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**See Page 11.**

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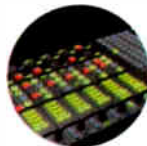
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## Features

### 76 Trends in Technology: Microphones

by Doug Irwin

Which mic is best for your needs?

### 92 Facility Showcase: WRN

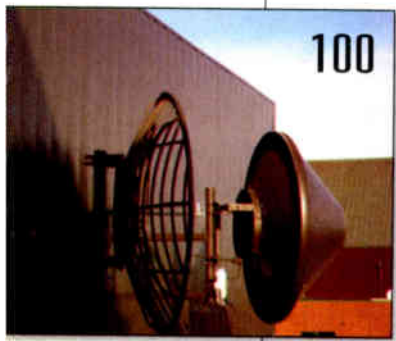
by Chriss Scherer

Satellite-driven radio

### 102 All About ISCSI

by Eric Newbauer

New protocols for storage



## Columns

### Viewpoint 08

by Chriss Scherer

Making IBOC simple

### Managing Technology 10

by Kevin McNamara

The wireless world is our future

### FCC Update 14

by Harry C. Martin

FCC eases up on tower laws

## Special

### 2006 Buyers Guide 15

A desktop reference to use all year

## Departments

### Online 06

at www.beradio.com

### Reader Feedback 75

### Field Report: Digigram VX882HR 98

by Kirk Chestnut

### Field Report: Broadcast Electronics

### Big Pipe 100

by Jess Meyer

### New Products 106

by Kari Taylor

### Classifieds 116

### Contributor Pro-File 117

Meet Jess Meyer

### Sign Off 118

by Kari Taylor

The early days of KPO-AM



### ON THE COVER:

Store-and-forward satellite technology is at the heart of WRN's programming service. WRN's Randy Johnson is at the mic. Photo by Chriss Scherer. Cover design by Michael J. Knust.

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## Currents Online

Selected headlines from the past month.

### Electronics Research Begins Major Facility Expansion

The new structures allow for the expansion of ERI's fabrication areas for FM antennas, FM filters and FM combiners.

### Podcasting to Hit Critical Mass in 2010

Bridge Ratings expects that weekly podcast usage will grow to as many as 75 million users in 2010.

### LBA Names Swiderski as Chief Technician

Swiderski joins LBA from Emmis' WIBC in Indianapolis. He previously held field and test engineering positions with Harris.

### BMW 6 Series to Offer HD Radio Receivers

BMW adds the Series 6 to its cars available with an HD Radio receiver as an option in 2006.

### Continental Signs Lowery for West Coast

Walt Lowery also represents Nautel and RF Specialties in Western states.



### Newest SBE Chapter: Ithaca, NY

Chapter 140 of Ithaca, NY, was approved by the SBE board of directors on Oct. 19. David Allen is the chapter chairman.

## Site Features

### Buyers Guide Online

The 2006 *Radio* magazine Buyers Guide is included in this issue. The same resource is available online as well.

### Today in Radio History

Important dates that have shaped radio are available online. These dates are also listed on the 2006 Radio Industry Calendar.

### Currents Online Weekly E-mail

The *Radio* magazine headlines are delivered by e-mail every Monday morning. Subscribe today.

### Applications and Solutions

Finding an article on the *Radio* magazine website is easy. You can always find articles sorted by their issue date, and you can search the archives as well. But you can also find articles by product category in the listing under Applications and Solutions.

### The Engineers Notebook

Everyone has a collection of handy tools, tips and tricks. We post some of them online in the Engineers Notebook. Recent updates include a math trick to add time and an updated set of online unit converters.

## Find the mic and win!

Each month, tell us where you think the mic icon is placed on that issue's cover and you could win a prize courtesy of Transaudio Group.



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## Keep it simple

As the IBOC rollout continues, individual features and enhancements of the system—not to mention the system itself—are the subject of ongoing debate. Last month I discussed the current state of HD Radio and noted that while it is not a standard, it has a great deal of work and effort behind its technology. In addition, it has a huge head start over the other systems that are being proposed. In short, unless something dramatic happens, HD Radio is the winning horse.

While the HD Radio transmission technology is comparatively mature, the receiver technology is not. We are still using the first generation of HD Radio receivers. Advances on the consumer side will progress as more stations implement their systems. This presents a chicken-and-egg scenario, however, because consumer demand for receivers is still quite low.

To increase the demand of HD Radio receivers we must be aware of the other media that are attracting consumer demand. Open any advertising flyer for a retail outlet that sells electronics and you'll see that satellite radio, feature-packed cell phones and portable media players are everywhere. Except for the Crutchfield catalog, I never see any advertising for anything with HD Radio capability.

While we wait for receivers that have HD Radio capability, personal electronics devices are bypassing terrestrial radio completely. Satellite radio now has walkman-style receivers. Cell phones have media players (and Web browsers and cameras). Portable games have media players and other functions. Digital cameras even have Wi-fi. Several years ago I noted that this media convergence would happen. Now it's here, but radio is missing the boat.

Consumers want music to take with them. While rolling your own and loading playlists of down-

loaded material is still popular, it's obvious that consumers also want the convenience of letting someone else pick the music. There are more podcasts available than ever, and several cell phone service providers have options to provide streaming music services.

Cell phone providers offer portable audio entertainment? Gee, that sounds like radio.

### Multicast identification

During November, I was invited to observe a series of focus groups that Cox Radio arranged to determine consumer preference in labeling multicast program streams. The analysis of these sessions is expected to be announced any day, but I believe that the results will show that the current generation of HD Radio receivers is doing it wrong.

The focus group panelists were given two methods of tuning multicast stations. Method A follows the current style of vertically stacking the streams on a frequency: 99.7 HD1, 99.7 HD2, etc. Method B places the stream horizontally by using an expanded-band appearance. All the HD1 streams are on the traditional 88.1 to 107.9 spots. The HD2 streams start at 108.1, that is 88.1 HD2 shows up as 108.1 on the Method B display. If a station on 99.7MHz has three multicast streams, they would appear on the display at 99.7, 119.7 and 139.7.

I admit that I thought that the vertical method was not that difficult, but after observing the second of the 12 groups, I realized that the horizontal method is much easier for a listener to understand, mainly because listeners tie a frequency to a program stream.

The horizontal method also allows stations to create completely different program offerings on the multicast streams without causing confusion to the root frequency (HD1) stream. I also believe that an expanded band offering will stir consumer demand for HD Radio and HD Radio multicast receivers.

I applaud Cox on its effort to better understand how consumers will accept HD Radio technology.

The rules governing consumer media are changing, and radio is losing the game. Let's change the rules so we can continue to compete—and win.



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Fax: 913-514-7201



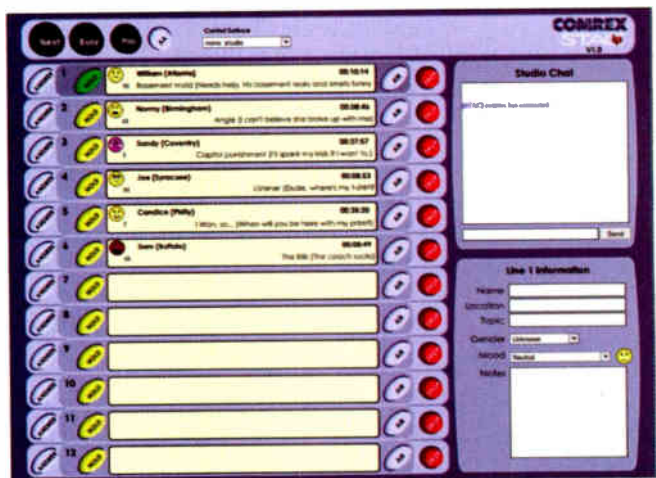


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## The next step for technology

By Kevin McNamara, CNE

Remember the phrase “paradigm shift?” It was used extensively in the 80s and 90s largely to point out an event, typically some new technology that caused people to do things in a different manner. Presumably, this event made your life simpler or more organized. We haven’t heard this term used in recent years, but I think we’re on the verge of another shift. I believe this is a direct result of five things:

- 1) The interoperability of digital devices across a wide variety of platforms.
- 2) Federal regulations providing new spectrum for existing and emerging technologies.
- 3) Increased competition in the marketplace.
- 4) Decreasing price-points for equipment.
- 5) Widespread and low-cost broadband Internet access availability to the general public.

Consider that technology over the last five years stayed pretty stagnant in terms of cool, new things. Yes there was high-speed wired Ethernet and wireless Ethernet equipment got better (and sold more), but during that time, technology companies were still working through standards issues as well as dealing with the need to reduce costs to roll-out their respective goodies and have a chance of reasonable sales. But take a look around now, everything seems to work together—cell phones, PCs, printers, PDAs, the TV, the MP3 player and the list goes on. There is also a trend toward the creation of the ultimate do-everything device. For example, there are mobile phones that also include personal organizers, MP3 record and playback, radio tuner, e-mail and Web browser that connect seamlessly to other devices using a wireless personal area

network (PAN).

There are a few technologies that are likely to cause a paradigm shift over the next five years.

### Mobile telephones

Perhaps the most obvious paradigm shift we are beginning to see is the transition of consumers disconnecting traditional wireline telephone service in favor of using the mobile phone as the primary telephone line. Beginning in November 2003, wireless carriers were required to enable telephone number portability, starting with systems operating in the top 100 MSAs, subsequently smaller markets were also required to enable this feature. This was a critical step in the ultimate growth of wireless usage. Here are some recent statistics from the CTIA to support this idea:

- 194.5 million subscribers
- More than 65 percent wireless penetration in the United States
- 6 percent of U.S. households use wireless phone as primary
- 675 billion minutes of use in the first six months of 2005 (up 31 percent from same period in 2004)
- 32.5 billion SMS messages in the first six months of 2005 (up 32 percent from last six months of 2004).

Another interesting statistic is that the revenue for wireless data use over mobile telephones in the first six months of 2005 was \$3.7 billion—up 85 percent over the same period in 2004.

Carriers have been aggressively moving forward with system upgrades that permit it to offer next generation technologies using its current allotment of frequencies. Over the next few years the FCC will be able to issue additional spectrum to existing wireless carriers and provide newly created allocations intended for emerging wireless applications.

The wireless carriers are in a unique position where they are not strictly limited to providing telephony services. In the larger plan they want to provide a wide range of data-based services beyond simple mobile data connectivity. Many of the major carriers have signed content deals with major providers and are currently offering that audio and video multimedia content to users. In the near future you may here the acronym “IMS” (IP Multimedia Subsystem), which simply put, allows handset devices to become another IP device (address) in the Internet world.

### Cable services and VoIP

Current cable technology permits operators to provide a large data pipeline across its franchised area and thus allowing it to provide a wide range of services to its customers including high-speed Internet access. While the technology itself may not qualify as causing a paradigm shift, it does



Consumer devices are more integrated than ever. This LG phone includes a Web browser, camera, media player and more.



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enable other technologies to flourish. According to the NCTA cable service passes 110.2 million homes throughout the United States. Of this number about 23.5 million homes are cable modem customers.

One such flourishing technology is Voice over IP (VoIP), a protocol that permits voice data to be carrier over an IP network. Currently, you might see this protocol offered to consumers as a means to communicate with users at specific destinations through the use of special software loaded on the PCs at each end, or through the use of special software and hardware that connects directly to a facilities-based provider that can route the call through the public switched network—basically you end-up with a dial tone on your regular telephone device. Cable operators are aggressively offering the latter as an add-on service to regular cable.

## Personal area networks

PANs were designed to allow devices to communicate with each other, typically only within a few meters of each other. In

more simple terms PANs can replace the wiring currently used to connect PCs to printers, external drives and other peripherals. We also are beginning to see the use of PANs in mobile phones and personal organizers permitting them to communicate with other enabled devices such as PCs and wireless headsets.

There are a few flavors of PANs offered, most intended for different applications. Bluetooth provides a means to connect and exchange data between two devices within about 10 meters (although specs exist that permit ranges up to 100 meters) and 1Mb/s. Bluetooth-enabled devices are beginning to show-up on a number of devices including becoming standard equipment on certain automobiles.

Zig Bee permits low-power communications between several devices (up to 256) with range up to 500 meters. Zig Bee appears to be the coming standard for wireless control and communications for alarm systems, appliances and other uses.

Ultra-wideband (UWB) technology provides an extremely wide bandwidth signal (500MHz+) that is range limited to about 10 meters. This is an ideal method to transport high-bandwidth information between professional and consumer devices such as digital multimedia streams between recorders, players and monitors. Imagine not having to run wires for a home entertainment system or studio for that matter.

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

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## Relaxed tribal notification standards

By Harry Martin

**T**he FCC has relaxed the notice and response procedures applicable to tower construction notifications to tribal or native organizations under the National Historic Preservation Act (NHPA) of 1966.

The NHPA requires federal agencies to consider the effects of federal and federally licensed projects on historic sites. The FCC's NHPA-compliance process includes consultation with the relevant State Historic Preservation Officer (SHPO) and Tribal Historic Preservation Officer (THPO) relative to proposed new tower construction to determine whether the proposed facility may create an adverse effect on an eligible or listed historic property. The goal is to identify and resolve, before new towers are authorized, any objections from the historic preservation community.

Achievement of that goal requires input from the local groups who are knowledgeable about historic sites. And that, in turn, means that the application process must provide for notice of the proposed construction to local historic and tribal organizations which, in turn, may wish to alert applicants and the Commission about potential problems.

Earlier this year the FCC adopted rules to implement a Nationwide Programmatic Agreement (NPA) that is intended to streamline compliance with the NHPA. The NPA is a negotiated settlement hammered out by representatives of the FCC and various historic preservation organizations. It sets up a review process that includes specific notice procedures that must be followed any time new tower construction, or tower alterations, are proposed. While that process was intended to be a streamlined one, it has turned out to be burdensome and time consuming in some instances.

While the NPA and the FCC's new rules do provide a mechanism by which the broad universe of potentially interested SHPOs and THPOs can be contacted more or less automatically, that system has not always worked efficiently. For example, while the system provides for automatic notifications to the SHPOs and THPOs, it affords no assurance that those entities respond within

any particular time frame. With no deadlines, many tower construction proposals have remained in limbo.

This was a matter of special concern with respect to Native American tribes. In some states, notice of a proposed tower is generally sent to a significant number of different tribes to ensure that there is no possible objection. But with many notices being sent, some notice recipients have failed to respond. To prevent non-responses from keeping tower projects on hold, the Commission recently announced a new policy for dealing with tribal and native Hawaiian organizations. The new policy imposes a deadline by which such groups must respond or risk losing the opportunity to do so.

### Only two tries needed

Under the new standard, a tower proponent must make two good faith efforts to obtain a response from a tribal or native Hawaiian organization. The first try is through the written notification process. If the proponent receives no response within 30 days, the applicant must make a good faith effort to contact the non-responsive organization by phone or e-mail. If no response is received to that second notification, the tower proponent may notify the FCC by e-mail sent to [TribalTowerExchange@fcc.gov](mailto:TribalTowerExchange@fcc.gov), at which point the Commission will send a letter or e-mail to the group's representative. The Commission also will follow-up with a telephone contact within 20 days of sending the mail/e-mail. If the organization still does not respond, the organization will be deemed to have no interest in the matter and the tower proponent will be deemed to have fulfilled its notification obligations.

*Martin is immediate-past president of the Federal Communications Bar Association and a member of Fletcher, Heald & Hildre, Arlington, VA. E-mail [martin@fhhlaw.com](mailto:martin@fhhlaw.com).*

### Dateline:

Feb. 1 is the deadline for New York and New Jersey radio stations, LPFMs and FM translators to file their 2006 license renewal applications. Radio stations in these states, but not LPFM or translator stations, must also file their biennial ownership reports and EEO program reports by Feb. 1.

Feb. 1 is the deadline for radio stations in Arkansas, Louisiana and Mississippi to file biennial ownership reports with the FCC.

Feb. 1 also is the deadline for radio stations in the following states to place their annual EEO public file reports in their public files and post them on their websites: Arkansas, Louisiana, Mississippi, Kansas, Nebraska, Oklahoma, New Jersey and New York.

## Alternatives to AM IBOC

The following is a response to a letter that was printed in Reader Feedback in the October issue. That letter commented on the lack of availability of HD Radio receivers and lack of public understanding of HD Radio.

### Dead system walking

I would like to respond to Bill Sutton, chief engineer-IT, with Clear Channel in Bryan-College Station, TX. Mr. Sutton, you don't have to worry about IBOC becoming the next AM stereo. It already is.

Let's see. A station has to rent IBOC for a lot of money. It splatters the spectrum messing up EAS. Nobody is going to buy the receivers. Nobody, except you and your friends. I had a chance to get one for free. I turned it down. Why? It wasn't heavy enough to be used as a boat anchor.

As I tell the good folks listening, do you want broadcasting to work as well as your cell phone? I know one person who would say yes, but then I find out that he still uses a bag phone like I do. Digital does not work well for transmission. When I see a digital system worth endorsing, I will do so; for free. I haven't seen it yet.

The folks listening aren't stupid. In fact they are starting to see that it may be time to decommission the FCC and move its services over to the Federal Trade Commission (FTC). When they see silliness like this going on, they know the FCC is not looking out after the public's welfare.

Scott Boehme  
The Society for Accurate  
Information and Distribution Foundation  
saidnews@mindspring.com

### Alternative approach to AM IBOC

I am a retired telecom guy and SBE member. I presented an idea to CBE Chapter 49 (Quincy, IL) for statistical multiplexing of AM audio and low-speed data so an HD Radio receiver could be directed to tune to an HD Radio FM multicast or broadband wireless. As far as I can tell, even AM C-QUAM stereo would be compatible with this idea. Anyone interested in the idea can run with it.

Larry Ray  
Springfield, IL

Note: You can read a synopsis of Larry's idea by accessing this article online at beradio.com. Click on Reader Feedback in the December 2005 issue.

### Doherty memories

Dear John,  
I enjoyed reading your recent discussion of the Doherty amplifier in the September 2005 issue. My father was a

field engineer for the old Western Electric broadcast division and spent many hours on the care and feeding of Doherty amps. When he was done with his setup, he would often loosen the set screws on the tuning shafts (with the chief engineer's knowledge, of course) to circumvent the "fiddling syndrome" on the part of the operators than you mentioned in your article.

W. Louis Brown, PE  
sales engineer  
FPDI

### Ask Radio magazine

I have noticed that when I rip music from a CD and trim the beginning and ending that I sometimes hear a pop when the audio file begins or ends. Do you have any ideas on why this happens, and more importantly, what I can do to eliminate it?

name withheld by request

The most likely cause is that the audio at the start or end is not completely silent (digital zero). Because this is a ripped file, hypersonic audio is not likely because of the low-pass filtering of the digital sampling. There is probably some low-frequency rumble present. You can't hear it, but you may be able to see it on a waveform display.

By applying a fade-in or fade-out level change to the ends of the file you can eliminate the pop of the noise when it starts. I apply a fade-in level change that starts at zero and curves to the 100 percent level in a gradual fashion at the beginning and end, but rapidly in the middle. The fade-out curve is the same with the opposite effect.

—Chris Scherer, editor

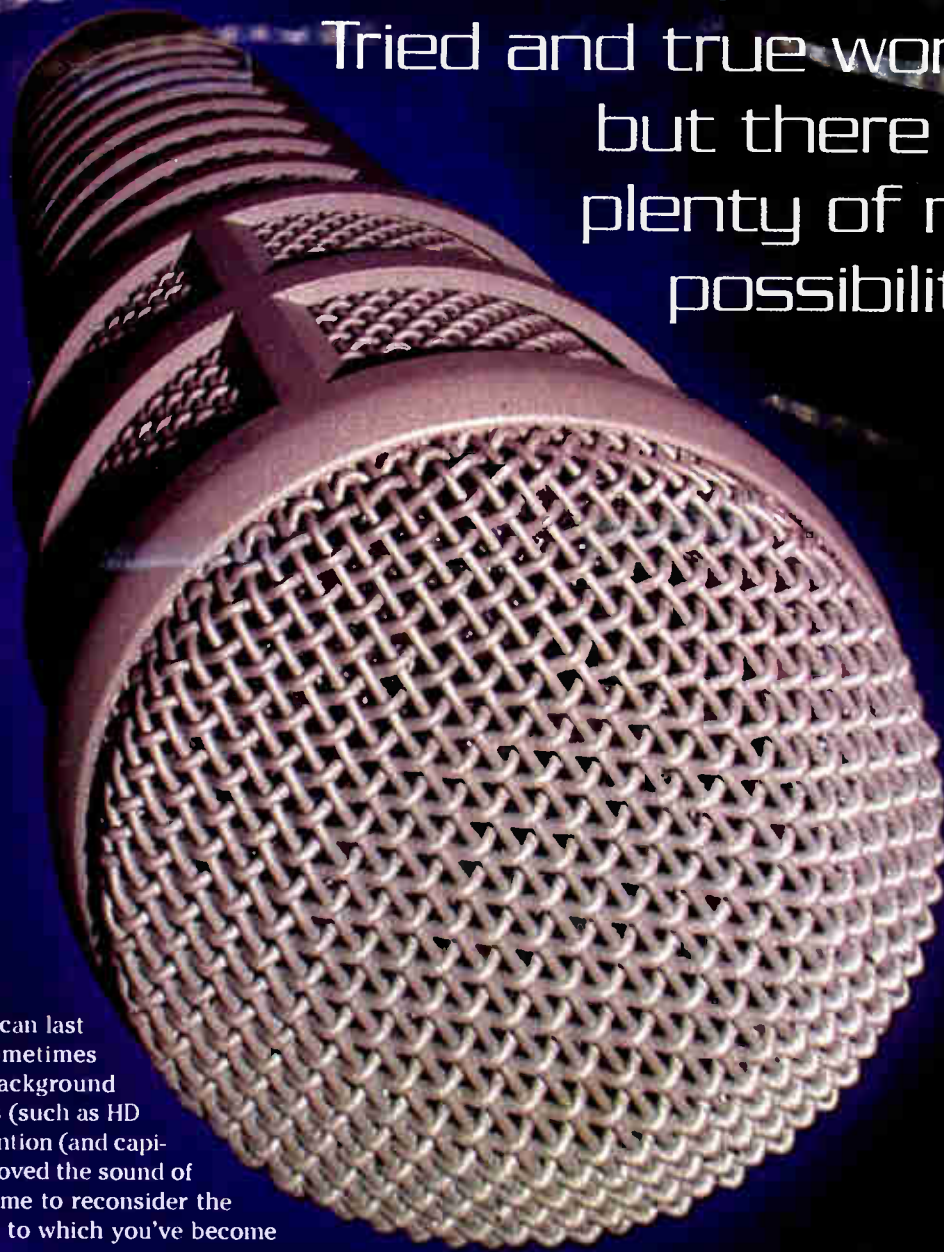
### comments?

radio@primediabusiness.com

# *Step Up* To the Mic

By Doug Irwin

Tried and true works,  
but there are  
plenty of new  
possibilities



**G**ood microphones can last for years and sometimes fade in to the background while more pressing needs (such as HD Radio) get most of the attention (and capital). But after you've improved the sound of the station perhaps it is time to reconsider the old microphone standards to which you've become so accustomed.

One way to stand out and above the competition, in my opinion, is with realistic microphone sound. Listeners are more familiar with the sound of the human voice than anything else, and with a little effort and the right mic an announcer can sound like he or she is right there in the car or at home with that listener.

There are several trends in microphones that I'll cover.



# “We were building brand-new studios. Why use the same old tech?”

“Our company bought a station in San Diego, and we had to move the studios. Since the station would be a part of our Southern California network, we needed equipment that could quickly re-route multiple audio signals – from satellite, T-1, ISDN and remote vehicles – to different destinations.



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“With Axia, setting up new routing configurations is easy; you just save new routes in software and recall them when you need them. SmartSurface makes controlling our many different audio sources and destinations very straightforward and uncomplicated; our air staff loves it!



“I knew how expensive routing equipment was. I also knew we’d regret buying a system with fewer capabilities just to save money.



“More than anything, we wanted to avoid limiting our operations with the use of conventional routers. Most of those systems force you to plan, during installation, for every signal routing configuration you might ever possibly need. If your needs change, you either have

“And expanding the network couldn’t be simpler. Just plug in more audio nodes and boom! you’ve got more inputs.



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



to re-wire or settle for operational compromises. Not very user-friendly! Making sure that the system was easy for non-technical air talent to understand and operate was critical, too.

“Here’s the kicker: Axia cost about half what we would have paid for a conventional router. We’re very pleased, and plan to expand the network to our second control room. My advice? Get Axia. You won’t be disappointed.”



“Axia addressed all these concerns.

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



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# Step Up To the Mic



One is the move toward high-end condensers and dynamics. Another is toward mics that have a retro look or feel to them. The third is the integration of a mic with new recording techniques and playback media.

## Condenser mics

Large-diaphragm condenser mics are well known for their ability to pick up fine high-frequency detail. With on-board amplification they typically have higher output levels and consequently will need less gain in an external part of the system (such as a console mic preamp or processor). The net effect is a lower noise floor, and hence finer detail.

One would think that this kind of mic would only really be useful in an application that allows for the transmission of quite a bit of high-frequency information, such as FM or HD Radio. However, my experience is that condenser mics make a substantial improvement on AM radio as well, where high-frequency content in the vocal range is extremely important for intelligibility and presence.

Shure offers the KSM44, a multiple-pattern, dual large-diaphragm microphone with a low noise floor. Some of the features that should be of interest to broadcasters are its low-frequency response, its high-

AKG C414 B XL II



Neumann  
KMS 105



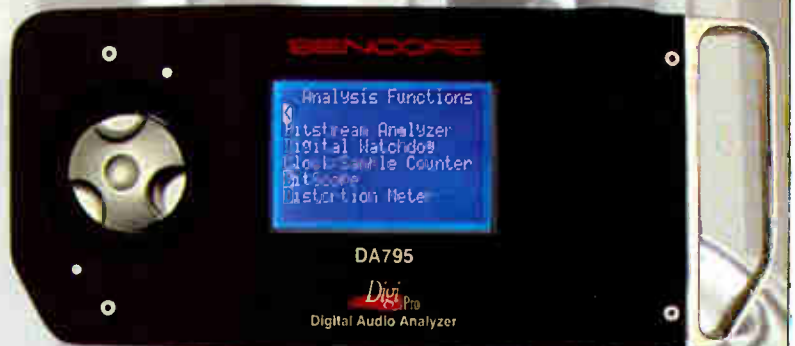
Shure  
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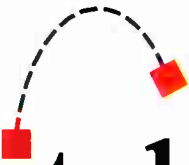
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World Radio History



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# Step Up To the Mic



output level, its ability to withstand high SPL levels (screaming jocks), and its inherent rejection of RFI and common mode noise. Perhaps most importantly, it includes an integrated three-stage pop filter (for p-popping jocks).

Audio-Technica offers the AT4060, which is a large dual-diaphragm condenser mic with a built-in tube amplifier. It features low noise, a high output level and a maximum input level of 150dB SPL (for 1 percent THD). The pop filter is external and offered as an accessory.

AKG offers a wide product line, but in particular are the C414 B XL II and XLS, which are the latest versions of the AKG classic. Like other condensers it has a low noise level in the output, and an ability to withstand a high SPL level; accordingly, it has a wide dynamic range. This new version features five switchable polar patterns and built-in LEDs that provide a quick visual indication of the polar pattern that is selected, and also an overload indication.

Neumann is well known for its famous and historical line of condenser mics, but I want to mention one that perhaps you haven't seen or heard yet: the KMS 105. This is a condenser mic without a large diaphragm, but with the special

features of a hand-held performance mic. If you have jocks that like to grab the mic and move it and the boom around while talking then this should be of interest to you. It has a tight polar pattern, thus minimizing pickup from the rear of the mic. It is optimized for the vocal range of frequencies and finally it has an integral four-layer pop filter built in.

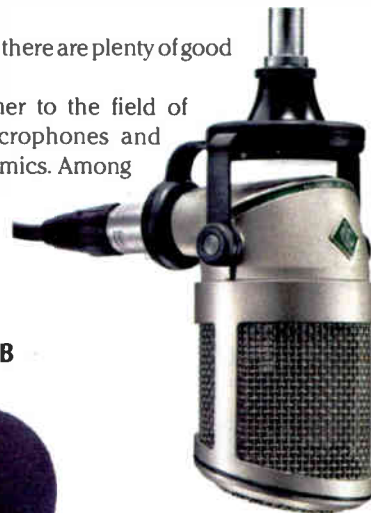
## Dynamic mics

While I like condenser mics there are plenty of good dynamic mics out there too.

Heil is a relative newcomer to the field of professional broadcast microphones and has several lines of dynamic mics. Among



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# Step Up To the Mic



them is the PR-30, a dynamic with a cardioid pattern. It has a wide frequency response—close to that of a condenser mic—and likewise can withstand a high SPL. It also has an integral pop-filter.

Shure is still manufacturing what is surely considered a classic by those of us that have been in this business for some time: the SM7B. It features a flat frequency response but also includes bass roll-off and presence boost controls. It has a cardioid pattern and also improved rejection of electromagnetic hum, specifically to reject noise signals from computer monitors. It has a built-in windscreen, but an additional external pop filter is available.

There are several manufacturers making dynamic mics with what I would have to call a retro look about them. First of these is the Heil Classic Pro studio mic. Let's just say it looks an awful lot like the old RCA 44-BX and includes a bracket that goes over the end (opposite the mounting bracket) for displaying the station call letters.

Neumann has introduced its first-ever dynamic mic: the BCM 705. This is a supercardioid specifically



Heil  
Classic Pro



Electro-Voice Blue  
Raven



Heil PR-30

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FIRST WE LISTEN

# Step Up To the Mic



designed for speech reproduction at close range. The headgrill can be removed for cleaning, and fortunately it comes with a built-in pop filter for the jocks that define close range. This particular mic has a wide frequency response (20Hz to 20kHz) for a dynamic. In practice it sounds much like the BCM 104 condenser (in the exact same package).

Electro-Voice also has a new line of trendy retro microphones, including the Blue Raven, a dynamic mic with a cardioid pattern, and an interesting double-swivel mount.

### Unique mic apps

First is the HHB Flashmic (DRM85), which is built around a Sennheiser omni-directional condenser capsule. In the body of this mic is a 48kHz/16-bit digital audio recording device. It records to an internal 1GB flash memory. Linear (WAV) files or MPEG 1 Layer 2 files can

## Resource Guide

Manufacturers of microphones

### AKG Acoustics

615-620-3800  
www.akgusa.com

### Audio Engineering Assoc.

626-798-9128  
www.wesdooley.com

### Audio-Technica

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www.audio-technica.com

### Audix

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### Behringer

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### Beyerdynamic

800-293-4463  
www.beyerdynamic.com

### Blue

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### Brauner Microphones

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# Step Up To the Mic

be recorded and then transferred up to 90x real-time via a USB cable to a Mac or PC. Two AA batteries can power the Flashmic for six hours. This looks interesting for news or sports gathering. And speaking of sports, AKG offers a line of professional level headsets derived from its K171 and K271 headset line. The HSC171 and HSC271 feature



AKG HSC271

## Resource Guide

Manufacturers of microphones

### Independent Audio

207-773-2424  
www.independentaudio.com

### Lawson

615-269-5542  
www.lawsonmicrophones.com

### Marshall Electronics

800-800-6608  
www.mxlmicro.com

### Mojave Audio

818-847-0222  
www.mojaveaudio.com

### Nady Systems

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www.nadywireless.com

### Neumann

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www.neumannusa.com

### Pearl Microphone Lab

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# Step Up To the Mic



condenser mic elements, a flexible mic arm that will swivel through 270 degrees for use by lefties or righties, and noise-free microswitches used for mic muting.

Microphone preferences are so subjective that you should try different mics for yourself. I have provided only a few ideas about types and manufacturers. It is a good idea to audition multiple mics at the same time, hopefully in the same studio environment, so that at least some of the external factors that affect the sound will be the same for the mics under test.

Mics with a different character—whether it's their sound or their look—can go a long way toward giving your station a unique feel with listeners and a unique look for jocks and other staff.

**HHB  
Flashmic**



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

## Resource Guide Manufacturers of microphones

### **Sennheiser Electronic**

860-434-9190  
www.sennheiserusa.com

### **Shure**

800-25-SHURE  
www.shure.com

### **Sony Electronics**

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

### **Sound Performance Lab**

805-241-5140  
www.spl-usa.com

### **Soundelux Microphones**

323-603-3228  
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# Unconventional means



# It's satellite-delivered programming delivered in an untraditional way.

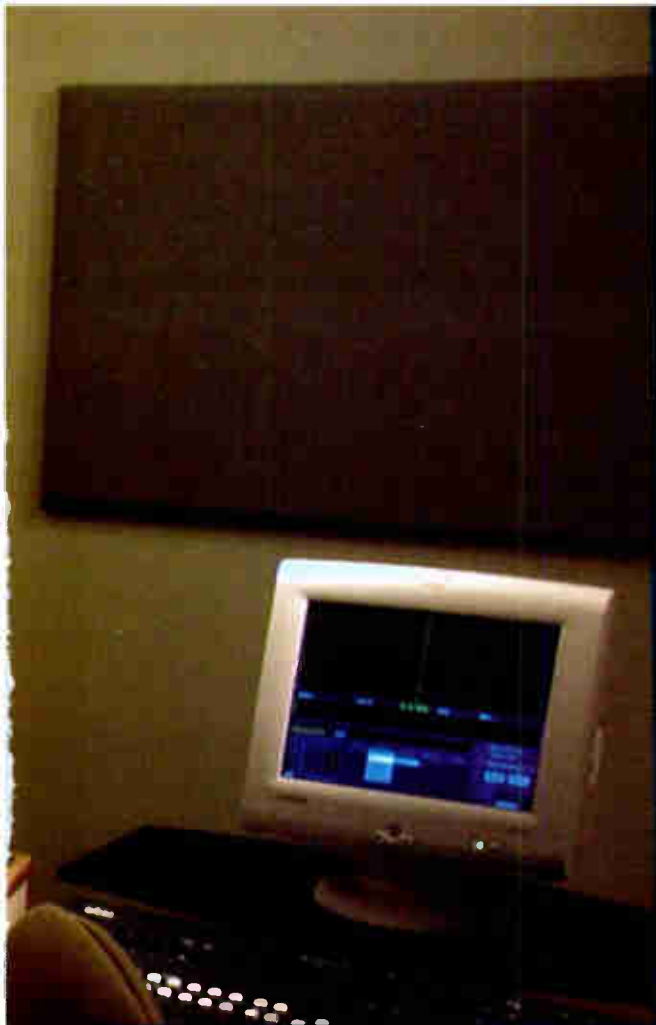
By Chriss Scherer, editor

Satellite-delivered programming services are not a new idea. There are many companies providing these services with formats covering a wide range of topics and musical styles. The idea is simple: provide a continuous stream of audio programming through a one-to-many distribution system in real time.

The typical satellite-delivered formats provide a continuous stream with a fixed clock. Stations can insert local content and spots within fixed points of the programming clock. The program provider also sends cues to trigger local audio elements to customize the generic feed to give it a local feel. While this method is the most common, another way to deliver a satellite-fed service with localized elements is to use a store-and-forward approach. This allows the local elements to be created in near real time without an additional burden to the station affiliate. This is the method that Waitt Radio Networks (WRN) uses.

Based in Omaha, NE, the WRN facility houses 13 on-air studios and three production studios. These facilities support seven formats that are delivered to the affiliates. Each on-air studio has a similar layout. While these studios are small, they are busy with activity all through the day as each format host provides customized breaks to as many as 40 stations.

The traditional satellite format delivers a continuous audio stream with signaling cues to trigger local events. WRN also provides signaling cues, but instead of the host delivering a generic break and triggering a local identifier, the host provides a custom break for each affiliate.



# Unconventional means

This allows the program to sound like it is live and local

even though the program host is sitting in Omaha.

The local affiliate can provide specific information to the host throughout the day through an online interface developed by WRN. Each break has the usual generic talk of what song was just heard and what song is coming next, but the host can add the station's name or moniker within the break, which preserves the natural flow of the break. The station



WRN maintains its own satellite uplink on the premises outside the studio building.

can provide weather, promos, community events and other items for the program host to include in as many as two breaks per hour. The system that WRN developed to do this is called EZ Localize. Stations can update information to the jock almost up to the minute. A station can also provide a pronunciation key to ensure that all the names and places are pronounced correctly. Each station's weather data is provided by Weather Underground.

Because of the customization being created for each affiliate, each program host can serve as many as 40 affiliates at a time. Each host works about 10 to 30 minutes ahead of the music schedule to keep things in sync.

At the receiving end, each station has a PC that is supplied by WRN that is connected to a satellite receiver. While each break is delivered as it is created, the satellite is not used to deliver the music. Instead, all the music is stored locally at the station on the WRN computer. WRN uses its own automation system, called Storq, to capture, store and play each element according to the program log. The idea of a format clock is still used, but it floats within a few minutes of the target time.

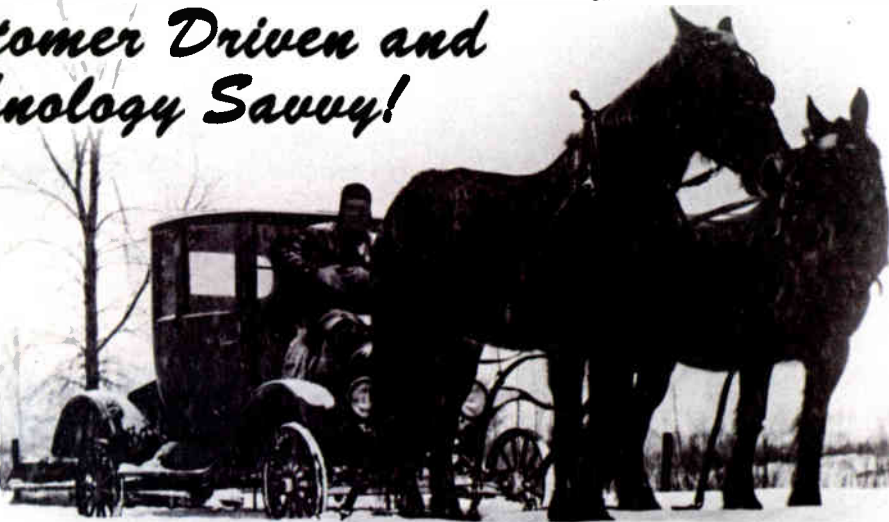
Once an element is created, the audio is sent to the stations. Each station's receiver captures the audio that is appropriate to that station. WRN transmits its signal via AMC-8.

WRN sets the limit for each program stream to be 40 stations, which is determined by the time constraint for each host to deliver the customized elements. Country is a popular format, and because of the demand, WRN provides two identical country formats from two different studios to accommodate the demand.

WRN supplies a PC to each station affiliate. These systems include



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a redundant 80GB hard drive with the operating system and all the music, plus the Storq automation system program. Each PC has dual NICs: one for the LAN, one for the satellite receiver. WRN specifies Intel, 3Com and Seagate hardware, and Audio Science audio cards in its systems. When a PC is delivered to an affiliate, it includes generic voice tracks and station imaging.

If a hard drive fails, the second redundant drive takes over. Each system is monitored by WRN for temperature and status. If a drive fails, WRN sends a new drive to the station. Once inserted, the system mirrors the remaining drive to the new drive to restore the redundancy.

All music is on the hard drive. The satellite only delivers local liners as needed during the hour. When additional music is added, it is downloaded overnight through the satellite. Each night, about 800 network commercials are sent as updates to affiliate systems.

Each affiliate can separate and rejoin the network as it wishes. Each hour is overscheduled with about 65 minutes of music, so near the end of an hour, the system reconciles to the end of the hour within a minute or two.

If the satellite system fails, the system defaults to an FTP backup mode. Instead of receiving audio elements via satellite, Storq will retrieve the elements via FTP. Because the delivery system works in store-and-forward instead of real time, WRN can perform basic satellite maintenance during the day

if necessary. The program hosts are asked to work a little further ahead in time to provide an additional time pad to the engineering staff.

Local spots can be stored as MP2 or WAV files, although, WRN recommends that stations use WAV files. As audio files are sent to the stations, a 40 percent forward error correction coding is used. This means

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Telos One  
Viewsonic monitors

# Unconventional means

that as much as 40 percent of the file can be corrupt and the Storq system can still resurrect the audio.

## Live and local elements

Many affiliates have a live morning show, so those stations use the Storq system in a live-assist mode.



Because the studios are mostly self-contained, the rack room houses a minimum of equipment.

That station's music is stored on Storq. In these cases, the WRN jock typically becomes the weather person for the local morning show. If the local morning show person is out sick, the WRN jock can fill in on the station. Some stations also use the WRN format in addition to another satellite-delivered format.

The technical operation is built along the walls around a central programming area. The air studios are small rooms, but because the announcer is providing voice-tracked elements, a large space is not necessary. The production studios are on one end of the open space. The technical operations center is on the other end.

Each studio and the tech center have their own UPSs, as does the satellite uplink. The satellite uplink has a triple redundancy as well. A main and a backup exciter are always available online at the dish, and a third exciter is kept on the shelf.

Because station audio is played locally, the satellite dish is not used continuously. If something needs to be done to the uplink antenna, the WRN engineers ask the announcers to get a little ahead on the schedule to buy them some extra time. Routinely, this can allow about eight minutes to make any changes to the uplink. If a longer outage time is needed, additional advance feeds can be created.

The satellite systems provides a 2Mb/s pipe. This path is divided into 10 channels. Nine are used for the various formats, and one is used for global information. The exact bandwidth is allocated as needed.

Audio is delivered to stations as MP2 files at 256kb/s. Server space is not a problem, but delivery via satellite is quicker with the reduced file size.

While keeping track of 40 stations during a shift sounds daunting,

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the announcers don't have to keep track of everything themselves. When a break is scheduled, the announcer's Storq system displays exactly what the announcer needs. The call letters and other station information are clearly displayed on screen, as is any additional text for the announcer to read.

Each studio is equipped with an Audioarts console (in most cases), an Electro-Voice RE-20 or RE-27ND mic and a Symetrix 528E, which are used all the time. The studios also have DAT machines and CD players, which are used infrequently, but are available when needed.

The production studios see regular use for the various formats. In addition, the studios are part of WRN's PDQ production services, which produced more than 22,000 spots for its clients in 2004.

When the studios were installed, it was expected that analog audio would be the primary signals distributed in the facility. It turns out that most of the signals being used are data, so the CAT-5 wiring forms the main backbone.

WRN provides satellite-delivered services to about 160 affiliates. These affiliates take advantage of the store-and-forward technology to deliver an economical program stream that does not sound like a canned feed.



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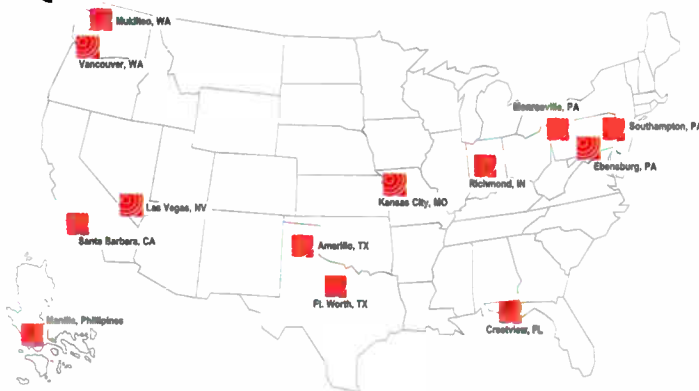
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## Digigram VX882HR

by Kirk Chestnut, CPBE

The Digigram VX882HR is a professional, eight-channel audio sound card. Equipment manufacturers and end-users alike will find it to be a powerful, versatile and easy-to-use interface for demanding multi-channel audio applications. It is a Windows-compatible device that is functional in recording studios and radio automation.

### Hardware installation

Digigram recommends at least a Pentium III or equivalent CPU running Windows 2000 or XP with 128MB of RAM. The computer must have Microsoft Direct X runtime version 9 installed.

The card is Universal PCI bus compatible, which means it can be plugged into a 32-bit/33MHz 5v PCI slot as well as a 64-bit/66MHz 3.3v keyed PCI slot. It is also compatible with PCI-X interfaces. Interface cables can be purchased separately, but a handy, 2RU break-out-box with XLR connections (aptly named BOB) is available.

At the heart of the design is the Motorola 56321 DSP chip. Like video, digital audio devices must be synchronized to the outside world for trouble-free operation. It can be synced internally with a crystal or externally with video, word clock, linear time code (LTC) or AES/EBU. The LTC interface also enables editing software to chase video in post-production settings.

Four stereo analog-to-digital converters (ADC) allow independent control on each channel. The maximum analog input level is +24dBu. Functions like input gain, mute and balance are controlled in software. The sample rate converter operates

from 8kHz to 96kHz on inputs and up to 192kHz on outputs, with data resolution from eight to 24 bits. Four AES receivers process the digital audio delivered to the separate digital inputs.

Four stereo digital-to-analog converters (DAC) manage the job of playback. Output gain is software controlled with a maximum output level of +24dBu. There are four digital transmitters for the digital AES/EBU outputs.

### Support software

Digigram works extensively with original equipment manufacturers (OEM) worldwide to marry hardware to second-party software applications. A comprehensive set of drivers comes with the card. The Software Development Kit (SDK) is a toolbox of application programming interfaces to minimize development time required to get a product to market.

The company website provides additional development resources and updates for developers. Finding driver and software downloads is easy. The VX882HR is relatively new, so the website's knowledge base is limited right now.

Basic drivers like Windows Direct Sound, Wave or ASIO are compatible with many off-the-shelf audio software



### Performance at a glance

- Eight analog and digital inputs/outputs
- Recording sample rates up to 192kHz
- 24-bit/192kHz converters
- Universal PCI interface
- Optional breakout box (BOB)

Digigram has created digital audio hardware and software since 1985. The HR series cards represent the company's latest development in digital audio processing. The company names its cards based on the audio configuration. The VX882HR manages eight simultaneous audio streams in and out, thus the 88 in the name. The last number indicates the audio format of the I/O. A zero is analog, one is digital and a two is both. The HR refers to its high resolution 24-bit/192kHz A/D and D/A converters.

packages. Users will recognize the all-familiar Windows Mixer, which becomes the intermediary between hardware and software. For those unfamiliar with the ASIO protocol, Digigram describes it as follows:

"Audio Streaming Input Output, developed by Steinberg in the late 90s as an alternative to poorly featured consumer protocols, is a cross-platform, multi-channel audio transfer protocol that has been adopted by many of the manufacturers of audio applications. It allows software to have access to the multi-channel capabilities of a wide range of powerful sound cards (which necessarily feature ASIO drivers). ASIO typical benefits are low-latency and timely synchronized overdubs, hardware monitoring management, 24-bit support and time-code synchronization."

A Play Rec test application helps to verify that the sound card is actually working by recording and playing back basic audio files. The Digigram Control Center has an extensive set of diagnostic tools including a sine wave generator.

### Foolproof installation

Everything to get started is located on the CD supplied with the card. In Windows XP it automatically opens a browser and shows a list of supported sound cards. Hardware interrupt and addresses are automatically set up at start-up by the PCI PNP BIOS.

For testing, I used an Audio Precision Portable One Dual Domain analyzer and a copy of Adobe Audition. I began my tests by setting the Audio Precision (AP) to +4dBu (about 1.227V). I began by setting a level of -18dB on the input meter. I had to lower the Windows Direct Sound mixer pot to nearly the bottom most setting. It was touchy.

A dedicated control panel is under development to be released in 2006.

Lowering my generator to -24dBu helped considerably with input control. The card

performed according to published specifications and interfaced seamlessly with the audio editor I chose.

Though the VX882HR is often sold to OEMs of audio processing software and equipment, it is available through Digigram resellers worldwide.

*Chestnut is assistant chief engineer at Entercom, Kansas City.*

## Digigram

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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.

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## Broadcast Electronics Big Pipe

By Jess Meyer

**W**hen Clear Channel Minneapolis finished a consolidation in the summer of 2003, it was apparent to us that we could also consolidate a part of our transmission system to save a sizeable amount of money in telco costs. While it was once reasonable to have four T1 circuits from three studio locations prior to the move, I felt that this situation was somewhat ridiculous given the current cost of wireless alternatives.

I began to look at systems offered by two broadcast companies, comparing value

the other system I had considered, and I wasn't required to hide the radio in the studio building's penthouse away from the climate-controlled technical operations center. I'm a big fan of keeping equipment where I can see and monitor it easily. With Big Pipe, cable loss isn't as important.

### Closer inspection

The radios are about 12" square and 4" deep with TNC connections for DS3 data and circular connectors for power and Ethernet control. An N connector is used for a solid RF connection to the antenna. The radio mounts to any standard-size leg or member with round-member adapters,

or as some like to call them: hose clamps. This provides a secure mount, and it makes it easy to get the radio right next to the antenna.

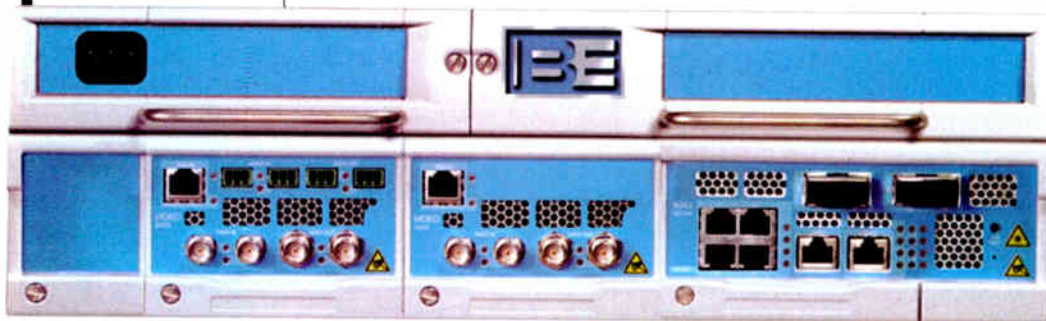
Radio installation was a breeze, with the exception of having to weatherproof power and data connectors that were placed in less than ideal locations for an easy tape and mastic application. A little extra time and

creativity was required to make the job look neat, but this was only a minor inconvenience. The N connector is on the opposite side of the radio; it was rather easy to connect and weatherproof.

When it came time for a path study and antenna selection, Jim Moody from Broadcast Electronics was a big help. Information was provided in a timely manner with professional courtesy. Moody specified 6' solid antennas with radomes for our 12.1 mile path length. With an antenna of that diameter at 5.8GHz, the beam width is 2°, and the gain is a 38dB. The narrow beam width makes for excellent interference rejection given the fact that the path takes us over a mostly urban area.

I was concerned with interference. I worried about the possibility of having all the equipment installed and none of it working. We erected the studio antenna prior to having the tower work done so that we could have the tower crew align the antenna at the time of installation. When everything was connected at the transmitter site, I plugged my laptop into the CAT-5 cable attached to the radio on the tower to watch the signal level come up as the antennas were peaked. I was elated when the signal came up to -45dBm, which I am told is an excellent signal for these radios.

To peak the antennas, a voltmeter is plugged into a BNC connector on the radio. The highest dc reading is the peak. We aligned both antennas at the same time, alternating



### Performance at a glance

Cost-effective alternative to multiple telco circuits

Robust operation in a large metro area

Easy installation

Affordable cost for high bandwidth

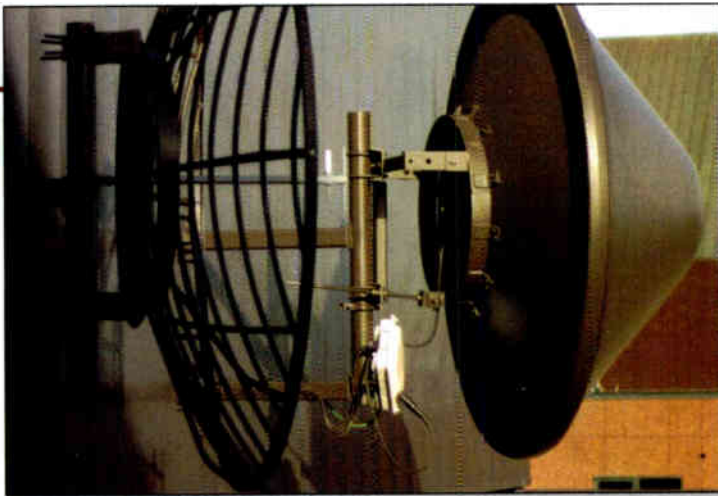
Ideal for combined facilities

and discussing reliability with other Clear Channel engineers who had systems currently in use. On the top of my criteria list was ease of installation. The tower didn't have room for waveguide, nor did I have the money for it.

With radios that are placed near the antenna, the Broadcast Electronics Big Pipe requires only four small cables between the radio and multiplexer shelf. There are two 75Ω coaxial cables that carry the DS3 information in and out of the radios, a 16-gauge twisted pair for radio power and a CAT5 cable for Ethernet connection to the radio for monitoring and control.

The cabling was inexpensive compared to





The transmitter is mounted outside next to the antenna.

between tower and studio alignments until the highest signal level was achieved.

I wanted to keep things similar to what we were using, so I elected to buy the 8xDS1 interface for a quick connection to our current Intraplex chassis. With this setup, I only needed to re-route data cables within our facilities. The studio site was simple, the Big Pipe indoor unit shares a rack with the DS1 multiplexers, and only a short CAT-5 jumper was required. The transmitter site required a little more effort, with cables run between three transmitter rooms and a separate building.

Once the system was operational, I decided to let it run by itself for a day or two before going full-time with our main program link. After the test period had satisfied me, I switched the stations onto the Big Pipe. I had one problem after the switch, but Richard Hinkle from Broadcast Electronics was there to help. It appeared the timing wasn't set quite right; both units were set to free running clocks. A simple configuration change to master-slave style timing was all that was required to get everything back to normal.

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I have since moved our Burk full-time remote control equipment onto the DS1 multiplexer equipment using 3kHz voice and data cards to save even more money. With a dial-up backup, the \$400-per-month cost of four non-equalized circuits is no longer required. I feel that our backups keep us from having all our eggs in one basket.

All in all, the system has been solid since the day it went in. With storms and heavy rain, the unit isn't fazed; it just keeps going. I keep 900MHz radios for backup—just in case—but the time we spend on them is much, much less than with the telco DS1 circuits I was used to. I think it's an excellent system for those looking to eliminate telco costs or consolidate multiple STL hops. 📻

*Meyer is chief engineer for Clear Channel in Minneapolis, MN.*

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# All about

By Eric Newbauer

**T**here has been much discussion and a good dose of confusion about the term iSCSI. This relatively new protocol for storage technology offers many compelling benefits, including solid performance and the ability to inexpensively create a storage area network (SAN) using standard Ethernet components. But what exactly is iSCSI? It may be helpful to first define what iSCSI is not. It is not network-attached storage (NAS). It does not require SCSI disks. It is not a file-sharing protocol like those used by Mac and Windows servers. It is not iFCP, which is a protocol used to connect Fibre Channel SAN islands across long distances, nor is it Fibre Channel over IP (FCIP).

If you are already familiar with Fibre Channel, iSCSI can be loosely generalized as Fibre Channel over Ethernet.

By definition, iSCSI (Internet SCSI or SCSI over IP) is a storage networking standard that enables the transport of block I/O data over an IP network. iSCSI replaces SCSI's direct-attached cabling architecture with a network fabric. Essentially, the protocol works by encapsulating SCSI commands into packets and transporting them via TCP/IP. In other words, the Ethernet network has the potential to become a SAN. And as a direct result of this ubiquitous, standardized Ethernet infrastructure come many interesting features and benefits that would otherwise be impossible.

Many would argue that simplicity is a key advantage of using iSCSI vs. Fibre Channel to deploy a SAN. The reason is that an iSCSI SAN doesn't require the specialized hardware knowledge that is perceived to be a prerequisite with Fibre Channel. There is already an inherent level of familiarity with the various Ethernet networking components. Therefore, a company lacking a dedicated staff of storage network technicians should feel more adept at maintaining and troubleshooting an iSCSI SAN.

Although iSCSI can be complementary to many other storage technologies, it is especially well suited for a large portion of the middle market. These users typically need considerably more throughput than NAS or client/server can provide, desire the benefits of a SAN, and have determined that Fibre Channel is somewhat excessive for their needs. An iSCSI SAN provides comparatively excellent throughput, delivers the

benefits of consolidated storage and requires fewer resources overall vs. Fibre Channel in terms of people or cost.

## Necessary bandwidth

The throughput levels achieved over a well-tuned Gigabit Ethernet iSCSI SAN are as much as two to three times greater than those of common file sharing protocols over a similar network. The client/server and NAS protocols used for basic file sharing rarely match the efficiency of a block-level protocol such as iSCSI or Fibre Channel. It is important to understand that those file level protocols are better for users or applications that need to access a particular file, whereas block level protocols are optimal for users or applications that constantly need the fastest access to data. In general, the protocol is a key reason pure wire speed is almost never achieved—the constraint is not the available bandwidth (1Gb/s in this case)—it is the overhead of the protocol being used. By using a more efficient protocol, one can more fully use the bandwidth of the pipe. Conversely, if the pipe is the bottleneck then a more efficient protocol won't help much.

Another benefit is that an iSCSI SAN is capable of natively spanning great distances. It is common for networked storage to be located a fair distance from its consumers. It could be located down the hall or locked away in a data center. iSCSI is certainly comfortable within the local network, but the task of securely extending storage—particularly SAN storage—can become complicated outside the immediate confines of a campus. iSCSI makes this much easier. A Virtual Private Network (VPN) can be used to securely extend an iSCSI SAN over a WAN, and iSCSI supports the Challenge/Handshake Authentication Protocol (CHAP). CHAP is an advanced authentication mechanism that can help ensure that a user or server has the valid credentials to connect to a particular resource on a SAN. VPN and CHAP can be used together or independently, depending on the desired level of security. A few applications for an iSCSI SWAN (Storage WAN) are:

- Remote mirroring
- Offsite archive/backup
- Disaster recovery
- Content delivery

ISCSI is compatible with existing software applications when it is presented to the operating system as though it is attached locally, rather than presenting it as a network share. When placing it at the block level, it is possible to use an operating system's native file system on those devices. Some applications simply will not run on storage that is presented as a network share.

### Hardware requirements

At the basic hardware level there are no special networking components required. See Figure 1. However, it is doubtful that much will be gained by using anything less than high-quality gigabit Ethernet (GbE) components.

Beginning from within the computer itself and working toward the physical storage, the first component to consider is the network interface. The integrated GbE NIC found in most computers is usually sufficient for SAN connectivity. If performance becomes problematic,

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# All about



the NIC is a prime component to consider upgrading. There is a heated debate as to whether a TOE-enabled NIC/HBA is a necessity. A TOE (TCP/IP offload engine) reduces the possibility of the host's CPU becoming an I/O bottleneck as it deals with the additional TCP flow. One side favors the concept of the TOE; the other believes the cost of a TOE should simply be applied toward a faster CPU.

Special cabling is not required other than that which is necessary for Gigabit Ethernet. High-quality CAT-5e is recommended. Although it is usually more expensive, plenum-rated cable should be used when safety regulations or compliance codes dictate.

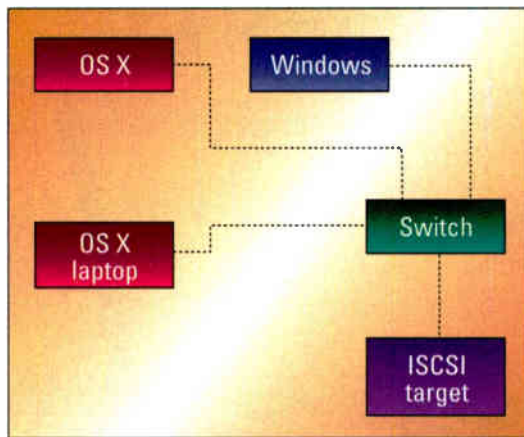


Figure 1. A typical ISCSI SAN.

A managed Layer 3 Ethernet switch is sufficient for the majority of ISCSI SANs. The configuration of the switch itself is of paramount importance. There can be thousands of settings in a good gigabit switch. As with most things, reading the manual and learning the ins and outs of the device can be the difference between unparalleled success and miserable failure.

The ISCSI target follows the Ethernet switch. However, before examining this device it is better to take several steps back and explain the relationship between the ISCSI target and the ISCSI initiator.

## ISCSI details

ISCSI works by encapsulating SCSI commands and transporting them via TCP/IP. On opposing ends of the network are the pillars of ISCSI: the initiator and the target. The initiator (which can be in the form of hardware or software) is installed on the host. The most basic responsibilities of the initiator are to establish a connection to an ISCSI target and start the transfer of information to and from it. See Figure 2.

Configuring the initiator so that it is capable of connecting to a given target is quite simple. (An example is shown in Figure 3.) Connection information can be made persistent so that the setup need only be done once per target. The ISCSI target's primary function is to respond to the requests started by the initiator. This task is accomplished by brokering the requests of the initiator to the physical storage. The ISCSI target most often takes the physical form of a storage appliance, although there are software-only products available as well. Regardless of the format, the ISCSI target acts as the bridge between the network and the disks—usually a RAID of Serial ATA drives.

A common question is whether a separate network should be implemented for the ISCSI traffic. The answer to this question requires close examination of the intended purpose and expected

## THE CHOICE IS CLEAR

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throughput of the iSCSI SAN. In small installations constrained by budget there often is no choice but to use the existing infrastructure. If this is the case, any IP-based system could possibly suffer due to the existing traffic on the network. Therefore, an iSCSI SAN will still perform better than the available alternatives because of the efficiency of the iSCSI protocol. To guarantee the highest performance and stability, implement a dedicated IP infrastructure for the iSCSI SAN. A compromise between these two approaches is to implement a VLAN (virtual LAN) to isolate the iSCSI traffic on an existing infrastructure.

Most stations probably already have an assortment of storage and networking technologies in place. When deployed correctly, iSCSI can complement these various storage/networking systems. iSCSI need not be viewed as an either/or solution. Nowhere is this truer than with Fibre Channel. Consider, for example, a Fibre Channel/iSCSI hybrid SAN. This opens the door to tiered storage networking, where it is possible to extend FC only to those that need the highest performance, while routing the Fibre Channel SAN over iSCSI to the remainder of users or servers. There are a number of bridging and routing devices available that are capable of extending iSCSI connectivity to various protocols.

The demand for iSCSI has been widely predicted to accelerate steadily over the next several years. It is hard to ignore the benefits of SAN, let alone one that is implemented on common network components.

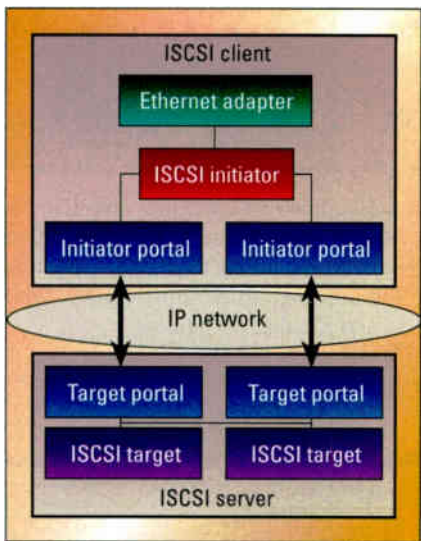


Figure 2. Typical iSCSI Architecture

The resounding truth is that iSCSI is firmly situated on top of the two most ubiquitous network standards: TCP/IP and Ethernet. Its value proposition becomes even more apparent with the realization that Ethernet economics can now be applied to an organization's SAN strategy.

Some have even predicted that iSCSI signals the demise of Fibre Channel. The more likely outcome (near-term at least) is that iSCSI will find its way alongside many Fibre Channel implementations. But perhaps nothing stands to solidify the position of iSCSI more than the mass adoption of 10Gb Ethernet. With five times the bandwidth of

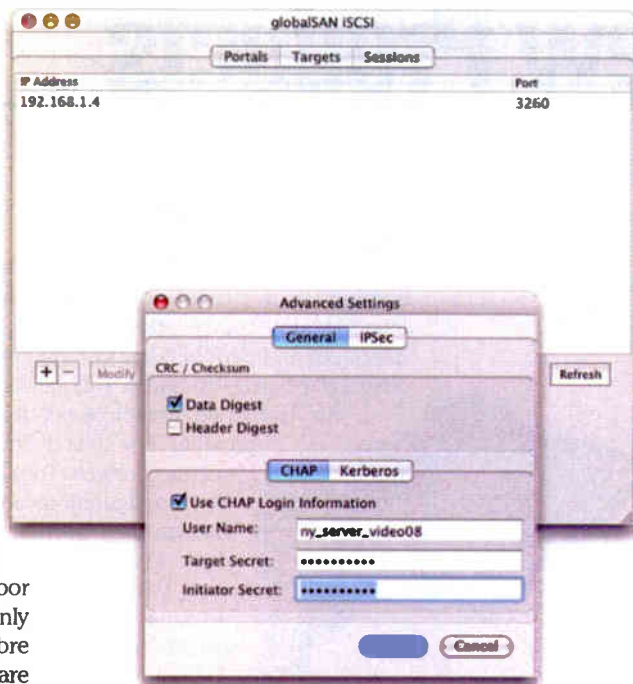


Figure 3. An iSCSI initiator setting up the first connection to an iSCSI target.

most Fibre Channel products sold today, 10Gb currently sits quietly in the background—an inevitable giant in waiting.

*Newbauer is the director of operations of Studio Network Solutions.*

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# New Products

By Kari Taylor, senior associate editor

www.beradio.com



## Console controller Digidesign

**Icon D-control:** These six configurations combine Icon system components, the Icon Surround Panner option, ProTools|HD interfaces and peripherals, a comprehensive set of plug-ins, and a Digidelivery file exchange system server that provides end-to-end control over projects. The six new configurations are: D-Controll16 Surround Music, D-Controll16 Surround Post, D-Controll32 Surround Music, D-Controll32 Surround Post, D-Controll48 Surround Music and D-Controll48 Surround Post. Each Icon console includes: surround panner option, ProTools|HD 3 Accel system HDpack 3 (v6) effects plug-in bundle and several plug-ins.

800-333-2137; fax 650-842-7999

www.digidesign.com; prodinfo@digidesign.com

## RDS, RBDS encoder Inovonics



**Model 713:** This unit connects to a station automation system with RS-232 serial interface or via LAN/Internet and sends dynamic messaging in block or safe scrolling modes. This encoder's connectivity permits full integration of RDS/RBDS transmissions with the station's other networked functions, including message streams for digital radio and Webcasting. Front-panel USB access further simplifies programming of all static RDS/RBDS information.

800-733-0552; fax 831-458-0554; www.inovon.com; info@inovon.com

## Wire marking equipment Automation Systems Interconnect-ASI

**EZ Mark:** The system allows the user to input the data into the software one time and then print wire markers or terminal block markers. The system can be used to print labels for 22mm industrial switches, 22mm pilot lights, name plates, cables and other industrial devices.

877-650-5160; fax 717-249-5542

www.asi-ez.com; info@asi-ez.com

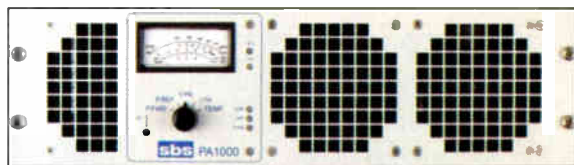
## Boundary mic AKG

**C 542BL:** This boundary-layer recording microphone is a small, round metal plate 3.2" in diameter and 0.2" high that weighs only 2 ounces. It uses a pressure transducer that is insensitive to vibrational noise and less susceptible to wind noise than a conventional microphone. The microphone also has a switchable bass cut filter (150Hz, 12dB per octave) located on its output connector to minimize any undesirable low-frequency noise. The microphone features a hemispherical pick-up pattern and can be powered by phantom power or with the AKG B 18 battery power supply.

615-620-3800; fax 615-620-3875

www.akgusa.com; akgusa@harman.com

## FM power amplifier Eddystone Broadcast



**PA1000:** Weighing 23kg, this 1kW FM power amplifier fits in a 3RU space. The unit incorporates a heat dissipating fresh-air-tunnel concept with dual fans and a cooling system in which the air flow has minimal contact with active components and requires no filtering.

+44 1789 768878; fax +44 1789 400630

www.eddystone-broadcast.com; sales@eddystone-broadcast.com

## Digital audio snake system

### Fiberplex Lightviper

**1808:** The system consists of two 1RU devices (VIM-1808 and VIM-0808) and a requisite fiber optic cable. The VIM-1808 accepts four AES3 digital inputs or eight line-level analog inputs. The outputs consist of four AES3 digital outputs and eight line-level analog outputs. The VIM-0808 is identical to the VIM-1808 except the latter has clock input and output, while the 0808 has only a clock output. The VIM-1808 is the clock master in the system and the 0808 is the slave. A dual fiber optic tactical grade cable connects the system's two components. The VIM-1808 digital snake will also facilitate RS422 serial data control along the same fiber optic cable with the addition of an optional dongle.

301-604-0100; fax 301-604-0773; www.fiberplex.com



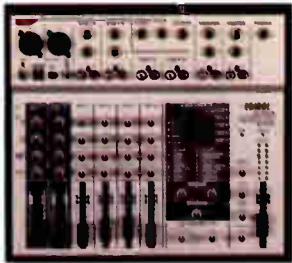
**Telephone call editor  
Digital Juke Box**



**Telephone Producer:** Record several callers and edit them to a telephone bit, as well as insert bleeps, swooshes, stingers, jingles and other sound effects with this call editor. Users can pre-load 18 elements to be edited in to a bit and have the ability to save 20 telephone bits. The system offers 22 digital editing commands. The system runs on Windows 98, ME, 2000 and XP.

740-282-SOFT; fax 443-241-2514  
www.digitaljukebox.com; Sales@DigitalJukeBox.com

**Portable mixer**



**Edirol**

**M-100FX:** A 10-channel audio mixer, this unit features a direct USB for connection to a computer, voice effects suited for voice-overs, and XLR, TRS and RCA inputs. The mixer also offers phantom power for use

with condenser microphones. The mixer features digital outputs on coax and optical connectors, and noise-free audio recording to the computer through the USB interface. A/D-D/A conversion is performed at 24-bits. The PC interface is 16-bit or 24-bit. It includes two XLR/TRS combo connections with phantom power, a 1/8" powered mic input; and four stereo channel faders and two mono faders.

360-594-4273; fax 360-594-4271; www.edirol.com; sales@edirol.com

**Portable digital recorder  
Korg**

**D4:** The system features four tracks of MPEG-1 Layer-2 format recording onto Compact Flash cards, plus eight virtual tracks per channel for 32 tracks total. Other features include turn/push editing knobs, a large backlit LCD, front panel XLR and 1/4" inputs that accept a microphone or guitar. The unit is equipped with 93 types of studio-quality modeling effects. A four-band EQ enables finite tuning plus chorus, phaser and flanger type modulation effects. One hundred factory programs are included, with room for 100 user programs. Additional onboard features include a built-in mic; tuner; metronome with 32 patterns for practice; three audio inputs; two audio outputs; a stereo mini headphone jack; and USB serial port for transferring songs to a PC or for MP3 encoding.

631-390-6500; www.korg.com; websales@korgusa.com

**Wireless mic transmitter  
Lectrosonics**

**Super Mini:** Delivering 107dB signal-to-noise ratio and flat frequency response to 20kHz, this transmitter's Digital Hybrid wireless technology uses 24-bit digital audio and analog FM signal transmission methods to encode a digital signal into an analog format for transmission over a UHF FM carrier. The unit's receiver captures the signal and DSP circuitry recreates the original digital audio. Operating on a AA battery, the device features 100mW of transmitting power, compatibility emulation modes and an LCD for frequency and audio level adjustment. The dimensions of the transmitter are 2 1/4" H x 1 7/8" W x 5/8" D and it weighs 2.8 oz.



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Congratulations to

### Jack Harney

of The Heartland Communications Group in Houghton, MI. His name was drawn from the correct entries for the October issue. He won a Pauly Superscreen pop filter from Transaudio Group.



The mic icon was along the Texas coast, left of the K in Katrina.

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### Audio switch and silence sensor Henry Engineering



**Autoswitch:** A multi-purpose stereo audio switcher and silence sensor, this device can be used to manually or automatically select between two stereo audio sources. It can be used for monitor and headphone audio switches from air to local when the mic is on. The unit senses loss of main audio source, and switches to a backup source until the main audio source returns to normal levels. It has gain-trims for easy level-matching, and uses electronic audio switching for smooth transitions.

626-355-3656; fax 626-355-0077; [www.henryeng.com](http://www.henryeng.com); [info@henryeng.com](mailto:info@henryeng.com)

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### Broadcast enclosure Middle Atlantic Products

**GRK series:** The series offers large openings to accommodate cable pass-throughs, abundant lacing points for versatile cable management, no raw edges at the bottom and top to prevent cable chafing and straight vertical top-to-bottom cable runs. It is available with horizontal lacer bars for tie and slide lacing, depending on integrator preference. The rack offers cupboard-style beveled doors, which provide space-savings. The universally hinged doors can be installed with a left or right swing, on the front or back of the enclosure.



973-839-1011; fax 973-839-1976

[www.middleatlantic.com](http://www.middleatlantic.com); [sales@middleatlantic.com](mailto:sales@middleatlantic.com)

### FM exciter Armstrong Transmitter

**FMX-150B:** This 150W frequency-agile exciter offers low distortion and intermod values combined with a high signal-to-noise ratio. Microprocessor-controlled and packaged in a compact chassis, the unit tunes easily and it is useful as a main or backup exciter. Its front LCD screen features all system parameters on a scrolling menu including modulation, power output, frequency and power supply parameters. Other features include automatic power output control, three SCA inputs and an optional internal stereo generator.

315-673-1269; fax 315-673-9972

[www.armstrongtx.com](http://www.armstrongtx.com); [sales@armstrongtx.com](mailto:sales@armstrongtx.com)

### Audio-video balun

#### Muxlab Quad Audio Balun:

The Quad Audio Balun allows as many as four analog line audio channels to be transmitted via twisted pair, thus allowing four coax audio cables to be replaced by one CAT5 cable. The system supports line level analog audio up to 5,000' via CAT5 cable and works in pairs or in conjunction with Muxlab's other analog audio baluns.



877-689 5228; fax 514-905-0589

[www.muxlab.com](http://www.muxlab.com); [videoease@muxlab.com](mailto:videoease@muxlab.com)



## Digital audio disk recorder Otari

**DR-100:** The DR-100 features 48-track recording at 24-bit, 44.1/48kHz sampling, and 24-track recording at 24-bit, 88.2/96kHz, direct to a 15,000 rpm 72GB SCSI hard drive, enabling seamless/gapless punch in/out throughout all 48 tracks. There are 208 virtual tracks that can be used for each project, with five editing layers totaling 256 tracks including 48 nominal tracks. This product features MADi digital audio interfacing and a dedicated 48-track direct access remote control. The unit offers 256 tracks with five editing layers for each project.

800-877-0577; fax 615-255-9070  
www.otari.com; sales@otari.com

## Converter/processor Prism Sound

**ADA-8 XR:** Providing eight channels of 24-bit/192kHz A/D-D/A conversion, this converter offers flexible digital interfacing options: AES3-two-speed or two-wire, and also handles S/PDIF. Firewire is provided for direct connection to DAW software on a PC or a Mac. Other features of this product include direct connection of 32 inputs and outputs per card to Pro Tools|HD; built-in signal-to-noise shapers for 16-bit and 20-bit reductions; built-in MR-X word-mapping for lossless recording up to 24-bit/96kHz on standard DA-88 or ADAT MDMs or other 16 or 20-bit media; and stereo monitor, with headphones and analog and digital line outputs, can monitor any input or output pair, or a panned stereo mix of all eight channels.

973-983-9577; fax 973-983-9588  
www.prismsound.com; sales@prismsound.com

## Audio monitor DK Technologies

**MSD660R:** The remote controllable multichannel/multiformat audio monitor incorporates a base unit and a remote panel with a VGA display and control buttons that is housed in the control room. The unit features point-to-point connection via CAT-5 computer network cable/connectors; logging software for overs and mutes; surround sound compatibility at 4.0, 5.1, 6.1 and 7.1 and facilities to monitor 32 channels of audio. This model also handles the Leq software package helpful in post-production environments where the speaker volume can also be controlled via the internal encoder.

+45 4485 0255; fax +45 4485 0250

## USB audio interface XP Sound

**XP202:** A USB audio interface for Mac or Windows PCs, this unit offers cross platform compatibility and several connection possibilities. The USB audio interface features two onboard mic preamps with phantom

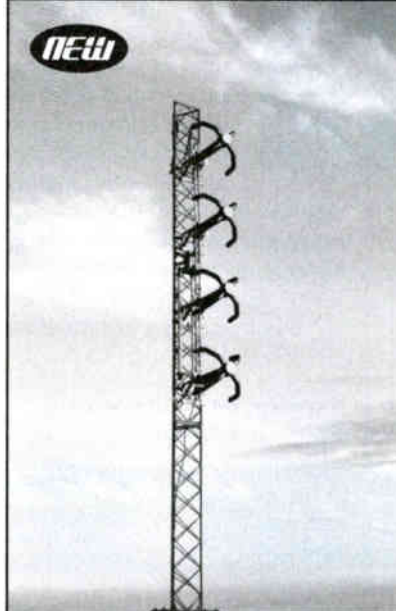


power with stereo line input, stereo phono preamp, stereo headphone amplifier and mix/balance control. The built-in RIAA equalizer provides processing of the incoming pick-up signals from the turntable and provides users an unmatched listening experience. A ground connector is provided on the front panel for connection to a turntable.

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## Antenna impedance analyzer Timewave

**TZ-900:** The transreflective TFTLCD color display prevents lost data from a washed-out display. The unit's rapid sweep updates the data graph every two seconds. Set the start, stop or center frequencies to see the data various ways. Tap a button for a different parameter. Push another button to store a graph to print later or to display as a reference while optimizing the antenna system.

651-489-5080; fax 651-489-5066

www.timewave.com; sales@timewave.com



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a BNC connector to attach a rack-illuminating gooseneck lamp. Power Factor Correction technology lowers the ac line impedance supplied by wall outlets and reserves a current surplus for peak demands. It provides a minimum of 3A of continuous current reserve and maintains a surplus of over 45A. Extreme Voltage Shutdown circuitry protects against accidental connections to 208 or 240Vac by shutting off the incoming power until the overvoltage condition is corrected.

707-763-1010; fax 707-763-1310

www.furmansound.com; info@furmansound.com

## Tube condenser mic Mojave Audio

**MA-200:** Using hand-selected three-micron capsules, Jensen audio transformers and military-grade JAN 5840 vacuum tubes, the mic is designed like classic microphones. The mic features a 1" diameter gold sputtered capsule. It also features a cardioid polar pattern and a balanced transformer output. The microphone ships with a carrying case, power supply, shock mount and cables.

818-847-0222; fax 818-847-0223; www.mojaveaudio.com



## Ethernet-based iSCSI storage system Studio Network Solutions

**Globalsan X-24:** The Globalsan X-24 package includes six terabytes of SATA storage and six iSANmp user licenses that can be upgraded to support additional users and storage. This storage system is useful for facilities that require a significant upgrade in networking performance, but do not need a Fibre Channel SAN or point-to-point WAN connectivity.

877 537 2094; fax 314 423 4867; www.studionetworksolutions.com

## Production computers Spectral Computers

**RM5000, RM7000:** These computers feature Serial ATA drives that operate at speeds up to 10,000 rpm. The RM-7000 system includes a removable drive for backup purposes, in addition to storing samples, loops and VST instrument libraries. The RM-5000 is based around 3RU with low-noise cooling and automatic temperature control system. Featuring an Intel motherboard with 865 chipset and 3.0GHz Pentium 4 800 FSB Hyper Threading 1MB L2 cache, the unit comes with 1GB of 400MHz dual-channel RAM and a 160GB SATA 7,200 RPM system drive with 8MB cache, and a 160GB SATA 7,200 RPM, 8MB cache audio storage drive. The unit features 3 IEEE1394 (Firewire) ports and six USB 2.0 ports, a built-in DVD-R/W 8x drive, onboard Intel video card and 10/100 LAN port, plus keyboard and optical mouse.

818-981-3101; fax 818-981-3102; www.spectralcomputers.com

**Power Factor Pro R:** This 1RU version of its Power Factor Pro floor/stage power conditioner; this unit includes more than double the number of outlets and

## CAT-5 UTP cables Belden

**Brilliance Catsnake:** These tactical field-deployable CAT-5e audio cables are designed for use in patching Ethernet or other CAT-5e digital audio formats. The UTP cables are AES/EBU-compliant. Belden offers a heavy jacket wall version (1304A) or an upjacketed version for harsh applications (1305A). Both versions feature bonded-pair 24 AWG stranded bare copper conductors and polyolefin insulation. To increase their flexibility the cables offer stranded (7x32) conductors and matte-finished Belflex jackets.



800-BELDEN1; fax 765-983-5294  
www.belden.com; info@belden.com

## Sound diffuser panels Auralex Acoustics

**PartScience:** The product line includes modular surface treatments for absorption, low frequency sound control, and diffusion in recording studios, performance venues, listening rooms, auditoriums, home theaters and worship spaces. The line includes Audio Tile, Space Coupler and Space Array. Audio Tile delivers broadband absorption, while the resulting design patterns allow a means of blending absorption, diffusion and reflection for an acoustical balance. The Space Array diffusor is based on a quasi-random series that provides performance without visual patterning. Space Coupler generates a low level reverberant tail to create a full sound, even in small footprint spaces.

317-842-2600; fax 317-842-2760  
www.auralex.com; auralexinfo@auralex.com

## Upgrades and Updates

Logitek Electronic Systems has updated its audio meter line with the availability of 96kHz sample rate support in all Logitek Super-VU and Ultra-VU models, including units packaged for surround monitoring. (www.logitekaudio.com)...The OMT digital logger, Imediatouch, is now available in a demo trial version on the company's website. The software can manage 12 recordings on one workstation and provides Internet access to all recordings via its own built-in Web browser. (www.imediatouch.com)...**Digigram** has revealed the specifications of Gigabit-Ethersound that will include 512 audio channels over a cable (256 channels in each direction) as well as a bandwidth of 100Mbit/s for control and IP data transport. It maintains all current Ethersound features. (www.digigram.com)...**Digidesign** is shipping Pro Tools 7 software for Pro Tools|HD and Pro Tools LE systems. Recent purchasers of these systems can upgrade to the new software for free. (www.digidesign.com).

## Audio splitter Lawo

**MPV-43P:** The alphonon MPV-43P is a IRU device offering four channels with one input split into three outputs. The inputs and outputs as XLR-connectors are provided on the front panel. This version offers individually switchable 48V phantom power for each of the four channels, thus avoiding external phantom power via additional direct outs. The alphonon multi-



channel audio splitters distribute optimally microphone- and line levels of up to +6dBu, featuring low distortion and low inertial loss. All alphonon splitters feature an optional direct-out in addition to the isolated outputs to handle phantom power. At the core of the alphonon multichannel audio splitters are distribution transformers featuring low inertial loss, flat frequency response, nominal level of +6dBu, mic/line levels and isolation voltage primary/secondary of 3KV.

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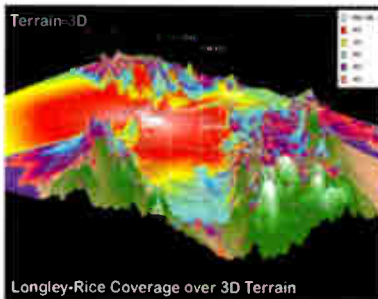
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10 KW	1988	BE FM10A
10 KW	2001	Henry 10,000D-95
12 KW	1996	CCA 12,000G
20 KW	1978	Collins 831G2
20 KW	1985	Harris FM20K
20 KW	1991	Harris HT 20
25 KW	1980	CSI-T-25-FA (Amp Only)
25 KW	1982	Harris FM25K
30 KW	1986	BE FM30A
35 KW	1990	Continental 816R-5B
50 KW	1982	Harris Combiner w/auto exciter-transmitter switcher

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1 KW	1999	Omnitronix 1000A solid state
1 KW	1983	Harris MW1A Solid State
5 KW	1985	Continental 315R1
5 KW	1982	Harris MW5A
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12 KW	2000	Nautel XL12 Solid State
50 KW	1985	Continental 317 C2
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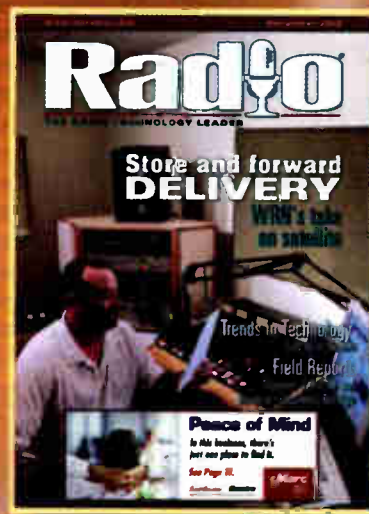
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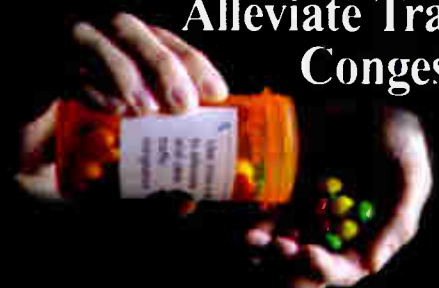


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(1)	Paid/Requested Outside-County Mail Subscriptions Stated on Form 3541* (Include advertiser's proof and exchange copies)	11,770	11,767
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(4)	Other Classes Mailed Through the USPS	0	0
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d	Free Distribution by Mail (Samples, Complimentary and other free)		
(1)	Outside County as Stated on Form 3541	579	620
(2)	In-County as Stated on Form 3541	0	0
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f	Total Free Distribution (Sum of 15d and 15e)	954	2,120
g	Total Distribution (Sum of 15c and 15f)	13,038	14,199
h	Copies not Distributed	590	353
i	Total (Sum of 15g and 15h)	13,628	14,552
j	Percent Paid and/or Requested Circulation	92.68%	88.01%
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Meet the professionals who write  
for Radio magazine.  
This month: Field Report, page 100.



**Jess Meyer**  
Chief Engineer  
Clear Channel  
Minneapolis, MN

Meyer began his career when he earned his amateur radio license at the age of 15. Shortly thereafter he started working with a contractor, Radiotek Broadcast Services. He moved to Denver in 1999 to work for Chancellor Media and has been in Minneapolis since 2000 with AM/FM, which later became Clear Channel. Meyer holds an Electronic Servicing degree from Western Wisconsin Technical College.

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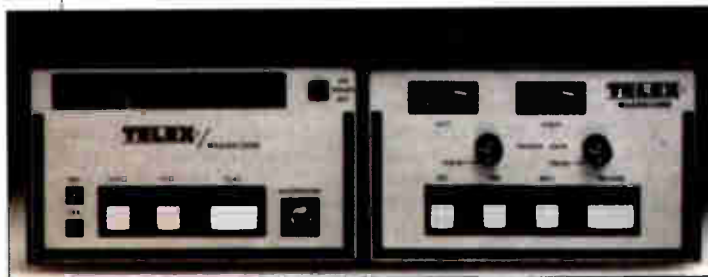
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By Kari Taylor, senior associate editor



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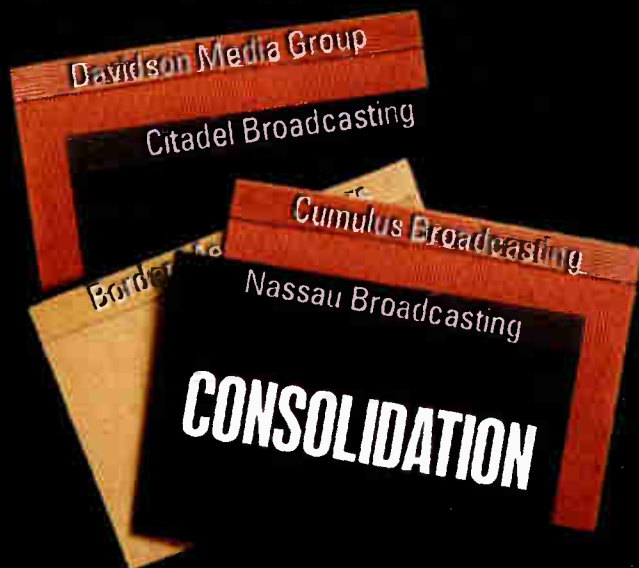
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## Sample and Hold Show me the money

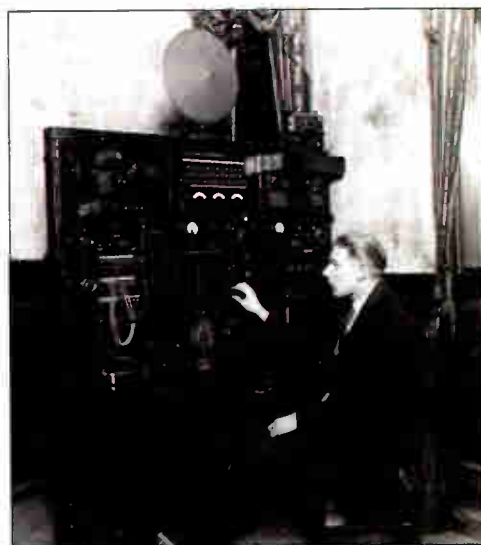
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Company	# of stations	# of deals	Average # of stations per deal	Total \$ spent (millions)
Nassau Broadcasting	26	8	3.3	70.349
Cumulus Broadcasting	21	9	2.3	92.226
Border Media Partners	20	10	2.0	126.441
Citadel Broadcasting	19	8	2.4	151.050
Davidson Media Group	18	9	2.0	41.806

Source: BIA Financial Network, Radio Station Transactions 2005: When is it Going to Get Better? 2005.

## That was then



This is San Francisco's KPO-AM speech amplifier equipment circa 1925. The equipment includes the amplifier and controls for connecting the station to outside points for remote broadcasting.

KPO was located in Hale Brothers Department Store. It shared the broadcast frequency of 360 meters with other San Francisco stations and was only on the air one hour a day during its first year.

Source: www.adams.net/~jfs

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**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!**