www.beradio.com August 2005

Radio®

THE RADIO TECHNOLOGY LEADER

A consolidation variation

Antennas
Trends in Technology

Field Reports
Prism Dscope & Klotz Aeon

A PRIMEDIA Publication

THIS IS THE NEXT BIG THING:

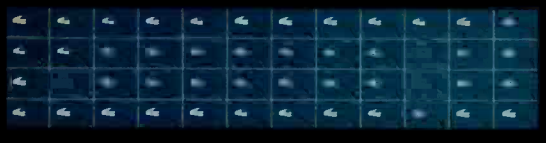
WHEATNET™ — FUTURE PROOF!

WHEATNET LETS YOU ROUTE THOUSANDS of bi-directional signals at ONCE in just 60 microseconds—all secure, virus-proof and in just 2 rackspaces! **WHEATNET** leaps way ahead of conventional stacked router or IP-based designs, interconnecting up to 48 studios (each with its own independent mix engines and I/O resources) using just one CAT-5 wire per studio, plus providing systemwide X-Y control from one central location. You can even meter and monitor (in stereo) any signal systemwide.

REDUNDANCY? We've got that covered too: just add a second WHEATNET and CAT-5 link from each studio and have an AUTOMATIC standby interconnect for the ENTIRE system!

WHEATSTONE has a proven track record for digital networking; benefit from our experience!

48 CAT-5 PORTS with 128 audio channels (plus embedded control data) per port.
THAT'S 6144 TRAFFIC CHANNELS IN JUST TWO RACK SPACES!



Wheatstone

GET THE POWER!

tel 252-638-7000 / sales@wheatstone.com

Together We Have The Power To Move Radio Forward.

At Harris, we're taking our leadership in the radio industry to an even higher level. Shaped by the feedback of customers and audiences across the market spectrum, the newly-formed Harris Radio Team is rich with the industry's most comprehensive products, services and expert resources. All with a focused team solely dedicated to moving our industry, and your business, forward. It's a spirit of innovation built on decades of pioneering solutions for radio. So get your business heading in the right direction, turn to the new leadership of Team Harris Radio.

To learn more about the new Harris Radio Team, call us at **800-622-0022** or visit us at **www.broadcast.harris.com.**

THE NEW HARRIS RADIO TEAM IS ON THE AIR

AM/FM

AUDIO CONSOLES

DIGITAL RADIO

BROADCAST STUDIO

HIGH POWER AM

SYSTEMS & SERVICE

www.broadcast.harris.com

HARRIS

Contents

Radio
THE RADIO TECHNOLOGY LEADER
Radio Magazine
www.beradio.com
August 2005 • Volume 11, Number 8

www.beradio.com

Features


16


60

Columns

Departments


62

ON THE COVER:
WRBR-FM The Bear is one of several stations in the Planet Radio facility near South Bend, IN. Cover design by Michael J. Knust.

For football remotes that deliver every heart pounding, bone crunching moment, choose a codec that outperforms the competition. Only Tieline codec options connect over your choice of POTS, ISDN, GSM and soon IP* with just one simple box. Get instant, rock solid connections, incredible wireless or wired audio quality and get your listeners into the game.

They're even compatible with Comrex† POTS codecs.

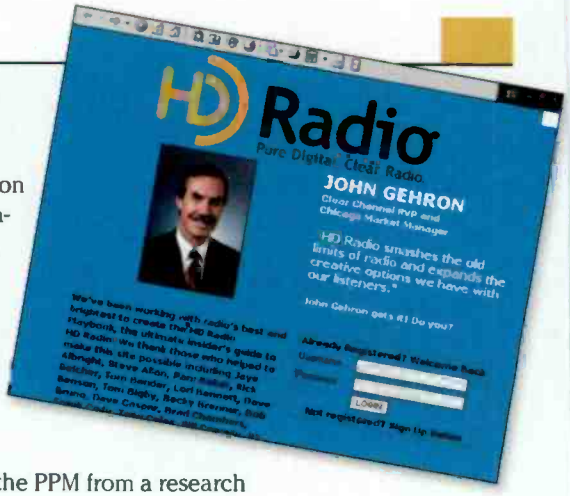
Order your free demo today.

800-950-0750

Tieline®
www.tieline.com

*Audio over IP and wi-fi software module for all Tieline G3 codecs available late 2005.
Compatible with †Comrex Matrix, Blue and Vector Codecs. †Comrex and associated trademarks are the property of Comrex Corporation

Currents Online



Ibiquity Launches Online Resource for Radio Stations

The HD Radio Playbook website combines how-to information and success stories with updated content to provide information on the challenges stations face as they convert to IBOC.

Broadcast Electronics Plans HD Radio Seminar in Philly

The event will be held Sept. 21 during the NAB Radio Show at the Philadelphia Marriott.

RAB Releases PPM Analysis

The preliminary report analyzes the commercial viability of the PPM from a research perspective. A PPM Economic Impact Study is being released separately.

NPR Releases KCSN Booster Test Data

The engineering test report details the results of using synchronous booster transmitters with hybrid IBOC digital FM transmission systems.

Museum of Broadcast Communications Breaks Ground

Construction has begun on the new $21 million Museum of Broadcast Communications in downtown Chicago. The new MBC will open late summer 2006.

Hilmer Swanson Dies

A Gates and Harris employee for 35 years, Swanson's first invention was an ultrasonic jewelry cleaner. He was 72.

Site Features

The DAB Answer Series is Online

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

Currents Online Weekly E-mail

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

IBOC Update Twice a month

Stay up to date with the source of digital audio broadcasting news and information. The coverage extends to DRM, satellite radio and more. Subscribe today.

AFFORDABLE STREAMING MEDIA TOOLS FOR THE RADIO INDUSTRY

CONSIDERING STREAMING YOUR STATION ONLINE?

Liquid Compass is an industry leading company that provides streaming media tools developed specifically for the *Radio Industry.*

With Liquid Compass as your premier streaming provicer, your station will receive superior audio and video hosting, unique cross-browser-compatible media players that are branded with your logo or creative concept, client acclaimed [24/7] tech support and detailed web reporting.

Most importantly, Liquid Compass will provide streaming media tools that will allow your station to *build a new source of revenue!*

LIQUID COMPASS OFFERS:

- Live & On-Demand Streaming
- Custom Media Players
- Video Gateways Branded for Your Station or Advertiser
- Ad Replacement / Ad Scheduling Software
- Custom Side Channels
- Web-Based Reporting Tools
- Audio & Video Encoding Services
- Server Collocation
- Live Event Management
- 24/7 Tech Support
- ***And More!***

To view a list or to listen to stations utilizing Liquid Compass' services, visit **www.liquidcompass.net** or call **(303) 839-9400** today!

WWW.LIQUIDCOMPASS.NET LIQUID COMPASS A CREATIVE MEDIA COMPANY

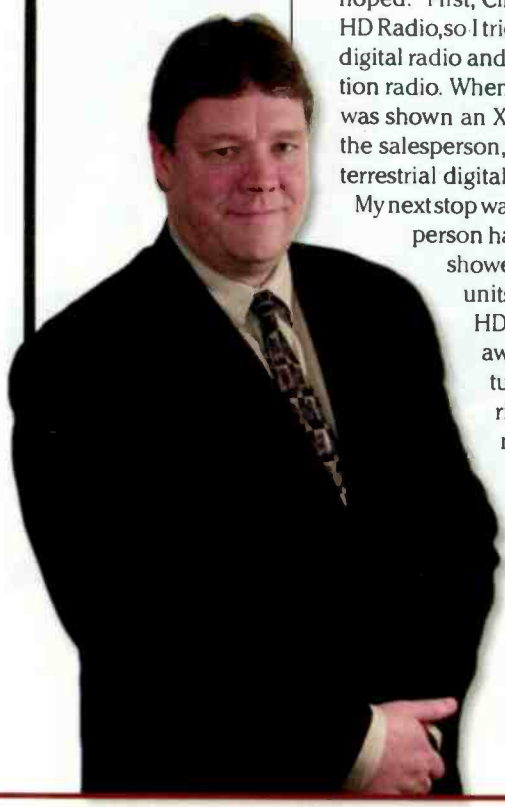
Digital radio? What's that?

The initial comments on NRSC-5 are in the FCC's hands, and the reply comments are nearing their deadline. A few hundred stations are on the air with HD Radio, and many more have obtained Ibiquity licenses and notified the FCC. The interest in IBOC and HD Radio is as high as it has ever been in radio.

So now that the rollout has begun, it's time for consumers to begin purchasing the radios. Unfortunately, this still isn't possible.

We work in radio, and being close to the business sometimes makes it difficult to see the industry in the same way that a consumer sees it. I felt that it was time to act like a consumer to see what how HD Radio is perceived. I have done this before to see what information is available to the public, for IBOC and satellite radio. The last time was about a year ago.

I visited three stores in the Kansas City area to do this: Circuit City, Best Buy and Nebraska Furniture Mart. The information I received was not as promising as I had hoped. First, Circuit City never heard of HD Radio, so I tried other names including digital radio and the incorrect high-definition radio. When I asked for digital radio, I was shown an XM receiver. According to the salesperson, there is no such thing as terrestrial digital radio.



My next stop was Best Buy. The auto sound person had heard of HD Radio. He showed me the Kenwood head units, but he did not carry the HD Radio tuner. He was not aware of any other manufacturers even though he carried Alpine and JVC (two manufacturers with HD Radio auto receivers). It was suggested that if I wanted to buy one of the other units I would have to visit a high-end store. The home audio department knew nothing about HD Radio and was convinced that I meant XM or Sirius.

Nebraska Furniture Mart, despite the name, sells more than furniture. The Omaha-based company opened a Kansas City location about a year ago, and it has a huge inventory of consumer electronics. On the home side, I found the Boston Acoustics Recepter radio, but it was the model without HD Radio capability. The salesman did not know if NFM would ever get that model. On the auto side, two salesmen knew about HD Radio and showed me the Kenwood head units, but said that the HD Radio tuner was only available online. Both these salesmen said that in two years only two people had asked for it. I was the second.

This field work came at the same time that I was assembling a list of all the HD Radio receivers that were available. A list of what I found will be in next month's Product Source. There are 12 units available. However, given the obscurity in the public eye, this is not an unexpected number.

My next effort was to find a statistic on predicted sales of HD Radio receivers for the Insight to IBOC supplement that is included in this issue. Again, I was disappointed. Ibiquity did not have the information readily available. The Consumer Electronics Association does not track or forecast this information. The receiver manufacturers won't share any data they have. Ibiquity was later able to share a Deutsche Bank report with projections. This data shows a promising forecast, but I'm concerned that reality disagrees. This year alone the report forecasts that 100,000 HD Radio-capable receivers will be sold.

If it's this hard to get an HD Radio receiver, can you imagine trying to get a DRM, Cam-D or FM Extra receiver if those systems begin widespread deployment?

Radio has its work cut out for it. HD Radio is the best-kept secret. Ibiquity has launched HDRadioPlaybook.com to help stations with the transition, but who will take the lead on marketing the technology to consumers? Ibiquity? The NAB? The CEA? The stations?

To their credit, some stations have worked with local retailers to promote the technology, but it's inefficient to do this market-by-market and station-by-station. Unfortunately, it may need to start that way.

Chriss Scherer, editor
cscherer@primediabusiness.com

E-mail: *radio@primediabusiness.com*
Fax: *913-967-1905*

STAC
STUDIO TELEPHONE ACCESS CENTER

GOT CALLERS? STAC 'EM!

No matter what they're talking about, STAC is the best way to manage your calls.

STAC (Studio Telephone Access Center) puts you in control of your talk shows, request/contest lines, call-ins and phoners with great sound, ease of operation and scalable configuration. Incorporating a pair of Comrex high-performance digital hybrids, STAC provides the most natural sounding telephone audio — even when conferencing up to four callers.

The STAC system is available in six (STAC 6) and twelve (STAC 12) line versions. Connect up to four control surfaces using standard CAT5 cable — no custom cabling required. Best of all, STAC is incredibly easy to use — anyone can master it in seconds.

Use STAC any place there's a web browser!

If you have a computer, you've already got all the hardware and software you need. Just log onto the internet using a standard web browser — NO SPECIAL SOFTWARE TO INSTALL — go to your STAC IP address, and you are there! STAC 'EM from home, the studio or that great beach in Cancun!

Cool features include:

- **STAC IP** allows call control from multiple networked computers.
- **Busy-All** makes starting contests a breeze.
- **Auto-Attendant** answers, plays your message and STACs callers on hold. Great stress relief for screeners and producers!

Got Calls? Put Comrex On The Line.

Toll Free: 800-237-1776 • www.comrex.com • e-mail: info@comrex.com
19 Pine Road, Devens, MA 01434 USA • Tel: 978-784-1776 • Fax: 978-784-1717

COMREX

IBOC and data

By Kevin McNamara, CNE

In the April issue of *Radio* magazine, I wrote about the real return on investment of IBOC. While researching for that article, it became abundantly clear that the real return of migrating to IBOC comes down to the simple fact that it levels the playing field. How? By allowing the radio broadcast to position itself against the myriad of new digital-based program delivery technologies that are aching to gain a little share of the radio audience. There have been several well-known studies telling us that these new media, including webcasting, podcasting, cellcasting and yes, even satellite radio, will take an increasing piece of the revenues terrestrial broadcasters have enjoyed. In my article, I theorized that the incorporation of an easily accessible universal data port in each receiver would be essential for broadcasters to take full advantage of any potential revenue opportunity from data streaming over their carriers.

Protocols; a review

Having said this, we are all well aware of the bandwidth capabilities that IBOC will provide using the various data modes, hybrid, extended hybrid and all-digital, but ultimately it is the job of the protocol that defines its ability for data to work in the real world. Protocols contribute to the ultimate framework that efficiently gets the data from source to destination, with as few errors as possible. They define the rules that permit different devices to communicate.

In the world of data there are two basic categories of protocols: low- and high-level. Low-level protocols deal with the physical and electrical standards of interfacing the data to a device, i.e. the primary job of the network interface. High-level protocols address the data formatting, syntax and other aspects of the encoded message.

First-generation data capabilities

The current data capabilities of IBOC are still somewhat limited in terms of what can be broadcast. This is not necessarily a limitation of the IBOC technology, but what, in my opinion, the receiver manufacturers feel are the critical features needed to sell radios and the lack of a standard in place to define the next generation of data services.

IBOC currently supports a standard called ID3V2, which is simply an implementation of tagging MP3 and other types of audio and video file formats, to provide specific information about the file. Tagging involves appending a frame of information, also called a chunk, at the beginning of the binary audio (or video) file. This is essentially the same as the Cart Chunk standard that was talked about for several years. In short, this is the method that IBOC uses to encode and decode textual program related information such as the song name, artist and about 40 additional fields of predefined information.

In the future, IBOC will support the Synchronized Multimedia Integration Language (SMIL), which is a method to deliver rich content-based multimedia programming using a variety of audio, video, text and other media.

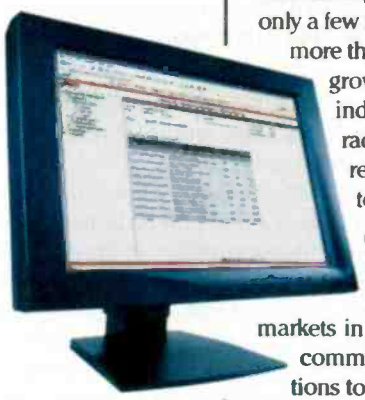
Perhaps the most exciting proposal for IBOC is the Advanced Application Services (AAS) framework. AAS will provide specific Application Programming Interfaces (API), which would create a development platform to enable programmers to develop a wide range of future applications. A white paper by Thom Linden entitled *An Advanced Application Services Framework for Application and Service Developers using HD Radio Technology* (available on the Ibiquity website at www.ibiquity.com) discusses the proposal and gives some good applications. Of particular interest is an application where it would be possible to create a distributed network across multiple stations, where any one station could originate programming. In a past article I wrote about the possibility of combining (programming) multiple local facilities into a regional network using a common data stream.

Consider a group of HD Radio-enabled stations that individually provide a usable signal from Washington, DC, to Boston. Also assume that a proper distribution network was created and available at each of these stations. Finally, we encode the digital program material with a chunk that identifies each station in the group as a common entity. In this example, it might be possible to program a user's radio to automatically switch frequency based on what they are currently tuned to as they travel throughout the area.

While it is somewhat similar to the RBDS function of following a particular format, the IBOC implementation would allow a listener to follow all stations owned by particular operators within that region, thus preserving the revenue stream.

Shrinking Revenues?

dMarc's new revenue solution gains momentum



RevenueSuite's Online Control Console keeps you informed.

The chase for new revenues has exasperated radio execs for what seems like years, yet some are now starting to see light at the end of the tunnel. RevenueSuite, a newly launched revenue-on-demand program from dMarc is finding revenue streams where none existed before.

Offered exclusively to Scott Studios and Maestro customers, RevenueSuite has been on the market only a few months, yet it is already syndicated into more than 250 stations. That makes it the fastest growing new revenue solution in the industry. An additional several hundred radio stations are in various stages of review and/or pre-installation, according to dMarc management.

One of the early adopters is Nassau Broadcasting Partners, headquartered in Princeton, NJ, and serving multiple markets in the Northeastern U.S. Nassau recently committed all 55 of its market-leading stations to the RevenueSuite program.

"We give RevenueSuite a resounding thumbs up," said Nassau's Senior Vice President of Engineer Tony Gervasi. "It's performing exactly as dMarc said it would. The best part about it is that we literally set it up, turned it on, and it operated seamlessly with our Scott Studios (SS32) systems, generating revenue. Prior to installing it group-wide, we put it through numerous performance tests. We found that RevenueSuite was easy to install, highly intuitive, hands-free and reliable. Now it's up and running, generating revenues across our network of stations."

Other managers report liking the fact that, once RevenueSuite is installed, it requires virtually no traffic management or operational maintenance. "After you close the logs for the day," said dMarc President Ryan Steelberg, "the RevenueSuite program begins to fill unsold and designated avails automatically without the need for station overhead or local trafficking. You can turn it on, and the system will run autonomously while providing real-time revenue reports and local control through a simple-to-use web-based interface. The RevenueSuite program is made available to any Scott Studios or Maestro enabled station." ■

For more information on RevenueSuite, check out the company's online site at www.dmarc.net.

What about the hardware?

The current generation of semiconductor technologies, aimed directly at the digital radio market, provide flexibility in their ability to handle existing and future data applications as a result of the use of programmable digital signal processors (DSP). These classes of semiconductors can provide virtually all of the RF, baseband and signal processing capability within a single package and the firmware can be updated as necessary.

The Radiosophy Multistream includes a USB port to update the radio's firmware. Data ports on future HD Radio receivers may provide a baseband data output.

Recently, receiver manufacturer Radiosophy added a USB port on its programmable radio, however in this case the port was used to provide software upgrades via the Internet and permitted stations to program preset buttons with a logo into the radio. While it appears the port is not currently able to provide baseband IBOC data to external devices, it is a still unique application for the programmable DSP-based radio.

Conclusion

As a medium, IBOC appears to be pulled in various directions: digital audio with data channels, supplemental audio channels (to provide multiple audio channels) and surround sound. Most of these discussions are still in process with no clear direction where the future of IBOC will go. However, what is certain is that stations are assigned a limited bandwidth and trade-offs will need to be made, most likely at the expense of potential ancillary data channels.

Recent press seems to indicate owners and operators have a growing interest in multiple audio channels, while it doesn't seem like there is a great deal of interest in exploiting opportunities using the ancillary data capacity. As much as I believe the utilization of the data channels would be essential to competing with other more widespread media outlets, I have to step back into reality and remember radio was only intended to be a local outlet and, realistically, who wouldn't want twice the quality programming and commercial content the local guy brings us instead of all that uninterrupted music we're getting with the real digital broadcasters?

McNamara is president of Applied Wireless, Elkins Park, PA.

BROADCAST

FM Transmitters

Reliable, cost effective
FM stereo transmitters
from 1 to 1000 watts

www.bwbroadcast.com

FCC Update

FCC to streamline allotment process

By Harry Martin

In June the FCC issued a Notice of Proposed Rulemaking (NPRM) seeking comments on proposals that, if adopted, would have a significant impact on how the agency makes commercial FM channel allotments and community-of-license changes for AM and FM stations. Until the proposals are dealt with, the Commission has imposed a freeze on the filing of petitions for changes in the FM Table of Allotments, even those that do not involve city-of-license changes. In addition, the Commission has opened a limited window for the settlement of pending contested rulemaking proceedings, through Sept. 19, and has waived the cap on settlement amounts. Here is a summary of the proposals:

Permitting Community of License Changes By Filing Minor Change Application. The NPRM seeks comment on whether the Commission should permit a change of community of license of an AM or an FM station through the submission of a minor modification application. Under current procedures to effect a community change an FM licensee must file a petition for rule making. On the AM side, a change in community of license is sought through the filing on a "major change" application that can be filed only during rare auction windows.

Getting Rid of the FM Table of Allotments. The Commission suggests that the agency delete the FM Table of Allotments from its rules. Under this approach, the FCC would continue to maintain the table, but not as a formal rule. Rather, it would simply be a list, probably maintained and accessible on the FCC's CDBS Internet site. Removing the table from the rules would relieve the FCC from due process and other procedural burdens imposed by the Administrative Procedure Act.

Requiring Filing Fee When Filing Petition for New Channels. The Commission is proposing to require petitioners for new FM allotments to file, along with their allotment petitions, a construction permit application and filing fee (currently $2,980). This proposal is intended to stem abuse by parties who file allotment petitions only for the purpose of blocking legitimate proponents and forcing them into settlement arrangements.

Limiting the Number of Allotments in a Petition. The Commission is proposing to limit to five the number of allotments that can be proposed in a single petition to amend the table. Under present procedures elaborate proposals involving 10 or more voluntary changes are permitted. These complicated proceedings, which often include one or more multi-channel counterproposals, cannot be easily or speedily dealt with by the FCC's staff.

Relocation of Sole Local Transmission Service. While not likely to be approved ultimately, the Commission also seeks comment on how to deal with proposals that might involve removal of a community's only local transmission service. First Broadcasting proposed that the Commission adopt processing guidelines that would permit the removal of such a local service if (1) two or more other stations provide 70dBu service to that community; (2) the station-to-be-moved would serve its new community with its first local transmission service; (3) the station-to-be-moved would provide service to a greater population; and (4) the proposed service would not cause any short spacing.

These proposals are the first to be considered since the adoption of the current FM allocation rules in 1982. If adopted, abuses of the system would be curtailed and the process of changing a city of license (for AM or FM stations) would be significantly simplified and improved. With backlogs of contested petitions of three years or more in some cases, this would be a welcome relief.

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

Dateline:

Radio stations in Alaska, Hawaii, Oregon, Washington and the Pacific Islands must file their 2005 renewal applications, biennial ownership reports and EEO program reports, all electronically, by Oct. 1, 2005.

By Oct. 1, stations in Connecticut, Maine, New Hampshire, Vermont and Rhode Island must start their renewal pre-filing announcements in advance of their renewal application filing date of Dec. 1, 2005.

Also, by Oct. 1, stations in Florida, Puerto Rico and the Virgin Islands must electronically file their biennial ownership reports.

Ask us about the most advanced technology in digital consoles and routers for Radio and TV

AEQ

BC 2000 D Digital Console

- Cost effective and flexible design.
- Flexible inputs and outputs allocated to faders.
- Design adaptable to digital and analog environments for a single studio or multi-studio installations.
- Enhanced interconnectivity between engines through MADI multi-channel links.
- Incorporating motorized faders with position memories enabling the allocation of up to 9 different channels per fader and with instant access.

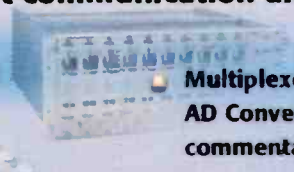
BC2000 D Router

The same router used by the BC 2000D Console works as a stand-alone router, with thousands of inputs and outputs, summing and processing, with a scalable and modular architecture.

For more information and user references please visit us at www.aeqbroadcast.com

AEQ also offers excellent communication and audio equipment

- Fixed and portable ISDN Audio Codecs and telephone hybrids.
- Advanced multi-channel talk show system.



- Multiplexers, analogue mixing consoles, AD Converters, monitors and digital commentary system for large sport events.
- Hand held digital audio recorders.

Phone: **866 817 9745 (US only)** **(954) 581 7999** Fax: **(954) 581 7733** e-mail: **sales@aeqbroadcast.com**

www.aeqbroadcast.com

The final Element

By Doug Irwin

A critical part of the transmission system

Fall is fast approaching, and with it for many engineers comes the chore of capital budgeting. You might be tasked with budgeting for an HD Radio installation next year. Last month I wrote about the trends in technology with respect to HD Radio-capable transmitters, but little was said about the antenna itself. This time we'll examine some ideas and items to look for in the budgeting and planning process as they apply to FM and AM antennas.

How you decide to implement IBOC depends on the circumstances of your current transmitter site. Let's take the example of a transmitter facility at which there is plenty of space on the tower that holds the current antenna. You could use a separate antenna for the planned HD Radio transmission. Keep in mind that the tower needs a space to support this additional antenna between 70 and 100 percent of the HAAT of the analog current antenna. The station also needs an STA from the FCC before the antenna is energized. The good news about the additional antenna, at least from a capital cost standpoint, is that the digital antenna can be a low-power type because the digital ERP will be 20dB below the analog ERP. The station can also use a smaller transmission line. Don't build it too small, however, because it could be licensed as an auxiliary antenna for the analog transmission and it's likely that you'll want to have as high an analog ERP for that use as possible. Likewise, remember that if it is using an auxiliary, and if it is too close to the main antenna, the RF field may prevent it from being used during maintenance to the main antenna.

The proximity of the analog and digital (or main and aux) is also a concern for other reasons. Two antennas with broad patterns in the vertical plane (i.e. low-gain types) will not provide as much isolation from one another, necessitating a considerable expense on an isolator for the output of the IBOC transmitter. The isolator will have to be rated for the amount of forward power being run through it in the forward direction, and the termination will need to handle the amount of power that is expected to come back from the IBOC antenna. At least three manufacturers make high-power isolators: AFT in Germany, Channel Microwave (used by Shively) and EMR. Even if an isolator is not needed, consider the proximity of the antennas of neighboring stations; too much RF from one of them could generate intermodulation products in the output of the IBOC transmitter. A low-power bandpass filter can be installed to prevent this. All the major antenna manufacturers make these as well. (Not to dwell on the auxiliary antenna aspect, but make sure the filter is sized to handle the amount of power that will go through it if the new antenna is used as an aux for the analog transmission.)

The big four antenna manufacturers all make low power versions of their FM-band antennas. ERI has the LPX, the lower-

Photo courtesy of Dielectric Communications

AEON

breaking down barriers

DIGITAL RADIO ON-AIR CONSOLE

- Full Audio Networking
- Any signal anywhere
- Complete format store, name and recall system
- Dynamic control matrix
- Dynamics and EQ control
- Powerful Mix-Minus capabilities

AEON

- ✚Level meters for all buses and selected inputs
- ✚Talkback
- ✚Macro programming
- ✚Voice processing presets
- ✚16-character channel name displays
- ✚Ultra slim low profile design - only 1" thick!
- ✚Table-top mounting, no furniture cutouts required
- ✚Split or straight console options
- ✚GUI based Autoconfig Setup Tool

Starting at $10K!
Including surface, audio engine and audio platform

AEON - the latest innovation from the market leader

actual height
mm inch
25 1
20
15
10 ½
5

For more information
visit **www. klotzdigital.com** or call **678-966-9900**

KLOTZ DIGITAL

Photo courtesy of Dielectric Communications

WNNK, Harrisburg, PA, has an interleaved antenna system (upper antenna) mounted directly above a backup antenna.

power version of the rototiller. It also offers the 1105 series, which is for lower-power applications, and the 100 series made for LPFM. In most cases it will easily handle the input power needed for an IBOC project. Jampro offers the JLST for low-power applications and the JMPC (among others) for medium power. Shively makes the 6812 for lower-power applications and the 6813 for medium power. Dielectric makes the DCR-L for lower power applications and the DCR-H for medium power applications.

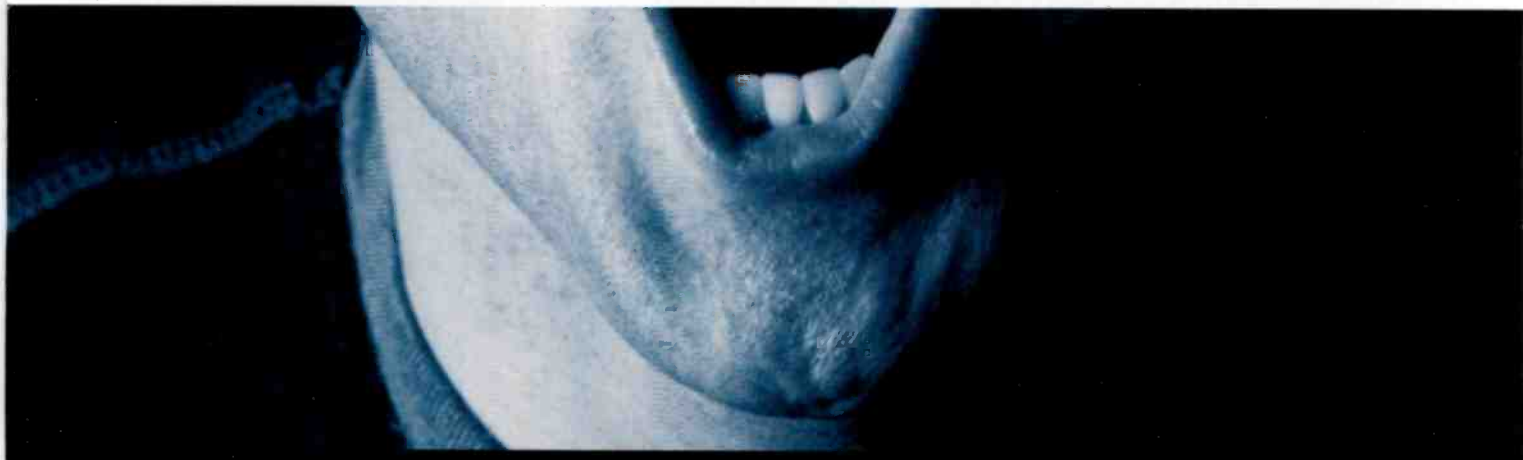
To the extent possible, you need to maintain the ratio of analog to digital at 20dB around the entire horizontal plane. So, if the current antenna is directional (or even optimized) you will likely want to match the digital antenna type with that of the analog antenna. Likewise, at least consider using the same gain in the digital antenna as is used in the analog antenna to keep the vertical plane pattern the same or at minimum similar.

Something old? Something new!

Perhaps it is time to replace the old antenna, and HD Radio is just the catalyst that your station needs to buy one. If you plan to continue using the tower space you already have, there are several options available.

An IBOC antenna interleaved inside the pre-existing analog antenna is a technology used by at least three antenna manufacturers. An interleaved antenna is basically a system comprised of two completely separate antennas fed by separate transmission lines, with the radiating elements for the HD Radio antenna installed on the same support structure between the radiating elements for the analog antenna. The necessary degree of isolation between

SANITIZED FOR YOUR PROTECTION



SOME WORDS SHOULD BE OBSCENE AND NOT HEARD

Eventide Broadcast Delays are designed to keep profanity off your air, and angry listeners, embarrassed advertisers, and the FCC off your back. We invented the obscenity delay and have a solution for stations large and small that provides up to 80 seconds of the highest quality, revenue and license-protecting delay.

Our new HD compatible BD600, 24-bit delay, comes standard with AES/EBU, and provides up to 80 seconds of memory — twice as much as other delays. There are fully adjustable Delay and Dump functions, and a Sneeze function which "edits" audio entering the delay, allowing the host to sneeze, cough, or make a short comment without being heard on air.

The BD600 offers two different methods of delay buildup and reduction: Eventide's catch-up and catch-down system, and an exclusive fast-entry-and-exit feature which allows starting a broadcast with the delay already built up to a safe amount and ending it with a rapid reduction of delay.

For HD, the BD600 offers MicroPrecision Delay™ mode which allows up to 10 seconds of delay to be adjusted in real time in 100 nanosecond increments. This is useful for synchronizing analog and digital signals while on-air, without audible artifacts, to maintain a seamless user experience.

Whatever your size, whatever your format, you can't expect to protect the integrity of your air and the foundation of your business without an Eventide Broadcast Delay in your rack.

Eventide®

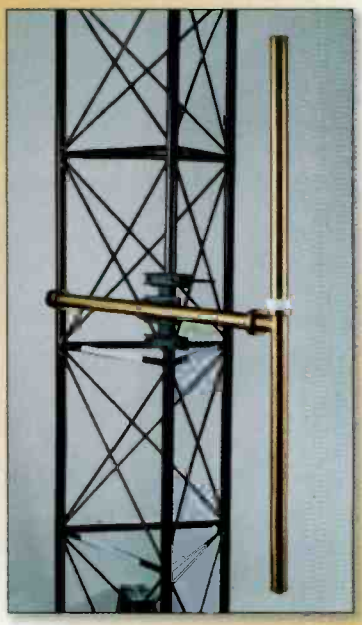
HD COMPATIBLE

the two antennas is achieved by the use of opposite circularity. Even though the IBOC bays will ultimately handle less power, Shively, for example, prefers to use the same type of bays for the IBOC that are used for the analog system. In this way the horizontal plane pattern of the IBOC antenna matches that of the analog. The number of bays of the IBOC antenna does not have to match the number of the analog antenna. Shively has gone as high as seven bays for the IBOC antenna. Dielectric also offers an interleaved antenna system (the HDR series). Dielectric says that it can use 14 bays on an interleaved system, and that it can retrofit an interleaved antenna with analog antennas made by other manufacturers. Jampro also offers interleaved systems, using the low-power version of the Penetrator as the IBOC elements.

ERI now offers the Lynx, a dual-input antenna. The analog and digital transmitters feed their own separate input on this system. With careful installation, more than 30dB of isolation between the analog and digital inputs can be achieved. The radiating elements are excited by the analog and digital

A backup alternative

While a fixed, permanent auxiliary antenna is the most ideal, there may be reasons why it's not practical for some stations. In addition, there may be times when a temporary backup is needed, particularly after a storm or when the location will be for a short term.



A single-bay backup antenna can be stored in a secure location and pressed into action when it is needed. This can be especially helpful to clusters in a region that can share the resource. It may be feasible to use a single bay from a retired antenna for this purpose.

If space or portability is a concern, Armstrong offers the FMA-2VBP portable antenna (shown above). This broadband antenna breaks apart for easy transport and sets up in moments. The antenna fits in a hard-shell shotgun case for shipping. Multiple-bay versions are also available. ■

We're all talk.

And all action, too.

All talk and no action? That certainly doesn't describe any radio station we've ever seen. With guest interviews, news and traffic feeds, live reports and listener calls to juggle, a talk studio is one of the most active places on the planet. Seconds count, and there's no room for mistakes.

That's why we created Status Symbols® for the Telos TWOx12 Talkshow System. Instead of flashing lights to decipher, there's easy-to-understand picture icons that give talk pros the information they need with just a glance. What caller's next? Who's screened, and who's just holding? With Status Symbols, you'll know instantly. And only Telos has them.

TWOx12 has lots more benefits. Like Digital Dynamic EQ, for uniform caller audio despite less-than-perfect lines. Twin DSP-powered hybrids for quick, no-hassle conferencing. A unique Dual Studio Mode that lets you use your 12-line phone system like dual six-line systems for extra flexibility. And TWOx12 is the world's only talk show system that can work with either POTS or ISDN lines to deliver exceptional caller clarity. Impressive? You'd expect no less from the company that *invented* the digital broadcast hybrid.

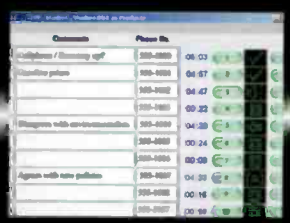
Is TWOx12 the perfect union of word and deed? Thousands of broadcasters worldwide think so. Why not see for yourself?

Telos
AUDIO | NETWORKS

12 lines, two digital hybrids, and superior audio performance. Desktop Director controller features handset, speakerphone and headset jack. Drop-in controls available for popular consoles.

New Call Controller has Status Symbols, DTMF pad and recorder controls (like Desktop Director), but lets talent use their favorite wireless phone or any standard handset for call screening.

Status Symbols show exactly what's what. Intuitive icons show calls locked on-the-air, which hybrid they're on, who's next in queue and more. So much better than a panel of blinking LEDs.



Assistant Producer enables talk show production via LAN or WAN. Status Symbols, Caller ID support, instant messaging and caller database are just a few benefits. Supports touchscreens, too.

signals, thus ensuring the same horizontal and vertical plane patterns.

Stations that use a multiple-element panel antenna, either singly or several through a combiner, should contact the antenna manufacturer for the modifications necessary to the system so that the panel antenna can also be driven with the IBOC RF signals.

If the tower holding the main antenna is crammed with other antennas and there is simply no possibility of adding a separate antenna, you may be compelled to stick with what you already have. That works fine, too. If you feed this single antenna with a high-level combined system, you will need an injector, which couples the IBOC carriers into the same transmission line that carries the analog RF to the antenna. Each of the big four can provide the injector. Dielectric makes several versions of its unit with power levels from 12kW to 70kW, and coupling factors of 10, 9 or 8dB. Custom coupling factors are also available. Shively makes five versions of its injector up to 40kW, with 10, 9, 8, 7 and 6dB of coupling. Jampro makes two versions of a 10dB coupler, a high-power one rated at 35kW analog and 10kW IBOC, and a medium-power one rated for 10kW analog and 3.5kW IBOC. ERI makes four versions of a 10dB coupler; 12kW max with a $1^5/_8$" connector and 30kW with $3^1/_8$" connectors. The higher-power version will handle up to 80kW of analog RF with a $6^1/_8$" connector.

AM antenna systems require linear, broadband and balanced response, which are the same factors that applied to an AM stereo upgrade.

A shift in the band

Planning for an AM HD Radio system is potentially much more of a minefield than planning one for FM. A critical aspect of the performance of the antenna system is the impedance bandwidth of the antenna as seen by the transmitter. If the VSWR seen by the transmitter in the upper sideband region is too different than that in the lower sideband region, the net result will be higher

bit-error radio (BER) at the receiver. The first step in the plan is to hire a consultant who is experienced with the characteristics of AM antenna systems, especially with respect to AM IBOC. He can evaluate the antenna system and subsequently make recommendations on its modifications should any be necessary. Several established companies, such as Kintronic Labs, LBA or Phasetek could then be used for the design and construction of new building blocks of the system such as the phasor in the event that the antenna is directional and the antenna-tuning units.

Research and planning are the keys to accurate budgeting. Do your homework now, and get an early start so that there is plenty of time to mull your decisions before finalizing them. Your antenna is your final link in the broadcast chain between you and your listeners, and as such its importance cannot be overemphasized.

Irwin is director of engineering for Clear Channel Radio Seattle.

Resource Guide

A list of some manufacturers and dealers of antennas and accessories

Isolators

AFT
301-670-2833
www.aftgmbh.de

Channel Microwave
805-482-7280
www.channelmicrowave.com

EMR Corporation
623-581-2875
www.emrcorp.com

Antennas

Antenna Specialists
440-349-8400
www.antenna.com

Armstrong Transmitter
315-673-1269
www.armstrongtx.com

Bext
619-239-8462
www.bext.com

Crossed Field Antennas
860-676-0051

Dielectric Communications
800-341-9678
www.dielectric.com

ERI-Electronics Research
812-925-6000
www.ERIinc.com

Multiple Personalities Aren't Disorders Anymore.

In fact, they're a powerful way to build listenership.

Multicast-capable consumer receivers will be available soon. Broadcast additional, digital program channels now using BE's IDi 10 and IDi 20 HD Radio™ Data Importers and Encoders. Enhance listener loyalty by providing program information and station branding using broadcast data software and services from The Radio Experience. Only Broadcast Electronics delivers the tools you need for HD Radio today, tomorrow and the day after tomorrow without risk of rapid obsolescence or unexpected costs.

BE

Broadcast Electronics, Inc. • 4100 North 24th Street, P.O. Box 3606, Quincy, Illinois 62305-3606 U.S.A.
Telephone: (217) 224-9600 • Fax: (217) 224-9607 • E-Mail: bdcast@bdcast.com

Resource Guide

A list of some manufacturers and dealers of antennas and accessories

Antennas Cont'd.

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

Jampro Antennas
916-383-1177
www.jampro.com

Kathrein, Scala Division
541-779-6500
www.kathrein-scala.com

OMB America
800-662-4872
www.omb.com

Propagation Systems
814-472-5540
www.psibroadcast.com

RFS Broadcast
877-737 9675
www.rfsworld.com

Shively Labs
888-SHIVELY
www.shively.com

Superior Broadcast Products
800-279-3326
www.superiorbroadcast.com

SWR
800-762-7743
www.swr-rf.com

Valcom Limited
519-824-3220
www.valcom-guelph.com

AM Systems

Kintronic Labs
423-878-3141
www.kintronic.com

LBA Technology
800-522-4464
www.lbagroup.com

Phasetek
215-536-6648

More online
Access the complete *Radio* magazine Buyers Guide online at beradio.com.

FACILITY
SHOWCASE

Working separately, working together

By Chriss Scherer, editor

A cooperative effort to cover North Central Indiana

Any facility construction project starts with establishing the needs of the stations that will use the facility. In most cases, it is a straight-forward process to identify the station's needs and temper them with the owners goals. Joint sales agreements and local marketing agreements with a second licensee can be a factor in the plans, but what happens when you have four licensees and two distinct locations? The Federated Media stations in South Bend and Elkhart IN, have figured it out.

With studios in two adjacent counties, the seven stations are split into two studio facilities. WAOR-FM (95.3, classic rock), WBYT-FM (100.7, country), WYPW-FM (95.7, CHR/urban), WNIL-AM (1290, news/talk), WRBR-FM (103.9, active rock) and WJBU-FM (106.3, smooth jazz) share a studio building in Mishawaka, a town near South Bend. WLEG-AM (102.7, adult contemporary) and WTRC-AM (1340, news/talk) share space in Elkhart. While all the stations serve a smaller market—Arbitron

Working separately, working together

WAOR—one of two studios on the ground floor—is adjacent to the sales area, making them accessible to station visitors as a showcase view.

ranks South Bend as market 177—the studios are built as well as any major-market facility.

The interesting twist is that Federated Media is not the sole licensee of the stations in the South Bend facility. The five stations are licensed to four owners. Federated Media owns WBYT and WAOR. Second Wind Communications owns WRBR and has a joint sales agreement with Federated Media. Talking Stick Communications owns WYPW and operates under an LMA with Federated Media. Partnership Radio owns WUBU and contracts operations functions from Federated Media.

The South Bend stations all operate under the Planet Radio name, which serves to provide a unifying brand to the listeners, but still maintains the necessary separation of business elements between the licensees.

For all of this, there is a single engineering staff of two people: Chief Engineer Greg Trobridge and Assistant Engineer Jeff Snyder.

Lots of stations need lots of signals. The backyard is the site of several satellite antennas and an STL tower.

How to build the perfect console.

Start with a flexible routing system that can accommodate all of your facility's audio distribution, along with intercom functions, EQ and dynamics processing, profanity delays, timers, and more. Next, select the right frame size for the router's control surface. Populate the frame with the number of faders you want, along with programmable pushbuttons, countup/countdown timer controls, and meter bridge with extra graphic displays. The result? Your console, exactly as you want it, with the functionality your talent craves and a sleek design that complements the studio perfectly.

Introducing

Mosaic

Where art meets technology

- Multiple frame sizes allow configuration of systems ranging from 2 to 24 faders
- Support for 16-character source names, allowing you to precisely identify a source rather than guessing on unintelligible abbreviations
- Full color LCD screens on each module that provide source information, meters, clocks, timers, delay information, text messages and more
- Programmable backlight colors in ON/OFF buttons alert users to operational conditions or separate faders by source type
- Source selection, bus assigns and other controls with each fader module make operation easier and faster

Available now! Contact us today for more information.

Logitek Electronic Systems, Inc.
5622 Edgemoor • Houston, TX 77081 USA
713.664.4470 **1.800.231.5870**
www.logitekaudio.com
info@logitekaudio.com

Logitek
Console Router Systems

Working separately, working together

They are employees of Federated Media, and through the licensee agreements they handle the technical needs of the other stations as contracted engineers. While the facility is fully integrated so that common resources are shared, there are times when Trobridge has to work with four general managers or program directors to see a project to completion.

The plans for the Planet

The Planet Radio stations occupy a two-story facility that was remodeled at the end of 2004. Federated Media already occupied the second floor, so when the first-floor tenant moved out, it seized the opportunity to consolidate all the stations under one roof. Two studios (WBYT and WAOR) are on the ground floor. While all the studios are well designed and look good, these two are used as the showcase studios for visitors because of their easy access.

The first floor also houses the engineering shop, sales offices, business offices and programming offices for the first-floor stations. The second floor houses the remaining studios, programming staffs

Partial Equipment List

360 Systems Shortcut
Adobe Audition 1.5
Air Tools 6000, 6100
Aircorp 500
AKG C3000B
Aphex Compellor
ART SLA2 and SLA1 power amps
Audemat-Aztec FMB-80
Audio-Technica AT4033
Auralex acoustic panels
Belden 1189A RG-6
Bogen TP30D tuners
Broadcast Electronics Audio Vault AV-100
Broadcast Tools SM II, SS16
Burk ARC-16, Autopilot
Circuitwerkes Telco-6
Comrex Matrix
Crown D-75
Denon TU-1500RD
Electro-Voice RE-20, Sentry 100A
ESE GPS master clock
Gepco audio and control cable
Harris Airwave Digital
Harris Quick-built II furniture
Henry Engineering Stereomixer, Superelay
HHB CDR-850
Homaco wiring racks
Inovonics 712
Marantz PMD-321
Moseley SL9003Q
O.C. White mic booms
Rane HC-6
Rolls RS79
SAS 16000 router
Shure SCM810, SM7B
Sine Systems MBC-1
Sony CDP-D11, MDS-E12, MDS-E56, MDS-E58
Symetrix 528E
Tascam 112 MKII
Woodline furniture
JBL Control One

NEW **Digilink** Satellite Automation...

ONLY $100 PER MONTH

now shipping !!!

Xtreme 'SOFTWARE'
powerful Windows PC software for live air, automation, scheduling, and production

The 'Bridge' hardware ...

supplied by Arrakis contains the audio sound cards, routing switchers, and control logic so that the PC requires NO special hardware or setup. This means that the PC can be off-the-shelf, and unmodified so that it is easily serviced locally. The Xtreme 'Solutions' program is per workstation for complete redundancy and backup. Imagine an AM/FM combo with production room for only $300 per month. With more than 15 years of automation experience and thousands of Arrakis automation systems in the field around the world, Arrakis can provide you with the solution that meets BOTH your business AND technology needs.

Xtreme 'HARDWARE'
a 16 x 3 stereo routing switcher, dual PC sound cards, & control logic

No down payment
Return at any time
Free Factory training
Free Hardware support
Free Telephone support
Free Software upgrades
Free Hardware upgrades
Free PC and Network setup

the XTREME '*Solutions*' program

Xtreme is a complete solution for live & automated On Air Radio systems. Pay one very low monthly fee, and we do the rest. We supply the audio hardware, software, and support, while all that you supply is the PC. Without a large initial equipment investment there is no financial risk or capital expense; the old automation system can be upgraded out of current operating costs. With free system configuration and training you receive the help you need to make a smooth transition to the new system. With free hardware replacement, ongoing repairs are worry free. Free telephone support helps train new staff, and free software upgrades means you have the latest product features at no cost. The only hardware that is not included is the PC computer and we can help you with that too... also for free.

...the risk free automation system
XTREME~digilink

970-461-0730 www.arrakis-systems.com *now shipping !!!* Arrakis

for those stations, the tech center and the station managers.

The heart of each station's operation is a Harris Airwave Digital console in all but one studio and a Broadcast Electronics Audiovault automation system. The first-floor studios are mirror images of each other because they were built at the same time. The remaining studios have similar layouts, but each is unique.

The B-100 studio is a mirror image of the WAOR studio next door.

Managing the data

All the stations run RBDS and are ready to provide PSD when they begin transmitting IBOC. When RBDS was implemented a few years ago, Trobridge was not satisfied with the performance of the available data management systems and interfaces, which were unable to provide the flexibility that the stations wanted, or required an ongoing licensing fee that the stations were not willing to pay.

Instead, Trobridge built the system that he wanted. A custom-written application takes the PSD information from the station automation systems to feed the RBDS encoders. The software allows the station program director to update text fields and provide additional information that can be displayed.

The software provides station promotional messages when commercials are played so that song information is not showing when commercials are playing. The promotional messages are day-part scheduled on a programmed clock.

It provides data to feed the now playing portion of the stations' websites. The software is written to feed Audemat-Aztec, Inovonics and Terion RBDS encoders, and it can provide scrolling PS if it is wanted. In addition, it can display warning messages that are manually entered or triggered by EAS.

The software also has an adjustable delay that accounts for the nine-second profanity delay that is used on all the stations. ■

The routing switcher gets a new twist.

(About five twists per inch, actually.)

Everybody needs to share audio. Sometimes just a few signals — sometimes a few hundred. Across the hall, between floors, now and then across campus. Routing switchers are a convenient way to manage and share your audio, but will your GM really let you buy a router that costs more than his dream car? Unlikely.

If you need a routing switcher but aren't made of money, consider Axia, the Ethernet-based audio network. Yes, Ethernet. Axia is a *true network*. Place our audio adapter nodes next to your sources and destinations, then connect using standard Ethernet switches and Cat-6. Imagine the simplicity and power of Ethernet connecting any studio device to any other, any room to any other, any building to any other... you get the idea.

Routers are OK... but a network is so much more modern. With Axia, your ins and outs are next to the audio, where they belong. No frame, no cards, no sweat.

Scalable, flexible, reliable... pick any three.

An expensive proprietary router isn't practical for smaller facilities. In fact, it doesn't scale all that well for larger ones. Here's where an expandable network really shines. Connect eight Axia 8x8 Audio Nodes using Cat-6 cable and an Ethernet switch, and you've got a 64x64 routing switcher. And you can easily add more I/O whenever and wherever you need it. Build a 128x128 system... or 1024x1024... use a Gigabit fiber backbone and the sky's the limit.

Are you still using PC sound cards?

Even the best sound cards are compromised by PC noise, inconvenient output connectors, poor headroom, and other gremlins. Instead, load the Axia IP-Audio Driver for Windows® on your workstations and connect *directly* to the Axia audio network using their Ethernet ports. Not only will your PC productions sound fantastic, you'll eliminate sound cards and the hardware they usually feed (like router or console input modules). Just think of all the cash you'll save.

There's a better way to get audio out of your PC. No more consumer grade ⅛" connectors -- with Axia your digital audio stays clean and pristine.

Put an Axia Microphone Node next to your mics and send preamplified audio anywhere you need it, over Ethernet -- with no line loss or signal degradation.

Put your preamps where your mics are.

Most mainframe routers have no mic inputs, so you need to buy preamps. With Axia you get ultra-low-noise preamps with Phantom power. Put a node in each studio, right next to the mics, to keep mic cables nice and tight, then send multiple mic channels to the network on a single Cat-6 cable. And did we mention that each Mic Node has eight stereo line outputs for headphones? Nice bonus.

Put your snake on a diet.

Nobody loves cable snakes. Besides soldering a jillion connectors, just try finding the pair you want when there's a change to make. Axia Audio Nodes come in AES/EBU and balanced stereo analog flavors. Put a batch of Nodes on each end of a Cat-6 run, and BAM! a bi-directional multi-channel snake. Use media converters and a fiber link for extra-long runs between studios — or between buildings.

An Axia digital audio snake can carry hundreds of channels of digital audio on one skinny CAT-6 cable. We know you're not going to miss soldering all that multi-pair...

With a little help from our friends.

A networked audio system doesn't just replace a traditional router — it *improves* upon it. Already, companies in our industry are realizing the advantages of tightly integrated systems, and are making new products that reap those benefits. Working with our partners, Axia Audio is bringing new thinking and ideas to audio distribution, machine control, Program Associated Data (PAD), and even wiring convenience.

Axia is already working with some great companies. Like Enco Systems, Scott Studios, Radio Systems, Bolsys Technology Group, and of course Telos and Omnia. Check AxiaAudio.com/partners/ to find out who's next.

Would you like some control with that?

There are plenty of ways to control your Axia network. For instance, you'll find built-in webservers on all Axia equipment for easy configuration via browser. PathfinderPC® software for Windows gives you central control of every audio path in your plant. Router Selector nodes allow quick local source selection, and intelligent studio control surfaces let talent easily access and mix any source in your networked facility.

Control freaks of the world, rejoice: intelligent Axia mixing surfaces give talent complete control of their working environment. Reconfigure studios instantly and assign often-used sources just where they're most useful.

"This sounds expensive." Just the opposite, really. Axia saves money by eliminating distribution amps, line selectors, sound cards, patch bays, multi-pair cables, and tons of discrete wiring — not to mention the installation and maintenance time you'll recover. And those are just side benefits: our hardware is about half the cost of those big mainframe routers. That's right... *half*. Once you experience the benefits of networked audio, you will never want to go back. AxiaAudio.com for details.

AXIA
A TELOS COMPANY

The new Radio
Millenium Digit
has many pluse
+ even more mi

Pluses (+)
Mic/Line/or Digital
on any input with
full simultaneous
analog and digital outputs

Minuses (-)
10 fully configurable
analog and digital
mix-minus outputs

Systems
al Console
s —
nuses...

Contact (!)
Radio Systems, Inc.
601 Heron Drive Logan Township, NJ 08085
phone: 856-467-8000 fax: 856-467-3044
www.radiosystems.com
or any Radio Systems dealer

WYPW is automated most of the day, so an Auditronics console was used in the studio. A DJ setup is used for a daily mix show (inset).

Some common design elements can be seen in the studio photos. These include a truss mounted along the ceiling to support the speakers and the LED signs. Driven by Sine Systems MBC-1 sign controllers, each air studio displays two LED signs, while the production studios have one. Each studio has one sign for general information such as ringing phones and after-hour visitors. The second sign in the air studios displays EAS information and notifies the operators when a station is off the air.

The air studios also have a KVM switch for the second computer to switch the monitor between the Audiovault system and the general use (Internet) computer. This allows the cohost to view the on-screen program log. While the video switches, the cohost does not have mouse or keyboard control of the on-air system to avoid confusion.

Every studio can be used to create voice tracking for the station. To reduce the possibility of errors by switching the console, a Henry Engineering Stereo Mixer was installed to mix audio for the automation system for the song ending, the song starting and the mic. This removes the console from the voice-track

HD RADIO?

I'M GOING WITH MOSELEY.

My challenge is to make the right STL choice for today, as well as for tomorrow.

With Moseley, it's no problem.

Check out their **Starlink SL9003Q-2SLAN**, the first STL to provide AES digital audio and Ethernet data over the traditional 950 MHz band.

Or add a bi-directional Ethernet LAN extension and serial data link to a new or existing STL with the license-free 900 MHz **Lanlink 900D**.

For T1 lines or license-free 5.8 GHz links, the **Starlink SL9003T1** STL/TSL transports bi-directional AES digital audio, Ethernet LAN extension, remote control, and telephones.

Your best connection to the future is a smart STL choice today. Take it from me, Moseley will insure that your station is ready for HD Radio and the new digital services of tomorrow.

Give the digital STL experts at Moseley a call for more details.

Moseley

Dave Chancey 805 968 9621
Bill Gould 978 373 6303
www.moseleysb.com

The two production studios serve as back-up air studios.

chain, and it sets a fixed level on the music. This prevents the voice tracking person from adjusting the audio level in his headphones, a change that will not be made on the air later.

The Audiovault keyboard and mouse are wireless units, which eliminates cord tangles. Because the keyboard is not needed often, this has proven to be a smart choice because the keyboard is usually needed when a problem arises, which is exactly when the cord is likely to be wrapped around something.

The audio and control trunk cables are terminated on Homaco wiring racks on each end. These hold the punch blocks on one frame that is easier to mount than individual block mounts.

Moving up

The second floor houses the remaining studios. While the first floor was completely remodeled when the previous tenant left, this space did not see the same construction, but the spaces were updated as needed.

The production studios are similar to the first-floor studios because they were built about the same time. WUBU is automated and can use the production studios to go live.

The WYPW studio is in one of the existing studios from before the rebuild. This station is also automated most of the time, and when it is live, the programming is usually a music mix show. A club DJ setup is installed on the backside of the on-air console. Because the on-air console does not see much use, an Auditronics 210 was refurbished and put into use.

The last studio built was for WRBR. While the other rebuilt studios use Harris Quick-built furniture, this studio has furniture from

Greg Trobridge checks the processing in the rack room, which is a showcase in itself with its clean layout and aesthetic lighting.

Woodline Furniture, a manufacturer based in Michigan. The furniture was designed to look similar to the Quick-built furniture.

The second floor also houses the tech center for the facility. The 10 racks hold all the behind-the-scenes equipment, but this space is far from being simply a practical space. The racks are lit with an overhead spotlight system that makes for an impressive view. Unfortunately, space did not allow for the rack room to be showcased through a glass wall. The station is located next to a power substation, so commercial power reliability is not normally a problem. When it does fail, the proximity to the substation means that the station's power is restored quickly. As a backup, the broadcast operations have a UPS to power everything needed to remain on the air as well as the office telephone system and computer network. Office PCs have their own UPS systems as they are needed.

Down the street

The two stations in Elkhart have strong ties to the community. Talk station WTRC particularly wanted to reinforce its importance to the listeners, so a corner showcase studio on the street was designed when its studios were rebuilt. This studio has several TV monitors to display various news channels, which fits with the station's news/talk format.

This studio is set up with three uses in mind. The console position, at the center of the furniture, is at stand-up height and looks into the corner of the studio toward the street. To the right of this

position is a cohost position, which is a few steps from the studio door. This allows the cohost, who is usually a news reporter, to quickly enter the studio and deliver his newscast.

The area to the left of the operator is set up for sit-down interviews. This allows the host to be in a comfortable position with his guests and still have a clear view to the operator and to the outside windows.

The furniture, custom-made by Harris, was designed with open space below to keep the open feel and to eliminate a hard furniture barrier between the station air staff and the listeners watching on the street. The studio also has a high ceiling—about 11 feet—which adds to the open feel.

A talk show with multiple guests requires many mics, and if all the mics are open at once, acoustic problems are likely to occur. In addition, the console has a limited number of inputs. Because of this, an automatic mic mixer, the Shure SCM810, is used. This system automatically mutes mics that are not being used, which improves the audio quality.

It's through this effective use of the available technology that the engineering staff is able to serve the needs of the stations and the separate owners. Because of this cooperation, these Northern Indiana stations have found a way to serve their collective audiences better.

The showcase studio in Elkhart faces the street corner from the ground floor, which gives the stations a close tie to the community.

More online

More photos of the stations are available at beradio.com

Insight to IBOC

August 2005 Part of the *Radio* magazine DAB Answer Series

Practicalities

of surround

by Chriss Scherer, editor

Now that the FCC is soliciting comments on NRSC-5, there has been renewed interest in the IBOC rollout. While the standard defines the basic operation of the transmission system, the enhanced functions of data, surround sound and multicast operation have yet to be fully defined. Several stations now transmit multicast programming, and multicast receivers are becoming available to consumers.

Surround sound for IBOC is not yet mature. While some of the surround technologies are established, there's no easy way for consumers to decode the signals. This is advantageous for broadcasters, because few stations have the capability to provide a significant amount of programming anyway. This could change soon.

Surround sound has potential for success with IBOC. While most radio listening is casual, which lends itself to the additional program offerings of multicast, surround sound will likely find its initial niche as a special feature medium. Concerts and special programs are an obvious possibility. Some classical stations may consider surround for more regular use.

Searching for standards

There are currently five surround systems that have been demonstrated for use with HD Radio, so there is no single standard. Three of them, SRS Circle Surround, Neural Audio's surround system and Dolby Pro Logic II have been approved by Ibiquity as compatible with HD Radio. The other two systems—from Fraunhofer and Coding Technologies—operate differently and have not yet received the Ibiquity stamp, although they have been shown to work with the HD Radio system.

As it is, there are few receivers available to decode a surround signal, so there is not much incentive for stations to begin regular broadcasts. SRS Circle Surround or Dolby Pro Logic II can be found in several models of home media systems, and Kenwood announced that it will release a mobile receiver for many formats, including HD Radio and Circle Surround.

Case Study: Installing multicast

By Don Danko, CBRE CBNT

Broadcasters have sought the killer application for FM HD Radio, and at first glance it looked like program-service data (PSD) was going to be it. More recently, the attention has turned to supplemental audio.

Three years ago, National Public Radio spearheaded a project called Tomorrow Radio. This technology, now referred to as multicast, provides a second channel of audio that is transmitted with a station's main program stream. The overall HD Radio data stream is set at 96kb/s. Streaming a second signal involves lowering the bit rate on the main channel and giving those saved bits to the second channel.

WGUC has tested its system with the main channel at 64kb/s and the second channel at 32kb/s. We also tested at 48kb/s for both channels. The main concern for any engineer is that when bit rates are lowered, more artifacts will be evident along with other audio quality issues. As an engineer of a classical music station I was concerned about our audio purist listeners. Lowering our main channel bit rate was a big concern.

After testing the main channel at 96, 64 and 48kb/s most of my fears and concerns vanished. The classical music proved to be more resilient than expected. It's

continued on page 3

Inside

A special supplement to Radio
THE RADIO TECHNOLOGY LEADER

New Nautel FM Digital Equipment

nautel

Ready for Digital. Ready for Anything.

Virtuoso V10

3 kW Digital, 7.7 kW Hybrid, 11 kW Analog Transmitter

More Versatility

- Frequency agile: N+1
- Programmable frequency & power
- Better than 62% overall efficiency
- Compact, light weight rack (32" W x 72.5" H x 35" D) is ideal for tight spaces

More Redundancy

- Hot-pluggable RF modules
- Hot-pluggable PS modules
- Parallel rectifiers
- Redundant ventilation fans

More Duplication

- Dual digital exciters
- Dual IPA
- Dual IPA power supply
- Dual low voltage power supply

HD Radio
Pure Digital. Clear Radio.

Maestro M50

Direct-to Channel Digital FM Exciter

- Plug-and-play integration with Nautel's NE IBOC FM signal generator for digital or hybrid transmission
- Built-in programmable analog modulation time delay is ideal for HD Radio or FM synchronous applications
- Links with Nautel FM transmitters to provide digital adaptive pre-correction
- Six programmable pre-selections for frequency, power and audio source
- Instantaneous remote or local selection of digital, hybrid or analog transmission modes
- Diagnostic 128 event time stamped log
- Built-in DSP stereo generator interpolates AES/EBU digital data or L&R analog audio to produce digital stereo composite
- Built-in SCA generators and RBDS/RDS coder
- Universal AC supply: 90 V to 264 V

Contact Nautel for details.

Phone: (207) 947.8200 | **Fax:** (207) 947.3693
info@nautel.com | www.nautel.com

SIMPLY THE BEST ENGINEERED TRANSMITTERS

Surround

The five systems can be divided into two distinct types. Circle Surround, Pro Logic and the Neural system all encode a surround source into a stereo audio path, while the Fraunhofer and Coding Technologies systems create a stereo channel and an associated data channel that is used to create the surround image.

Because the first three encode the surround information into a stereo signal, it is easy to understand how these systems can work with HD Radio. In reality, they could work with any stereo audio path. As long as the appropriate decoder is installed in the receiver, any or all of these systems could be used. Because the surround audio is encoded into a stereo path, compatibility with non-surround systems is maintained by not decoding the imbedded signals. The SRS and Dolby systems are matrix processes, and the Neural system is a watermarked process.

The surround sound formats have different needs for transmission.

The last two are different because they split the data path of the FM signal into two portions. Instead of using 96kb/s for the entire stereo audio path, Fraunhofer and Coding Technologies use a large portion of the path—about 80kb/s or more—for a stereo signal, and up to 16kb/s for the surround data. The surround data is created in the encoding process by comparing the surround mix to the stereo mix. The stereo portion is left intact for systems without a surround decoder. For simplicity, I'll refer to these as discrete systems.

The HD Radio signal is a data path, and with the development of multicast, this path can be allocated with different bit-rates for different uses. Again, more than one surround system could be implemented and the receiver could detect which process was used for the encoding.

Fraunhofer's system is touted as being compatible with MP3, AAC, AAC Plus and other codecs. Coding Technolgies uses the HDC coder, which it built for Ibiquity.

Surround around the station

Before a surround signal can be transmitted, stations must be able to work with surround content. There are several points along the signal where surround sound can be implemented, but we'll start at the beginning of the audio air chain and move forward.

Creating surround content will likely be the most challenging for any station. While music may be

Case Study: Installing multicast

continued from page 1

important to note that those tests happened almost five months ago, before any supplemental audio equipment was available. I did this so that when Harris shipped the supplemental audio equipment—a Flexstar—I could concentrate on the second channel. The one unresolved question is listener fatigue at lower bit rates. I feel confident with the quality of the 64, 48 and 32kb/s audio stream for a variety of music formats.

The Flexstar is simply a streaming audio encoder. We push the stream to our Dexstar exciter via a LAN connection through an E1 fiber optic Intraplex link. The Dexstar accepts the stream, merges it to the main HD Radio stream, and then sends it as one big data stream. The signal coverage is identical to the main HD Radio program signal.

Room for improvement

There are three important details to be identified. Unlike the main channel audio, when the second channel drops out because of a lack of signal strength there is no analog audio to switch to. This is simply a limitation of the system that can't be improved on. The second issue is the lack of being able to switch bit rates or turn the second channel on and off at will without restarting the exciter. This issue is expected to be fixed in a future Ibiquity software release. The last issue deals with surround sound broadcasting. WGUC has been testing multiple surround technologies and has been involved with the NRSC subcommittee dealing with surround. When broadcasting surround it will be important to maintain the highest bit rate possible. Depending on the system used it will be necessary to use either 64kb/s or 96kb/s to broadcast surround on the HD Radio signal. This is where switching bit rates without restarting the exciter becomes an important issue.

Available multicast receivers are still limited. Kenwood, JVC and Panasonic have the only aftermarket automobile receivers available. Boston Acoustics, Folk Audio and Radiosophy are scheduled to ship tabletop receivers by fall. All of these receivers are now forward compatible and can decode second channel audio. Kenwood has offered to upgrade its older non-compatible HR-100 HD Radio receivers for a nominal fee.

On the Kenwood system, when users tune to a station that has a second channel the display will indicate the second channel by displaying a call sign then HD1 for the main signal and with a push of a button it will say HD2. When the second channel signal is lost the receiver will mute and wait for the signal to return or for the user to change the channel. Using the HD Radio receiver in my car I soon realized that a Clear Channel station in town was on

continued on page 6

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

Insight to IBOC - a supplement to Radio *magazine*, August 2005,

Open Mic

Every radio engineer has his favorite songs that he uses to adjust a station's processing or to evaluate an audio system's performance. Surround Sound is a newer format, and it can take time to find the works that demonstrate a system's performance.

What are your top picks for outstanding surround sound productions?

David P. Reaves, III,
co-owner,
Translantech Sound

Gaucho - Steely Dan

The clarity of the instrumentation is simply amazing. Singers and instruments seem to leap out of thin air from any direction, then disappear just as magically.

The Beatles Anthology - five DVD set

I loved them first on AM radio, stereo LP, CD and now in surround on DVD. As each new technology reveals previously unheard layers, the original quality never becomes workaday and flaws never seem to surface.

Band on the Run - McCartney & Wings

I suspect the 5.1 surround mix is basically the original quad master tapes with a bit of work, but whatever the history, the surround engineering is superb. "Band on the Run" immerses the listener in a sonic fantasyland.

Frank Foti
Founder and President
Omnia Audio

Tommy - The Who

Pete Townshend created a full-blown 5.1 surround mix from the original eight-track masters to add detail and dimension in surround that should not be missed.

Brothers In Arms - Dire Straits

This masterpiece has been given the Mark Knopfler touch in an astounding 5.1 mix. Using the surround placement augments the subtleties on this recording.

Goodbye Yellow Brick Road - Elton John

Here's an example where surround stands out. Using the surrounds to place harmony vocals really shows off not only what a great performer Elton John is, but what great production was added to this album. Candle In The Wind offers chills.

Surround

provided to the station in a surround format, live concerts or other station productions will need surround capabilities. In addition, if any program elements are delivered in surround, station imaging would sound better in surround too, or it will sound flat compared to the program.

The audio production needs for a surround sound studio can be handled by many audio systems today, although some are not broadcast specific. Still, radio console manufacturers are answering this call, as was demonstrated at NAB2005. The router-based broadcast console manufacturers have shown that they are ready to meet this need.

If surround content is delivered to a station, it will need to be encoded into the transmission format being used. All the systems have encoders and decoders to do this. Each audio entry point will need an encoder, as will each audio monitoring point need a decoder.

To encode and decode audio with the matrix and watermark systems, Neural offers the 5225 Upmix decoder and 5225 Downmix encoder; SRS has the CSE-07D and CSE-07 hardware encoders, and CSD-07D and CSD-07 hardware decoders, as well as VST and TDM software plug-ins; and Dolby provides the DP563 encoder and DP564 decoder. Fraunhofer and Coding Technologies do not have commercially available encoders and decoders at this time.

Creating the stereo mixdown from the surround source can be a source of heated debate. The matrix and watermark systems perform this function automatically. The discrete systems can take advantage of using a manual mixdown for the stereo version. While a manual mixdown could maintain some artistic control, the amount of material being encoded may make this step impractical. A compromise will have to be made between the expended effort and the desired result.

Once audio is encoded into the surround format, it must be stored for later playback. The matrix and watermark systems encode to stereo files, so nothing needs to be done to handle the files. The discrete systems create two elements for the audio file. Computerized audio storage systems can easily store and deliver these files. Enco and Broadcast Electronics demonstrated their systems' abilities to deliver discrete surround-encoded audio at NAB2005.

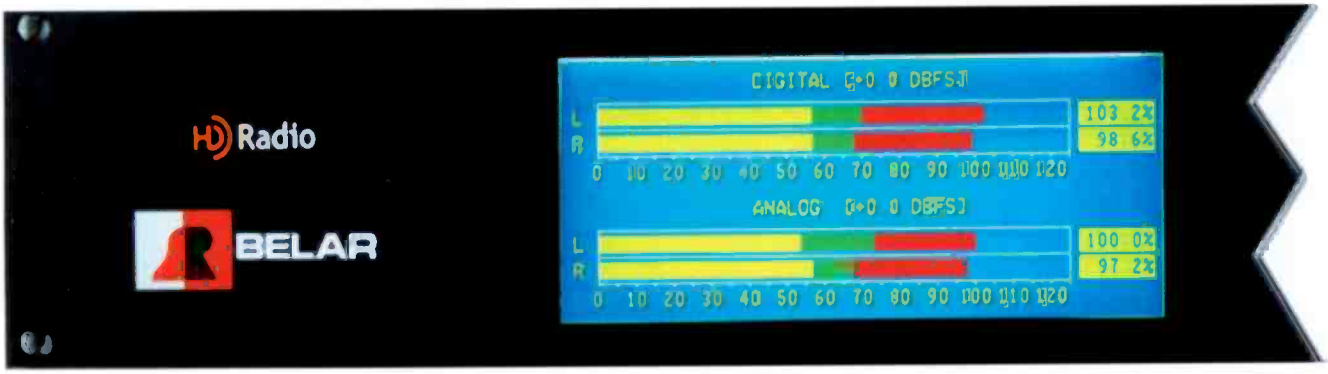
The final step is routing and delivery of the surround content. Again, the matrix/watermark systems are ready to go because of the existing stereo infrastructure. The ability to transmit one of the discrete systems will depend on the facility itself. An analog infrastructure will need to be upgraded.

The discrete-encoded audio is transmitted as a bitstream, but this is not a traditional digital audio stream. Some of the router-based audio systems have demonstrated their ability to carry these signals.

Coming Soon from the leading name in Radio Monitoring Equipment

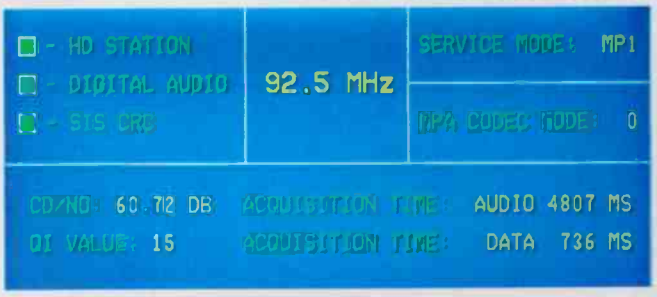
BELAR FMHD-1

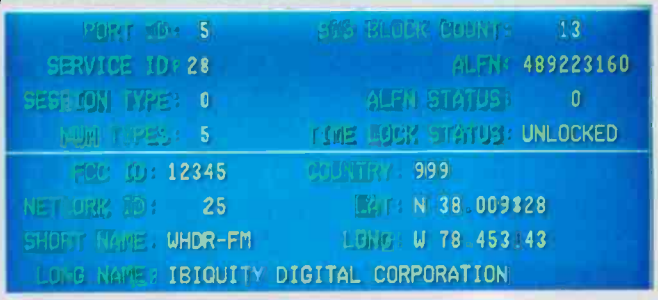
"When accuracy counts, count on Belar."



- Frequency Agile High and Low level inputs
- High Resolution Graphical Color Display
- HD Status, Station Info, and Program Info
- Analog to HD Audio Delay Measurement
- HD and Analog Program Audio Metering
- RJ 45 Ethernet Interface
- FFT Spectrum Analysis
- 8 Assignable Analog Audio Outputs (L/R Analog, L/R HD, L/R Tomorrow Radio, 5.1 Surround, etc)

Here are some sneak preview screen shots!





For updates and more information on the **BELAR FMHD-1** and **AMHD-1** go to

www.belar.com/hdradio.htm

Belar Electronics Laboratory, Inc.
119 Lancaster Avenue
P.O. Box 76
Devon, Pennsylvania 19333 USA

Telephone: (610) 687-5550
FAX: (610) 687-2686
E-mail: sales@belar.com
Website www.belar.com

Surround

Decisions, decisions

So if your station decides to carry surround-sound audio, which system is the one to choose? This is a decision that the station will have to make on its own, but that decision can be tempered by weighing the various aspects of the systems.

The matrix and watermark systems work with existing stereo facilities. Audio encoded in this way can be mixed and edited with little or no effect on the encoding. However, surround aficionados may notice that the surround audio may not be exactly like the original. In addition, there is concern that the encoding process may introduce unwanted artifacts, such as excessive stereo difference information.

Meanwhile, the discrete systems maintain the stereo quality and accurately replicate the surround field. The drawback is that existing stereo facilities are probably not yet able to route and mix the encoded audio. The matrix/watermark systems have the advantage that they are easier to implement, and can be done so gradually.

The ability to transmit surround-sound programming adds a sparkle to IBOC's consumer acceptance, and it provides another element to keep terrestrial radio in step with other forms of digital entertainment. While the specific format used widely has yet to be determined, stations should plan now for a possible surround-sound future.

Case Study: Installing multicast

continued from page 3

the air with second channel audio. After further investigation I found that a handful of public radio stations nationwide along with some Clear Channel stations (and I'm sure other broadcasters) are implementing second channel audio. Now that encoders are shipping (at a price of around $5,500) I expect it to spread fast.

I believe that multicast audio may be the killer application needed to give HD Radio a boost and propel the technology. The next generation may provide even more channels. Currently, there are tests being conducted for three channels of audio each at 32kb/s.

PSD will be an important feature of HD Radio, but the availability of a viable second channel of programming is something that will have every station program director and sales manager salivating, and it will only provide the radio listener with more options and a better experience. It is precisely this kind of experience terrestrial broadcasting needs to secure listener loyalty and prevent them from signing up with satellite radio or listening to that six-disc CD changer mounted in their trunks.

Danko is VP of engineering and operations for WGUC-FM, Cincinnati.

Slow and steady

by Chriss Scherer, editor

As the HD Radio rollout continues, many stations ponder the chicken-and-the-egg situation that exists: some stations won't install IBOC equipment until there are sufficient receivers in consumer use, but consumers won't buy the receivers if there aren't any HD Radio stations to receive. Many consumers believe that satellite radio is the only form of digital radio, which further hinders the acceptance of HD Radio.

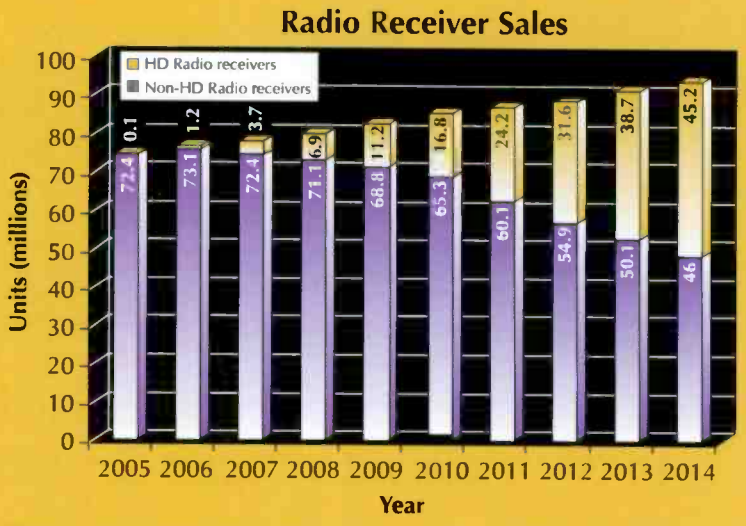


Figure 1. Projected sales of radio receivers with and without HD Radio.

The transition to a completely digital transmission system will take several years. During this time, more stations will commence IBOC transmissions, and more radio receivers will become available. The balancing act will continue, but the two will fuel each other. The data in Figure 1 shows that consumers will increase their investment in HD Radio-capable receivers over the next decade.

These figures show that it will take five years for more than one-quarter of all radio receivers to be sold with HD Radio capability, and nine years before half the receivers sold have HD Radio capability.

Source: Audio Signals, Deutsche Bank newsletter, June 1, 2005, from Ibiquity and Deutsche Bank estimates

We're Reshaping The Future Of Radio From A Solid Foundation Of Leadership.

The newest force in radio was forged from a rich heritage of leadership that is decades strong. We're bringing a breath of fresh air and a re-energized spirit to an industry we helped to build. At Team Harris Radio, we've brought together the industry's largest and most comprehensive range of products, services and people dedicated to advancing radio. All working together in perfect harmony and focused on the success of your business. From our innovative products to our forward-looking services, management tools and expert support teams, we're dedicated to our mutual future of pioneering and growth. So whether you're audience is around the corner or around the world, Harris Radio is on the air with the resources you need to succeed.

To learn more about the new Harris Radio Team, call us at **800-622-0022** or visit us at **www.broadcast.harris.com.**

T H E N E W H A R R I S R A D I O T E A M I S O N T H E A I R


AM/FM


AUDIO CONSOLES


DIG'TAL RADIO


BROADCAST STUDIO


HIGH POWER AM


SYSTEMS & SERVICE

www.broadcast.harris.com

HARRIS

Solutions for All of Your IBOC Needs from ERI®

From the beginning, ERI has been a leader in the research and development of IBOC FM technologies. Join us as we continue to work toward developing new products for this exciting technology.

NEW LYNX™ Dual Input Side Mount FM Antenna for IBOC Operations

The Electronics Research LYNX™ Dual Input Side Mount FM Antenna is designed specifically for FM IBOC applications. This new antenna is capable of transmitting both the analog and digital FM signals without requiring a high loss hybrid combiner and maintains high isolation between the digital and analog transmitters. The design meets the current Federal Communications Commission requirement for informal notification of IBOC implementation.

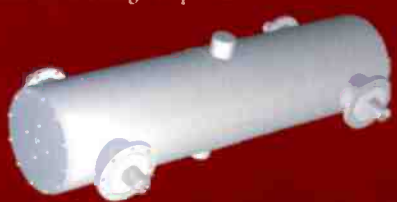
MASK-960 IBOC Spectral Compliance Filter

ERI has developed a compact arrangement of our famous FM 970 band pass filter cavities to address the specific needs of FM IBOC broadcasting. ERI's mask filter configuration can provide the right response for any requirement.

iBOX Low/Medium/ High Power Hybrid Combiners

The quality and reliability of ERI's standard quarter wave hybrids have been adapted for use as an IBOC Hybrid Combiner. The iBOX™ 10 dB Hybrid Combiner is available in two versions:

- Low/medium power version for analog FM power levels up to 30 kW
- High power version which is rated to handle up to 80 kW of analog FM power.



Your Single Source for Broadcast Solutions™

ELECTRONICS RESEARCH, INC. ERI®

Call Toll-free at 877 - ERI - LINE • Visit Online at www.eriinc.com

Facility Focus
the technology behind Federated Media

Inovonics RBDS Encoders

Inovonics offers a range of RBDS encoding products, from the simple Model 702 Mini Encoder to a new Model 713 with TCP/IP network connectivity.

Models 712 and 713 are interactive encoders, connecting directly with station automation to send song title and artist information, station promos and advertising. Dynamic messaging can be scrolled across the receiver faceplate either as scrolling PS and/or as radio text; these independent functions are available simultaneously.

Inovonics has addressed automobile safety with the option of a unique Safe Scrolling mode, which displays text in a less distracting manner, albeit at a slower rate.

www.inovon.com
831-458-0552

Comrex Matrix

The Comrex Matrix offers the ultimate in flexibility for remote broadcasts. Whether on regular telephone (POTS) service, ISDN lines or GSM wireless networks, the Matrix can send high-quality remote audio to the studio from virtually anywhere. As a 15kHz POTS codec, the Matrix can connect with all Comrex POTS codecs, and with the optional ISDN module, the Matrix is compatible with most ISDN standards. When the remote site has no phone line, the optional GSM module allows the Matrix to transmit 7kHz audio with an internal GSM wireless phone. Along with the full line of Comrex codecs and telephone hybrids, the Matrix will help your station broadcast great-sounding audio from anywhere.

www.comrex.com
800-237-1776

Moseley SL9003Q

Taking advantage of the Starlink's modular platform, Federated Media uses 950MHz STL carriers to convey three FM composite signals sampled at 128kHz. A fourth system is used to feed an AES 44.1kHz sampled AES stereo pair to its transmitter sites. Moseley engineering concentrated on the low-end audio frequency response for both configurations resulting in an STL that allows Federated Media to adjust its digital audio processors for maximum effect. If the station decides to go with HD Radio, the composite audio cards can be exchanged for the AES versions.

www.moseleysb.com
805-968-9621

Sine Systems MBC-1

The Sine Systems MBC-1 replaces all the various strobe lights and colored beacons that are a part of almost every broadcast studio. It has 15 inputs for relay contact closures or logic level sources and a single serial output that connects to an electronic message display—typically an inexpensive Beta-Brite display. Each input can trigger a unique message on the display including text and graphics. Multiple message boards can be connected to a single MBC-1. Messages are stored in the display so a single input can trigger different messages on different displays. A factory setup feature can initialize the display with a list of starter messages. The display is fully programmable with a hand-held remote that is included with the Beta-Brite display.

www.sinesystems.com
615-228-3500

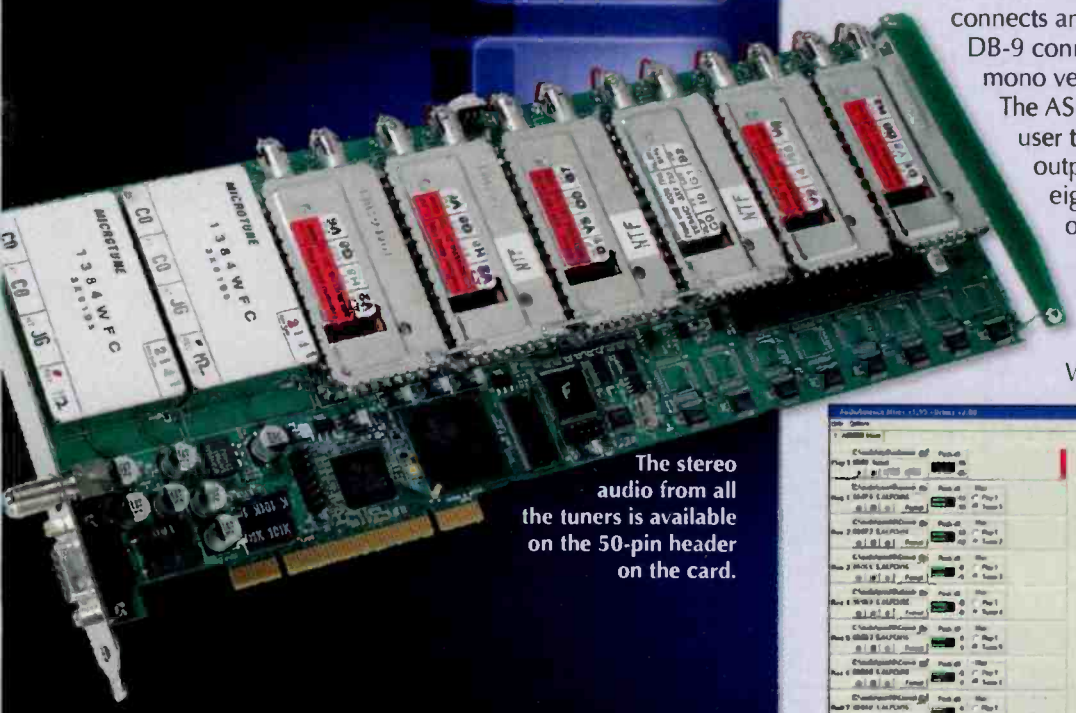
The 1st annual 2004 Radio Innovative Product Reader's Choice AWARD WINNER

Audio Science ASI8702

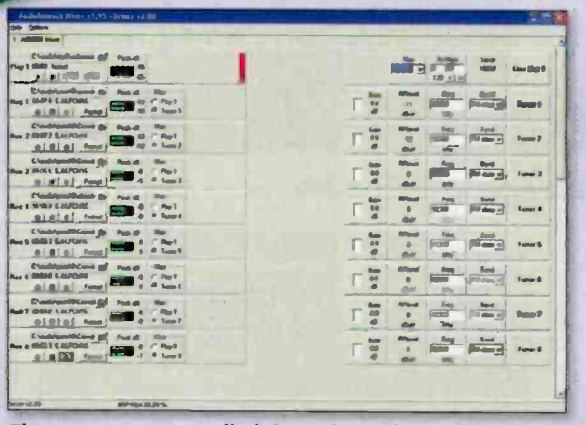
A PCI card with eight AM/FM tuners, the Audio Science ASI8702 receives radio signals and creates a mono or stereo stream from each tuner to the PCI bus. As many as eight cards can be installed in a system. The audio can be sampled at rates from 8kHz to 48kHz.

The AM portion of each tuner covers a range from 520kHz to 1,750kHz. The FM portion covers a range of 76MHz to 109MHz. The stereo decoder is software controlled.

A 75Ω F connector on the card bracket connects an antenna to all the tuners. A DB-9 connector supplies a line-level mono version of each tuner signal. The ASI Mixer software allows the user to select which tuner feeds output one. Tuners two through eight have dedicated line outputs on the connector. The full stereo signal is available from a 50-pin header on the card. Drivers are available for Windows 2000, Windows XP and Linux.



The stereo audio from all the tuners is available on the 50-pin header on the card.



The tuners are controlled through a software interface.

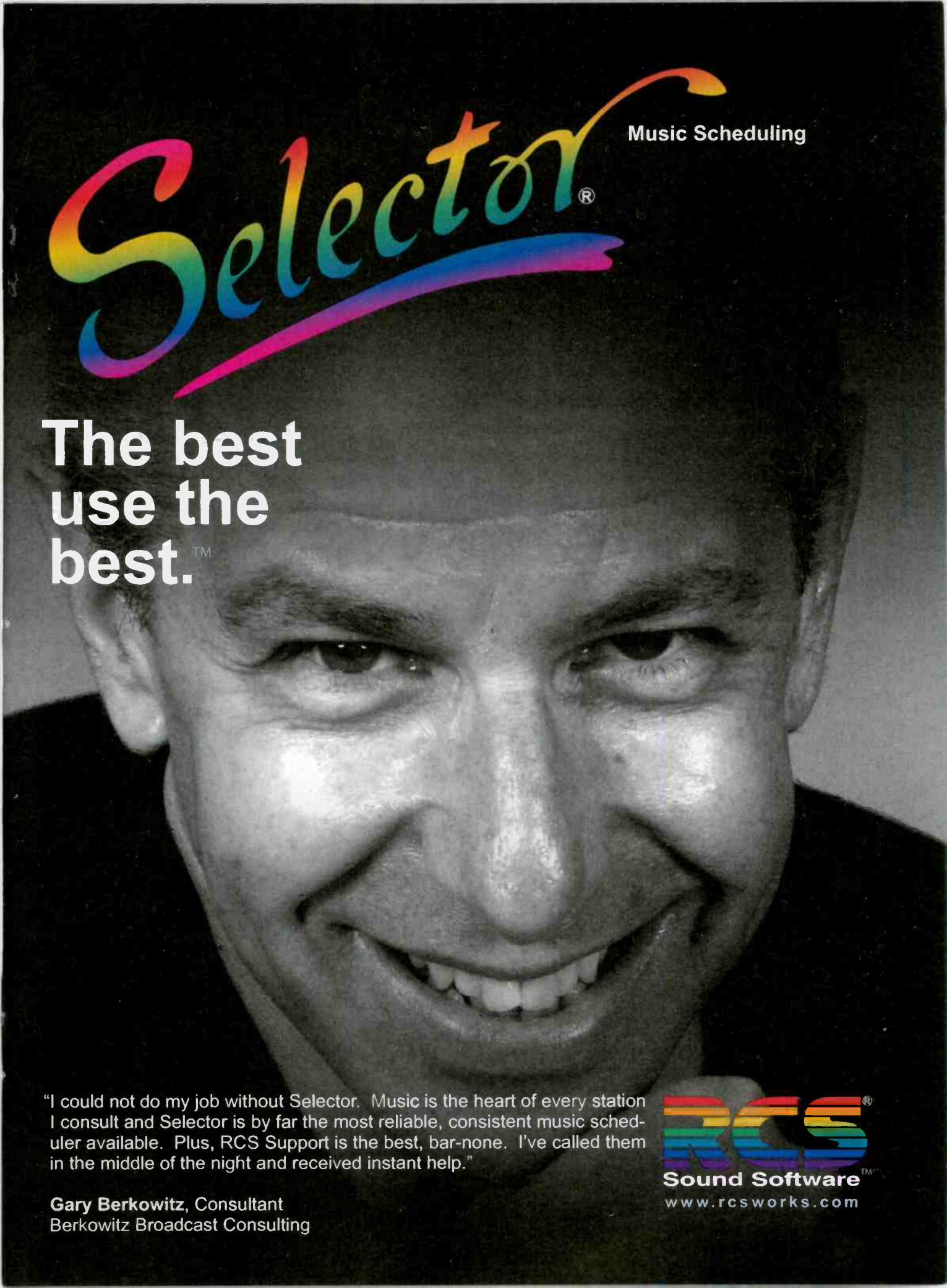
The tuners are controlled with the ASI Mixer software. This sets the band, frequency and attenuation for each tuner section. The RF input level is also displayed for reference. The display also indicates when the tuner PLL is locked and if there is an FM stereo pilot.

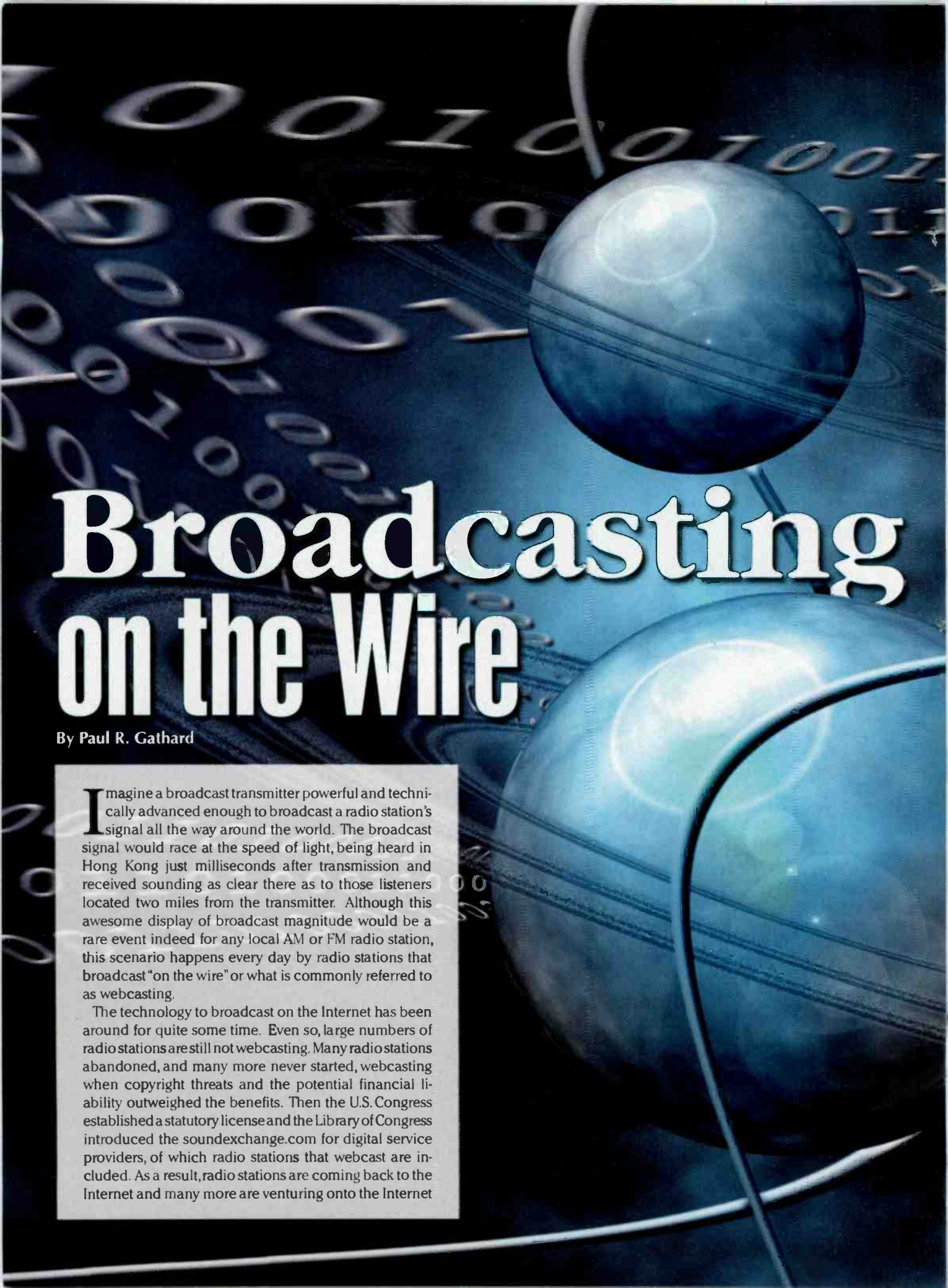
Applications for the ASI8702 include broadcast monitoring and logging, advertising verification and content identification. Other models in the series include the ASI8703 (eight FM/NTSC-TV tuners), ASI8705 (four AM/FM and four FM/NTSC-TV tuners), ASI8712 (four AM/FM tuners) ad the ASI8713 (four FM/NTSC-TV tuners). Custom tuner configurations are also available. ■

Introduced in 2004, the *Radio* magazine Innovative Product Awards were developed to honor excellence in new product development in the radio industry. The awards demonstrate the talent and commitment of the people in every aspect of development at each company, from concept through sales. The entrants were listed in the 2005 *Radio* magazine Buyers Guide that was included in the December 2004 issue.

Manufacturers submitted products in several categories, and the winners were selected through an online form by you, the *Radio* magazine reader. The results were tallied at the end of February, and the winners were presented with their awards at NAB2005. Over the next few months, we will profile each of these winning products.

The 2005 Innovative Product Award entries will be listed in the *Radio* magazine 2006 Buyers Guide, which will be released in December.


Selector®
Music Scheduling
The best use the best.™
"I could not do my job without Selector. Music is the heart of every station I consult and Selector is by far the most reliable, consistent music scheduler available. Plus, RCS Support is the best, bar-none. I've called them in the middle of the night and received instant help."
Gary Berkowitz, Consultant
Berkowitz Broadcast Consulting
RCS®
Sound Software™
www.rcsworks.com



Broadcasting on the Wire

By Paul R. Gathard

Imagine a broadcast transmitter powerful and technically advanced enough to broadcast a radio station's signal all the way around the world. The broadcast signal would race at the speed of light, being heard in Hong Kong just milliseconds after transmission and received sounding as clear there as to those listeners located two miles from the transmitter. Although this awesome display of broadcast magnitude would be a rare event indeed for any local AM or FM radio station, this scenario happens every day by radio stations that broadcast "on the wire" or what is commonly referred to as webcasting.

The technology to broadcast on the Internet has been around for quite some time. Even so, large numbers of radio stations are still not webcasting. Many radio stations abandoned, and many more never started, webcasting when copyright threats and the potential financial liability outweighed the benefits. Then the U.S. Congress established a statutory license and the Library of Congress introduced the soundexchange.com for digital service providers, of which radio stations that webcast are included. As a result, radio stations are coming back to the Internet and many more are venturing onto the Internet

The Infinite Stream

By Gary Eskow

The Internet has been easy to embrace, and obviously helpful in many ways. But how do Google searches and Itunes translate into advertising revenue? What are the business models?

Infinity, one of the largest radio broadcasters in the country, avoided streaming for years; now it's in the fold. Why? Are there lessons in Infinity's migration to the Internet that others can draw lessons from? Matt Timothy, Infinity's vice president of streaming media provides some answers about these issues.

"Why is Infinity, which has avoided streaming for so long, embracing it now? I don't know the answer, other than to say, why not now?" asks Timothy. "We have a tremendous collection of local brands, and Infinity wants to unlock that value, to extend it to platforms and places where everyone can access it.

Web tuners, like this one for Infinity's WINS, provide more visual information than radio has previously been able to provide.

"Attracting advertisers targeting localized markets is one strong advantage of streaming broadcasts," said Timothy. "Advertisers are on board, without a doubt. Our initial streaming launch consisted of 12 news stations, and the response from advertisers has been great. Fundamentally, streaming allows us to expand the sales conversations we have with potential advertisers in two ways: we can talk to individuals and companies who haven't been able to afford our services in the past, and we can now offer them a suite of tools that were not available in the past. For example, banners and online spots give advertisers more choices, and more entry points into the markets we provide them with."

When asked if streaming helps Infinity compete with satellite radio, Timothy says, "Let's say that it allows our brands to be heard in more places. Reaching people while they are at work is important, and streaming gives us more shelf space for our brands. We have an aggressive, nimble sales force on the ground, and streaming gives them even more to sell."

Negotiating with AFTRA and other talent unions has been a sticking point for many would-be advertisers on a budget. What is Infinity's position on this ticklish issue? "In any new initiative there are obstacles and challenges to overcome. The potential for this business is big enough that we're addressing the issue you just brought up every single day."

Yes, but there must be a way to provide one layer of spot production for entry level clients, and another that uses top union talent, for national clients with larger budgets, right? "We can accommodate Home Depot, for example, and its desire to appear on our sites, as well as the most local, community based businesses. The conversation we have with talent unions and others is on-going. The cement is still wet on the policies we're developing in this area."

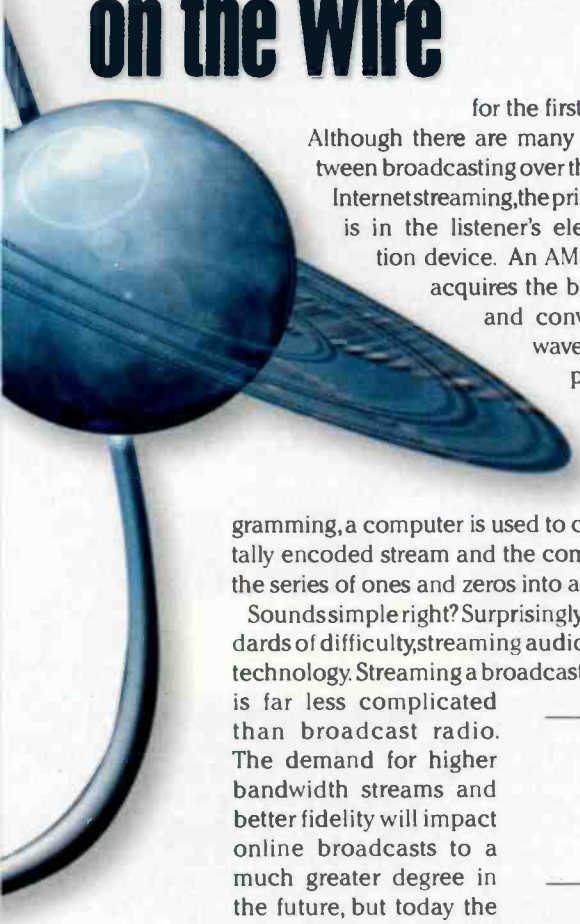
Technology approach

Ray Miklius, vice president of studio systems for Broadcast Electronics, said that his company has expanded into datacasting products and services. For example, BE provides Sonixtream, an application to allow Internet listeners see the title of a song and information on the artist. The system also provides real-time data for other playback devices, including car radios and table-top units.

"After the Internet advertising crash of 2001, companies realized

Continued on page 59

Broadcasting on the Wire



for the first time.

Although there are many similarities between broadcasting over the airwaves and Internet streaming, the primary difference is in the listener's electronic reception device. An AM or FM receiver acquires the broadcast signal and converts the radio waves into audio output. When the listener uses the Internet to acquire radio programming, a computer is used to capture the digitally encoded stream and the computer decodes the series of ones and zeros into audio output.

Sounds simple right? Surprisingly, by today's standards of difficulty, streaming audio is fairly simple technology. Streaming a broadcast on the Internet is far less complicated than broadcast radio. The demand for higher bandwidth streams and better fidelity will impact online broadcasts to a much greater degree in the future, but today the state-of-the-art is still rudimentary in nature. Taking a rather robust broadcast-quality signal and compressing it down to a 16kb/s or 20kb/s stream might make an audio engineer cry. On the other hand, producing a great sounding Internet experience in spite of the signal compression is where a master of the airwaves can really shine.

In any event, the decision to webcast may have already been made or will be made in the near future. So how do you manage the implementation of this wired broadcast technology and integrate streaming into your already demanding responsibilities?

Getting started

First, you assemble the equipment and software required. You will need a personal computer, an audio capture card and an uninterruptible power supply (UPS). Download the free Microsoft Windows Media Encoder to the webcast personal computer.

You will also need unobstructed access to the Internet with an always-on Internet provider that offers a T-1, DSL, ISDN or cable modem connection.

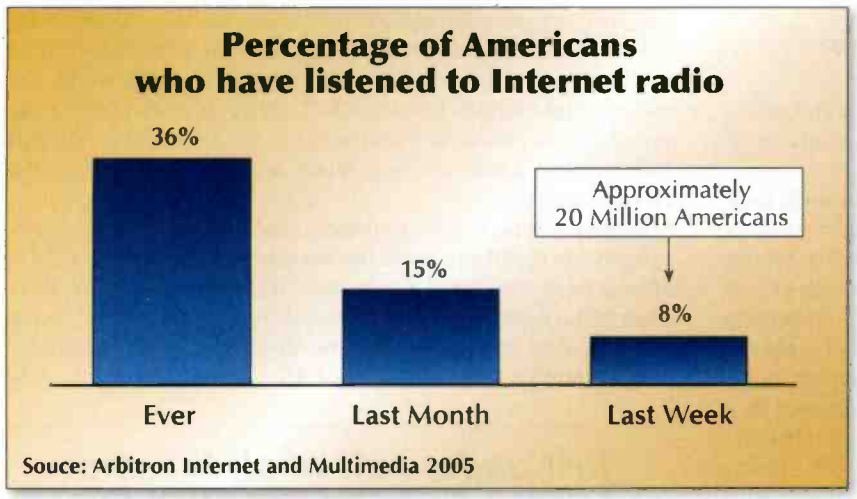
You will need a static IP address or if you have a dynamic IP connection, you will require the services of a free IP address forwarding service. This is the short list of equipment and software required, but as easy as it sounds the devil is definitely in the detail.

While I focus on the Windows Media Systems technology, other operating systems can be used, such as Real Media, which are similar and may use various algorithms to code and decode the audio. Each codec system has its own strengths and weaknesses.

The subject of which technology is better has caused many an argument among knowledgeable streaming media gurus. We have chosen the Windows Media System because of the widespread distribution of the Windows Media Player and the non-scientific observation that webcasting in this technology appears to come with a lower overall cost of content delivery (COCD).

Streaming a broadcast on the Internet is far less complicated than broadcast radio.

Webcasting a live radio program is all about processing speed. The faster the central processing unit (CPU), the better the overall digital output quality and the less likely other applications or running multiple streams will have a degenerating effect on the audio output. A CPU speed of 333MHz should be considered the bare



Internet radio has an established presence.

minimum requirement for even a single 16kb/s bit-rate stream. I personally recommend a 2GHz or faster processor or even dual processors. I don't think there is such a thing as too fast.

Many stations provide multiple streams to allow dial-up and broadband listeners equal access to the most usable bandwidth. Using higher bandwidth streams and sending multiple streams to the media server may force you to increase the CPU processing speed. I don't recommend taxing the processor at more than a 50 percent usage on a continuous basis. Although other applications and processes will most likely be subordinate to the Windows Media Encoder output, continuously pushing a processor into 80 or 90 percent utilization is not worth risking the computer locking up and the webcast ending abruptly. Remember, faster is better. The Windows Media Encoder control panel indicates the continuous CPU utilization percentage in real time.

The sound card is the next most important item of equipment in the Internet streaming media configuration. Think of it this way: the transmitter simply pushes a carrier wave loaded with an amplitude-modulated or frequency-modulated signal. The quality of the broadcast audio signal started with the pre-transmission audio electronic equipment long before the signal was loaded onto the carrier wave. The hosted media server is equivalent to an Internet transmitter that distributes the Internet stream to listeners and in this way is similar to a broadcast transmitter. The media server simply takes the signal presented by the WMS encoder and faithfully redistributes the digitally produced output to hundreds or even thousands of online listeners.

If the audio source is clean and a high-quality audio capture card is used, theoretically, the low-bandwidth Internet stream will sound equally great no matter the listener's location on the planet.

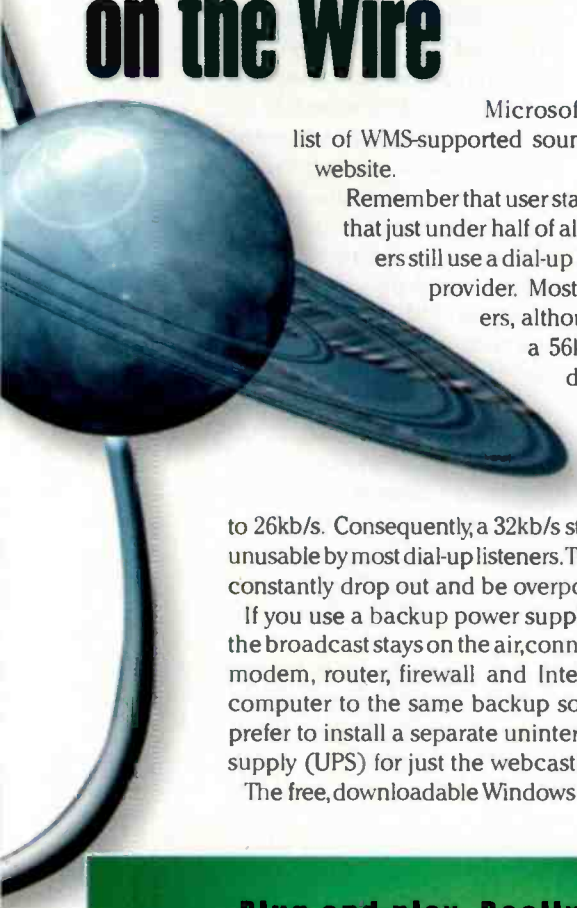
I recommend a 24-bit sound card, but you may have to experiment with different brands to find the best integration with the PC's motherboard configuration. Broadcast automation systems frequently process more than one audio source simultaneously by incorporating multiple processor chips. Likewise, you can stream more than one audio source through the same computer. You may have two separate radio station broadcasts, one station broadcast and an Internet-only side-channel or other multiple-stream requirements.

Reliable service

One single-processor sound card can encode different bandwidths of the same audio source if you run Windows XP. Using another Windows operating system, such as Windows 98 or Windows 2000, may require multiple sound cards even if the audio source is the same.

Computer sound cards come in many brands, but for low-bandwidth streaming, high-tech sound cards may mean a much more complex job of system integration and configuration. Some more costly sound cards will not stream at less than 32kb/s.

Broadcasting on the Wire



Microsoft maintains a list of WMS-supported sound cards on its website.

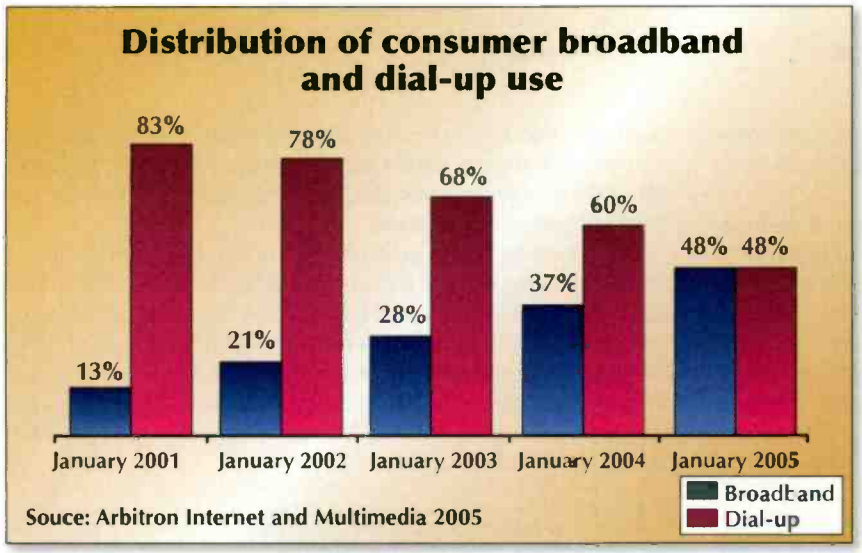
Remember that user statistics still show that just under half of all Internet listeners still use a dial-up Internet service provider. Most dial-up providers, although advertising a 56kb/s bandwidth downlink, rarely connect their customers at more than 19kb/s to 26kb/s. Consequently, a 32kb/s stream would be unusable by most dial-up listeners. The player would constantly drop out and be overpowered.

If you use a backup power supply to make sure the broadcast stays on the air, connect the Internet modem, router, firewall and Internet streaming computer to the same backup source. You may prefer to install a separate uninterruptible power supply (UPS) for just the webcasting equipment.

The free, downloadable Windows Media Encoder provides a stream setup wizard that is fairly intuitive and easy to use, but there are a few non-intuitive things to know to get the encoded source stream to a media server for distribution to the world. For example, the multiple bit-rate (MBR) setting will not work for live streaming one-pass radio broadcasts. You will select the continuous bit-rate (CBR) setting and only select one bit-rate stream from the bit-rate pick list.

If you do not use a router or firewall, the Windows Media Encoder will provide the IP address of the encoder installed on the PC. If a firewall or router is used, the encoder will only indicate the IP address of the network or protective device. Consequently, a couple of things must be done to have the Media Server hosting service pull the stream from the webcast PC. Although some hosting services allow the stream to be pushed to the Media Server, it is a more efficient use of bandwidth to have the hosting service pull the stream. If a router or firewall is used, open the HTTP port to allow the Media Server access to the webcast PC located on the station's network. Read the router or firewall device instructions as to how to open the port.

Just under half of all Internet listeners still use a dial-up Internet service provider.



While broadband use is increasing, dial-up is still common.

Use the broadcast security provided by the WME software. This will prevent denial of service attacks and keep unwanted intruders from redistributing the signal directly from the encoder.

Once the sound card is installed, the Windows Media Encoder is downloaded and it is possible for a Windows Media Sever to access the webcasting PC, you are port ready. Port refers to the HTTP port that is opened to allow the Media Server to pull the signal. The HTTP port default value is 8080, but you can designate your own port numbering strategy just as easily.

Quality counts

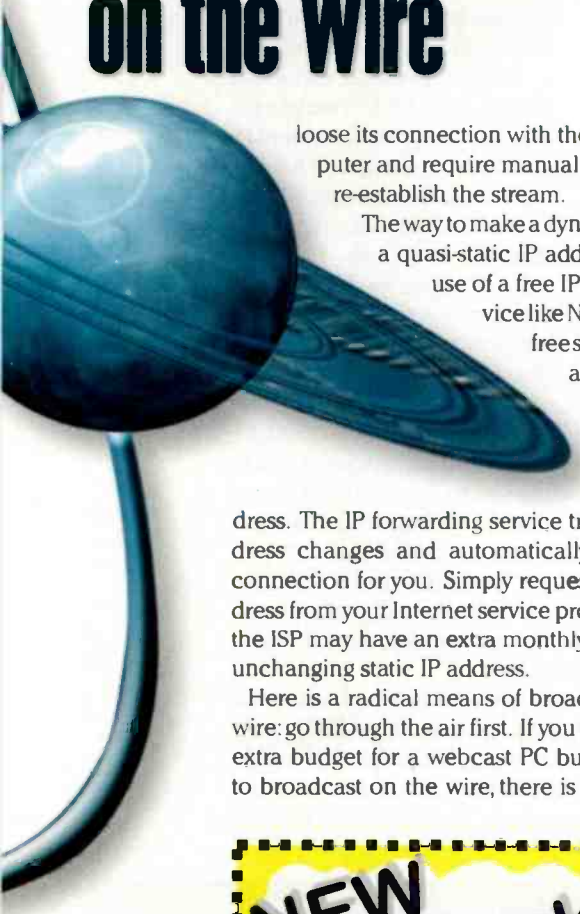
My number one rule of streaming on the Internet is if you don't care what the stream sounds like, don't bother. No one listens to a poor sounding Internet stream unless there is a disaster in his home community and that poor-sounding stream is the only way he can hear what's happening to loved ones or his own property. Strive for listener enjoyment and don't rush to the Internet just to be able to say that a webcast is on the Internet. Some listeners will stay with a station when they are driving on the fringe of a broadcast area, but there is no fringe area on the Internet. Low-fidelity laptop and desktop systems already have a strike against them. Don't let the streaming webcast quality drive listeners away from the station entirely.

Internet Service Providers come in various sizes and quality of service. There is a noticeable difference in the bandwidth and stability of connections so don't think one is just as good as the other. Going cheap is not prudent when it comes to the stream to the Windows Media Server. The station's connection to the server needs to be 5x5. You cannot control how the listener connects to the webcast, but you should make every effort to make the best decision when it comes to the station's only path to the Internet. If the stream to the media server goes down, everyone listening to the webcast goes down with it. Fast and stable are the two words I use to describe the most important aspects of an ISP. Of course, cost is another important element in the decision. It might be hard to justify a $300-per-month T-1 line vs. $26.95 per month for a DSL Internet connection.

If a telephone modem is unacceptable for streaming, then a decision to use DSL to stream the station's webcast should be weighed with great care. DSL providers often don't connect at the fully advertised upload throughput unless the customer complains that something doesn't work correctly. DSL connections are historically less stable than residential broadband hookups. ISDN and T-1 lines are more stable, but also more expensive. Choose wisely.

Finally, the desired type of IP address is static as opposed to dynamic. A static IP address never changes, but with a dynamic IP address, the Internet service provider recycles its connections when the PC or modem is rebooted, changing the IP address. When this happens the streaming media host will

Broadcasting on the Wire



loose its connection with the webcast computer and require manual intervention to re-establish the stream.

The way to make a dynamic IP address a quasi-static IP address is with the use of a free IP forwarding service like No-IP.com. These free services provide a host name that the Media Server uses instead of an IP address. The IP forwarding service tracks any IP address changes and automatically switches the connection for you. Simply request a static IP address from your Internet service provider; however the ISP may have an extra monthly charge for the unchanging static IP address.

Here is a radical means of broadcasting on the wire: go through the air first. If you do not have the extra budget for a webcast PC but you still want to broadcast on the wire, there is a work-around. Use the PC and Internet connection of someone in the broadcast area who can receive a solid signal from the transmitter. A remote AM or FM receiver can feed the streaming encoder. This is not the ideal method, but it can work.

Wired broadcasting is in its early years and the more you learn about the technology of streaming media the better you will be able to take full advantage of its revenue-generating possibilities. Don't give away potential advertising revenue for the promise of low or no streaming costs. Take control of your Internet presence and run your own streaming media show. Broadcasting on the wire is easy, its local and the Internet webcast is your property. Take control and stream on.

Gathard is president of Barnabas Road Media Hosting, RC24x7.com, Indianapolis.

Continued from page 53

that the level of advertising they received from streaming couldn't support the initiatives that had been undertaken on the Internet, in part because the valuations coming from Internet companies were inflated. Royalty uncertainty was also an issue, and radio seemed ready to disappear from the Internet, from a streaming standpoint," said Miklius.

"The CARP and AFTRA negotiations didn't make things easier for clients. AFTRA, for example, wanted a lot more money for a spot played on the Internet than via terrestrial broadcast, but that just didn't make sense for advertisers. A major push to replace ads came to be. Stations needed to get the union spots off the Internet because they could not afford them."

Miklius added, "To be fair, an important point was reached when customers realized that local transmission at affordable rates brought additional assets into the picture. At that point, new models for monetizing the Internet stream came into being that were more focused, and in some cases, targeted to a quite specific market.

"Everyone's looking for revenue growth, and streaming is definitely more economical than it was four years ago. Bandwidth rates, for example, have dropped significantly. It's great for a listener to have a DSL line for $40 a month, but when you need lots of bandwidth price becomes an important factor. Not long ago a megabyte of bandwidth cost about $500 a month. The price has dropped significantly. And now that the fiber has been laid and the infrastructure is in place, rates have dropped by a factor of 10 to 1 over the last three years," said Miklius.

"Traditional radio streams will continue to be viable for many years with Internet streaming simply adding value for advertisers," said Miklius. "Graphics, for example, are obviously not possible with radio, but they can be incorporated into streaming audio in a number of creative ways that will help listeners remember information. Album artwork can be displayed while a song is playing. The Web address of an advertiser, a coupon code or a number of other pieces of information can be displayed as well. A new level of interactivity has been added for the listener. Stations have to sell the value to their advertising base. That's how these services will get properly monetized."

Additional interactivity allows listeners to purchase music online. Likewise, a listener can click to an advertiser's website if he hears something he likes.

Clearly, the day has arrived when creative ways to use the Internet will result in effective new revenue streams for advertisers at all entry points. Taking this message to mom and pop stores and all the way up to the most visible national advertisers is the next important step for broadcasters looking to profit from Internet streaming.■

Eskow is a freelance technology writer in New Jersey, and contributing editor to Radio magazine's sister publication, Mix magazine.

Prism Sound Dscope III

By Doug Irwin

The Prism Sound Dscope III is an easy-to-learn and use analog and digital test set that works in conjunction with a user-supplied PC. The unit itself is 9" deep and 12" wide and therefore can easily have a laptop computer sitting directly on top of it. The Dscope and the computer communicate via a USB cable. All its inputs and outputs reside on front of the unit.

If you are familiar with the Windows operating system (I used XP for this evaluation) then learning how to use the Dscope will be no problem. A series of icons along the top of the display window lead quickly to the controls and test functions.

The "Quick Tour" icon takes the user through the basic functions of the unit. After studying the tour I was able make use of the equipment's basic functions in about 30 minutes.

The Trace Window is a display that is essentially like that of an oscilloscope, but better. The user can look at the scope trace (time domain vs. amplitude) while at the same time looking at an FFT trace (frequency domain vs. amplitude). See Figure 1. This enables the user to study individual distortion products in real-time. The trace window is also used to display the outputs of other swept measurement tests, such as THD vs. frequency and THD vs. level.

Performance at a glance

- Uses Windows as the GUI
- Simultaneous digital (AES-3) and analog outputs
- User-selectable digital and analog signal analyzer
- Continuous Time Analyzer akin to standard distortion analyzer
- FFT analyzer performs complex array of tests, including user-defined

This product features an analog and a digital signal generator (AES format) that operate simultaneously. The output signal type includes everything from sine wave to square wave, ramp, burst, white noise, pink noise, simultaneous multiple frequencies and user-defined waveforms. Output levels on the analog generator can be referenced to dBfs or more conventional units such as dBu or dBM. Different signals can be generated in the A output vs. the B output. While the digital output follows the analog in terms of the type of waveform, the user can change the sample rate and word-length independently. As part of the suite of digital tests, the user can also add deviation to the sample frequency (up to ±1,500 ppm) and errors and noise to the digital carrier output itself, such as variations in the actual output level, the rise time, jitter, common-mode interference and differential interference. These parameters allow the user to test the effects of lossy cable (for example) on a device's ability to receive and decode an AES data stream.

The signal analyzer side is versatile. With mouse control, the user can switch back and forth between the analog input and the digital input. The most basic analyzer window displays the received level (displayed in dBfs or more conventional units such as dBu), frequency and inter-channel phase. The Dscope includes a Continuous Time Analyzer, which is more like the traditional distortion analyzer. It can display distortion measured in the received signal in terms of dB or a percent. The CTA window also allows the user to add a high-pass and low-pass filter, and band-pass or band-reject filters in the distortion measurement process. In addition to the CTA is the FFT analyzer. The FFT analyzer can perform more complex functions than the CTA, including user-defined measurements from Visual Basic scripts. It can calculate 40 two-channel measurements at once. The CTA window and the FFT window can be displayed at the same time, and look similar. Graphical results of swept measurements using either or both of the CTA and FFT are displayed on the trace window.

The unit also provides a set of monitor outputs that allow the user to monitor the signal being generated or the signal being analyzed. The unit included a headphone output, and four BNC connectors that correspond to the A and B outputs and the A and B inputs.

Testing, testing

I first used the Dscope to align the analog vs. digital levels of a Moseley digital receiver located at our transmitter site on Cougar Mountain. Because this receiver has two sets of outputs that need to match, the Dscope's ability to quickly switch between the analog and digital inputs, along with the dBfs reference, made the level setting that much

easier. This was done as part of an HD Radio installation, and even with the distraction of that project I was able to plug-and-play and to get the Dscope going in about five minutes. Strong RF fields seemed to have no detrimental effect on its operation.

For purposes of this evaluation, I decided to do something just a bit more complicated. The device under test (DUT) in this case was a pair of transmit and receive PT353 and PR353 cards for an Intraplex multiplexer. The PT353 card has digital and analog inputs, and the PR353 has digital and analog outputs. I attached the units back-to-back on the test bench, and quickly matched the analog and digital output levels. Using the AES ins and outs, I was able to measure THD vs. amplitude sweep followed by a THD vs. frequency sweep at -3dBfs. The results are turned out fast and they look good; I was comfortable with the results.

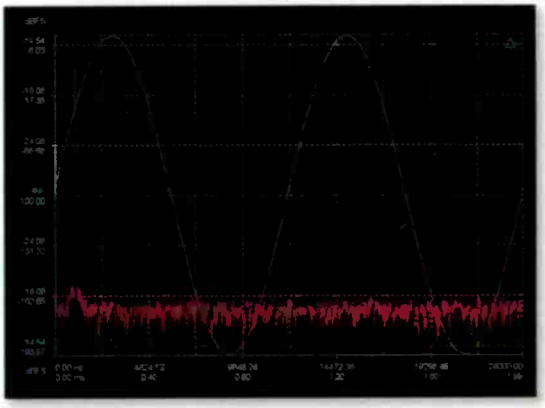


Figure 1. Screen traces can be captured and stored as image files. This is the Trace Window, which looks much like the screen of an oscilloscope.

Irwin is director of engineering for Clear Channel Radio in Seattle.

Prism Sound

P 973-983-9577
F 973-983-9588
W www.prismsound.com
E sales@prismsound.com

Editor's note: *Field Reports are an exclusive Radio magazine feature for radio broadcasters. Each report is prepared by well-qualified staff at a radio station, production facility or consulting company.*

These reports are performed by the industry, for the industry. Manufacturer support is limited to providing loan equipment and to aiding the author if requested.

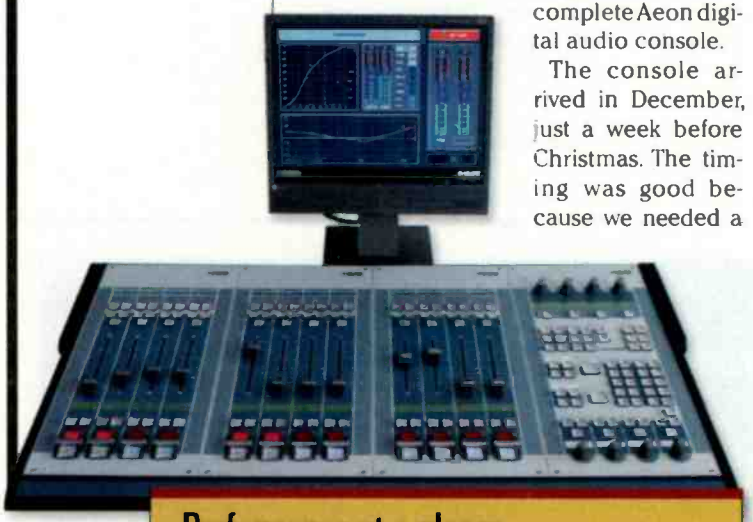
It is the responsibility of Radio magazine to publish the results of any device tested, positive or negative. No report should be considered an endorsement or disapproval by Radio magazine.

Klotz Digital Aeon

by Gordon S. Carter, CPBE

Have you ever been at a trade show and come up to a booth where you see a sign, "Put your card in the box for a chance to win"? So, you pull out your card, put it in the box and figure that's the end of that. After all, I never win anything.

Well, that is what happened to me at NAB2004. I put my card in the box at the Klotz Digital booth thinking that the grand prize was just too good to really win. Guess what? I won! The grand prize was a complete Aeon digital audio console.



The console arrived in December, just a week before Christmas. The timing was good because we needed a new console in a small production room. The early music production digital console no longer fit our needs. We needed more output channels than the old console could provide. In particular, we needed to create a mix-minus, which was difficult to do in a way that semi-skilled operators could understand.

Performance at a glance

- Dynamics and EQ control for each channel
- Extensive mix-minus capabilities
- Level meters for all busses and selected inputs
- Cost effective, router based system
- 16-character channel name displays
- Low-profile (1") design
- Table-top mounting
- Split or straight console options
- GUI-based setup

Installation

The console consists of three major components: the control surface, an electronics frame and a power supply. In addition, a USB keyboard and mouse, and a cable to connect the control surface to the electronics module were in the package. All documentation is on a CD-ROM. The power supply is a 2RU cage with what appears to be a conventional computer power supply inside. It has a captive cable that connects to the electronics card cage.

The electronics frame is the heart of the system. Our unit came configured with one eight-input analog card, one eight-input digital card, one eight-output digital card and two eight-output analog cards. In addition, two DSP cards were included that are required for operation of the unit. The unit has connectors for a VGA output, PS2 keyboard and mouse, USB connectors, RJ-45 and several other connectors normally associated with a computer. All analog and digital audio input and output connections are on 15-pin DB connectors. Some of the connectors on the unit are noted in the manual as not being used. A 36-pin DB connector is also included for GPI input and output connections.

The control surface connects to the electronics frame with a 15-pin DB cable. The control surface in our configuration consisted of three four-fader channel modules and a master/monitor module. The system will support two to five channel modules. The modules may be separated for more flexible control room layouts. The control surface has a clean, low profile, high-tech look. The only thing we had to add to the system was a monitor. We chose a 17" black, flat screen monitor to complement the look of the control surface.

I began by planning the installation. While the total number of inputs and outputs was no problem for our small control room, it did take some thought to make sure we had enough analog inputs for those devices that require it. For instance, DAT machines with AES outputs were no problem, but we needed to reserve space for our remote inputs, cassette machines and analog tape. (Yes, we still sometimes need to play those through our system.) I used a spreadsheet to help outline the inputs and outputs. Once I had this figured out the next step was to set up the software of the console.

The software was intuitive and easy to use once I had gone through the procedure in the setup manual. The software allows you to assign labels to the various inputs and outputs. The input labels show up on the control surface as the inputs are assigned to the channels. Once the keyboard and mouse are removed (you can also perform the setup with a computer connected to the RJ-45 connector) users cannot change the setup. Each output can be assigned to one of the seven buses in the console

(two of them are mono for mix-minus uses) or one of the four monitor channels.

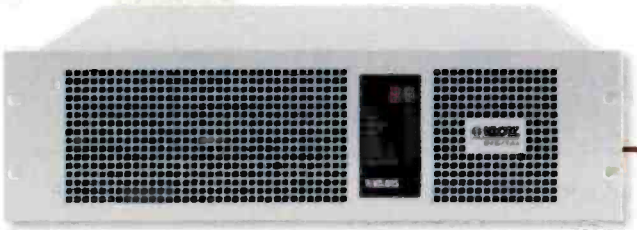
Users have the ability to change which input is assigned to which fader channel, as well as the more typical user functions on an audio console. However, the real power of this console appears when you press the select button for any channel. The EQ and dynamics control window pops up on the monitor display. The EQ has a high and low frequency shelf function, as well as two full parametric sections. The dynamics section has a compressor and expander with full control including an "over-easy" option. The monitor section can independently control the four monitor channels for source selection and volume. An auto-cue function can be activated to allow instant monitoring of channels put in cue without playing with the monitor controls. Two of the monitor channels can be ganged so one follows the other. This is useful when you want one to feed monitor speakers and the other to feed headphones.

While the console can save several snapshots of the controls, there appears to be no way to lock them so a user cannot change them inadvertently.

The console has several other features that would be useful in an on-air situation that we are not using, such as the ability to control other devices from the console controls.

This is a flexible system that would be at home in most radio stations.

Carter is chief engineer of WFMT, Chicago.



The Vadis frame handles all the audio functions of the console.

Klotz Digital

P 678-966-9900
F 678-966-9903
W www.klotzdigital.com
E sales@klotzdigital.com

Editor's note: *Field Reports are an exclusive* Radio *magazine feature for radio broadcasters. Each report is prepared by well-qualified staff at a radio station, production facility or consulting company.*

These reports are performed by the industry, for the industry. Manufacturer support is limited to providing loan equipment and to aiding the author if requested.

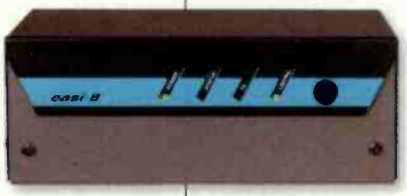
It is the responsibility of Radio *magazine to publish the results of any device tested, positive or negative. No report should be considered an endorsement or disapproval by* Radio *magazine.*

New Products

By Kari Taylor, associate editor

www.beradio.com

Remote monitoring
WIT



Easi-8: By connecting this Ethernet-based remote monitoring and control system to a LAN hub, concentrator or Ethernet switch, the system can be accessed from almost anywhere in the world. A unit will monitor eight inputs and each input can be individually set as metering (voltage monitoring) or status (binary). Multiple units can be tied together via the software control panel. The unit can make ac or dc measurements of zero to 160V with auto-ranging or user defined scales at 1, 4, 16, 64 or 256V. It can also measure an ac frequency range of 20 to 400Hz.

801-326-1300; www.witinc.net; info@witinc.net

Cordless, rechargeable headphone
AKG

K206: This wireless UHF stereo headphone system uses a PLL-synthesized radio section that delivers a signal as far as 150 feet away, penetrating walls and floors. The transmitter operates in the 914 to 916MHz range. Three selectable channels enable it to side-step interference. The headset receiver offers an auto-tune feature. The product's three-in-one transmitter integrates the storage cradle and battery charger. The system comes with high-current rechargeable batteries that will deliver about 15 hours of operation when fully charged. The transmitter can be used with several headphones.

615-620-3800; fax 615-620-3875; www.akgusa.com; akgusa@harman.com

GPS time
Broadcast Tools

Time Sync Plus: The equipment provides four GPS time referenced outputs. The first is a SPST relay, which pulses at 54:30 each hour and is user programmable for any minute and second each hour. The second output is an active high driver with a 100ms pulse every second, while the third output is a 4,800 baud, RS-232 serial port. The fourth output will provide an active high driver in two serial time code formats. Indicator LEDs are provided to display power/valid GPS data, programming mode and time sync relay operation.

877-250-5575; fax 360-854-9479
www.broadcasttools.com; bti@broadcasttools.com

Remote power controller
Omnitronix

Power Boss PB1: The first in a new line of power-management products, the PB1 control unit allows the individual power-cycling of eight pieces of equipment—such as routers, servers, transceivers, amplifiers and air conditioners—at the mixed voltages commonly found in remote and local sites. Control sites via its mechanical relays that handle ac or dc current to 10A at 60Vdc or 277Vac. The controller is available in rack mountable form, weighing 5.5 pounds and measuring 14.25" × 1.75" × 7.8". Power requirements are 24Vdc to 60Vdc, with an operating temperature range of zero to 40° C.

206-624-4985; fax 206-624-5610
www.omnitronix.com; sales@omnitronix.com

On-air processor
Orban

Optimod-FM 5300: This processor provides five-band and two-band Optimod processing in a 1RU package. The processor's built-in stereo encoder, AES/EBU digital inputs and outputs and analog I/O provide connectivity. Tight band limiting to 15kHz allows uncompressed digital STL to pass processed audio from studio to transmitter. The processor features three remote control ports: GPI contact closures, RS-232 serial and built-in Ethernet for TCP/IP networks. Built-in clock-based automation allows for automatic daypart processing.

510-351-3500; fax 510-351-0500; www.orban.com; custserv@orban.com

Upgrades and Updates

Orban has released Opticodec-PC Streaming Encoder Version 2.0. This version features a new mid-cost SE (standard edition) and adds several features to the existing PE (professional) and LE (light) editions. (www.orban.com)...**Scheduall** has released version 4.46 of its scheduling and resource management software suite, including Scheduall, Schedulink and Newsplan. (www.scheduall.com)... The **Axia** Smartsurface version 2.5 software has been released. The primary update to the software adds compression, de-essing and a noise gate to mic channels. (www.axiaaudio.com)...**Radiosophy** has added a USB port to its Multistream HD Radio receiver. This inbound-only service port will eliminate the need to return the unit to the manufacturer for software updates. (www.radiosophy.com)... The **A-Ware Software** has released version 2.0 of its Musicmaster for Windows music scheduling software, which adds a real-time studio editor, a trivia editor, manual-assist scheduling, a custom separation wizard, external library synchronization, segue preview and new schedule editor tools. (www.a-ware.com)...The **Henry Engineering** Studiodrive is now available with a USB interface, which allows it to be used with any computer without a sound card. (www.henryeng.com) ■

Chapters

For Sale

Help Wanted

Electronics Engineer

NPR seeks an Electronics Engineer for Culver City, CA office to design, construct, install, test, maintain, repair technical equipment, and assist in determining Engineering's purchasing requirements. Two years college/technical school, including analog and digital electronics courses. SBE certification preferred. Three years broadcast and/or recording studio equipment maintenance; ability to troubleshoot to component level; knowledge of drawing and MS Office applications; ability to work independently or on team; work efficiently with tight deadlines; available for rotating shifts; able lifting up to 75 pounds; valid driver's license with good driving record a must.

To apply, visit www.npr.org/about/jobs
EOE

Help Wanted

Assistant Chief Engineer

Newsweb Radio Group is seeking an Assistant Chief Engineer for it's 9 Station Chicago cluster. You need to have a high degree of knowledge with windows 2003 server/XP networked computer operations and oplog or other automation as well as be familiar with all facets of AM/FM Broadcast Technical Operations. Candidate should have three years experience in Broadcast Engineering with an IT background and/or certified Microsoft MSCE for 2003/XP.

Send resume and salary history to:
Michael McCarthy
NEWSWEB RADIO GROUP
6012 S. Pulaski Road
Chicago, IL 60629
No phone calls please.

NEWSWEB RADIO GROUP is an equal opportunity employer.

Services

Professional Services

Radio
THE RADIO TECHNOLOGY LEADER
A PRIMEDIA Publication
www.beradio.com
radio@primediabusiness.com

Editor – Chriss Scherer, CSRE CBNT, *cscherer@primediabusiness.com*
Technical Editor, RF – John Battison, PE., *batcom@bright.net*
Associate Editor – Kari Taylor, *ktaylor@primediabusiness.com*
Senior Art Director – Michael J. Knust, *mknust@primediabusiness.com*
Art Director – Robin (Morsbach) Metheny, *rmetheny@primediabusiness.com*

Technical Consultants – Harry C. Martin, *Legal*
Kevin McNamara, CNE, *Computers and Networks*
Mark Krieger, CBT, *IBOC, Contract Engineering*
Russ Berger, *Broadcast Acoustics*
Donald L. Markley, PE., *Transmission Facilities*

Senior Vice President – Peter L. May, *pmay@primediabusiness.com*
Publisher – Dennis Triola, *dtriola@primediabusiness.com*
Marketing Director – Kirby Asplund, *kasplund@primediabusiness.com*
Vice President of Production – Lisa Parks, *lparks@primediabusiness.com*
Senior Director of Production – Curt Pordes, *cpordes@primediabusiness.com*
Group Production Mgr. – Julie Gilpin, *jgilpin@primediabusiness.com*
Production Coordinator – Dana Honn, *dhonn@primediabusiness.com*
Classified Ad Coordinator – Mary Corcoran, *mcorcoran@primediabusiness.com*
VP Audience Marketing – Jerry Okabe, *jokabe@primediabusiness.com*
Audience Marketing Dir. – Barbara Kummer, *bkummer@primediabusiness.com*
Audience Marketing Mgr. – Sonja Rader, *srader@primediabusiness.com*

MEMBER ORGANIZATIONS
Sustaining Member of:
· Acoustical Society of America
· Audio Engineering Society
· Society of Broadcast Engineers
Member, American Business Media, The Missouri Association of Publishers
missouri association of publications

PRIMEDIA
Business Magazines & Media
President – John French, *jfrench@primediabusiness.com*
COO – Andrea Goldschlager, *agoldschlager@primediabusiness.com*

PRIMEDIA Inc.
745 Fifth Ave., NY, NY 10151
PRIMEDIA
Chairman – Dean Nelson, *dean.nelson@primedia.com*
President & CEO – Kelly Conlin, *kelly.conlin@primedia.com*
Vice Chairman & General Counsel – Beverly Chell, *beverly.chell@primedia.com*

SUBSCRIPTIONS: Free and controlled circulation to qualified subscribers. Non-qualified persons may subscribe at the following rates (prices subject to change): USA and Canada, 1 year, $50.00, 2 years, $95.00, 3 year, $140.00. Outside the USA and Canada, 1 year, $65.00, 2 years, $125.00, 3 years, $185.00 surface mail (1 year, $105.00, 2 years, $205.00, 3 years, $305.00 airmail delivery). For subscriber services or to order single copies, write to *Radio*, 2104 Harvell Circle, Bellevue, NE 68005 USA; call 866-505-7173 or 402-505-7173; or visit beradio.com.

POSTMASTER: Send address changes to *Radio*, P.O. Box 2100, Skokie, IL 60076-7800 USA.

ARCHIVES & MICROFORM: This magazine is available for research and retrieval of selected archived articles from leading electronic databases and online search services, including Factiva, LexisNexis, and Proquest. For microform availability, contact ProQuest at 800-521-0600 or 734-761-4700, or search the Serials in Microform listings at proquest.com.

REPRINTS: Contact FosteReprints to purchase quality custom reprints or e-prints of articles appearing in this publication at 866-436-8366 (219-879-8366 outside the U.S. and Canada). Instant reprints and permissions may be purchased directly from our website; look for the RSiCopyright tag appended to the end of each article.

PHOTOCOPIES: Authorization to photocopy articles for internal corporate, personal, or instructional use may be obtained from the Copyright Clearance Center (CCC) at 978-750-8400. Obtain further information at copyright.com.

PRIVACY POLICY: Your privacy is a priority to us. For a detailed policy statement about privacy and information dissemination practices related to Primedia Business magazines and Media products, please visit our website at primediabusiness.com.

EDITORIAL, BUSINESS and CORPORATE OFFICE: Primedia Business Magazines & Media, 9800 Metcalf, Overland Park, KS, 66212; 913-341-1300; beradio.com, primediabusiness.com.

LIST RENTAL SERVICES
Marie Briganti
Walter Karl
Phone: (845) 732-7054
Fax: (203) 778-4839
marie.briganti@walterkarl.infousa.com

EDITORIAL REPRINTS
FosteReprints
Phone: (866) 436-8366
(219) 879-8366

Sales Offices

Regional Sales Manager East
Angie Connley
Phone: 913-967-7221 *Fax:* 913-514-6852
E-mail: aconnley@primediabusiness.com

Regional Sales Manger West
Scott Slocum
Phone: 913-967-1358 *Fax:* 913-514-3789
E-mail: sslocum@primediabusiness.com

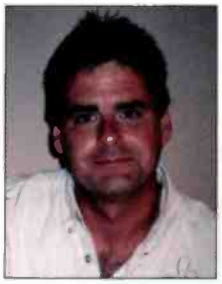
Europe/UK
Richard Woolley
Phone: +44 1295 278 407
Fax: +44 1295 278 408
E-mail: richardwoolley@btclick.com

Classified Advertising
Joyce Nolan
Phone: 610-701-9993
Fax: 610-701-0580
E-mail: jnolan@primediabusiness.com

Online Sales & Marketing
Samantha Kahn
Phone: 212-462-3401 *Fax:* 913-514-7006
E-mail: skahn@primediabusiness.com

Contributor Pro-file

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



Don Danko, CBRE, CBNT
VP of Engineering & Operations
Cincinnati Public Radio (WGUC, WVXU, WVXA, WVXM, WVXH, WVXR, WVXC & WVXW)

Danko joined WGUC in 1997, and the station began building its IBOC plans shortly thereafter. The station's IBOC strategic plan was developed in 1999. On July 26, 2003, WGUC commenced HD Radio transmissions. WGUC began multicasting on June 20, 2005.

Radio
THE RADIO TECHNOLOGY LEADER

Written by radio professionals
Written for radio professionals

Radio, Volume 11, Number 8, ISSN 1542-0620 is published monthly and mailed free to qualified recipients by PRIMEDIA Business Magazines & Media Inc, 9800 Metcalf, Overland Park, KS 66212-2216 (primediabusiness.com). Periodicals postage paid at Shawnee Mission, KS, and additional mailing offices. Canadian Post Publications Mail Agreement No. 40597023. Canada return address: DHL Global Mail, 7496 Bath Road, Unit 2, Mississauga, ON LT4 1L2. Additional resources, including subscription request forms and an editorial calendar are available online at beradio.com. To order single copies call 866-505-7173 or 402-505-7173.

POSTMASTER: Send address changes to *Radio*, PO. Box 2100, Skokie, IL 60076-7800 USA.

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.

www.beradio.com

Sign Off

By Kari Taylor, associate editor

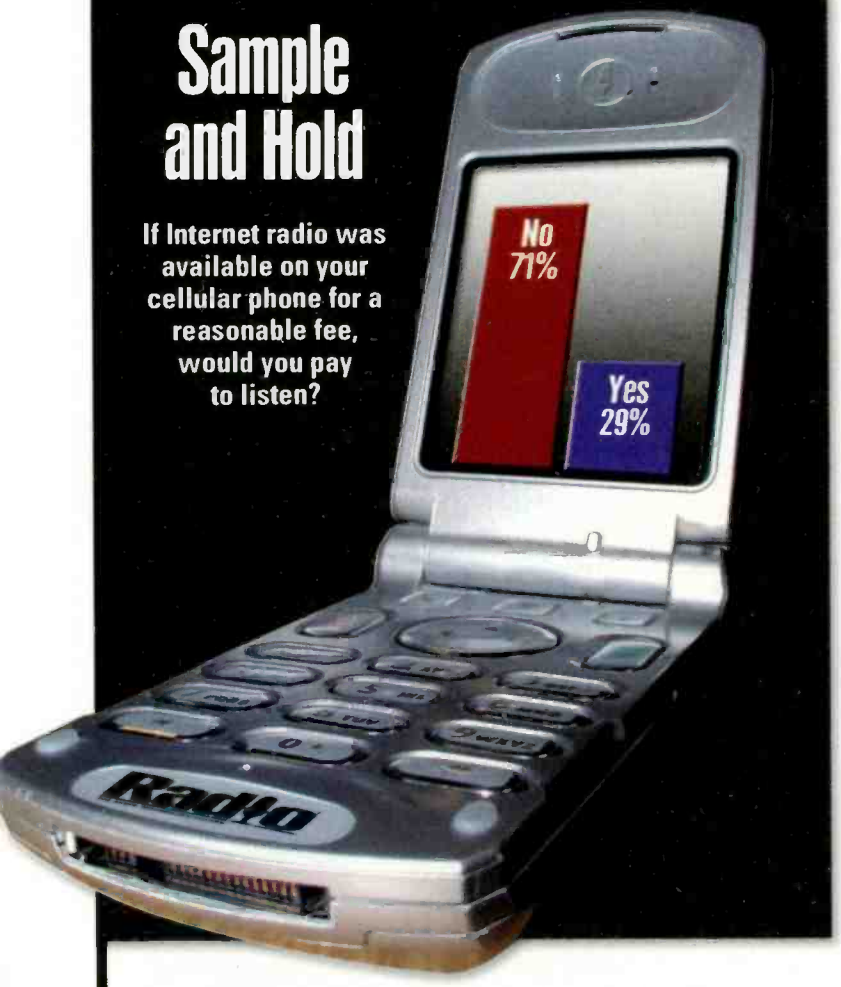
www.beradio.com

Do you remember?

The TCM-6, manufactured by Terracom about 30 years ago, was a portable microwave radio that provided performance for up to 1,200 frequency division multiplexing (FDM) voice channels or high bit-rate digital data transmission. The unit offered 0.005 percent frequency stability across its 1.7 to 15GHz range. Other features included continuous frequency tuning, automatic fault indication, a solid-state modular design and internal subcarrier program channels. The system was available for simplex, duplex, hot standby and diversity operation. Convertible mounting configurations allowed rack installation, stacking or vehicular mounting. The RF unit plug-in modules could be remote controlled from hundreds of feet away in weatherproof enclosures at the antenna, eliminating waveguide.

Sample and Hold

If Internet radio was available on your cellular phone for a reasonable fee, would you pay to listen?



Source: RRadio Network, Survey 29 Music, Cell phone, the Future, 2005.

That was then

Manufactured around 1954 in Indianapolis, the Regency TR-1G was one of the first consumer transistor radios. The radio received AM broadcasts only, as FM was not yet an option. Using transistors instead of tubes allowed portable audio entertainment to become a common part of everyday life.

This is now

Today portable audio devices are not limited to radios. CD players, Minidisc players and now media file players such as the Apple Ipod provide consumers with access to more audio choices than ever before. As portable as the first transistor radios, modern media players add extensive battery life and vast amounts of storage space to hold hours of audio material.

The distance consumer technology has traveled from the transistor radio to the Ipod has come full circle with the emergence of N&S Valveworks' tube-based amplifier. This vacuum-tube amplifier allows the portable Ipod to be used as a table-top set in a way that appeals to audiophile interests while making something of an homage to the humble transistor radio's ancestry.

How Would You Like Your SOUND?

HOW DO YOU WANT IT in MIAMI? How about NEW YORK? Should Chicago be the same as Houston? What about Boulder versus LA?

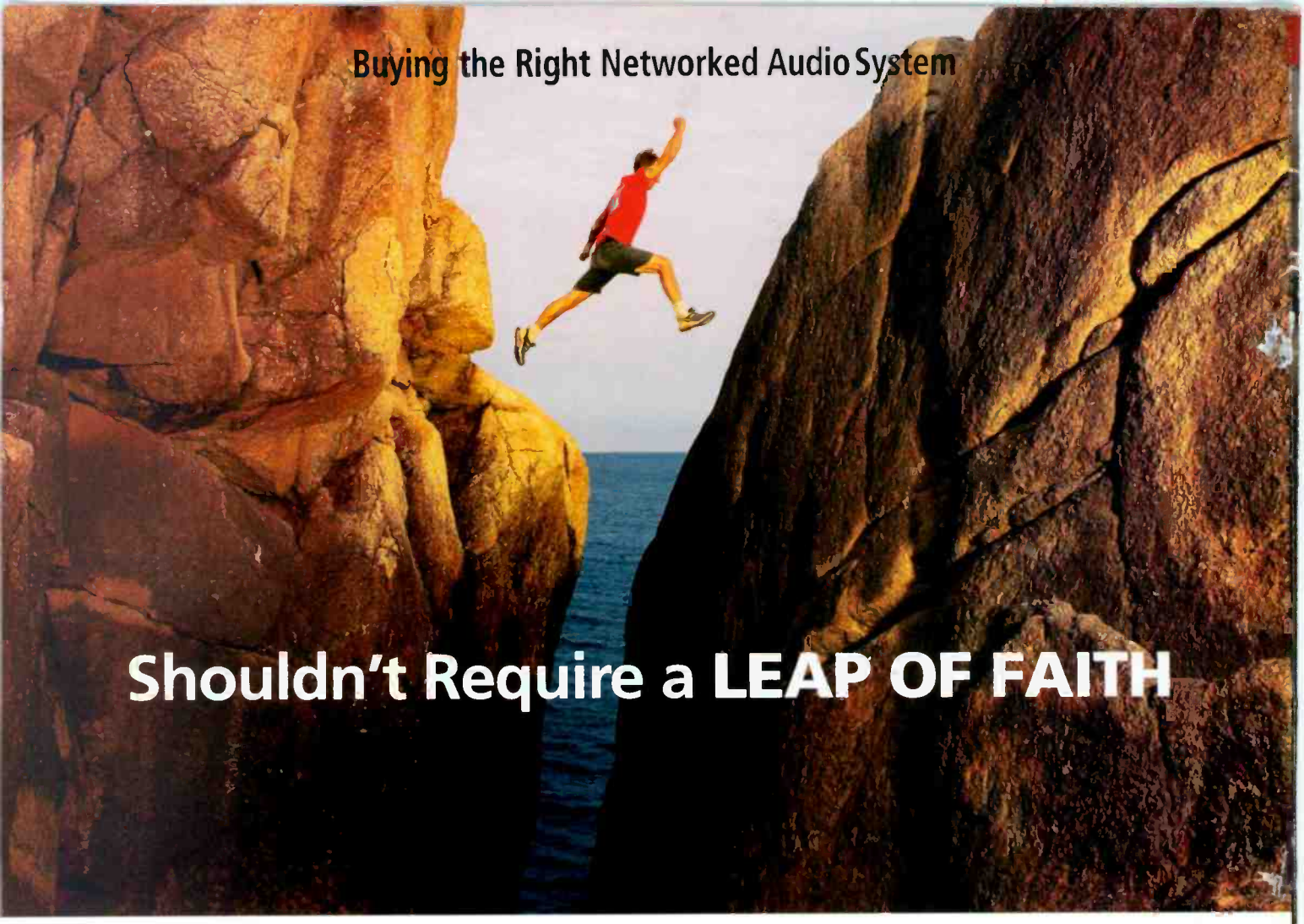
YOU GET THE POINT: today's market sound is dynamic; formats and personalities can change on a dime. Keeping up with what the competition's doing can be a fulltime job.

Our VORSIS™ AP3 processor incorporates multi-band compression, parametric EQ, high/low pass and notch filters, expansion, de-esser, AGC and a host of system and output settings that let it perform as a dual-channel mic processor OR a stereo signal processor—perfect for in-house rack use or that final HD radio signature sound shaper.

And you don't have to fly from city to city (or room to room) to stay on top—VORSIS™ ethernet protocol lets you control all settings right from your laptop—anywhere there's an internet connection.

VORSIS™— Get the POWER!

www.vorsis.com / tel 252-638-7000 / sales@vorsis.com



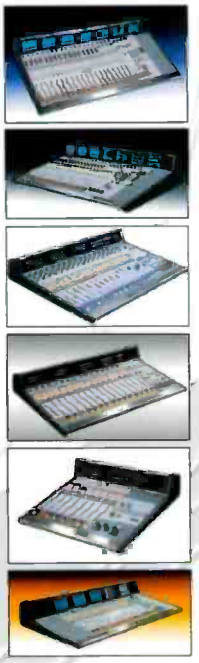
Shouldn't Require a LEAP OF FAITH

JUMP! We have the NET you can TRUST

YOUR ENTIRE COMPLEX depends on the reliability and longterm support of the digital network. WHEATSTONE has the hardware, the software, the GUI, the op manuals, and most important, the support TEAM. We'll get you up and running on time—without budget surprises.

OUR NETWORK SYSTEM: It's not just a product; it's an **entire line**—CONTROL SURFACES: we've got eleven to choose from; CARD CAGES: three different sizes to optimize your budget and still allow for future expansion.

DIGITAL AUDIO ISN'T EASY, and reliable networks are much more challenging. Trust the company with EXPERIENCE, RESOURCES and STAYING POWER: ***WHEATSTONE!***



- *Proven designs—hundreds installed!*
- *64 bi-directional signals on CAT-5 or optical*
- *Bi-directional machine control embedded with audio*
- *Routable mixes*
- *Extremely low latency (audio and logic) not system size dependent*
- *Scheduling software*
- *Automation control interface*
- *Desktop X-Y control plug-in*
- *Audio over Ethernet portal to automation*
- *Virtual soundcard software*
- *Embedded router control*
- *Realtime operating system*
- *Ethernet controllers*
- *Redundant DSP option*
- *Redundant WHEATNET™ option*

Wheatstone

*AUDIO is what we do **BEST!***

tel 252-638-7000 / sales@wheatstone.com