time CD material. ID3 v.1 tagging is supported when creating CDs, so metadata such as artist, album, year and genre will appear on other media players.

Compression and acoustic effects are popular processes in radio production. After working with non-linear software for an extended period of time, the engineer picks his favorite processes and docking preferences. The Favorites tab allows the user to insert his most commonly used tasks, and then give the tasks a friendly name. Also, currently open files, favorites and Audition's onslaught of effects are examples of the tabs found in a dockable panel next to the audio file timeline workspace. In the workspace menu, several pre-defined options allow the user to optimize his desktop, specific to his task.

## Making it sound great

The creative possibilities stuffed into Audition 3 are endless. First, Audition boasts a complement of tools that allow for cleaning up and restoring audio. When digitizing old cassettes or reels, frequency specific Automatic Phase Correction effects are available to quickly correct azimuth problems. The Adaptive Noise Reduction filter allows for extra-critical elimination of unwanted noises that occur in a poor recording. This filter will find noise within the audio track, without the user's having to sample a segment of noise, which is sometimes impossible. Plus, if for example a ground loop buzz changes in frequency over the length of the audio clip, the Adaptive Noise Reduction filter will change, thus continually eliminating the noise.

Secondly, with the help of Izotope, Audition 3 is armed with a near infinite list of effects. For example, Audition 3 has introduced a multi-band compressor from Izotope in addition to the traditional dynamics compressor (both VST). The Mastering Tool, also VST, makes difficult mastering techniques easy. It is equipped with presets that allow for adjustment of the final mastering EQ, exciter, tube, reverb, Loudness Maximizer and stereo image widener. Izotope also delivers a time stretch feature, which transparently changes the pitch and/or tempo of an audio clip, and a tube-modeled compressor that replicates classic compressor techniques, and comes with plenty of presets.

Thirdly, Audition 3 supports multi-core technology. Dividing real-time effects across several processors reduces glitches and bugs, thus increasing productivity. In addition to multi-core processing, dual-monitor technology will help productivity as well. Two monitors not only give the user more desktop space, but more importantly, a quality dual-monitor video card usually handles the video processing, which lightens the CPU processing load.

## The big bang theory

There are two groups of audio professionals we've failed to mention: the radio production folks who produce their own music, and the audio perfectionists who hear absolutely everything. For the music people, Audition 3 is bundled with Loopology, an extensive set of layered loops in different tempos and keys. These loops can be combined to create original sounding ads and imaging bed masterpieces. A new MIDI sequencer is also available, making music creation possibilities endless.

Next, are the type-A sound engineers. When in waveform editing view, switching the file to spectral display allows the user to physically change the waveform by seeing audio anomalies that aren't visible in the standard green waveform display. Harmonics, frequency-specific phasing problems, and other oddities can be edited using the spectral display. A healing brush and lasso tool allow the user to change the way the waveform looks, in order to change its sound. The waveform, in spectral display, can be exported as a BMP file to Adobe Photoshop, edited, and then imported back into Audition 3. Using this technique, the user can see the sound and edit accordingly.

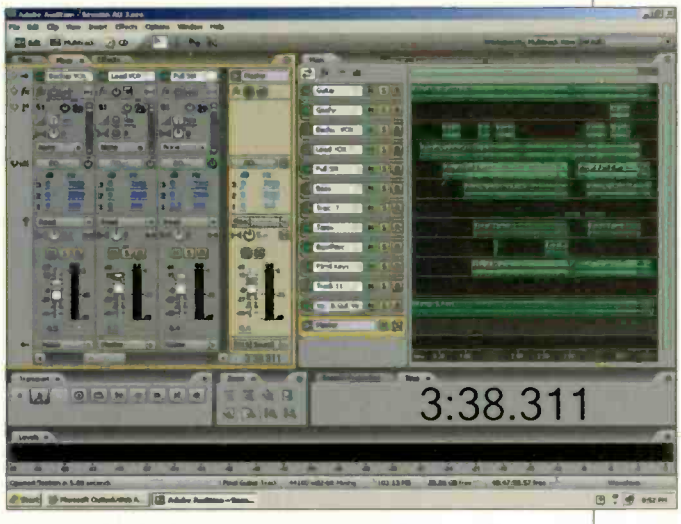
Obviously, Audition 3 is far from lacking when it comes to creating top-quality audio. Whether a musician, voice-over artist or radio producer, Audition 3 is pushing the envelope by expanding creative possibilities, making affordable features efficient and available.

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

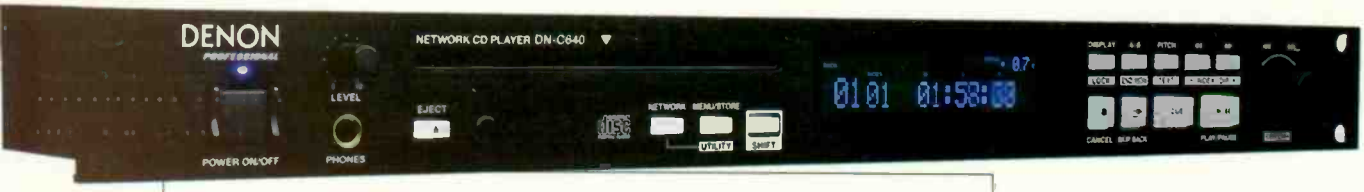
**Adobe**

P 800-833-6687

W www.adobe.com




**Adobe Audition 3 has a very intuitive layout.**




# Denon DN-C640

By Bill Eisenhamer

Looking for replacements for our old, rebuilt-many-times, Audiometric CD10 CD players turned up some good candidates. On a whim I accessed the Denon professional website to see what the company offered as a replacement for its discontinued, cartridge-style CD players. I discovered a 1RU CD player, the DN-C640. This player was introduced early in 2007 and was displayed at NAB2007, although I did not notice it at the time. After I read the description, I decided this was no ordinary CD player: It is network addressable and was worth a closer look.

For a 1RU CD player, the front and back panels are well designed and the functions fairly intuitive. This CD player is slot-loading, not cartridge-loading. Only time will tell how this will hold up under the daily duress of a broadcast facility, but it cannot be any worse than the cartridge trays. One comforting feature is that the eject button is locked while a CD plays. Along with your normal transport controls, a multi-function jog wheel controls track selection, network media selection, preset selections and pitch control. Advanced functions are accessed by the Menu/Store/Utility button and a Shift button. The latter adds depth to the menu scheme without confusing the user. The Network button is the new – and quite useful – feature of accessing a shared network drive whether its a PC or a server. In my tests I set up a UNC path to a file server folder.

The back panel has all the amenities of a CD player and provides interconnects necessary for a broadcast facility. As expected from a professional machine, the analog outputs are balanced, XLR type connections. If that was not enough, unbalanced outputs are available, one with variable output level control via the internal Web interface. For those working in the digital realm both AES3 and S/PDIF outputs are provided, and active simultaneously. For interfacing to external equipment, the parallel DB-25 type connection accesses transport controls and tally and the RS-232 DB-9 connection is a full-function serial port. An EOM (end of message) tally is also provided.

The nontraditional addition is the LAN jack. This is a standard 10Base-T/100Base-T Ethernet connection. IP address is assigned dynamically by DHCP or static. I recommend assigning the IP address statically to these machines, as it is difficult to keep up with a device with a Web interface and potentially changing IP address.

The most notable feature of the DN-C640 is its networking capability. Using the internal Web interface, after setting up the IP address, you can fully control the CD player and playback files stored on a server or PC. The formats supported are WAV, MP3, MP2, WMA and CD-DA. It also reads the ID3 standard to provide artist and title content of MP3s. You can also create playlists in the M3U format and upload/download them to the machine. For disk compatibility, this machine will play music CD, audio files on CD and audio files on DVD data discs. As expected, you can upload a track or a whole CD to a network location from the CD player. Between CDs and network access, the flexibility is amazing.

Many other features are found on this machine that take a back seat to the new networking functions. Many CD players today do not have pitch control, but there are still uses for this feature. The DN-C640 varies the pitch between ±12 percent. Many presets can be set on how the player responds when a disc is first inserted to what the player does when a song ends. This latter feature is the Finish Mode. Upon completion of a song, you can set whether the machine stops, continues to play, plays next or recues. The capability to recue on end is quite useful. Presets are set via the front panel controls or the internal Web interface.

Bench testing revealed typical specs for a professional CD player. The most impressive is the start of playback from a CD or a file over the network. This unit is as close to instant start as one can get. Press play and the machine plays. Even files played over the network show minimal delay in playback. Network response is dependent on network traffic. We keep our audio separate from day-to-day use to off-set latency. The Auto Cue function assists in quick play response. The cue level is user selectable between off, -48dB, -42dB, and -36dB. I chose -48 for my tests and did not experience any up-cutting. Another example of a user selectable item is the EOM. This defaults at 10 seconds and can be set for 15, 20, 30

## Performance at a glance

Occupies 1RU

±12 percent pitch control

Plays back audio from network location

Reads CD-R/RW, DVD-R/RW and DVD+R/RW discs

Supports WAV, MP3, MPG and WMA files

User selectable Finish Mode feature

or 60 seconds. For morning shows or contests that require the playback of a snippet of a song, there is a Skip Back function where the amount of time the player will instantly play back when engaged is selected.

## Who needs a network?

This question is both easy and difficult to answer. With automation systems playing music and so many other networked devices, I wondered at this device. My colleagues and I produced a list of uses instantly upon setting up this unit. For morning shows, have one machine assigned to access stored interviews and archived bits for near instant playback. While many stations are becoming more network-intensive, a production file server can be addressed. One suggestion was to backup the automation system with currents. Another concept is a backup source at the transmitter site. If an off-site server is deployed and the main studio is inaccessible, you can stream through the CD player over the network. We intend to try this soon. You can expand this to storing a playlist at a program director's home that can be accessed. There are alternatives to this method, but how many laptop computers provide AES3 out to feed a digital exciter?

As with any new product there is room for improvement. Unless you map to the root directory of a server or computer there is limited access to network resources. One machine cannot access multiple locations or machines without being configured for such access each time using the Web interface. This limitation forces you to assign one machine to a morning show that may not store on the same file server as the rest of production. In addition the network location must be chosen using the Web interface, not the front panel.

On my test unit, the most annoying item is the time remaining setting. I was unable to set this and make it stay. It is also not a default setting. Recently, Denon provided a firmware upgrade to the machine, which is very easy to use. The company provides a CD; you pop it into the machine, and accept the update. Again, the default for the timer was not remaining time, but a press of a couple of buttons and the setting is changed and stays ever if you need to power down the machine. With this fix out of the way, I still would like to be able to name uploaded tracks from a CD through the player. Though inconvenient, you can edit the name on the file server later.

**Denon**

P 630-741-0330
W www.d-mpro.com
E info@d-mpro.com

**The rear panel connections are clearly labeled.**

The Denon DN-C640 is a true professional CD player and the network functionality adds to the experience. The response on playback is tremendous. It took less than a half-hour to have the unit up and running on the network and most configurations were done without using the manual. Intuitive design and user functionality make this CD player a useful tool in any broadcast facility.

*Eisenhamer is the staff engineer for Lincoln Financial Media Company of California.*

by Erin Shipps, associate editor


## Digital recorder
### Sony

**PCM-D50:** This compact version of the PCM-D1 digital field recorder offers 96kHz/24-bit recording, two-position electret condenser stereo microphones, PC/MAC file transfer via high-speed USB interface and numerous special features. The PCM-D50 includes 4GB built-in memory, records up to six hours at 44.1-16-bit, LCD digital peak metering, MP3 playback, digital pitch control, SPDIF digital input and output, and a five-second pre-recording buffer.

**800-686-SONY**
**www.sony.com/proaudio**

## Drive duplicators
### Arco

**EZ Copy:** The EZ Copy is a small, easy-to-use, stand-alone drive duplicator. It features two removable drive caddies and is designed for organizations with low volume drive copy needs. The EZ Copy is available in IDE and SATA models. Both may be purchased with either 3.5" or 2.5" drive caddies. The EZ Copy transfers a bit-by-bit copy of the original onto the target drive, rapidly moving data at less than one minute per gigabyte. It can duplicate drives of up to 144PB (petabytes), is virtually maintenance free and can be used to copy to and from drives of dissimilar sizes as well as between drives from different manufacturers. Because the EZ Copy does not connect to a computer, it requires no installation or software, no computer time and virtually no user intervention. A front-panel LED provides status information, making it easy to identify copy direction or to abort a copy if necessary.

**954 925-2688; www.arcoide.com**
**arco@arcoide.com**


## Three-in-one printer
### K-Sun

**Label Shop BEE3:** The K-Sun Label Shop Bee3 features automatic tape and heat shrink tube cutter; transparent tape cover, LCD display, light adjustment, print preview, 180dpi print resolution, print speed of 2.36" per second, automatic power off, 60 industrial tapes and five heat shrink tube materials, flexible polyester base for wire and cable wrap, safe 6.5Vdc power and overheat detection.

**800-622-6312**
**www.ksun.com; info@ksun.com**

## USB broadcast console
### Henry Engineering

**Six Mix:** This 10-input, 6-channel broadcast console is about the size of a laptop computer. The most important feature is its integral USB digital audio interface. Connect a USB cable to any PC or laptop, and it's ready to record, edit and play digital audio with superb audio quality. This makes Six Mix ideal for use with radio automation, digital production, news editing, webcasting, or as a self-contained emergency studio. Other features include a cue bus with cue speaker, monitor system with mic-on muting, a mix-minus output, and guest headphone facilities with full talkback.

**626-355-3656; www.henryeng.com**
**info@henryeng.com**

## Safety signs
### RF Signs

**Signs:** RF Signs is the brainchild of Broadcast Signal Lab, which has been providing RF exposure management services for more than 20 years. The RF Signs mission is to provide the radio industry with the best, most effective, standards-compliant RF safety communication tools.

**508-359-8833; www.rfsigns.com**
**info@rfsigns.com**

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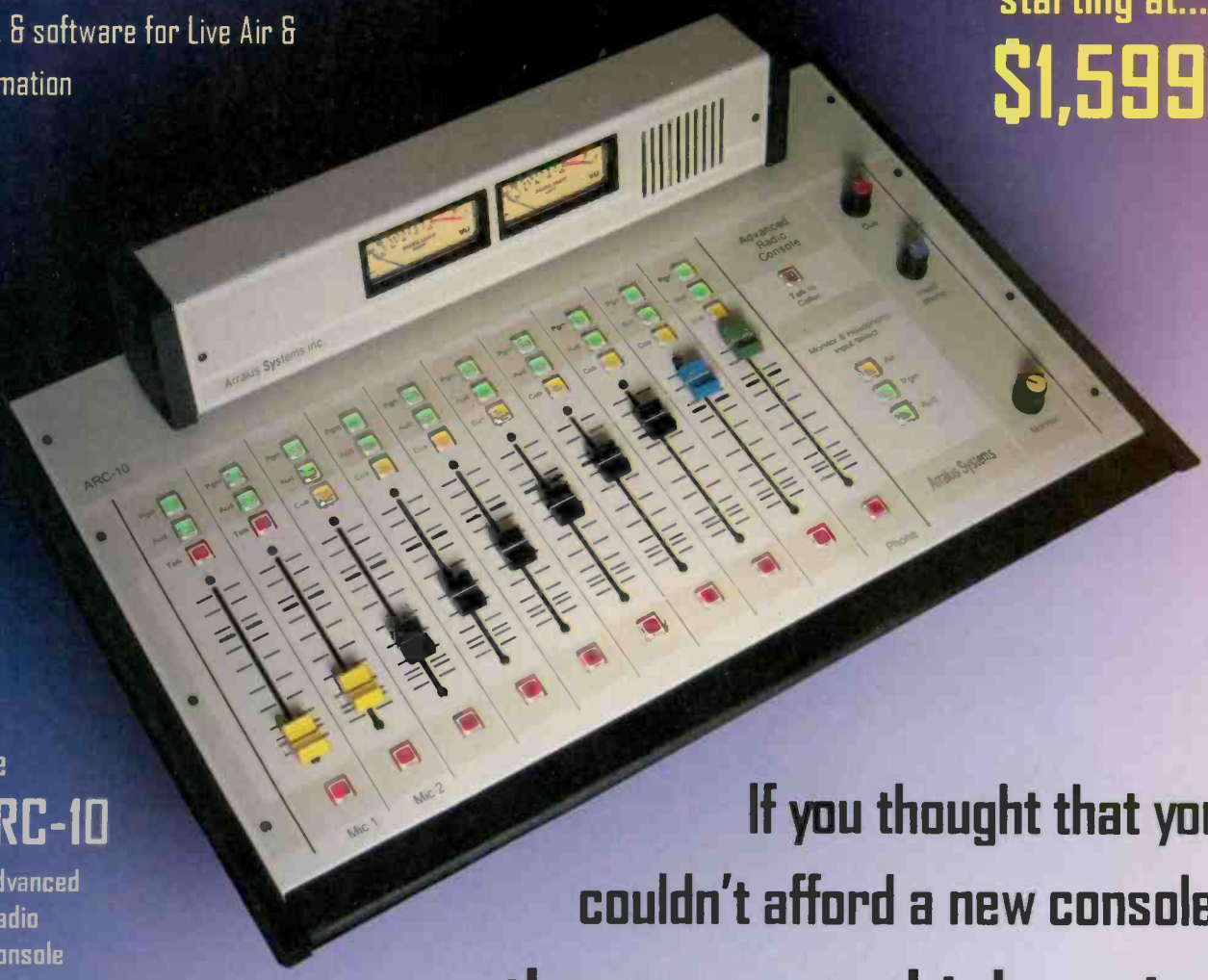


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| ARC-10BP | balanced w USB | $2,495 list |
| ARC-16SW | 16 in x 3 out switcher | $995 list |

www.arrakis-systems.com/zrra-1.html 970-461-0730

## DJ Headphones
### Allen & Heath

**XD-53:** The XD-53 professional monitoring headphones were designed to complement Allen & Heath's Xone DJ mixers. The XD-53's incorporate a circumaural isolation design, providing high-level isolation from ambient noise. Comprising 53mm diameter drivers – the largest drivers currently available – with high power neodymium magnet design, 1500mW of power handling and high SPL capacity, the XD-53 headphones deliver excellent sound reproduction. They also have rotating earpieces for easy one-ear monitoring, a coiled cable with convenient one-side exit and a folding design for compact portability.

**800-431-2609**
**www.allen-heath.com/US**

## Professional USB Converter
### Yellowtec

**PUC:** PUC is a two-channel self-contained audio interface for use with USB-enabled PCs. The unit is powered through the USB, so no external power supply is needed. PUC requires no installation of drivers other than those automatically loaded by the host operating system. With the exception of a 1/8" headphone jack, audio connections are made via an optional breakout cable, which attaches securely to the PUC via a DB25 connector. Electronically balanced analog audio I/O (0dBFS=+18dBu) is provided through stereo pairs of Neutrik XLRs.

**+49 2173 967 30; www.yellowtec.com**
**info@yellowtec.com**

## NEW PRODUCTS

### Active loudspeakers
**Tapco**

**Thump TH-15A:**

Designed by the same team that produced Mackie's compact active loudspeakers, the Thump TH-15A active loudspeaker's two-way bass reflex (ported) design provides accurate response, from 20kHz down to 40Hz. All-new Class D circuitry drives its custom, high-precision 15-inch woofer to greater volumes with less heat. Additional onboard electronics include full system protection and three-band EQ with swept midrange. And with its durable polypropylene enclosure, the TH-15A is the most lightweight and powerful compact active loudspeaker in its class.

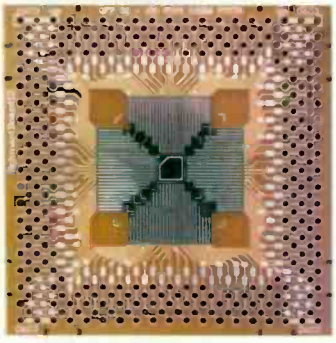
**425-487-4333; www.tapcoworld.com**
**sales@tapcoworld.com**

## AC power management
### Panamax

**M4300-PM, M5100-PM, M5300-PM, M5400-PM:** These devices offer advanced linear filtration for noise reduction and patent-pending circuitry to protect components from damaging power irregularities. The M4300-PM power conditioner offers Level 2 power cleaning and Linear Filtration Technology (LIFT) to eliminate common symptoms of ac line noise. Additionally, noise isolation between the two isolated outlet banks prevents any noise created by a component plugged into one bank from contaminating the power to equipment plugged into the other outlet bank. The M5100-PM features three isolated outlet banks, while the M5300-PM and M5400-PM offer five, including two high-current outlets. All three conditioners offer sequential startup/shutdown, which prevents internally generated voltage transients that occur when home theater components are powered on or off at the same time. A 12-volt trigger input allows source equipment to activate or deactivate the delayed outlets.

**800-472-5555; www.panamax.com**
**custrelations@panamax.com**


## Hand soldering component
### Schmart Board



**Schmart Board EZ:** Schmart Board EZ uses a patent-pending technology to simplify hand soldering surface-mount components. Hand-soldering surface-mount components can be a problem because it is hard to correctly place the chips on the pads and keep them aligned, not to mention the difficulty in soldering such tiny areas. With the Schmart Board EZ, place the chip (the solder mask is higher than the electronic pads); put masking tape on one side of the chip; put Solder Flux along the base of the chip; solder each chip leg to the Schmart Board EZ by pushing the solder from the outside of the groove to the chip leg (all the solder needed is already on the board); remove the tape and repeat for the other sides.

**830-237-9527**
**www.schmartboard.com**

## Sound card
### Audio Science


**ASI6514:** The ASI6514 is a professional PCI sound card designed for use in radio broadcast automation. Providing up to 12 play streams mixed to four balanced stereo outputs and up to two record streams fed from one balanced stereo input, the ASI6514 features anything to anywhere mixing and routing. The ASI6514 provides both balanced analog and AES-3 inputs and outputs. The maximum analog input and output level is +24dBu. A choice of uncompressed PCM, MPEG layer 2 and MP3 is available for both recording and playback. All compression is handled by an on-board floating point DSP, allowing the host computer to focus on other tasks.

**302-324-5333; www.audioscience.com**
**sales@audioscience.com**

## Stereo interface
### Rapcohorizon


**LTI-1:** This laptop interface features a 3.5mm plug and 3' cable to connect to laptops, MP3 players or any other stereo 3.5mm audio output to a professional audio mixer. The LTI-1 is equipped with built-in ground lift switches and a -20dB pad. It also features left and right XLR outputs.

**573-651-6500; www.rapcohorizon.com**
**info@rapcohorizon.com**

## Tabletop console
### Harrison by GLW

**Air 24/7:** The system features an IKIS-based control platform; DSP engine using dual Opteron processors; redundant power supplies; 15" console TFTs for precision parameter, waveform metering and routing display; multi-studio resource sharing, eight, 16-, 24- and 32-fader control surface configurations; mono, stereo or 5.1 surround sound channels; full EQ and dynamics processing available on every channel; and scalable mix minus and aux output buses.

**615-641-7200; www.harrisonconsoles.com; info@harrisonconsoles.com**

## Universal USB microphone interface
**MXL Microphones**


**Mic Mate:** The Mic Mate universal USB microphone interface is a tool that enables any dynamic or condenser microphone to be connected to a personal computer. The Mic Mate is a USB 2.0 high-speed device that is backward compatible with USB 1.1. The analog section of the Mic Mate features a 20Hz-20kHz frequency response, and a three-position, switchable attenuation pad with settings for high (0dB), medium (-5dB), and low (-10dB), making it easy to configure the attached microphone to virtually any sound source. The digital section features a 16-bit Delta Sigma A/D converter with a sampling rate of 44.1kHz and 48kHz. For use with condenser microphones, the Mic Mate supplies 48V phantom power.

800-800-6608; www.mxlmics.com
sales@mxlmics.com

## UPGRADES and UPDATES

***Danagger Audio Works*** has reduced the list prices of its popular audio loss prevention systems. (www.danagger.com)...***Zaxcom*** has released a software upgrade for its Deva IV, Deva V and Deva 5.8 multitrack recorder systems. Deva software 4.0 includes the capability for simultaneous multi-disc recording and background disk copying. (www.zaxcom.com) ...***Dialight*** has introduced a 48Vdc version of its D264 Series of medium-intensity LED red beacons. Until now, the beacons had been available only in 120/240Vac fixtures. (www.dialight.com) ■

## Online radio royalty reporting tool
### Liquid Compass

**RIAA Reporter:** This royalty-reporting tool automates the new per-performance RIAA royalty reporting requirements that went into effect in 2008. As a result of the new royalty fee arrangement, streaming radio stations will no longer be allowed to report royalty fees by aggregate tuning hour, which was based on the total hours of programming that the stations transmitted during a month to all listeners. Instead, stations will be required to report on a per-performance basis - or the total number of people listening each time a performance is played. Royalty fees are paid by streaming radio stations to Sound Exchange. RIAA Reporter removes the burden for stations by generating a monthly and quarterly report in spreadsheet format that does all the calculations, showing what was played, how often, and the total number of listeners. Clients need only to logon to the Liquid Compass Client Control Center and select from pre-populated dropdown information such as call letters and date range. The program will automatically calculate the stations fee and provide it in a form acceptable to Sound Exchange.

**303-839-9400; www.liquidcompass.net**
**info@liquidcompass.net**

## Condenser microphones
### Audix

**Micros Series:** The world's smallest condenser microphones with integrated preamp and detachable cable are the newest members of the Micros Series: the M1250 and M1280. Both feature newly designed circuitry with immunity from RF interference. The M1250 is 50mm in length, 12mm in diameter and 0.6 oz with a frequency response of 80Hz-20kHz, while the M1280 is 90mm in length, 12mm in diameter, and 1 oz with a frequency response 40Hz-20kHz providing extended bass response. Each body is precision machined out of brass at the Audix factory, finished in a durable black e-coat, and laser etched with model and serial number. Each model has four interchangeable capsules to choose from: cardioid, hypercardioid, omni-directional and supercardioid.

**800-966-8261; www.audixusa.com; info@audixusa.com**

## Software
### Wirecad

**XLT:** Often, other designers or engineers will produce the initial system design and hand it off to the facility maintenance team. Wirecad XLT is perfect for the facility maintenance team. It provides unlimited project databases, cables and drawings. Tools are enabled to link to other user's projects and create new projects. The software is an ideal upgrade to XL or v3 Personal. It can be used as a starting point for a design or documentation effort, or simply maintain existing Wirecad documentation.

**661-253-4370; www.wirecad.com; sales@wirecad.com**



## Passive studio montior
### Blue Sky International

**I/ON:** A fully sealed box design solidly constructed out of acoustic-grade MDF, this speaker is five times heavier than the typical 6.5" two-way in-wall speakers. I/ON offers easy in-wall or on-wall installation with consistent performance regardless of mounting and the sealed enclosure provides the correct acoustic volume. Also, I/ON is an evolution of Blue Sky's SAT 6.5 MK II active studio monitor, and is designed to integrate with Blue Sky's SUB 12 and SUB 15 Universal.

**516-249-1399; www.abluesky.com**
**info@abluesky.com**

## Content management software
### Netia Digital Audio

**Manreo:** Manreo is a range of software to realize productivity gains in media asset management and rich media. Its tools include software packages and customizable solutions. Manreo software addresses the problems of a range of professionals who manage and add value to media: digitization, editing of raw footage, indexing, archiving and browsing. Owing to its video product range Manreo, Netia offers content providers with the tools to manage their entire processes, from acquisition to multi-support broadcast, such as radio, Internet and mobile phones.

**866-638-4222; www.netia.net**
**j.martin@netia.net**

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# Contributor Profile

**Meet the professionals who write for *Radio* magazine.**
**This month:**
**Insight to IBOC, page 13.**

***Mark Krieger, CBT***
***Director/General Manager***
***WJCU-FM***
***Cleveland, OH***

In addition to his responsibilities at WJCU, Krieger is a contract engineer in Cleveland. He is an SBE senior member, former chapter chairman and vice chairman of SBE Chapter 70, and SBE-certified CBT. He is also an inductee into the Broadcasters Hall of Fame, Akron, OH. He holds an M.A. in Communications Research from Cleveland State University. Krieger also writes the bi-monthly *Radio* magazine e-mail newsletter, Digital Radio Update.

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**Written by radio professionals**
**Written for radio professionals**


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# ADVERTISER INDEX



This index is a service to readers. Every effort is made to ensure accuracy, but *Radio* magazine cannot assume responsibility for errors or omissions.

by Erin Shipps, associate editor

## Do you remember?

On August 17, 1969, hurricane Camille slammed the southeastern edge of Louisiana and continued its devastation through the Mississippi Gulf Coast. If the 200MPH winds weren't enough to destroy everything in its path, a 20' tidal wave followed, finishing the job. Many radio stations fought to get back on the air after this storm, but as you can see from this photo, it wasn't so easy for everyone. WGCM Biloxi's tower toppled into one of the station's buildings, and *Broadcast Engineering* ran this photo, along with a special report on the storm in its October 1969 issue.

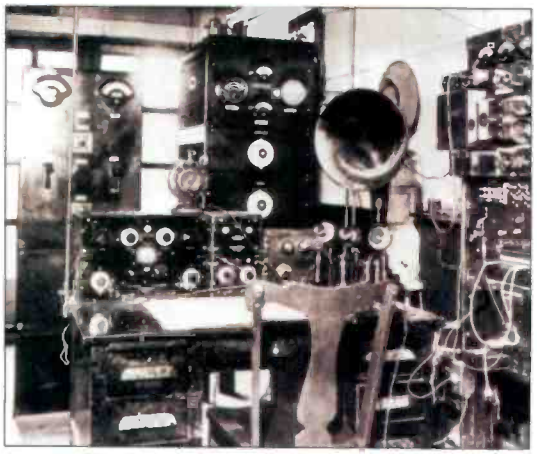
Do you have photos or stories of damage to your station or transmitter site from hurricane Camille or another storm? Tell us about it at radio@RadioMagOnline.com.

## Sample and Hold

Cellular phones became commercially available in the 1980s, but widespread use has only occurred in the past 10 years. Today's mobile phone, and the phones of the future, makes it possible for the public to access almost anything in the palm of their hand – including radio. This fact makes the future growth of cell phone use very relevant.


*Source: SNL Kagan*

## That was then

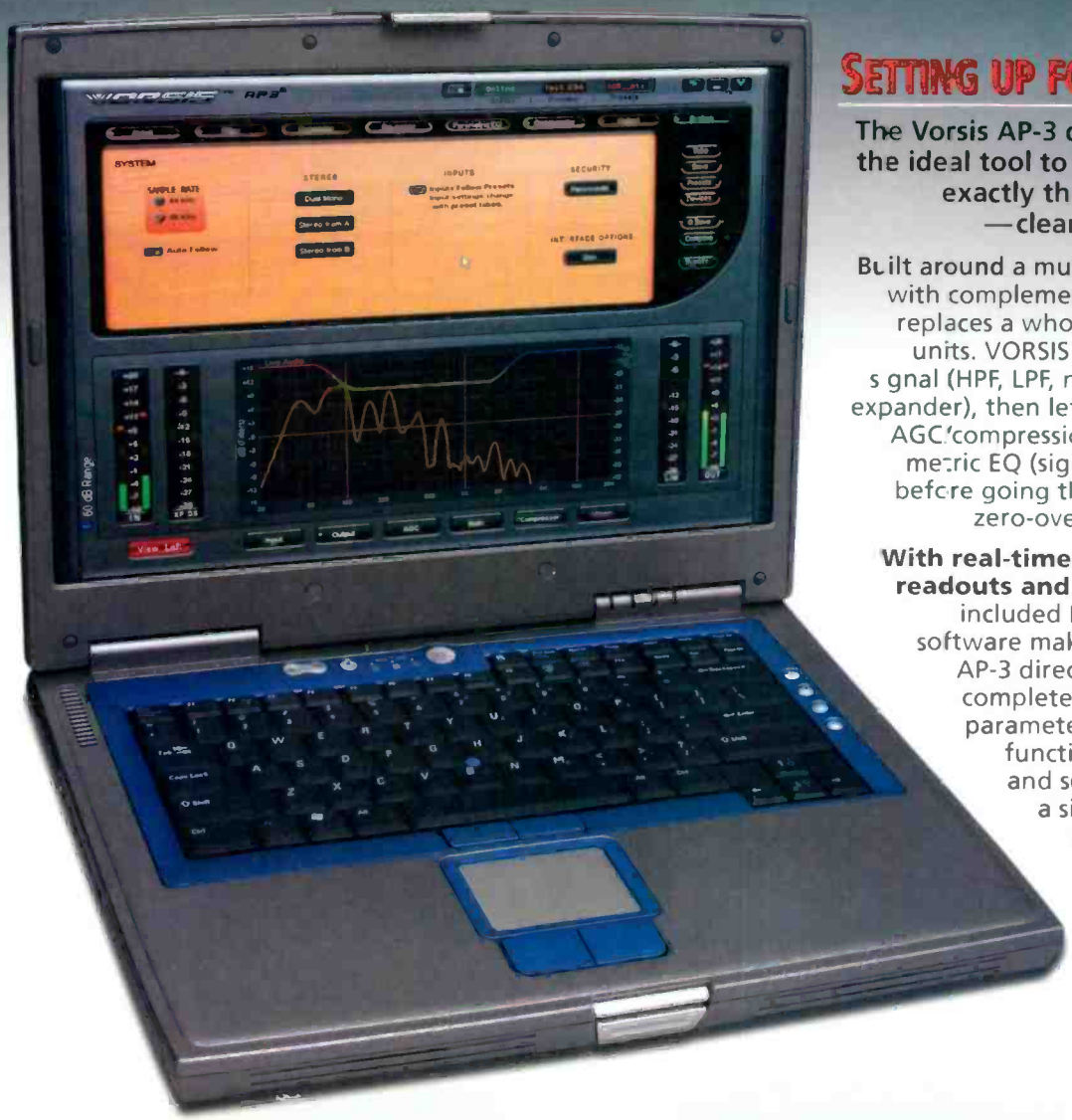


KPO San Francisco began airing radio programming at 9 a.m., April 17, 1922. Because it shared a broadcast frequency with other area stations, it was only on the air for one hour a day. This photo is of the transmitter room, located on the sixth floor of the Hale Brothers' Department Store. On the operator's desk is a radio receiver used to listen for distress calls from sea for five minutes every hour. During this time, the station was required to be off the air. Behind the desk on the left is the generator control panel, which operated a 5-1/2 HP motor that drove a 2kW, 1600Vdc generator. To the right of the control panel is the Western Electric 500W transmitter. At the right of the operator's desk is the speech input panel, which amplified the program audio and allowed the operator to adjust the modulation level of the transmitter. (Information courtesy John Schneider, Quincy, IL)

# This Little Unit

# Can Do BIG Things!

## Our new AP-3 is the perfect HD Processor:



### SETTING UP FOR HD RADIO?

**The Vorsis AP-3 digital processor is the ideal tool to shape your sound exactly the way you want it —cleanly and efficiently.**

Built around a multi-band compressor with complementary AGC, the AP-3 replaces a whole *rack* of dedicated units. VORSIS pre-conditions your signal (HPF, LPF, notch filter, de-esser, expander), then let's you apply 3-band AGC/compression *and* 4-band parametric EQ (signal chain reversible) before going through a final stage zero-overshoot peak limiter.

**With real-time spectrum density readouts and full metering**, our included PC graphic interface software makes operation of the AP-3 direct and easy, offering complete control of all audio parameters, presets, monitor functions, system settings and security—all through a single RJ-45 ethernet connection that lets you control one or many AP-3 units.

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***Here's what professionals who've tried the AP-1000 have to say:***

*"By far the best processor I've ever used."*

*"It achieved greater loudness with a smoother sound right out of the box."*

*"Your GUI is so well designed I didn't even need to read the manual to get started."*

*"Love the box!!! The sound of the station is vastly improved...it's loud, wide and clear."*

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