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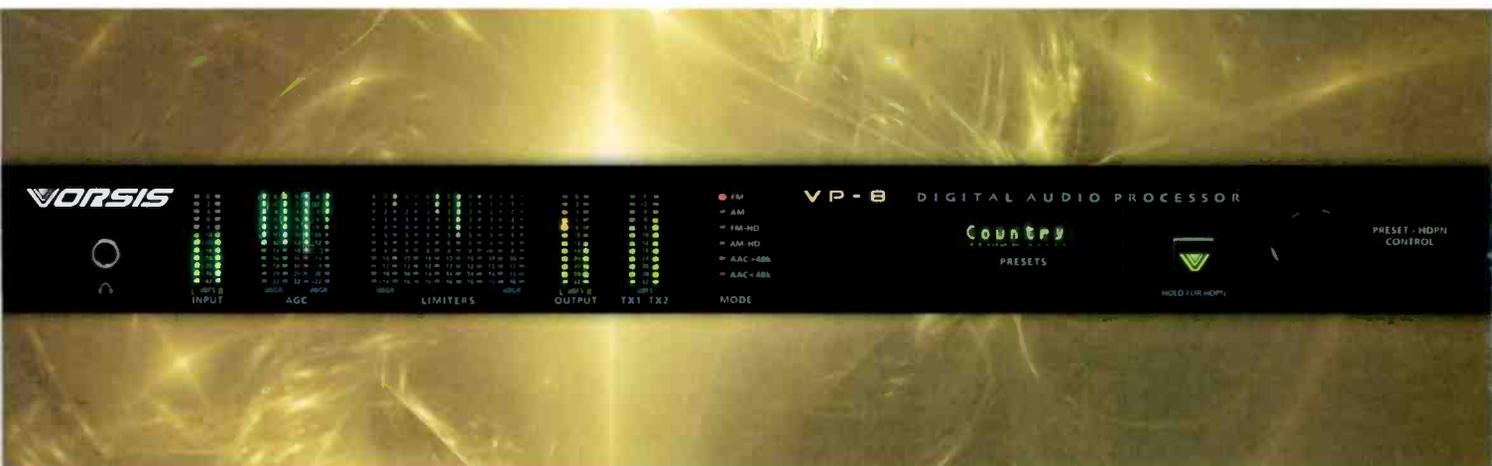


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CONTENTS



42



48



56

ON THE COVER

The 2010 NAB Show is coming fast. What is your studio missing? Whatever it is, the NAB Show has it. Check out our powerful preview including new products coming to the show on page 16.

Cover design by Michael J. Knust.



Features

- 14** Tech Tips
by **Chriss Scherer**
Tips, tricks, hints and more
- 16** 2010 NAB Show Preview
New products, sessions guide and floor map
- 42** Trends in Tech: N/ACIP
by **Doug Irwin**
Can your codec play nice with others?
- 48** Facility Showcase: KUNV Las Vegas
by **David E. Reese**
The UNLV station moves back on campus
- 56** On Location: Broadcasting Yo-Yo Ma
by **Candace Horgan**
The Colorado Symphony Orchestra teams up with CPR

Columns

- 8** Viewpoint
by **Chriss Scherer**
What's showing at the 2010 NAB Show?
- 10** RF Engineering
by **Kevin McNamara**
Third-adjacent protection review
- 12** FCC Update
by **Harry C. Martin**
Annual national EAS test proposed

Departments

- 6** Online
at www.RadioMagOnline.com
- 68** Classifieds
- 69** Contributor Pro-File
Meet David Reese
- 70** Sign Off
by **Erin Shipps**
The FCC measures cell phone activity.

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Currents Online

Selected headlines from the past month.

2010 NAB Engineering Achievement Award Winners: Steve Church and Mark Richer

The awards, first established in 1959, are given to individuals for their significant contributions that have advanced the state of the art of broadcast engineering.

FCC Survey: 93 Million Americans Disconnected from Broadband Opportunities

The survey cites cost and digital literacy are the main barriers to broadband adoption.

Inovonics Hires Lukas Hurwitz in Sales and Marketing

Lukas Hurwitz has held positions in sales and marketing and is also an accomplished musician.

United Screens Media Acquires Klotz Digital

Dr. Andreas Gruettner has been appointed the new CEO of the console and router manufacturer.

BIA/Kelsey Forecasts Local Advertising Revenues Through 2014

Following declines through 2011, BIA/Kelsey expects a rebound in local media spending beginning in 2012.

Arbitron Expands Radio Advisory Council

The move adds additional representation for networks, digital radio, public radio, urban and Spanish stations.

SCMS to Distribute NeoGroupe Products

NeoGroupe produces software that interfaces with Telos phone systems for call screening and contest management.

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Site Features

NAB Insider Newsletter

Our pre-convention newsletter kicks off March 9. Be sure to get all your pre-show info on products and sessions each week leading up to the convention.



Digital Radio Update Newsletter

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

New Products Extra! Newsletter

Like new products? Subscribe to our twice-monthly e-mail newsletter and be the first to know about the latest technology.

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Web links to the advertisers in the February issue.

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

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What's showing?

The NAB Show is a big event. There's lots of activity on the exhibit floor, usually some stimulating ideas in the sessions, and always something to do in the evenings. If you will attend the convention, I hope you have started planning your time there. There's too much going on to just coast through. So what will this year bring? Here's what I expect will be getting the most attention during the week.

I know you're not surprised that HD Radio is going to be a popular topic. Now that increased digital sideband power has been approved, stations

that put HD Radio installations on hold can move forward. We have already seen transmitters with smaller footprints, and some techniques on squeezing more power out of them have been developed. I also expect the combiner manufacturers will see some interest from stations that want to increase the digital power of existing installations.

Radio is a mobile medium in itself, but other new mobile technologies are in the hands of consumers

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as well. Look for plenty of apps for radio stations scattered throughout the exhibit floor. In addition, automation manufacturers are enhancing their methods of uploading mobile content and controlling their systems from handheld devices, and codec manufacturers are adding apps to transmit audio, too. Also look for ways to enhance your station's mobile streams.

You can't get away from IP audio today. It's being used within facilities and to send audio to and from the studio. There will be more refinements and enhancement on the various uses of IP audio. Also look for more ways to connect various elements of the facility via IP, although we still have to wait a while before various IP audio routing systems will be able to communicate directly.

Emergency alerting is an omnipresent topic that continues to be a focus. While the specifics of the Common Alerting Protocol (CAP) are not yet available, broadcasters are waiting for the day when FEMA will trigger the countdown clock. In the meantime, EAS equipment manufacturers are working as far ahead as they can even though CAP specifics are not yet completely available.

A good overview of new technology at the show will be revealed in our annual Pick Hit awards. Created in 1980, this prestigious list – chosen by a group of radio engineers and not the magazine

staff – highlights the top 15 new products from the convention. The recipients will be selected at the convention, so look for the Pick Hits signs to appear late on Wednesday afternoon at the convention.

Attendance predictions are common sport leading up to the convention. I expect that attendance will be flat if not slightly lower than last year. We are all aware of the current economic situation, and many travel budgets set several months ago will affect the numbers. While indications of recovery are being seen and radio forecasts are looking up, the budget cuts from last fall are likely to still be affected. However, it appears that hotel rates are more affordable than ever. It might be worth another look to see if costs can fit a reduced budget.

What's going to be out this year? While pondering this, I remembered that it was about 10 years ago when we noticed there were no cart machines being displayed on the convention floor. What's next in line to be retired? With the proliferation of IP audio, some technologies could be on their way to the extinction list, such as ISDN codecs and TDM-based routers. They're not gone yet, but they could be close.

I'll see you in Las Vegas.

Chris Scherer

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

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Third-adjacent protection review

By Jeremy Ruck, PE

One of the hallmark missions of the FCC is to promote the use of the radio spectrum; the corollary is that it ends up being a traffic cop in order to eliminate interference, or perhaps *reducing* interference. Throughout the history of broadcasting, the regulations defining the phenomenon of interference have morphed. Sometimes the more things change the more they stay the same.

When FM service was in its earlier days the landscape was different. Receivers were not overly sensitive on the extraordinarily high frequencies around 100MHz, and problems on second- and third-adjacent channels just did not seem to be a big deal. AM was universally accepted as the king, FM station density was low, and that new-fangled FM stuff was still just a curiosity. One of the results was the lack of second- and third-adjacent channel interference protection.

This archaic situation remains today in some instances, and is coming full circle in others. The earlier lack of protections (among other things) is the genesis of Section 72.213 of the Commission's Rules, pertaining to grandfathered situations. Prior to November 1964, spacings for second- and third-adjacent facilities were not considered. These stations, usually clustered

to the grandfathering under this provision, these stations are permitted to relocate relative to each other without having to consider the current second- and third-adjacent spacing norms. Stations authorized after this time frame, however, must be protected and similarly must protect the older guys.

As the receiver technology improved and station density increased, protection out to third-adjacent channels started to become a concern. The spacing tables were subsequently modified several times, and third-adjacent protection became enshrined. That is until the past few years.

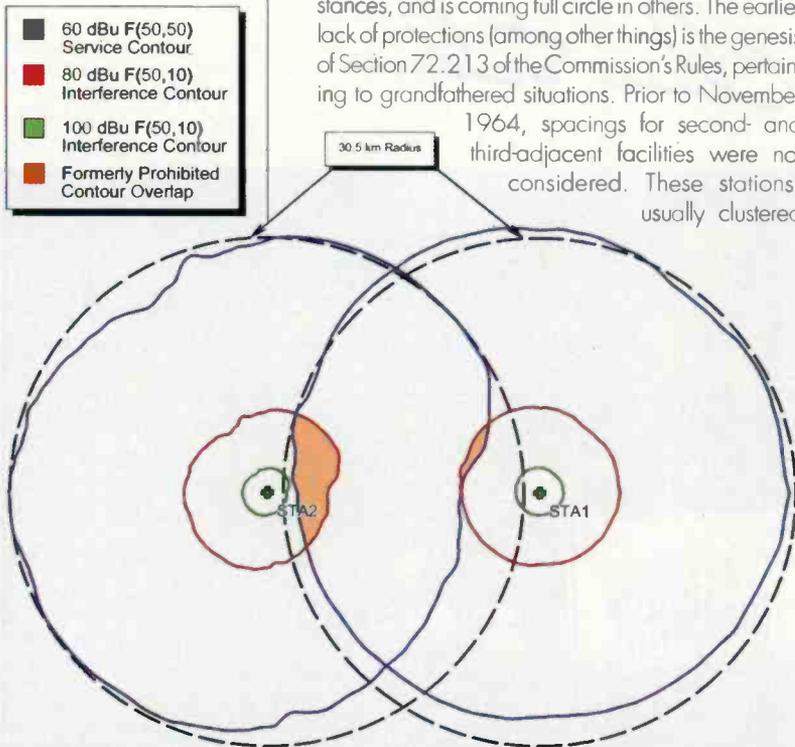
What's ahead

One issue that started the downfall of third-adjacent protections is the anomalous 73.207 spacing table. This anomaly was manifest in second-adjacent situations, and resulted (in most cases) in the inability to utilize contour protection. To correct the anomaly two corrective paths could have been taken.

The first would have been to revise the spacing table, resulting in the creation of numerous short spacings and the neutering of any future relocation potential. Sagely, the Commission chose the second path, which was to loosen the second-adjacent U/D protection ratio from +20dB to +40dB due to receiver technology. Interestingly enough this patch was initially only applied to allocations in the non-reserved (commercial) portion of the band. A couple of years later the Rules were modified again to apply the ratios to all FM facilities.

Then the "Raleigh Waiver" appeared. Under this Order by the Commission, applicants could request a waiver of the NCE contour protections. It would be granted in cases where the applicant received normally prohibited contour overlap on second- and third-adjacent channels if the area of the overlap was 10 percent or less of the service area. The resulting limited area of overlap was greatly outweighed by the benefits of a larger service area. With this, the Commission recognized the demand for NCE service (still robust today) and the limited spectrum available in the reserved portion of the band.

It should be noted that this waiver only applied to cases of received overlap. You could not increase your coverage area to cause overlap with others and hope to get a waiver. By the same token, if you were granted a waiver, the other station(s) involved in the waiver were not precluded from



With the old spacing table anomaly, two second-adjacent FM facilities would nearly always fail contour protection by a wide margin even though 73.207 spacings were slightly short, met or exceeded. These situations were rectified by changing U/D ratio from +20dB to +40dB for second-adjacent situations.

around larger metropolitan areas, find themselves in situations where they are grossly short-spaced with regard to other facilities of the same vintage. Due

making subsequent changes.

Today third-adjacent protection is likely to be weakened further as a result of bills working their way through Congress. In 2000 when the Commission created LPFM service, the original proposals did not contain third-adjacent protection requirements. On Capitol Hill concerns were raised that a substantial number of new LPFM stations would be created resulting in diminished full-power service areas due to interference. At that time, Congress stepped into the fray and amended the Communications Act to maintain third-adjacent protections. This of course statutorily overruled the Commission, while at the same time ordering the FCC to study the matter further.

The result of this was the 2003 Mitre report, which basically concluded that third-adjacent interference should not really be that much of a problem. Encouraged by this report, which has been called into question by numerous parties, the Commission asked Congress in 2004 to re-amend the act, yet again, to delete third-adjacent protections. In late 2007 the Commission started allowing LPFM stations to seek waivers of these protections. This brings us to today.

The Local Community Radio Act of 2009 passed the House in December 2009 on a voice vote. As of the writing of this article it is still in committee on the Senate side. Ostensibly the bill has bi-partisan support

in the Senate; however, of the seven sponsors listed the only Republican is Senator John McCain.

Will the stripping of the third-adjacent protections affect the FM broadcaster? The simple answer: maybe. Mitre in essence said third-adjacent should not be much of a problem. It did not say it would not be a problem. The presence, or lack thereof, of interference will be situational dependent.

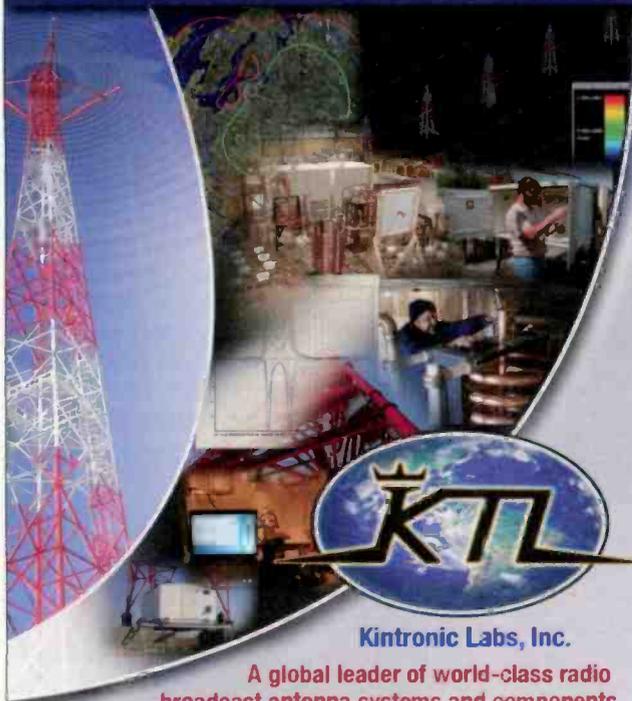
Remember that actual interference is not merely contour overlap, but the ratio between undesired and desired field strengths. A 100W LPFM signal will throw a field strength of 100dBu about 800 meters. If your field strength is 60dBu or less in this area, you may encounter interference. Indeed anytime the undesired is more than 40dB above the desired, interference is predicted.

Intuitively areas that may suffer the most from the deletion are quasi-listenable areas in cities from rim shots and highly rural areas. The former case would seem to be the more likely to appear as the viability of an LPFM station in a highly rural area seems questionable. Ultimately there can be no guarantee that the specter of interference will not surface in some cases. Similarly the blanket notion that interference will be ubiquitous is equally implausible. 

Ruck is a senior engineer with D.L. Markley and Associates, Peoria, IL.

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Annual national EAS test proposed

By Harry Martin

The FCC has proposed rules providing for an annual test of the national alert capability of the broadcast Emergency Alert System (EAS). Under the proposed rules, all EAS participants will have to tell the FCC whether they received the test, whether they retransmitted it, and if there was a problem, exactly what that was.

Virtually all full-power radio and television stations are required to have an EAS decoder in place, and most are also required to have an encoder, and to conduct weekly and monthly alert tests. All tests must be recorded in the station's log. Some stations are less than observant of these obligations, or have faulty

equipment, and fines for non-compliance are among those most frequently assessed by the FCC.

The EAS is capable of both national alerts and alerts restricted to specific regions or single states. If a national alert is received, all stations must cease normal programming and either put the alert on the

unattended all or part of the day. The Commission wants to know if EAS would work nationwide given these and other system characteristics.

Interestingly, in 2007, some FEMA workers accidentally triggered a national-level EAS alert. Since it was not intended to be a test, presumably the alert looked like a real alert. But a combination of equipment failures and speedy intervention by EAS participants made the alert into a non-event.

In pursuit of its planned nationwide system, the Commission issued a notice of proposed rule making in January. The notice proposes that a national test be conducted once a year. Stations would be given at least two months' advance warning that the test is coming but would not be told the exact time and date. Every EAS participant would be expected to air the test, log it, and then provide the test results to the FCC within 30 days. If the test is not received or retransmitted, a station would have to fix its EAS equipment and report what went wrong to the FCC. Presumably the national test will contain information making it clear to listeners and viewers that it is only a test.

With national testing in the offing, licensees should check their EAS systems now to make sure their equipment is operating properly will be capable of receiving the tests. Unlike the current system, where compliance tests take the form of occasional FCC inspections, every station will be held accountable under the national testing procedure. One thing to check is whether the encoder/decoder requires a Federal Information Processing Standards (FIPS) location code to respond to a message. That code identifies the geographic area to which an alert applies. A nationwide message might not have one, and some decoders are known to ignore messages with no FIPS Code.

Digital radio and TV stations should make sure that the alert can be retransmitted on each of their audio or video streams.

Martin is a member of Fletcher, Heald & Hildreth, PLLC, Arlington, VA. E-mail: martin@fhhlaw.com.

Dateline

For noncommercial radio stations in Delaware, Indiana, Kentucky, Pennsylvania and Tennessee their biennial ownership report deadline is April 1. The deadline for submission of biennial ownership reports for commercial radio stations has been suspended pending a further redesign of Form 323.

April 1 is the deadline for radio stations in Delaware and Pennsylvania to electronically file their Broadcast EEO Mid-Term Reports (Form 397) with the FCC.

April 1 is the deadline for radio stations licensed in the following states to place their annual EEO Reports in their public files: Delaware, Indiana, Kentucky, Pennsylvania, Tennessee and Texas.

air or, if they cannot, go silent until the emergency is over. Retransmission of local or regional alerts is optional on the part of licensees.

The FCC has never tested the national alert system. The proposed rules are intended to perfect an alert system wherein during a true national emergency the president could get his voice on every radio and TV station in the country. A lot of EAS decoders are automated, and a lot of stations operate

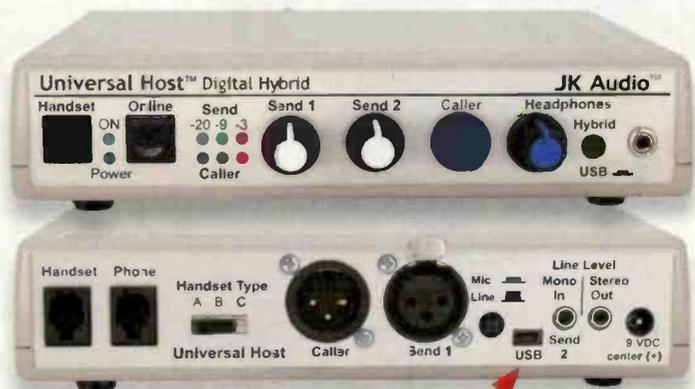


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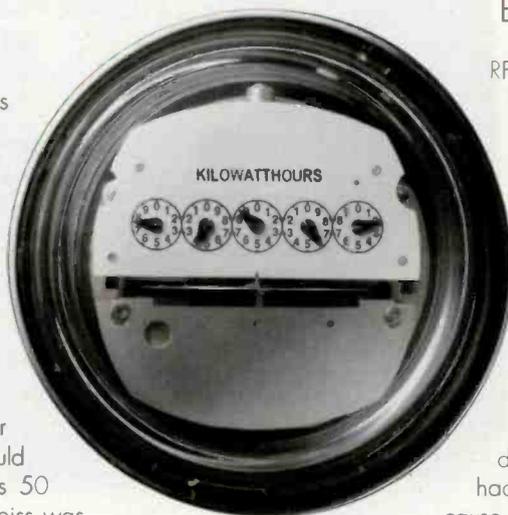
By Chriss Scherer

Feeling the power

Ben Weiss, CPBE, a contract engineer in Kansas City, MO, told me about a recent head-scratcher with a station's transmitter power bill. This 16.5kW TPO (50kW ERP) station's transmitter site is not unusual, having a transmitter and HVAC as the largest power consumers.

Given the regular equipment usage, it was expected the electric bill would be consistent month to month, with usual changes for the HVAC with the seasons. However, the station owner noticed the power bill would fluctuate by as much as 50 percent each month. Weiss was asked to investigate.

The power company was willing to work on the problem to find a solution, but it wasn't until Weiss asked how the meter was being read that a possible answer was found. The power company was obtaining the meter reading remotely by sending an



RF signal through the power line to the meter. Weiss began asking about the reliability of the RF signal in the presence of an RF broadcast signal. The power company could not answer.

To verify the readings, the power company began sending someone to physically read the meter. It was discovered that the station had been overpaying because the remote reading was intermittently higher than the actual reading. The station is now set up to have its meter read in person.

From this story, it seems like a good idea to compare the power bill information to the actual meter reading once in a while.



Mine that light

Working in tight spaces with low light is no fun. I found a handy device to shed some light on the task. It's called a Light Mine from Striker Tools. I found it at Radio Shack, but other retailers sell them as well.

This LED light has 12 magnets placed around its slightly smaller-than-a-golf-ball sphere.

It can be positioned to throw light at nearly any angle. The light costs about \$6 and operates on three button-cell batteries. While there are no instructions on how to replace the batteries, there are two tabs that can be pressed to open the light. Although for the inexpensive price it's just as easy to buy a new one – albeit not as friendly on the environment.

For such a small size and a single LED, the device produces a very bright light. I have used mine in a dim rack to throw light just where I needed it by letting the magnets hold it on the rack or the chassis of equipment.

A Perl of a logger

When it comes to logging a station's stream, there are many products available with a variety of features. But if you're handy with writing scripts, you can create your own. Rob Landry, a contract engineer in Boston, created such a script for one of his clients.

His Perl script records each hour as an MP3 file by capturing the station's Internet stream. Each hour is labeled and placed in a directory for each day

(e.g. "wed_dec_16_2009"). The complete script is posted at RadioMagOnline.com.

What custom scripts have you developed to handle routine tasks? Share them with us to be posted online.

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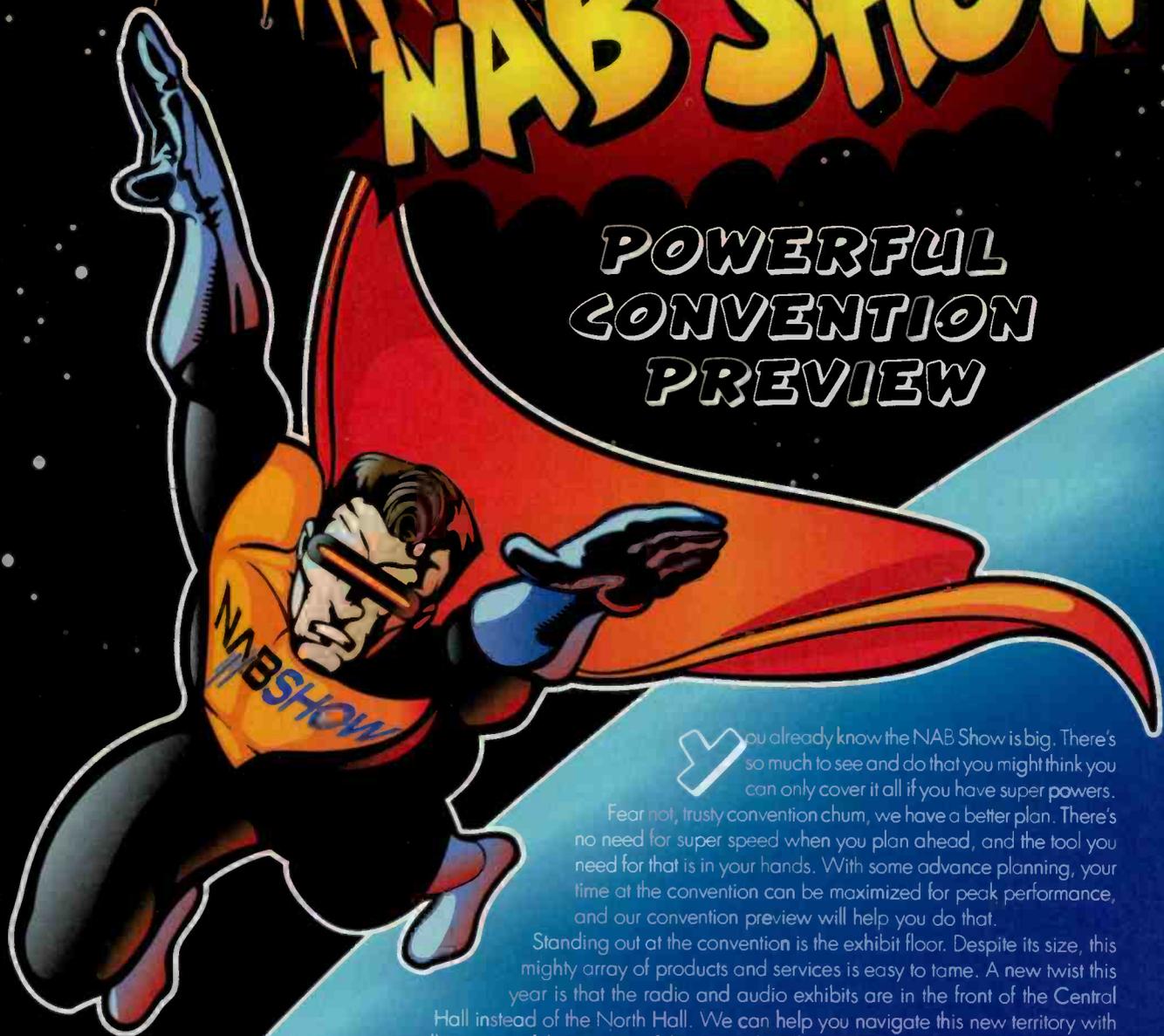
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2010

NAB SHOW

POWERFUL CONVENTION PREVIEW



You already know the NAB Show is big. There's so much to see and do that you might think you can only cover it all if you have super powers.

Fear not, trusty convention chum, we have a better plan. There's no need for super speed when you plan ahead, and the tool you need for that is in your hands. With some advance planning, your time at the convention can be maximized for peak performance, and our convention preview will help you do that.

Standing out at the convention is the exhibit floor. Despite its size, this mighty array of products and services is easy to tame. A new twist this year is that the radio and audio exhibits are in the front of the Central Hall instead of the North Hall. We can help you navigate this new territory with our pull-out map of this portion of the Central Hall. But don't stop there, there are more radio and audio exhibitors sprinkled throughout the exhibits. Our condensed exhibitor list – also on the map – lists all the radio-relevant exhibitors.

Take note of our NAB Extra. This is a peek behind the mask of many new products you'll find being shown. We'll have some in the April issue as well. We'll also feature more in the NAB Insider e-mail newsletter coming to you every week before the show, starting March 9.

Finally, take note of the session timetable. All the radio-related presentations in the Broadcast Engineering Conference are listed, plus a few other sessions and events of note.

Use the combined strength of our convention preview to make the most of your 2010 NAB Show visit.

Chris Scherer

– Chriss Scherer, editor



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Growth in broader-casting® is fueled by the evolution taking place around the world right now. The global exchange of content, technology and innovation that is driving us forward will be captured and showcased at the 2010 NAB Show.™

Introducing Destination Broadband: This cutting-edge area of the show floor focuses on broadband-enabled TVs, online video, mobile broadband networks,



DESTINATION BROADBAND
The Online Video Experience

platforms, gaming, IP, streaming, monetization

and disruptive technologies that are redefining the viewing experience. Broadband's potential to revolutionize content delivery at every turn will be unveiled and discussed, from Web sites, VOD and set-top boxes to advertising and sales.

Join the worldwide community of content creators, producers, managers and distributors, and bring your content to life at the NAB Show, the ultimate venue for exchanging tomorrow's solutions and today's most successful revenue strategies. For more information, visit www.nabshow.com.

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Conferences April 10-15, 2010 :: Exhibits April 12-15
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WAB

EXTRA

Longwave transmitters

Nautel
Booth C2615



NX Series: With power outputs ranging from 25kW to 2000kW, this transmitter series offers AM adaptive pre-correction, ac to RF efficiency of 90 percent, linearity utilizing a nine-phase Direct Digital Modulation scheme encoded at 2.7 mega-samples per second, and a footprint requiring 1/3 to 1/2 less space than other transmitters. A touch-screen controller plus remote Web access are standard.

207-947-8200; www.nautel.com; info@nautel.com

On-air processor

Orban
Booth C1657



Optimod-FM 5500: The 5500 combines the functionality of Orban's Optimod-FM 5300 and 2300 processors in a compact 1RU chassis. It features five- and two-band processing (including stereo generator), plus a stand-alone stereo generator mode that offers performance equivalent to the stereo generator in the Orban Optimod-FM 8500 and 8600 processors. New in the 5500 is a 10MHz frequency reference input that allows the 19kHz pilot tone frequency to be locked to GPS or another high-accuracy frequency standard. In addition, a cool-running switching power supply saves energy and reduces heat build-up inside the chassis.

480-403-8300; www.orban.com; sales@orban.com

Broadcast stereo headset

Audio-Technica
Booth C1632



BPHS1: The BPHS1 broadcast stereo headset with dynamic boom microphone offers natural, highly intelligible stereo reproduction. The rugged BPHS1 features closed-back around-the-ear ear cups designed to provide maximum comfort and

ambient noise rejection with minimal ear fatigue. The headset also has a professional boom-mounted moving coil dynamic microphone that can be positioned for use on either side of the mouth. It is specifically intended and optimized for on-air or live news and sports broadcasting, announcing and interviews.

330-686-2600; www.audio-technica.com
sales@atus.com

Wireless audio interfaces

JK Audio
Booth C2010

BlueDriver Series: The BlueDriver series of audio interface adapters use Bluetooth wireless technology. BlueDriver-F3 plugs directly into a dynamic mic or the mic-level output from a mixing console. Pair it to a Bluetooth-equipped cell phone or headset. The 3.5mm stereo jack contains a mic-level output suitable for recording, with the clean mic signal on the left channel and the Bluetooth return on the right. BlueDriver-M3 plugs into the mic input channel of a mixer. BlueDriver-M3 will accept a signal from the headphone output of the mixer for transmission back to the cell phone or headset. A switch on either unit selects between connection to a third-party Bluetooth headset or a cell phone.



800-552-8346; www.jkaudio.com; info@jkaudio.com



Talkshow System
Telos Systems
Booth C146

Nx6: Contained in a slim 2RU chassis,

the Nx6 contains four adaptive digital hybrids with advanced DSP technology to give callers better sound. It supports up to six analog or digital phone lines. Each of the four hybrids is equipped with individually adjustable AGC and noise gate by Omnia. Combined with Telos' Digital Dynamic EQTM (DDEQ) and adaptive hybrid technology, the Nx6 delivers caller-to-caller consistency whether using POTS or ISDN. The Nx6 package includes one Desktop Director, and Assistant Producer call screening software.

216-241-7225; www.telos-systems.com
telos-info@telos-systems.com

Automation mobile application

Enco Systems
Booth C3036

iDAD: iDAD is a companion mobile application for the Enco DAD and Presenter audio automation studio systems. The initial release is targeted at the iPhone and the new iPad tablet computing device from Apple. It will feature the ability for news reporters and announcers to record, trim and tail, label and then send audio from the mobile device directly to their DAD or Presenter automation systems for timely playback. iDAD will also feature a remote control function which will allow control of the DAD or Presenter system from the mobile device using a simple array of buttons representing various user definable functions.

800-362-6797; www.enco.com; sales@enco.com

IP88e WheatNet-IP application

Wheatstone
Booth C2623



Mic Blade: The IP88e WheatNet-IP Mic Blade features eight built-in mic preamps with phantom power, eight analog output channels and 12 universal logic (GPI) ports. Mic audio is available anywhere in the WheatNet-IP system. Analog outputs can access any system source, and are typically used for studio headphone and speaker feeds.

252-638-7000; www.wheatstone.com; sales@wheatstone.com

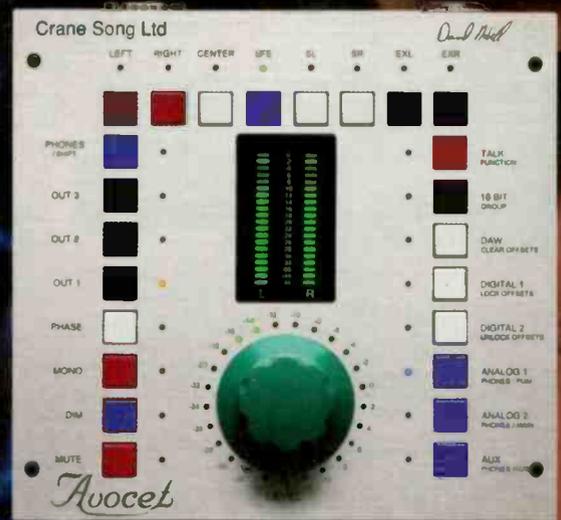
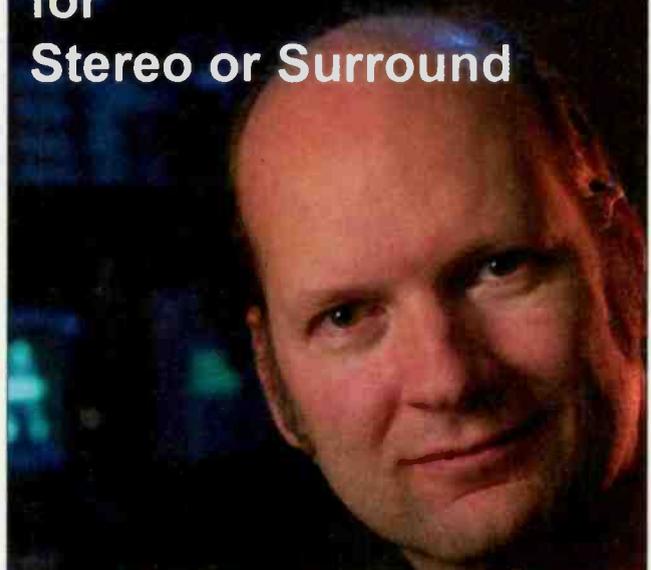
Power meter
LBA Technology
Booth N516

Kathrein 3024: With measuring capability from 1W to 1MW, the 3024 can be used with most existing directional coupler-based RF measuring transmitter power monitors to provide PC and Internet access and SNMP network connectivity. Internal user-programmable software calculates the display power depending on the probe input, offset, gain and the given value of the directional coupler. Because the setup for each probe in the system is unique, it will even work with different brands of directional couplers. The working end of the rack-mounted 19" 3024 is in the rear, where up to eight probes can be connected for simultaneous power measurements.

252-757-0279; www.lbagroup.com; lbagrp@lbagroup.com

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Intercom equipment **Axia Audio** **Booth C146**



IP-Intercom: Axia's IP-Intercom system debuts with a full family of intercom equipment that includes a variety of rackmount stations,

as well as drop-in modules for Axia Element 2.0 mixing consoles - providing a unique interconnection between intercom and console that allows any audio from any station in the broadcast facility to be immediately brought to air. IP-Intercom stations connect to the studio network with a single CAT-5 connection. Its features include auto-answer and hands-free operation, bright, sharp OLED displays for maximum visibility, built-in speakers and front-and-rear-panel mic connections, and drop-in modules that integrate into Axia consoles. The Advanced Echo Cancellation (AEC) technology, licensed from the Fraunhofer Institute, effectively suppresses acoustic feedback generated between open mics and speakers, producing clear, feedback-free audio.

216-241-7225; www.axiaaudio.com
inquiry@axiaaudio.com

Microphone preamps **RDL (Radio Design Labs)** **Booth C451**



EZ-MPA1; EZ-MPA2: The EZ-MPA1 is a microphone preamplifier with front-panel volume control and audio level metering. A front-panel switch engages an audio compressor to control overloads and clipping during high-level audio bursts or peaks. Dynamic or condenser microphones are both supported with rear-panel switchable phantom voltage. The preamplified mic signal feeds both channels of the line output on RCA or mini jacks. LED VU metering facilitates easy level adjustment.

800-281-2683; www.rdl.net.com; sales@rdl.net.com

Portable production system **NewTek** **Booth SL10814**

TriCaster, TriCaster Interface: In one lightweight, portable system (small enough to fit in a backpack), TriCaster provides all the tools, including live virtual sets on select models, required to produce, live stream, broadcast and project a show. Its small footprint makes it possible to broadcast from anywhere and it is flexible enough to allow you to deliver live productions on your own or with a team.

800-847-6111; www.newtek.com

Audio analyzer **Audio Precision** **Booth C2023**

APxUpdates: Since the beginning of 2010, Audio Precision has been shipping the BW52 ultra-high-bandwidth 1MHz FFT option for the APx525 family of audio analyzers, which delivers high bandwidth (dc to 1MHz), one million points, and 24-bit resolution when measuring out-of-band noise in Class-D amps, sigma-delta converters and other modern audio devices, easily surpassing the maximum FFT bandwidth offered by competing analyzers (usually topping out at 250kHz). More recently, the v2.5 software update for APx has added custom reporting options, WAV file analysis, and the ability to stream Dolby's TrueHD audio compression format through the APx HDMI option.

800-231-7350; ap.com; sales@audioprecision.com

Headphones **Shure**

Booth C2013 **SRH840, SRH440,** **and SRH240:**

The SRH840, SRH440 and SRH240 join Shure's lineup of professional and home recording equipment.

These headphones achieve a balance between comfort, durability, and rich lows, warm mids and crisp highs. Each have a unique sound signature and feature closed-back, circumaural design, which maximizes comfort during extended wear.

800-25-SHURE; www.shure.com; sales@shure.com



Audio encoding for Windows **Omnia Audio** **Booth C146**

Omnia A/XE: The Omnia A/XE blends power with advanced encoding capabilities. It can process audio for bit rate-reduced and linear applications. It runs as a background service, can be fully-managed and configured remotely with a Web browser, and can process and encode multiple streams in various formats simultaneously. A/XE can be run on most off-the-shelf computers; the minimum requirements are Windows XP or later, 521MB RAM, 20MB free hard-drive space and a network card. It can encode directly to MP3 or AAC as well as feed a Shoutcast-style or Windows Media Server in the MP3 format, or feed Adobe Media server an AAC stream. It can also be paired with an existing Windows Media, Real, MPG Pro or MP3 streaming encoder.

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



Silence monitor/audio switcher
Broadcast Tools
Booth C1451

Audio Sentinel: The Audio Sentinel is a Web-enabled two-channel stereo silence monitor combined with a transparent, integrated audio switcher. It is designed to monitor two balanced or unbalanced independent stereo analog audio sources and switch to a back-up analog audio source when silence is detected on either or both channels. It may also be configured for independent dual-stereo non-switching applications. The Audio Sentinel can be controlled and monitored locally and/or remotely over any IP network, including private networks, IP-based industrial control networks, and the Internet. Users can operate the product using a Web browser or Web-enabled mobile device. E-mail notification may be configured to alert up to four recipients when alarms are detected. The user may also enable a sound effect to play on a PC speaker when an alarm is generated.

877-250-5575; www.broadcasttools.com
 bti@broadcasttools.com



IP audio codec
APT
Booth C751

Worldcast Equinox: The Worldcast Equinox enables delivery of bidirectional stereo over IP and ISDN links. Noteworthy features include automatic back-up from IP to ISDN, support for SIP/SDP and interoperability with other manufacturers' codecs using Layer 3 bonding. Additional functionality is priced as optional add-ons, ensuring that the user pays for only those features that are most important to them.

800-955-APTX; www.aptx.com; info@aptx.com

Mixing console
Lawo
Booth C2217

Crystal: This control surface features buttons illuminated by RGB LEDs that allow for color coding of the various functions and a high-resolution OLED displays guarantee an optimum readability from every angle. And as one of the two displays per channel always shows the selected source, it is easy for users to see a status overview all the time. The console chassis is made completely of aluminum with an abrasion-proof surface.

+49 7222 1002 0; www.lawo.de; info@lawo.de



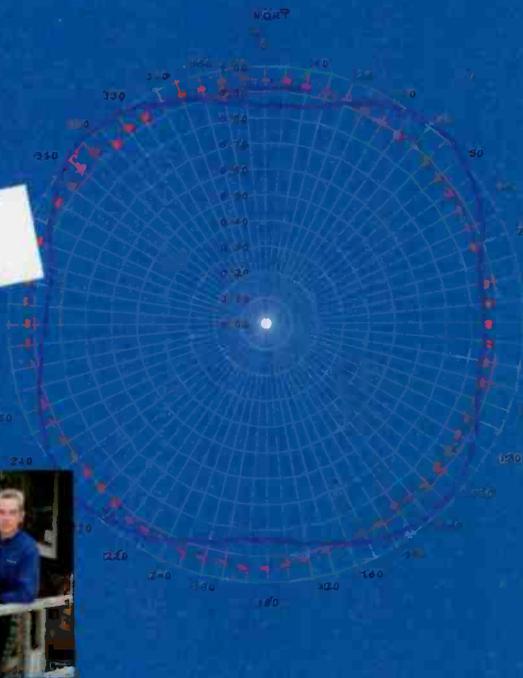
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Recording app RCS Booth C2628

iPush: iPush is the latest mobile application for Nex Gen Digital; it records one or more news reports or remote inserts and sends them to Nex Gen Digital via an integrated version of WANcasting. The audio then lands into the system for playback on the air. With RCS iPush, users can leave bulky recording equipment at the studio and still capture events. iPush works with an iPhone or second generation or newer iPod Touch. It is compatible with the phone's microphone, or upgrade to plug-in higher quality over-the-counter microphones.

914-428-4600; www.rcsworks.com; info@rcsworks.com

Emergency messaging platform Digital Alert Systems Booth C3651

DASDEC-II: DASDEC-II leverages common information exchange protocols and offers a broad range of physical connections and third-party interfaces. Any standard Web-browser on a PC, Mac or smartphone can be used to view, change or activate DASDEC functions. With its optional three internal receivers, it can monitor any standard AM/FM/WX frequency, on any individual receiver with band selection, tuning, level adjustment and even live audio monitoring over the network. EAS alert details are presented on an integrated NTSC character generator screen, or connect the DASDEC to a wide range of other third-party CGs for crawling text overlays or automation control.

585-765-2254; www.digitalalertsystems.com; info@digitalalertsystems.com

Portable PA system Samson Technologies Booth C1422

XP510i: The XP510i boasts dual two-way speakers and a detachable 10-channel mixer with a 500W (2 x 250) Class D amplifier. The speakers employ 10" woofers in vented enclosures for outstanding bass response while 1" high-frequency drivers deliver sweet highs. For transport, the speakers slide together, the mixer locks into the back of one speaker and the cables pack up in the back of the other for a single unit that weighs just over 50 pounds.

631-784-2200; www.samsontech.com; info@samsontech.com



Multiband combiner and coupler Bird Technologies Group Booth C306MR/C454

43-05-01 Series; 80-05-14: The

Multiband Control Station Combiner, model 43-05-01 series, provides frequency-agile operation across multiple bands. Operating in frequency ranges of 40-960MHz, the multi-channel multi-band combiner interoperability can be combined into a single network for efficiency. The unit is low profile for space-efficient installation while saving cost by combining multiple bands in the same combiner. The Multiband Coupler, model 80-05-14, reduces tower transmission lines at sites operating from VHF to 900MHz.

866-695-4569; www.bird-technologies.com; sales@bird-technologies.com



Program shrinker/stretcher
25-Seven Systems
Booth C144



Program Length Manager: The 25-Seven Program Length Manager (PLM) shrinks or stretches your programs and program segments by 5 percent (three minutes per hour) or even 10 percent – without pitch change, artifacts or glitches. Time-manipulated audio is clean enough to use on stereo music programs and live events. PLM is operator friendly and requires little training whether controlled from the front-panel or via Web browser. PLM is the next best thing to being able to stop the clock or add more minutes to the hour.

888-257-2578; www.25-seven.com; info@25-seven.com

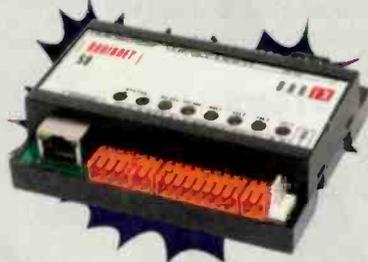
Sealing gaskets
Neutrik
Booth C2336



SCDP Series: Neutrik features a dust- and water-resistant connector for use with all D-shaped chassis connectors with its newest sealing gasket (SCDP*). Designed for use with Neutrik's Opticalcon Duo and Quad fiber connectors or any Neutrik product using a standard D-style cutout, including the newly introduced water-resistant USB/FireWire and HDMI feedthroughs, the SCDP gasket gives additional value and safety to any installation in the mated condition. The sealing gasket is available in six different colors: Black, red, yellow, green, blue and white. Color-coded D-shaped chassis connectors also provide the added benefit of quick identification on-site.

732-901-9488; www.neutrik.com
info@neutrikusa.com

IP automation controller
Barix Technology
Booth C1139



Barionet 50: A fully programmable network controller, the Barionet 50 is ideal for interfacing devices and real world I/O via IP with open, standards-based monitoring and control platforms. It is a modular component that can operate standalone or in concert with other units, Web servers and control systems. Professional applications include access control, machine data collection and environmental monitoring of everything from temperature to water pressure. Barionet devices use very low power (typically 1.2W with inactive relays) and are well-positioned for green applications such as energy metering, smart grid control and intelligent building management.

866-815-0866; www.barix.com
info@barix.com

Broadband dipole
Shively Labs
Booth C3019

6020: The 6020 broadband dipole is now also incorporated into a low-windload broadband FM panel, model 6018V or 6018H. It is rated at 10kW input and can be used either for vertically or horizontally polarized applications. The 6020 has already been used successfully in Turkey and Haiti, and has proven its capabilities as a rapidly deployable, robust 5kW antenna. Features include vertical polarization and 5kW power rating per bay. Radomes and de-icers are not required.

888-SHIVELY; www.shively.com; sales@shively.com

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NAB booth # C1358

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Web: <http://www.acousticsfirst.com>



**Soundproof door
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 Booth C1844**

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877-438-7843

www.soundproofwindows.com
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**Vector network analyzer
 Array Solutions
 Booth C1332**

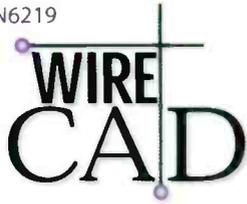


VNA 2180: The VNA 2180 measures impedance (magnitude and phase) and filter transmission in the range of 5KHz to 180MHz. A PC is used to plot parameters, such as impedance, SWR, S11 and S21. The test frequency is generated digitally. A 12-bit analog-to-digital converter digitizes the raw data. This avoids non-linearity associated with diode detectors, and results in very good dynamic range and linearity for accurate magnitude and phase measurements.

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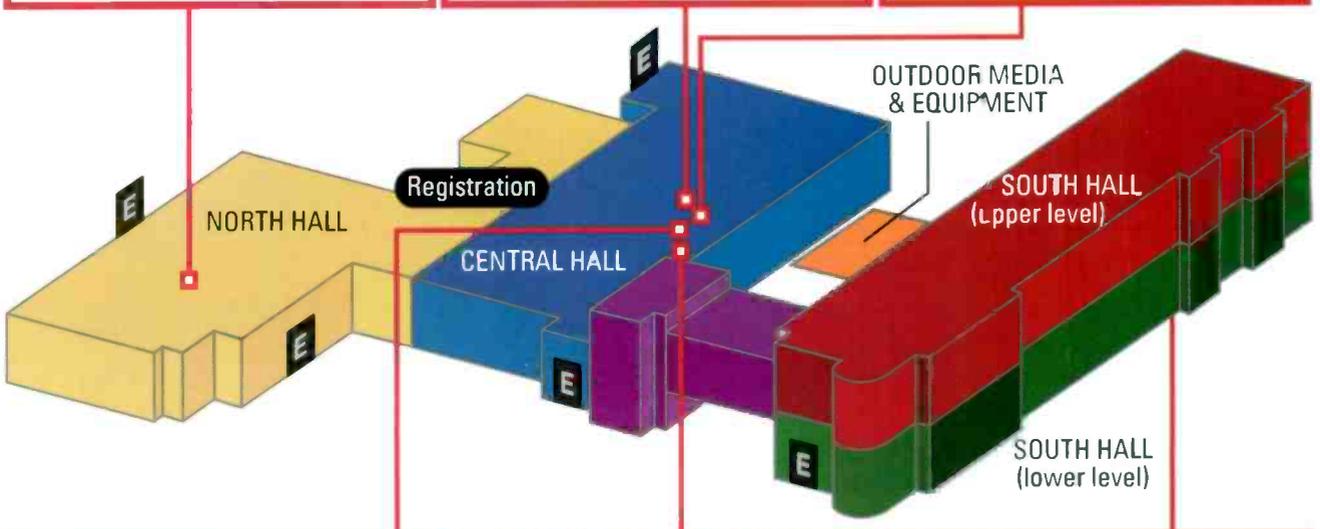
Booth N6219



Booth C6437



Booth C5643



Booth C4342

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SmartSound Software	SL7609
Society of Broadcast Engineers	L29
Sonifex	C2739
Sony Creative Software	C10515
Sony Electronics	C11001
Sound Devices	C1354
Sound Ideas	SL8416
Sound4	N1403
Soundproof Windows	C1844
Spectra Logic	N6216
Staco Energy Products	C1148
Stainless	C2025
Stantron	C6049
Stephen Arnold Music	SL8513
Streambox	SU8911
Studer Soundcraft	C2619
Studio Technologies	C10048
Superior Broadcast Products	SU2713
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Switchcraft	C8137
Systems Group, The	C5115
Tascam	SL1717
TBC Consoles	C12626
Teac	SL1816
Tec Nec Distributing	C1941
Techni-Tool	C9237
Tektronix	N2522
Telos Systems	C146
TFT	C2307
Thermo Bond Buildings	C1430
Thermodyne Cases	C5637
Tieline Technology	C157
Tiger Technology	SL7723
Touchcast	C4946
Tower Consultants	C2732
TrafficLand	SU1708
TransLanTech Sound	C1323
Triolithic	SU5704
TWR Lighting	C2136
Unimar	C2839
VCS Engineering	C3332
Vetronix	N6119
VidCAD	N702
Vocalbooth.com	SL8510
V-Soft Communications	C2734
W B Walton Enterprises	OE1728
Ward-Beck Systems	N3425
Wegener	SU4902
Wenger	N3830
Wheatstone	C2623
Whirlwind	C4342
WhisperRoom	SL5105
WideOrbit	N5129
Will-Burt	C8333
Winmedia	N1005
Winsted	C8608
WireCAD	N6219
Wireworks	C8612
Wohler Technologies	N3023
Xytech Systems	SL9915
Yamaha	C1336
Yellow Jacket	C2459
Yellowtec	C1451
Z Technology	SU3018
Zaxcom	C154

Exhibitor list current as of February 16, 2010
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Map advertisers noted in blue.

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Making Digital Radio Work.

See what more looks like at nautel.com/expectmore/

Booth C2343



Booth C1246



Booth C862



Booth C1151



Entrance

Entrance

To South Halls

Supplement to March 2010

Radio

THE RADIO TECHNOLOGY LEADER

Radio Hall Map

Booth information provided by the NAB, current as of February 16, 2010

25-Seven Systems	C144	AEQ	C1928	Atto Technology.....	SL2512
5 Alarm Music	SL8209	Aeta Audio.....	N1002	Audemat - APT.....	C751
615 Music	R206, SL9115	Akamai Technologies	SL527	Audio Accessories.....	C3847
Abel DRM Systems.....	SU8806	Allen Avionics	C1428	Audio Plus Services.....	C1247
ABX Engineering.....	N1334	Altronic Research.....	C1625	Audio Precision.....	C2023
AccuWeather.....	SU6717	Amphenol Fiber Systems International	C6540	Audio Video Metals.....	N6732
Acoustical Solutions	C4937	Analog Way.....	SL1509	Audioarts.....	C2623
Active Storage.....	SL5225	Anystream/Grab Networks	SL2010	AudioScience.....	C1721
ADC.....	C6744	APM Music.....	SL8609	Audio-Technica.....	C1632
Adjuggler.....	SU9506Y	Argosy.....	N4316	Autodesk.....	SL2020
Adobe Systems.....	SL3320	Armstrong Transmitter	C1420	Avid.....	SU902
Adrienne Electronics.....	SL8820	Arrakis Systems.....	C2007	Avcent.....	SL8223
Advanced Fiber Products	N4417	ARRL.....	L1	AVP Mfg & Supply	C9149
Advanced Media Technologies	SU4704	Associated Press/ENPS	SU2002	Axel Technology	C1654
Advanced Microwave Components	SU5912	ATI-Audio Technologies	C1720	Axia Audio.....	C146

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Model 703

Mini-Encoder

Introduced at NAB 2009 and the first in our line of cost-effective **INOmini** products for broadcasters. The 703 lets you send simple scrolling messages for station ID, program promos and advertising, and does all the usual 'housekeeping' functions as well. Easy USB programming and quick installation.

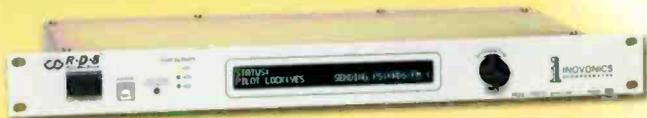


Model 720

Dynamic Encoder

Connects to your playout system to scroll song title and artist info on listeners' radios, along with station promos and advertiser support. Easy serial connection to automation, front-panel USB port for fast register programming. A unique 'no headers' mode can even scroll song info from raw satellite feeds.

Inovonics offers broadcasters an entire line of RadioData encoders and decoders, plus analog and digital audio processing systems, AM, FM and subcarrier mod-monitors and off-air rebroadcast receivers.



Model 730

BEST! Our 'Flagship' Encoder

Our 'does everything' encoder with USB, serial and network connectivity. The 730 accepts both ASCII and UECF command sets and supports "song tagging" and other advanced RT+ applications. TCP/IP and UDP ports feature a built-in dynamic-DNS client service, and an on-board scheduler allows static message programming weeks in advance.



www.inovon.com

Inovonics

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Booth C2607



Booth C2615



Booth C2032



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➔ To Main Lobby and North Hall

Booth C1721



Booth C1607



Continental Electronics

Booth C1411



Booth C1310



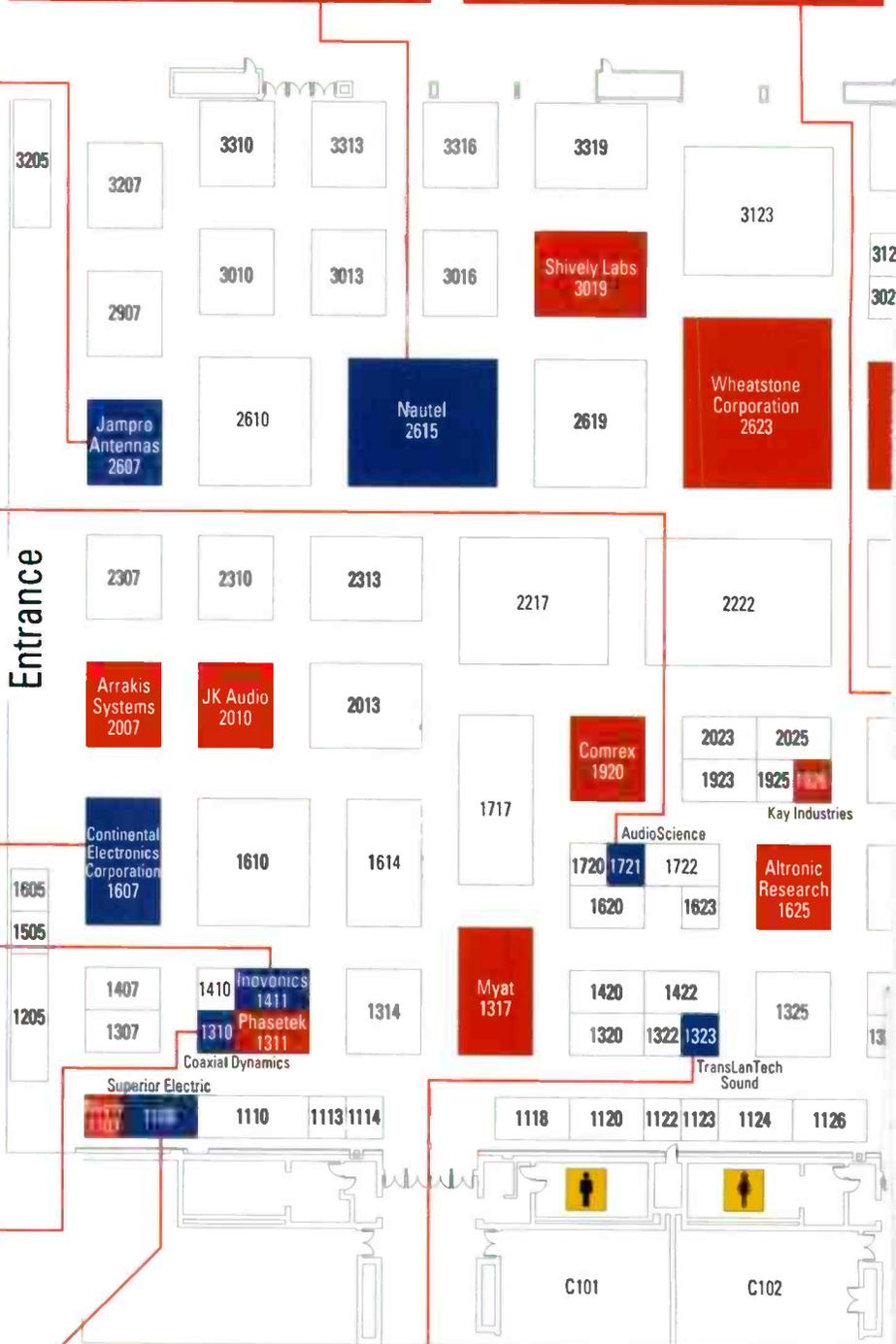
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Booth C1323



Booth C1131





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Beat The Traffic	SU2302	File Catalyst	SL8505	Microwave Service Company	C6419
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Blastwave FX.....	SL8813	Gefen	SL2809	Motu	SL2720
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BroadcastStore.com	C9733	Harris	N2502	NewTek	SL10814
Broadview Software.....	N4334	HD Radio.....	C151	NKK Switches	N6425
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BTX Technologies	C8537	HNB	C2228	Non-Stop Music	SL7612
Building4Media - Primestream	SL6510	Hilomast	C6147	Noren Products	SL2506
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Buri Software	C2343	Hosa Technology	SL2507	NTT Electronics	SU7217
BW Broadcast	C3034	IABM	C10149	NuComm.....	C6419
Cedar Audio	C3039	IBM	N5823	OMB Sistemas Electronicos	SU5720
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CircuitWerkes	C1451	Independent Audio	C2939	OMT Technologies	C1054
Cisco	SU10612	Inovonics	C1411	On Call Communications	OE910
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Clear Channel Satellite.....	SU3117	Intelsat.....	SU1417	Overly Door Company	C544
Coast to Coast Tower Service	C1114	International Datacasting	SU6321	P.I. Engineering	SL7627
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Comrex	C1920	JK Audio	C2010	Phillystran	C1722
Continental Electronics	C1607	JLCooper Electronics	N1617	Potomac Instruments	C1410
Coship Electronics.....	SU4607	JMA Architecture Studios	C8332	Prime Image	N4036
Countryman Associates.....	C2310	JMR Electronics	SL7408	Primera Technology	SL8920
CPI	C1407	Joseph Electronics	C3747	Prism Media Products	C944
CPI.....	SU2617	Junger Audio Studioteknik.....	SU7206	Pristine Systems/Summit Traffic.....	C3032
Crown Broadcast	C2632	KAE Corporation	C8510	Professional Sound Corporation	C1118
Cummins Onan	C7542	Kathrein, Scala Division	SU817	Professional Sound Services.....	C11424
Cyber International Technology	SU8013	Kay Industries	C1926	Progressive Concepts	C3034
Daktronics	C12419	KD Kanopy	C1134	Propagation Systems (PSI)	C754
Dalet Digital Media Systems	SL4720	KenCast	SU4905	Radian Communication Services C1131	
Dan Dugan Sound Design	C1944	Killer Tracks	SL7615	Radio Frequency Systems	C2907
Davicom.....	C1124	Kings-Winchester Electronics	SU6213	Radio magazine	SL9123
Dawnco.....	SU7813	Kintronic Labs	C1332	Radio Systems	C3013
DaySequerra	N3400	Klotz Digital	C11827	RCS	C2628
DB Elettronica Telecomunicazioni ..	SU5610	KLZ Innovations	C862	RDL Radio Design Labs	C451
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DG FastChannel/Pathfire	N5123	Kramer Electronics	SL4505	Rees Associates	C4837
DH Satellite.....	SU7225	Larcant	SU3317	Remote Audio	C1457
Dielectric Communications	C2222	Lawo	C2217	Richardson Electronics	SU6814
Digigram.....	C1639, N1306	Lawson & Associates/Architects.....	C7846	Richland Towers	C1635
Digital Alert Systems	C3651	LBA Technology	N516	Riedel Communications	C6747
Disc Makers	SL8806	LEA International	N6121	RJS Electronics	N4416
DK Technologies.....	C1751	Leader Instruments.....	C8140	Rohde & Schwarz.....	SU3717
Dolby Laboratories	SU7917	Lectrosonics	C1717	Roland Systems Group.....	C4345
Dorrough Electronics	C3016	Location Sound.....	C1325	RTW	C457
DPA Microphones.....	C3319	Logitek Electronic Systems.....	C2636	RVR Elettronica	C848
DSI RF Systems	SU5717	Magnum Towers	C1307	S.W.R.	C1126
EchoStar	SU6020	Markertek	C5343	Sabre Towers & Poles.....	C1925
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Empire State Filter Company	C4839	Megatrax Production Music ..C757, SL8013		Sencore	SU4310
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AUDIO COMPASS

Audio Compass Navigator and P2P - Pointing the Way to Connectivity Your Low-Cost Audio Over IP Software Solutions

What is Audio Compass?

Audio Compass is the perfect software solution for your station's or network's remote broadcasting needs. Consider Audio Compass for sporting events, live remotes, remote talk show hosts, pre-recorded broadcasts and MORE. ISDN is obsolete and becoming more difficult to find. Other options are expensive, requiring a "degree" in the setup and implementation of the software/hardware. Since Audio Compass is purely software, once your computer is configured for connectivity (access to the Internet), Audio Compass just works! Networks, stations and remote broadcasters need a new, reliable technology that will fill this void, at an affordable cost. Broadband Internet connections, including wireless and wired are everywhere (well, almost). Allow Audio Compass to transfer low-delay, crystal-clear audio from one location to another – IP Audio at its best. If you need a great remote broadcast solution, look no further! If you can browse the web you can GO LIVE with Audio Compass.

Key Features of AC Navigator:

- ▶ See all Broadcast Locations in your Account Group - One Click and You're ONAIR
- ▶ Text-chat to all Members of Your Team, Instantly
- ▶ No Complex Configuration Required
- ▶ Nat Traversal Server
- ▶ UDP and TCP Support
- ▶ Support for LAN, WAN, Public Internet and 3G Wireless Networks
- ▶ Remotely Control Audio Switchers and Send Relay Closures via RS232 Serial Port
- ▶ Real-Time, Detailed Connection Statistics Window
- ▶ Direct Control Over the AC Audio Buffer (0 – 9999 ms), Providing the Greatest Flexibility for your Broadcast
- ▶ Choose from the G722, SPEEX and other Broadcast Quality Codecs. **Check our Website for Continued Updates.**
- ▶ Separate Send and Receive Audio Codecs

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Try the Audio Compass **Free Trial for 30 days**. Email info@audiocompass.com or call **888-62-AUDIO (28346)** to Setup your Test Account.

Testimonials:

"Audio Compass is on the cutting edge of remote broadcasting and where you need to be if you are a forward thinking company. Gone are the days of microwave shots and ordering ISDN lines. There's a new world of remote broadcasting and the internet is where it's at... Audio Compass is leading the way."

Al Camaione
Partner / Chief Information Officer
Atlantic Broadcasting Group

"Three years of using a Codec to link up with the production studio for a two hour talk radio show that's broadcast across the country was enough. However, when you add in the drops, and digital stutters it was maddening. When a production engineer from Langer Broadcasting called me up and said 'We're gonna go a different route', I was skeptical. However, I downloaded the trial version of Audio Compass and not only tested it with the production office, we did two shows with no incident! I made the purchase of this software and was thoroughly impressed with the attention given by Audio Compass Technical support in setting up this computer illiterate mouthpiece. Thanks Audio Compass!!! The sound quality and dependability will have me using this product for years!"

Rob Doherty
Outdoors this Week

Contact Information:

Sales and Support: 888-62-AUDIO (28346)
info@audiocompass.com www.audiocompass.com

iPhone IP audio codec application
Tieline Technology
Booth C157

Report-IT Live: This application allows reporters and announcers to send live broadcast-quality IP audio wirelessly from any remote location to a Tieline IP codec in the studio. Report-IT Live can broadcast live and record the broadcast of the iPhone at the same time, so a copy of the live report can be kept. Record an interview or report offline and then go live on the air later. Users can also report live and play grabs from any recorded interview while on the air. Audio files can be forwarded in real time to a Tieline codec in the studio for recording, or uploaded via FTP to a news server with no codec required in the studio. Tieline has designed and built the Report-IT Live hardware dock (sold separately).

888-211-6989; www.tieline.com; sales@tieline.com

Content management software
Netia Digital Audio
Booth SU3502

Manreo 2: Manreo 2 offers an open, scalable architecture along with all the tools needed to simplify the cataloging, indexing, accessing and distribution of media. It is designed to maximize productivity gains in asset management and the use of rich media, which in turn can be repurposed and published to platforms such as Web portals and mobile devices. The system supports all industry-standard formats, ingesting content, generating browse proxies, enriching media through speech-to-text functionality, and providing easy access to media. It also now incorporates the new Netia Workflow Engine as well as the Hypercast Warehouse set of archiving tools, a flexible platform entirely dedicated to media asset management. This powerful archiving manager at the heart of the system interfaces with acquisition, production, automation and storage applications.

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

CAT5e network cabling
Wireworks
Booth C8612

MCat524: The MCat524 is multi-pin based, multi-channel CAT-5e network cabling that eliminates individual cable runs, reducing the wear and tear on equipment by utilizing a sturdy multipin connector instead of the standard RJ-45 connector, creating a rugged point-to-point secure connection. MCat5 tails are configured to support six channels of 10/100/1000Base-T signals and equipment requiring four pairs per RJ-45. Tails are also available to support 12 channels of 10/100Base-T utilizing cable sharing technology. These cables are heavy-duty, yet small and light. Sections are available in lengths up to 250'.

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**Messagecasting software add-on
Broadcast Electronics
Booth C1628**

TRECast: Broadcast Electronics' Message Manager suite marketed under The Radio Experience (TRE) now offers new functions for RBDS, HD Radio, the Internet and Twitter. TRECast is a tool for creating instant unscheduled messages such as weather warnings, news alerts, or even live contest details to be delivered instantly to a single station or group of stations. These messages can be archived to a message clipboard for immediate access by announcers at any time, and from any station in the network for redistribution on RBDS, HD Radio, the Web or Twitter. This is in addition to TRE's new social network tagging capabilities, giving listeners the ability to receive a station's now playing data as well as earmark songs for purchase through the station's social networking feeds such as Twitter and Facebook. Compatible with BE's AudioVault and most other major automation systems, TRE messagecasting software enables operators to schedule text messages in much the same way they would schedule music, with a complete set of tools for generating and tracking advertiser, as well as promotional messages.

217-224-9600; www.bdcast.com; bdcast@bdcast.com

**Digital COFDM and analog
transmissions converter
Microwave Service Corporation
Booth C6419**

Block Down Converters: Available in the 2.0-2.7GHz band as well as the UHF bands (450-850MHz), Microwave Service Company's block down converters are designed to convert digital COFDM and analog transmissions to their respective signal range. The converter is a single conversion BDC with low phase noise and high linearity. Its front end features an LNA and ceramic filter that delivers a 3.5dB noise figure with a minimum conversion gain of 24dB. The UHF model also delivers a 3.5dB noise figure with an overall typical conversion gain of 24dB. DC power can be supplied locally or remotely via the coax to the IF output to both versions.

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www.larcan.com

Email: sales@larcan.com

AES digital to analog converter
Whirlwind
Booth C4342

AESDA: The AESDA provides AES digital-to-analog conversion while providing diagnostic analysis of the incoming digital signal to help in troubleshooting signal faults. It features 110Ω balanced and 75Ω unbalanced inputs. Dual function level meters display either digital input signal level or analog output level. Dual function LEDs display digital input information or signal condition/fault type. It also features separate balanced XLR and 3.5mm headphone outputs; each output has its own volume control.

800-733-9473; www.whirlwindusa.com
sales@whirlwindusa.com

Four-bay broadband FM antenna
ERI-Electronics Research
Booth C2032

Rototiller Axiom: The four-bay Axiom master FM antenna is a light-weight option as a main or auxiliary FM antenna for multiple FM stations. It has been used to provide backup FM transmission facilities for multiple FM stations in a single market area and as an emergency standby that can be deployed to restore service following a facility disaster.

812-925-6000; www.ERlinc.com; sales@ERlinc.com

Studio master clock sync generator
ATI Group
Booth C1720

MCDA-208/WC106: The Model MCDA-208/WC106 contains an ultra-low jitter 192kHz studio master sync generator, two independent 1x4 AES/EBU digital audio distribution amplifiers and a 1x6 clock distribution amplifier. It is designed to give studios centralized control over their digital audio signals.



When used as a studio master clock, the MCDA can generate an exceptionally stable 44.1, 48, 88.2, 96, 176.4 or 192kHz clock reference for the purpose of synchronizing all digital equipment. Automatic fallback allows external sync signals to be used, with the internal generator providing backup if external timing is lost.

856-626-3480; www.atiaudio.com; sales@atiaudio.com

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South West	1.210.775.2725
North Central	1.513.376.8600
Pro Audio	1.877.640.8205
Latin America	1.760.650.1427
Bradley Division	1.800.732.7665





Portable recorder
Tascam
Booth SL1717



DR-2d: The DR-2d is a portable digital recorder that brings high-resolution recording to a compact package. It offers up to 96kHz/24-bit audio resolution, capturing WAV or MP3 files to SD Card media. The new stereo condenser microphone design has a 74dB signal-to-noise ratio for dynamic recordings. The dual recording feature prevents overload by recording a second track at lower level, ensuring recordings won't be ruined by distortion. The DR-2d offers variable speed audition to slow down music without changing the pitch. A metronome and digital effects are also included, as well as an overdub feature for sound-on-sound recording.

323-726-0303; www.tascam.com; tascamlit@tascam.com

Dynamic stereo headphones
Hosa Technology
Booth SL2507



HDC-800: HDC-800 headphones feature closed earpieces for isolation and bass response combined with a collapsible, fold-flat design for convenient storage. The dynamic stereo headphones employ 40mm drivers for linear frequency response that extends from 20Hz through 20kHz. Featuring a gold-plated 3.5mm stereo plug and 1/4" adaptor, the headphones are outfitted with a 10' cable. An extra-wide headband ensures comfort.

**714-736-9270; www.hosatech.com
lee@hosatech.com**

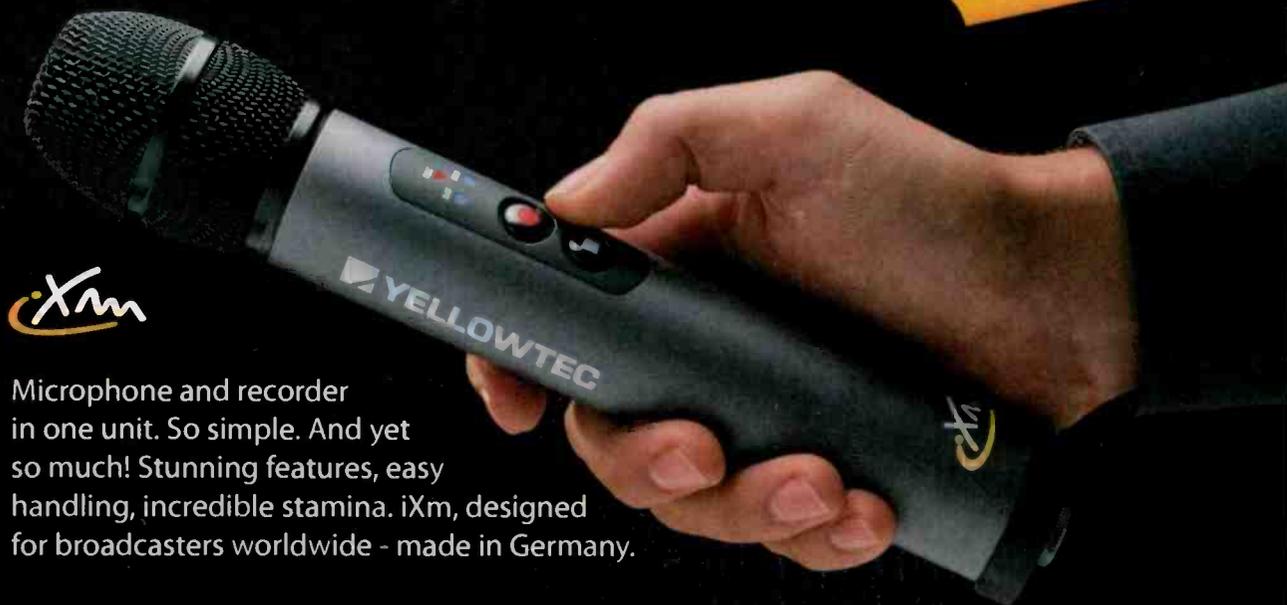
Printed acoustic panels
Acoustical Solutions
Booth C4937

Acoustiprint: With Acoustiprint acoustical panels, beautifully printed images transform acoustical treatment into wall display art. Decorate a station with customizable panels featuring station logos. Acoustiprint panels are Class 1 fire rated, NRC rated at 0.85-1.15, available in custom sizes with various mounting systems and optional beveled or radius edges.

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Automated closings
CGS Infographics Automation
Booth SU2602

Closenow: This system automates the collection and distribution of weather-related school, business, church and activity closings. Designated officials have the choice to submit a closing or delay through an encrypted website log-in process, or through a password-protected, touch-tone voice-prompt system. Closing information is made available for station personnel in a Web browser interface. The system automatically updates the information to one or multiple station websites. Closenow also now has an automated voice synthesis feature to read the closings on air. In addition, CGS offers an optional service to deliver automated e-mail and/or text alerts to subscribers. A listener can opt in to receive alerts on a specific organization through a station's website.

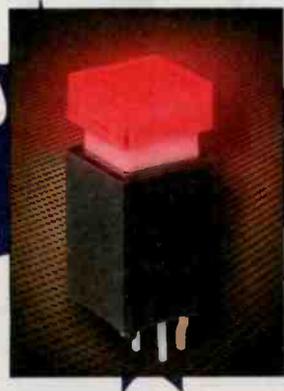
859-299-4081; www.cgsautomation.com
sales@cgsautomation.com

Free sound effects
Blastwave FX
Booth SL8813

Download Pack 1: The Free Sound Effects Download Pack 1 contains 68 favorite sound effects selections from 40 Blastwave FX libraries. Sonic novelties include angry goat bleating, bursting fireballs, robot footsteps, a pixie dust fly-by, digital glitch, low frequency tremors and much more. The 68 sound effects are available for all to use on a royalty-free basis via a Creative Commons License.

www.blastwavefx.com; info@blastwavefx.com

Subminiature pushbuttons
NKK Switches
Booth N6425



HB2 Series: The HB2 Series of subminiature pushbuttons offer full-face illumination and quiet actuation. The compact and contemporary series was developed in response to design engineers' requests for a smaller version of NKK's KPO1 Series of pushbuttons. HB2 Series switches are SPST momentary devices featuring quiet

actuation combined with a crisp tactile feedback. These pushbuttons come standard with either red/green or red/yellow bicolor built-in LEDs; the red/yellow combination can be combined to produce amber illumination. The LEDs are an integral part of the design and as a result, illumination is evenly diffused throughout.

480-991-0942; www.nkkswitches.com
sales@nkkswitches.com

Digital audio mixer/router
Sonifex
Booth C2739

RB-DMX4: The RB-DMX4 is a digital mixer capable of mixing or routing four mono input channels into four mono outputs, or two stereo inputs into two stereo outputs. The inputs are sample rate converted to allow sources of different sample rates to be mixed. The flexible Mix Matrix allows for a wide variety of mixing options and creativity, using four blocks of four-way DIP switches to select which inputs are mixed or routed to which outputs. Each input has a trim pot. Audio presence LEDs around each input button give an indication of input audio level. There is one LED for each channel. There are also four presence LEDs around the monitor button that give an indication of output level. Additional gain can be added by accessing the output gain mode.



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NAB booth # C1926



Saturday April 10, 2010			Room
SBE Ennes Workshop	8 a.m. - 9 a.m.	Audio over IP Tutorial: Part I	S219
	9 a.m. - 9:10 a.m.	Opening Remarks	
	9:10 a.m. - 10 a.m.	Audio over IP Tutorial: Part II	
	10 a.m. - 10:45 a.m.	Next Generation EAS	
	10:45 a.m. - 11:30 a.m.	Considerations for Adding Mobile DTV to a Broadcast Station	
	11:30 a.m. - Noon	SMPTE Update	
	1 p.m. - 2 p.m.	Management/Media Skills and the Future of Broadcast Engineering	
	3 p.m. - 3:30 p.m.	HD Radio Update	
	3:30 p.m. - 4 p.m.	Wireless Mics after the DTV Transition	
4 p.m. - 4:45 p.m.	Impacts of 3-D Television on Video and Broadcasting		
4:45 p.m. - 5:30 p.m.	Reorganization of Broadcast Workflows		
Sunday April 11, 2010			Room
	9 a.m. - 9:30 a.m.	NAB Broadcast Engineering Conference Opening Session and Keynote	S219
Digital Radio: Advancements in Technology	9:30 a.m. - 10 a.m.	AM IBOC Update	S219
	10 a.m. - 10:30 a.m.	When and How Will Terrestrial Radio Go Digital in Europe?	
	10:30 a.m. - 11 a.m.	Electronic Program Guide Field Trial: How HD Radio EPG Works	
	11 a.m. - 11:30 a.m.	Laboratory Test Results of Digital Radio Technologies, DAB, DAB+, T-DMB Audio and HD Radio	
	11:30 a.m. - Noon	Digital Power Enhancement for DRM	
FM Digital Radio	2:30 p.m. - 3 p.m.	HD Radio Sideband Power Boost: Your Questions Answered	S226
	3 p.m. - 3:30 p.m.	Planning for the Increase in Digital Power for FM HD Radio Signals	
	3:30 p.m. - 4 p.m.	Extending Your HD Radio Footprint	
	4:00 p.m. - 4:30 p.m.	Practical Tools for HD Radio	
	4:30 p.m. - 5 p.m.	HD Radio, the Way Forward	
	5 p.m. - 5:30 p.m.	Translators and Boosters - What You Need to Know	
5:30 p.m. - 6 p.m.	Putting the IBOC Quality Metric to the Test		
Monday April 12, 2010			Room
	9 a.m. - 10:15 a.m.	All-industry Opening and Keynote	Barron
Radio Facilities	10:30 a.m. - 11 a.m.	The Smart Site: Integrating Intelligence into all Facets of the Broadcast Facility	S226
	11 a.m. - 11:30 a.m.	Reducing Operation Costs with Better Monitoring and Control of Transmitter Facilities	
	11:30 a.m. - Noon	Radio in a Cloud	
IP Audio for Radio	1 p.m. - 1:30 p.m.	LANs, and Drivers and Fares - Oh My!	S226
	1:30 p.m. - 2 p.m.	Extending AoIP to the Transmitter	
	2 p.m. - 2:30 p.m.	Beyond Automation - Intelligent Software Design For Live Assist Applications	
	2:30 p.m. - 3 p.m.	VoIP in the Broadcast Studio	
	3 p.m. - 3:30 p.m.	Going National: Special Considerations for Large Scale Deployments of Audio over IP	
	3:30 p.m. - 4 p.m.	An Introduction to IEEE 802.1 Audio/Video Bridging for Radio Broadcasters	
4 p.m. - 4:30 p.m.	Point-to-Point Audio Distribution: It's Not Just Satellite Anymore		
Tuesday April 13, 2010			Room
Radio Data Services	9 a.m. - 9:30 a.m.	Emerging Bonded Meta-Data Applications Accessible Radio Services	S226
	9:30 a.m. - 10 a.m.	Saving Lives with FM Radio-Based Mass Notification	
	10 a.m. - 10:30 a.m.	The Benefits of Using FM RBDS Data in Integrated Public Alert and Warning	
	10:30 a.m. - 11 a.m.	Do More with RDS Data	
	11 a.m. - 11:30 a.m.	Providing Media-Rich Content Using Digital Radio	
	11:30 a.m. - Noon	Enhanced Radio Broadcasting: Next-gen Features for Connected Devices	
	12:30 p.m. - 2 p.m.	Radio Luncheon	Barron
	1 p.m. - 2:15 p.m.	The New FCC Database: A Sneak Preview	N232
	2:30 p.m. - 3:45 p.m.	The Washington Face-off	N250
Radio Case Studies	1 p.m. - 1:30 p.m.	Poor Man's Method of Moving Audio	S226
	1:30 p.m. - 2 p.m.	Satellite Distribution of HD Radio and Analog FM using HDC	
	2 p.m. - 2:30 p.m.	Maximizing the Reliability of Studio-to-Transmitter Links for Radio	
	2 p.m. - 2:30 p.m.	Indoor Noise Conditions in the FM Broadcast Band	
	3 p.m. - 3:30 p.m.	Case Study: PRSS Next Generation Content Delivery	
	3:30 p.m. - 4 p.m.	Radio Living in a Multimedia World	
	4 p.m. - 4:30 p.m.	Detuning in the MOM Era	
	4:30 p.m. - 5 p.m.	Telephones in Your Studio or Newsroom: Big Changes Coming	
	5 p.m. - 5:30 p.m.	Power Quality in Communications Facilities	
	5 p.m. - 6 p.m.	SBE Membership Meeting	S228

SESSIONS

Wednesday April 14, 2010			Room
Disaster Preparedness, Recovery and Security	9 a.m. - 10 a.m.	Are You Prepared for a Disaster?	S228
	10 a.m. - Noon	Putting the Final Touches on Next-Generation EAS Panel	
	Noon - 1:30 p.m.	Technology Luncheon	Barron
Spectrum Issues for Broadcasters	2 p.m. - 2:30 p.m.	Leveraging White Spaces and an Introduction to the New Networks Being Built with Them	S226
	2:30 p.m. - 3 p.m.	Wireless Microphone Testing for White Space Proceeding in Mid-town Manhattan	
	3 p.m. - 3:30 p.m.	What Wireless Mic Users Need To Know about White Spaces and the 700 MHz Band	
	3:30 p.m. - 4 p.m.	Radio Communications in Today's Complex RF World	
	4 p.m. - 4:30 p.m.	Broadcast Operation and Co-existence in the White Space Era	
	4:30 p.m. - 5 p.m.	Spectrum Issues Panel Session	
	6 p.m. - 8 p.m.	Amateur Radio Operators Reception	Ballroom B
Thursday April 15, 2010			Room
Green Technologies for Broadcasters	9 a.m. - 9:30 a.m.	Sustainable Facilities and LEED Certification: A Broadcaster's Guide	S226
	9:30 a.m. - 10 a.m.	Building a LEED, WEEE, and RoHS Facility	
	10 a.m. - 10:30 a.m.	Hollywood East: Home of Sustainable Production	
	10:30 a.m. - 11 a.m.	Best Practices for the Design of Facilities	
	11 a.m. - 11:30 a.m.	HD Quality Energy Efficient, Low Heat Broadcast Lighting	
	11:30 a.m. - Noon	Alternative Power Options for Broadcasters	

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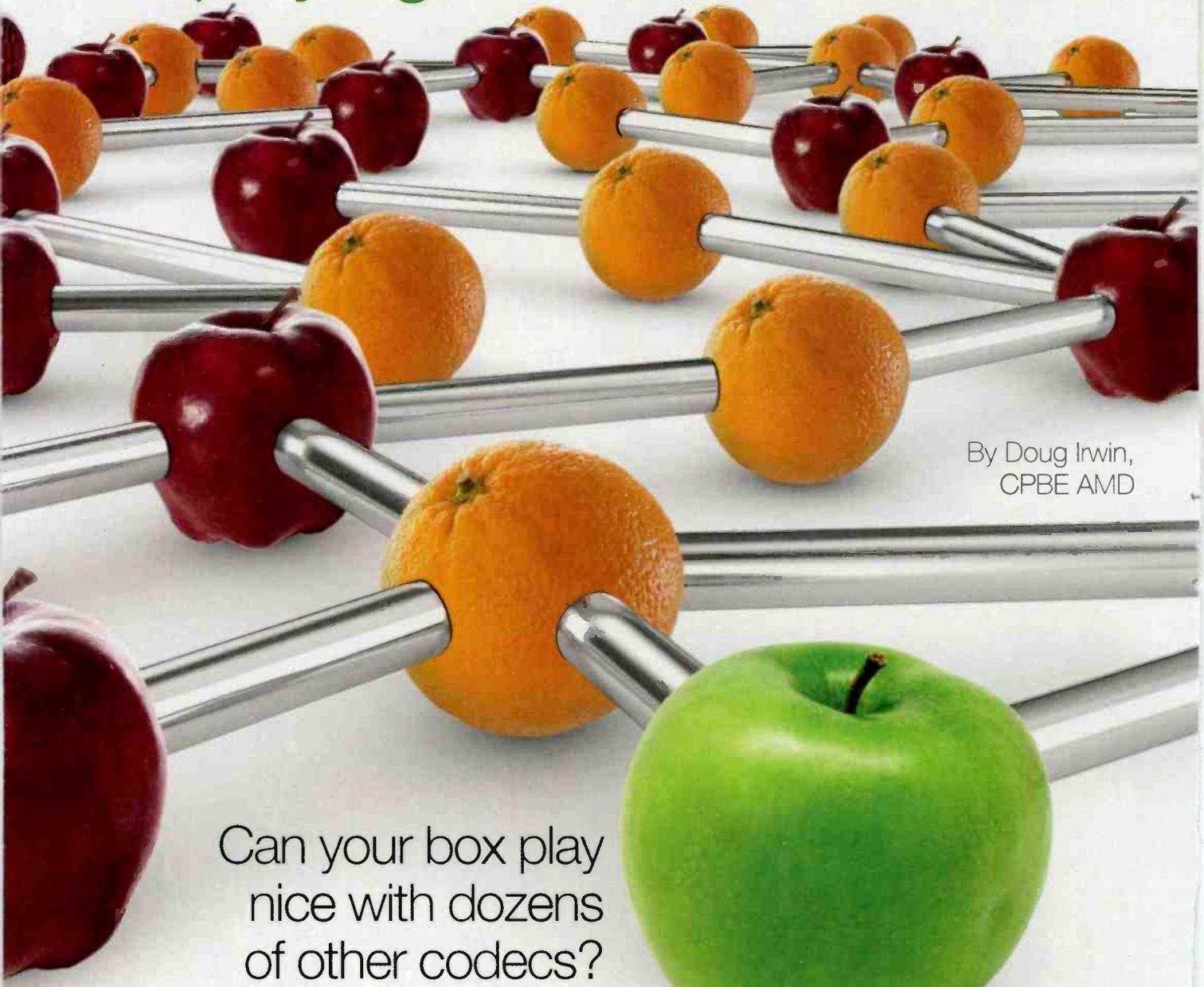
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N/ACIP:

Simplifying codec connections



By Doug Irwin,
CPBE AMD

Can your box play nice with dozens of other codecs?

As IP codecs become more and more familiar around the broadcast plant, and their use becomes more commonplace, it's only natural to expect that one day you might want to make an audio-over-IP connection with some entity that has a different brand of codec than you do. This was certainly a selling point with some ISDN codec manufacturers, and now is becoming one with IP codec manufacturers as well.

In 2006, some German vendors and broadcasters put forth the idea that interoperability between IP codecs was desir-

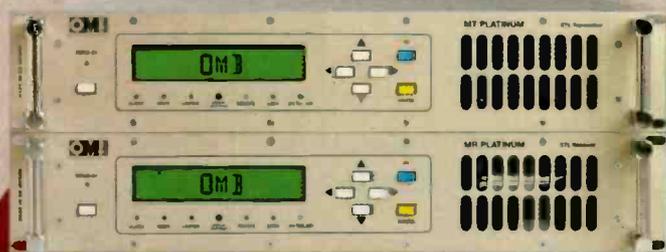
able, and soon thereafter the EBU formed a group (N/ACIP) to establish audio compatibility over IP standards with two main objectives. The first was interoperability of devices from different manufacturers, and the second was to provide guidelines to broadcasters for the introduction of audio contribution over IP. I'll investigate what N/ACIP means and how it can benefit us.



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EM 2000

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

EM 10000

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

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N/ACIP

Standards

The interoperability standards in N/ACIP are based on two different aspects of codec operation. First, for a codec to meet the standards, it has to include at minimum the following codec algorithms: G.711, G.722 and MPEG-1/2 layer II. In addition, the unit in question must also support plain old

PCM (not the AES/EBU data stream we are accustomed to). For the MPEG Layer II codec, many bit-rate/sampling-rate combinations are mandatory, as seen in Figure 1.

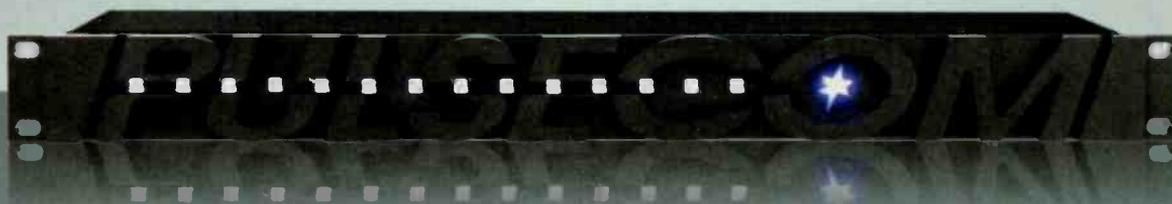
In addition to the required codecs and PCM, there are recommended codecs: MPEG-4 AAC, MPEG-4 AAC LD, and MPEG-1/2 Layer III with various bit-rate/sampling-rate combinations, as seen in Figure 2.

Bit Rate (kb/s)	Sampling Rate			
	16kHz*	24kHz*	32kHz	48kHz
32	M			
40	M			
48	M			
56	M			
64	M			
80		M	M	M
96		M	M	M
112		M	M, JS, S	M, JS, S
128		M	M, JS, S	M, JS, S
160			M, JS, S	M, JS, S
192†			M, JS, S	M, JS, S
224			S	S
256†			S	S
320			Frame Too Large	S
384†			Frame Too Large	S

* MPEG-2 † Optional for portable equipment
M = mono, JS = joint stereo, S = stereo

Figure 1. N/ACIP bit-rate/sampling-rate combinations for Layer II. Mandatory rates are shown in bold.

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Another one of the interoperability standards describes the means by which the packets are built up by the encoder. The N/ACIP compliant device must use RTP (real-time transport protocol), which uses UDP for its transport method. User Datagram Protocol (UDP) is the connectionless transport method used in IP, as opposed to TCP, which is the connection-oriented transport method in IP. Whereas TCP allows for the retransmission

of lost packets, UDP does not; any error correction methodologies (such as forward error correction) must be implemented by the application running on top of UDP. A UDP data stream has less overhead than TCP, so in that sense at least, it provides a more efficient use of available bandwidth.

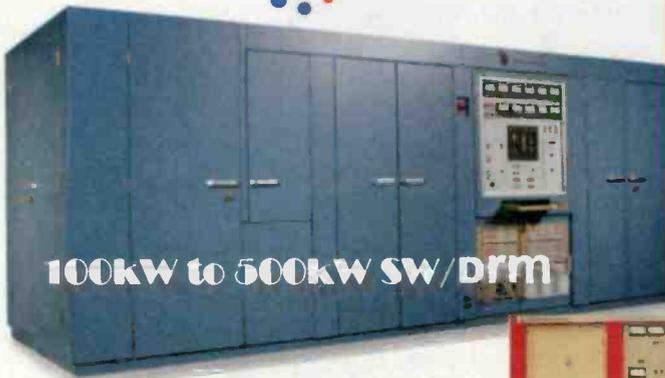
Another aspect of the operation of a N/ACIP-compliant codec is the use of SIP to establish a session

Bit Rate (kb/s)	Sampling Rate			
	16kHz*	24kHz*	32kHz	48kHz
32	M	M		
40	M	M		
48	M	M	M	M
56	M	M	M	M
64	M	M	M	M
80		M	M	M
96		M	M	M
112		M	M, JS, S	M, JS, S
128		M	M, JS, S	M, JS, S
160			M, JS, S	M, JS, S
192†			M, JS, S	M, JS, S
224			S	S
256†			S	S
320			Large Frame	S

* MPEG-2 † Optional for portable equipment
M = mono, JS = joint stereo, S = stereo

Figure 2. N/ACIP bit-rate/sampling-rate combinations for Layer III, AAC and AAC-LD. Mandatory rates are shown in bold.




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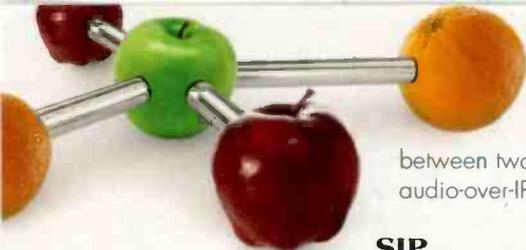


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N/ACIP

between two endpoint devices (i.e., two audio-over-IP codecs).

SIP

What is SIP? Let's take a look at SIP and see why its use makes sense, along with some particulars about how it works.

SIP stands for Session Initiation Protocol. It's an application layer protocol that is agnostic about what transport layer it runs on top of – for example it will work with either UDP or TCP. The job of SIP is the creation, modification (if needed) and termination of sessions between two endpoints – which would be two IP codecs. By the way, in the parlance of SIP, these endpoints are also known as UAs (user agents).

Consider this common scenario, which should clarify the advantage to using SIP.

Say you are a news reporter, and your typical means of communicating with your HQ is by way of an IP codec that can work over wired networks or Wi-fi networks. As you move around and connect to various networks, your IP codec will necessarily have to get a new IP address every time (likely by way of DHCP). For HQ to initiate a connection with you, it would have to have an updated IP address each and every time you moved.

This would be like using a cell phone that had its number change every time you got into a different cell. Not very practical – you'd be tough, if not impossible, to reach.

With SIP, your codec gets a URI (Uniform Resource Identifier). This looks and sounds very much like a Web address, probably because SIP is modeled on HTTP. The format of the URI is SIP:username@domain.com. For our example then, say our news reporter has a URI of SIP:newsguy@bignewsnetwork.com. Every time newsguy gets on a different network, his codec registers its new IP with a registrar server that functions very much like a DNS server. (HQ could very well be hosting its own SIP server, which, among other things, performs the registrar server duties. This server would live on the public side of a firewall on the network.) When HQ wishes to contact newsguy, it does so by dialing his URI on the codec at HQ. SIP uses the updated information in the registrar server to come up with the actual IP.

Aside from putting the two endpoints in contact with one another, SIP also sees to it that they agree on the codec to be used, thus assuring that they actually do pass audio from one end to the other. After the session is established, SIP goes idle; the two endpoints connect directly with one another for the actual passage of the payload data. Once the session is over, SIP is also used to tear down the link and effectively end the communications.

Applications

So, to review, the standards for N/ACIP interoperability are just these: each device must use RTP over UDP in building the packets; audio must be sent using

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one of three codecs or PCM; and the initiation and termination of sessions between endpoints is done via SIP.

Most of the major codec manufacturers offer N/ACIP compliance in their product lines.

The ubiquitous nature of the Internet opens up many new possibilities for unique programming elements at a radio station. For news/talk stations: Need to send talent off to the war zone? For CHR stations: What about an impromptu interview with talent that is touring overseas? For sports stations: Dead audio pairs in the locker room? With the ever-increasing number of IP codecs in existence around this country and overseas, N/ACIP compliance is an important feature to consider when outfitting your own station with an IP codec or two. Sure, when you buy a pair of them, you're going to buy both from the same manufacturer; but when connecting on the spur of the moment to a location you never heard of that morning, knowing your box can talk with many of the dozens of codecs out there already is going to increase your chances of success.

Irwin is transmission systems supervisor for Clear Channel NYC and chief engineer of WKTU, New York. Contact him at doug@dougirwin.net.



N/ACIP Rundown

Which IP codecs support N/ACIP? Here's a list of several.

- **AETA**
AETA was an early participant in N/ACIP compatibility.
- **Comrex**
A 2009 firmware release for its Access IP codecs makes them N/ACIP compatible.
- **Digigram**
The Iqoya link is N/ACIP compatible.
- **Mayah Communications**
The C11 series codecs, Sporty and Flashman are N/ACIP compatible.
- **MDO UK**
The Audio-TX STL-IP is compatible with N/ACIP.
- **Musicam USA**
The Suprima LC, Road Warrior and Suprimax are N/ACIP compatible.
- **Orban**
The Opticodec 7600 is N/ACIP compatible.
- **Telos Systems**
The Zephyr/IP is N/ACIP compliant.
- **Tieline Technology**
All IP codecs are N/ACIP compatible.
- **Worldcast Systems APT**
APT was an early adopter and participant of the N/ACIP standard and supply the Worldnet Oslo, Worldcast Equinox, Eclipse and Meridian as fully compliant codecs.



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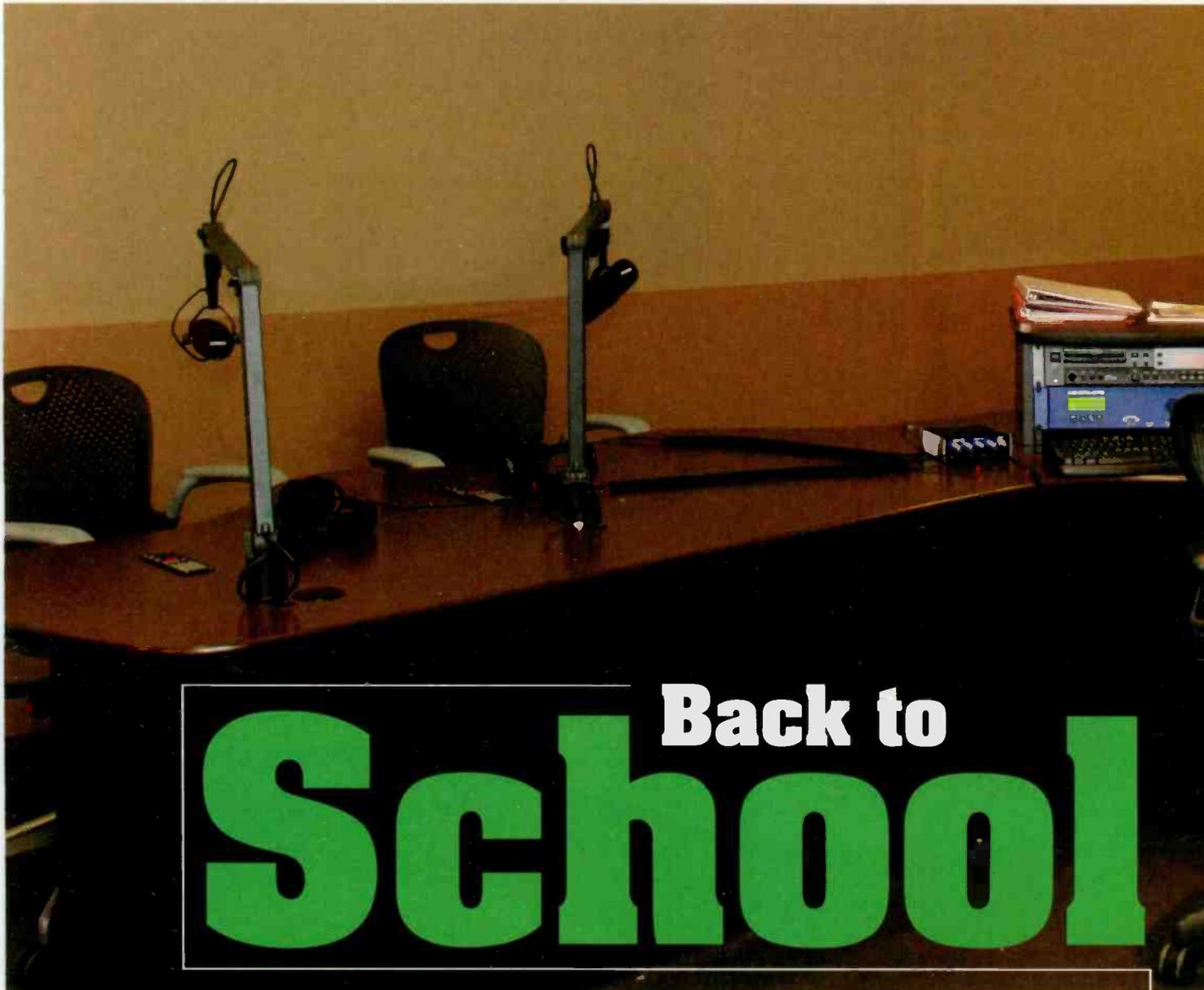
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Back to School

The KUNV air studio – an identical studio in the facility will serve as the control room for a future HD Radio channel.

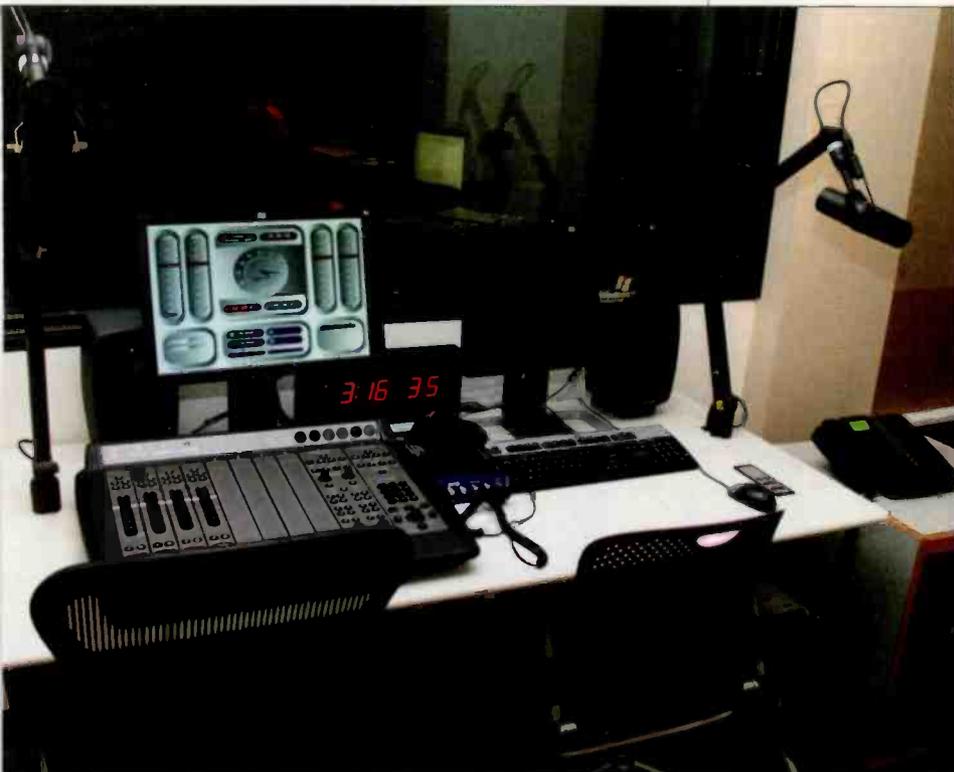
KUNV returns to the campus of the University of Nevada, Las Vegas as part of the Greenspun Hall project.

By David Reese



For the past 10 years, KUNV has been housed in an office complex a few blocks from the campus of UNLV. While the facility was adequate (the previous tenant being another Las Vegas radio station), the distance between the station and campus kept student involvement to a minimum and didn't allow the station to become an active member of the campus community. KUNV is licensed by the Nevada System of Higher Education Board of Regents and is operated by UNLV under the Journalism and Media Studies program, so a greater campus presence has long been desired. The University received a \$37 million donation from the Greenspun Family Foundation for a project that ultimately became almost a \$94 million public/private enterprise to build Greenspun Hall, which would house the various units that make up the Greenspun College of Urban Affairs as well as KUNV and UNLV-TV. Construction of the building began in January 2007 and the various academic units would move into the building early in the fall semester of 2008. The radio facilities moved in late August 2009, about a year after the building opened, while the television facilities were being completed in November 2009.

Back to School



The KUNV news booth is adjacent to the air studio.

Designing for radio

The radio complex was designed around a three-studio concept, which was similar to the old facility. The on-air studio and an identical production studio are located at opposite ends of one hallway, while a large performance studio is situated between them. The performance studio has its own recording control room and isolation booth and also serves as an interview studio. One challenge of the project was to build a modern, state-of-the-art facility, yet keep the design simple enough for students and community volunteers who would be involved in the station's operation. Another challenge was to build a radio station within an environment that served other purposes and would probably be noisier than your typical radio facility. And a final challenge was to recover some of the old equipment, but in such a way that the old facility would stay operational until a seamless switch could be made to the new facility.



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Looking into the performance studio from the recording control room

The radio studios were designed and built with sound proofing considerations in mind. The Russ Berger Design Group provided acoustical and interior design for the

broadcast area. The studio walls are splayed to lessen sound reflections and standing waves, acoustic foam and diffusion panels are liberally used, and window partitions are sealed double-glass. In addition, each studio area is essentially a box-within-a-box. The studio floors float on neoprene isolators and ceiling and walls are separate from the main building structure. Studio doors are STC-50 rated and feature Cam Lift hinges and magnetic seal plates to provide a positive seal in the closed position.

Each of the studios at KUNV was built around Omnirax studio furniture. We felt this broadcast furniture was ergonomically friendly, aesthetically pleasing and sturdily built. The furniture follows a typical U-shaped plan, but was custom designed to fit the size and shape of the room housing it and the equipment employed in that studio. Three HP L2045w 20" LCD TV monitors are stand mounted behind the control surface to provide a display for the Encc automation, Axia

system and general Internet information. Because the entire broadcast facility was designed to be an IP audio based operation, the Axia Livewire system with Element

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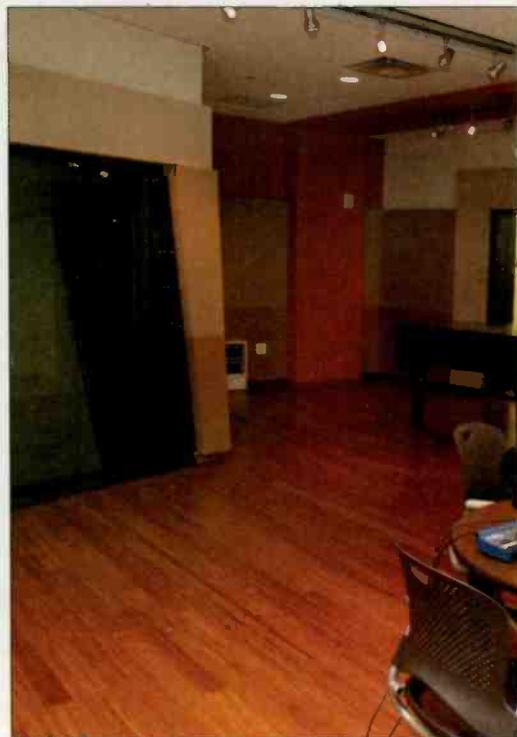


RDL
Radio Design Labs

Back to School



A recording control room is part of KUNV's performance studio.



The KUNV performance studio

control surfaces was selected for the on-air, production, and news booth studios.

For our digital playback and automation, we chose Enco's DAD with Presenter. This was a major change in our operation as we had previously played back our music from CD. Prior to our move, more than 75,000 songs were digitized to provide a library for our jazz and other programming formats. We chose the Enco

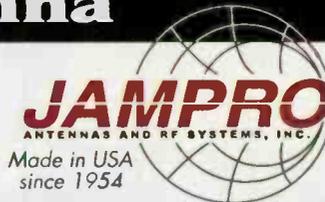
digital delivery system because it could handle a large database and provided several other features we desired, such as

easy remote access and control and smooth integration with NPR's Content Depot. The Enco system also had an interface display that could be kept simple for our community volunteer operators. These studios also house a Tascam CD-RW901SL recorder, which provides both a back-up playback source should the Enco system suffer a catastrophic failure and air check recording for the announcers.

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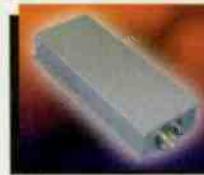
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The performance studio from the other side of the room

We also chose Shure SM-7B microphones throughout the facility because of their flat, wide-range frequency response, exceptional rejection of electromagnetic hum, and minimum coloration of off-axis sound, which greatly helps announcers who tend to wander off mic. The Mika Yellowtec mic arms provide a neat, pleasing studio look as well as stable control of the microphone position. Genelec monitors were also used throughout the facility with the 8040A bi-amplified model most prevalent. Sony MDR-7506 headphones and a Presonus HP4 headset amp provide personal monitoring in each of these studios. The on-air studio looks into a news booth, which is equipped similar to the other studios, but on a smaller scale.

Designing for performance

The performance studio is intended to be the site of many live and live-to-recording performances tapping into the available musicians who make Las Vegas their home or performing base. The recording control room houses a Yamaha O2R96 console and is designed for 7.1 surround sound production with seven Genelec 8040A monitors and a 7050B active subwoofer. Editing can be accomplished with Adobe Audition 3.0 and a Sony 32" WEGA LCD flat panel display stand-mounted directly behind the audio console. Additional audio sources can be handled in this studio with a Tascam DA-40 DAT recorder and MD-350 MiniDisc recorder along with a Marantz PMD325 CD, Denon DN-780R cassette, and Gemini XL-120 turntable.

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Back to **School**



A small edit suite (Edit A) utilizes repurposed equipment from the old KUNV facility.

In addition to musical performances, the performance studio is designed for interview programs. A custom-built interview table has ample room for a host and three guests with Rode NT2000 microphones at each location on Mika Yellowtec arms and a Rane HC 6S headphone amp centered and flush mounted in the table top. Normally positioned to look directly into the recording control room, the interview table can be rolled to the side of the studio when a musical performance is under way. The performance studio also houses a baby grand piano and has an isolation booth for drums or soloists depending on the recording requirements.

Two edit suites were built using mostly repurposed equipment from the old facility. Centered around Mackie mixers (1642 and 1202 VLZ models), the suites have Electro-Voice RE20 microphones, JBL Control 5 monitors, Telos One telephone interfaces, Denon DN-C635 CD players, Tascam DA-30 MKII DAT recorders and some additional miscellaneous equipment. Production work is accomplished using Adobe Audition 3.0. Although the edit suites were intended primarily for student production projects, they also provide KUNV with additional studio spaces for basic voice-over production or telephone interviews.

A central TOC is shared by both radio and television and houses 46 Stantron Broadcast E-Rack units; each 45RU x 36" D. Radio equipment currently is

Equipment List

Adobe Audition 3.0
Axia Livewire
Broadcast Electronics 10S
Denon DN-780R
Electro-Voice RE-20
Enco DAD, Presenter
Gemini XL-120
Genelec 8040A, 7050B
Mackie VLZ 1202, VLZ 1642
Marantz PMD325
Omnia 6 EXI, One
Omnirax furniture
Presonus HP4
Rane HC6
Rode NT2000
Russ Berger Design Group,
acoustic design
Shure SM-7B
Sony MDR-7506
Stantron E-Rack
Tascam CD-RW901SL, DA-40,
MD-350
Yamaha O2R
Yellowtec Mika

located in four racks with additional racks available for future expansion or new equipment. Wiring throughout the facility is carried in over-head wire trays and is a combination of fiber, coax, and CAT-6. To transport audio and data from the studio facilities to the transmitter location, we chose a Dragon Wave Horizon Compact system. With 300Mb/s throughput, this system allows us to transport our digital audio stream uncompressed from a local Axia node to another node at our nearby mountaintop transmitter site. From there an AES connection runs to an Omnia 6 EXI, which not only processes our analog signal, but will also act as an HD1 processor for our main channel. An Omnia One will handle the HD2 processing, which is scheduled to be on-air next summer. Finally a BE10S transmits our signal through a three-bay antenna located on Black Mountain, giving us city grade coverage of the Las Vegas valley and most of Henderson, NV.

As a broadcaster, it isn't often you get the opportunity to have a say in building a new radio station from the ground up and when you do the process can be daunting, but when the finished facilities meet the goals

and expectations of all involved it's a great feeling. Today, KUNV serves the UNLV campus and the Las Vegas community from state-of-the-art facilities and it truly is a great feeling.

*Reese is general manager of KUNV 91.5 FM, Las Vegas.
Photos by Ginger Bruner.*



The KUNV newsroom

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The technology behind KUNV

Omnirax Innova Furniture



The 10-studio Omnirax Innova installation at the University of Nevada, Las Vegas furnished both KUNV Radio and UNLV TV. This project followed the Omnirax

proven formula of close collaboration with both the management staff at UNLV and the engineers and integrators at Azcar Technologies. Azcar provided the rough furniture layouts, to which Omnirax applied its signature design concept rendered as 3D images for client approval. The custom components were then built and fit-tested in the Omnirax shop before shipping to UNLV to be assembled by an Omnirax technician, working alongside Azcar personnel, making for a swift and seamless integration. Omnirax is currently completing an installation at another Las Vegas facility, KLVX, the local PBS TV affiliate. What happens in Vegas, doesn't have to stay in Vegas.

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Mike Pappas heads up a recording and broadcast of the CSO,
featuring Yo-Yo Ma, with Colorado Public Radio

By Candace Horgan

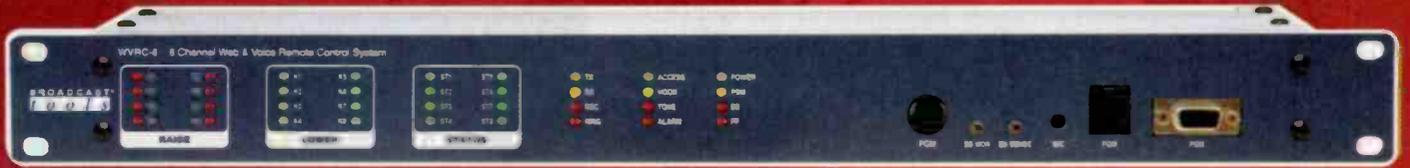
When the Colorado Symphony Orchestra began to feel the economic pinch this year, it came up with several novel ways of addressing potential budget shortfalls. In addition to across-the-board pay cuts, the CSO teamed with Colorado Public Radio for a three-day pledge drive that culminated with a concert with acclaimed cellist Yo-Yo Ma.

CPR broadcast the CSO/Yo-Yo Ma concert live to 22 radio stations in Colorado in DTS Neural 5.1 Surround. All told, the drive raised more than \$600,000.

When the CSO looked into having the concert broadcast, it selected someone it worked with before, Mike Pappas. Pappas has been recording "forever" in his own words. "I sold my car

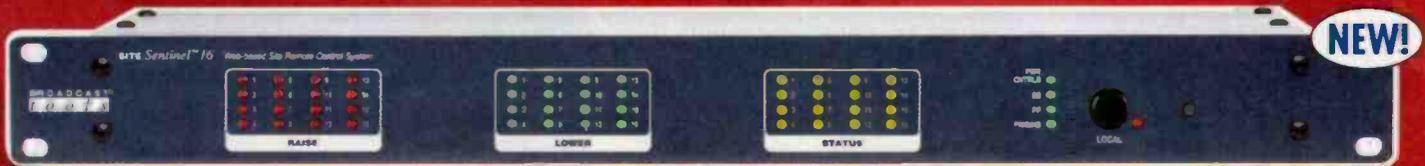
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and bought a Scully 280 two-track, 1/4" tape recorder, which I used to carry in a flight case and lug around to gigs," he says. "It weighed like 90 pounds. I had 14" reels on it so I could actually record for an hour."

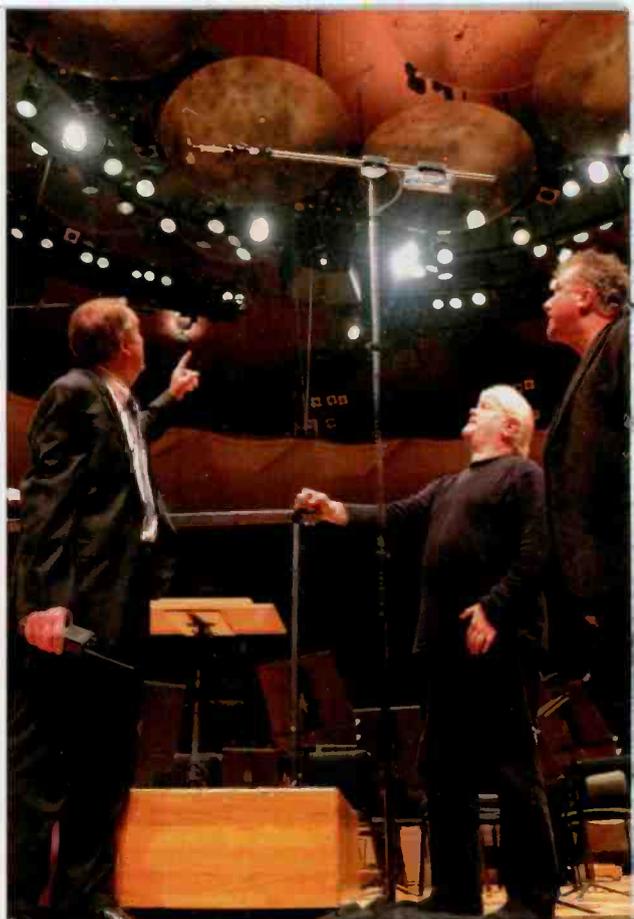
Setup problems

Pappas is technically an independent consultant, though he often works with KUVU Public Radio and considers it home base. He first worked with the CSO in 2004, on a recording of Dianne Reeves playing the CSO.

"The CSO called us a couple years back to do 10 days of Beethoven, so we loaded in May 28 and were out of here on June 13," explains Pappas. "There were usually two performances a day, or a rehearsal and a performance. None of those rehearsals and performances were the same, so you'd rehearse one thing and they'd be performing something different that night. I think we had, at one time, 12 different sets of tape marks on the hall floor as to where microphone moves were for specific events. We had to take the stage apart from the morning rehearsal and then put it back up for the evening performance."

The Boettcher Auditorium itself is idiosyncratic, with several problems an engineer has to consider in setting up a recording.

"The whole hall is in a really weird spot," laughs Pappas. "Half the audience is behind you and none of the seating areas are symmetrical. It's hard to find a center line in that



Mike Pappas checks mic placements while David Day looks on.



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Pappas sets levels before the concert.

room. It has quirks, like players on the right hand of the stage can't hear players on the left hand of the stage. It's particularly interesting problems out there, so all that plays into gear we use and how we get it to work."

Microphone paradise

On a tour of KUVU, Pappas' assistant Will Barnette

unlocked the equipment cabinet and revealed a Neumann lover's paradise, with M150s, U87s, a U67 and more. For the Yo-Yo Ma concert, which was held in the Boettcher Auditorium, Pappas turned to a prototype Neumann microphone, the KM133D, a digital microphone. The microphone uses an M50 titanium capsule, which Pappas said is ideal for many classical applications.

"It's mounted in a sphere, so at low frequencies the microphone is an omni. As we get above 1kHz the microphone develops a cardioid pattern. Then above 16kHz it's a hyper-cardioid," explains Pappas. "With classical work, that allows you to be real creative. Being omni at low frequencies allows us to integrate some of the room tone. The other cool thing about omnis is they are extremely flat in their frequency response. Now, the Germans won't tell you this, but the capsules on those digital mics, or the M150s for that

matter, are 3dB down at 2.5Hz. We have lots of low frequencies, and that's good, because you don't want to have rolloff that's going to look back anywhere into the audio passband. You want to keep that as far out of the audio band as possible, because the minute you have a rolloff, you have a phase shift. Omnis are cool for that, but the problem with omnis is they are omnis, so you

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Making final settings on the surround encoder

want something with some directivity at high frequencies, because it allows you to aim the microphones into the orchestra and use that directivity to help bring out certain sections of the orchestra.

Pappas used a total of five in front of the stage, using tape to mark the placement of each microphone to within a quarter of an inch, since they had to take them down after each morning rehearsal. The microphones were placed 10'3" above the stage, aimed slightly down at a five degree angle. Barnette and Joey Kloss helped Pappas place the microphones and take them down each day after rehearsal.

The digital microphones have an NMC DMI-8 eight-channel control box that feeds into a Mac running RCS software. The control box provides phantom power, in this case 10V at 0.5A, because the mics have a gain stage, A/D chip and DSP chip inside the bodies.

A mic named Fritz

From the computer, via the RCS software, many parameters can be set, including compression and limiting, though Pappas used neither. The control box also sets the sample rate, which in this case was 24-bit/44.1kHz. The reason for the sample rate is the console, in this case a Digico DS-00 broadcast console, which runs at 44.1kHz.

"We have every imaginable facility on the console, but we don't use it," laughs Pappas. "Let me qualify that; for big symphony projects, we don't use any EQ, dynamics processing, or the eight stereo reverbs. It's a big level control and router, because we route stuff to get it to the broadcast guys."

In addition to the KM133Ds, Pappas used a stereo dummy head, the KU100, which he and his team have affectionately nick-named Fritz, back in the hall hanging from the ceiling 10 meters above the floor to create the surround rears. Fritz was aimed at the back of the hall, instead of at the orchestra, to get more of the room integrated into the surrounds.

"Fritz is an analog box and has standard (analog) outputs," says Pappas. "We try to not run analog mic cables very long. The cabinet right above Fritz is a Grace 802 unit with a built-in A/D converter that outputs AES. We feed that AES signal down 400' of CAT-5 cable. We use CAT-5 because it is very low capacitance, and capacitance is the number one killer for AES. You don't necessarily need it shielded because it's a balanced signal coming off 7.5-8V peak to peak."

Miking Yo-Yo Ma

One big point of contention for Pappas and his team had to do with how to mic Yo-Yo Ma's cello. Pappas was leaning toward a KM140 figure-8 and cardioid in a mid-side configuration during the rehearsals, so that he could control the stereo width. Ultimately, Pappas's assistants persuaded him to use a Neumann U67 and all its tube glory, running into a Grace 802 unit in the stage rack above the Digico controller.

Not many engineers are concerned with things like audiophile-grade cable, but Pappas has 3,000' of Cardas microphone cable for his setup.

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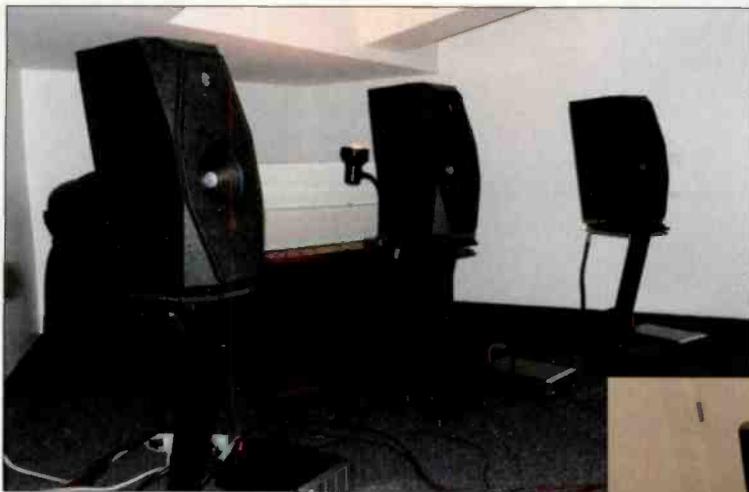
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"We studied cable capacitance and a microphone's ability to drive live cables," says Pappas. "Where this came into play was with applause on live recordings. Typically you'd have 150-200 people and it sounded great; you get to 1,500-2,000 and it sounds like crushed pink noise. I

heard a lot of this on classical recordings too, and we started looking into what was causing it.

"We came to the conclusion that it's not a frequency response problem or a filtering issue, it's the microphones running out of current to drive the load, so you get this insidious slew rate limiting distortion. The amplifiers in the microphones can't deliver enough current to charge the capacitance at a high level with high-amplitude signals. Once we figured that out, it was an epiphany. We have an Excel spreadsheet that allows us to enter the parameters of a microphone, dial in the cable specs and how much capacitance it has per foot, and



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it calculates the cable length and frequency at which things start rolling off as well as the slew rate distortion. Once we got that done, our applause in the rear channels sounded much better. Low-capacitance cables on analog microphones are the key."

In addition to high-end cable, Pappas has high-end equipment for monitoring the mix. He uses five Avalon Acoustics speakers driven by Jeff Rowland Class D 1,000W amplifiers. The control room in the Boettcher was filled with tube traps to control echoes.

Mixing

When mixing the show, Pappas had a hard right/left pan of the outside microphones, and the middle three were mixed left center/center/right center, with the U67 mixed just left of center. Fritz was used for SR and SL.

Pappas also paired with David Day of Day Sequerra for the surround encoding equipment. From the DS-00, the signal was routed into a Day Sequerra NLC5.1ST for encoding in Neural Surround. The NLC5.1ST helps control intermodulation distortion without artifacts, so that it increases time spent listening (TSL).

"The Neural Loudness Processor isn't a multi-band processor at all; it's a loudness processor," explains Day. "It speaks to how the ear hears. It's processing is set to be sensitive to critical bands, ERB's, in your ear. About 600 radio stations and about 2,000 TV stations in the U.S. are using it right now.

After going through the NLC5.1ST, the feed went to a Day Sequerra DTS Downmix Surround Encoder, and then via Telos Zephyr Xstream (ISDN) to Colorado Public Radio.

All the digital units were clocked via an external Rosendahl word clock using BNC coax connectors. The Rosendahl clocked the Grace 802 units, the Day Sequerra units and the NMC DMI-8.

"What we've found is that jitter is the defining factor in digital audio quality," says Pappas. "Especially once you start getting into the A/D conversion process, if you have a lot of jitter going on at that point, there's nothing that fixes that later. You're stuck. Early on we figured that out, and decided we wouldn't buy anything that had anything greater than 500 picoseconds of jitter in the audio passband. Most of the stuff we have now runs in the 100 range."

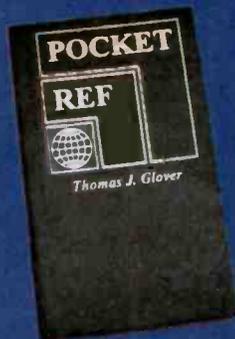
In addition to broadcasting, Pappas and his team recorded the concert in both PCM, via Logic on a Mac, and in Direct Stream Digital (DSD). The DS-00 sent one stream to an EMM Labs Digital-to-Analog converter, then to a Genex 9048 for DSD recording.

Horgan is a freelance writer based in Denver.

GALLERY

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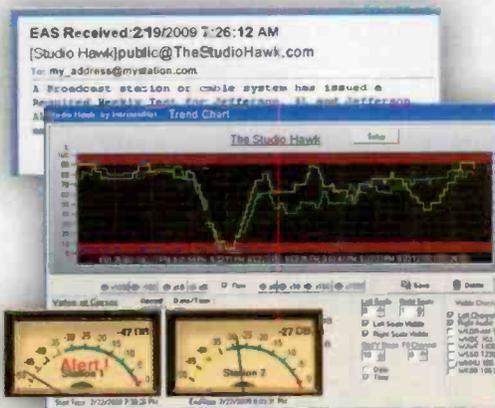
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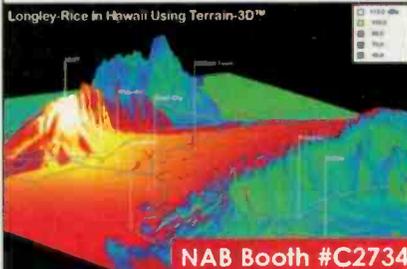
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Contributor Pro-file

Meet the professionals who write for *Radio* magazine.
This month:
Facility Showcase, page 48.



David Reese
Administrative Manager
KUNV at UNLV
Las Vegas

Reese received his M.A. from Kansas State University and has taught and been station manager at Wabash Valley College and John Carroll

University before coming to the University of Nevada, Las Vegas. As an affiliate faculty member in the Hank Greenspun School of Journalism and Media Studies, Reese teaches classes centered on various aspects of radio broadcasting. Prior to his academic positions, he worked in programming, sales and management at several commercial radio stations in central and western New York. He has co-authored *Broadcast Announcing Worktext, 3rd Edition*, and *Audio Production Worktext*, now in its 6th Edition.



Written by radio professionals
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by Erin Shipps, associate editor

Do you remember?



The movie "Accidental Husband" was released in February 2008, starring Uma Thurman as a radio talk show host. Dan Braverman and Gerrett Conover of Radio Systems both did technical on-set work for the film. Once again, can you identify any of the equipment? Comment on this article at radiomagonline.com



Sample and Hold

FCC Measures Cell Phone Activity

As part of its survey, titled "Broadband Adoption and Use in America," the Federal Communications Commission found that downloading or streaming music or video via cell phone appealed to only 17 percent of adults on average. The largest interest came from 18-29-year-olds, who show a 32 percent interest in this activity. There is hope: With our society's growing interest in mobility and the ever-increasing combination of mobile media devices, these numbers are bound to boost.



Cell Phone Activity

	All adults	Age 18-29	Age 30-49	Age 50-64	Age 65+
Percent with a cell phone	86	94	93	86	66
Percent as a share of those with cell phone send or receive text messages	66	94	79	51	15
Send or receive pictures	52	77	61	38	14
Send or receive e-mail	26	40	30	17	5
Send or receive Instant Messages	28	42	35	20	8
Access Web pages	28	38	32	15	5
Get a map or directions to another location	27	44	30	16	8
Download an application to cell phone	20	36	24	9	3
Download or stream music or video	17	32	18	8	3

Source: Federal Communications Commission survey of 5,005 adult Americans, October-November 2009.

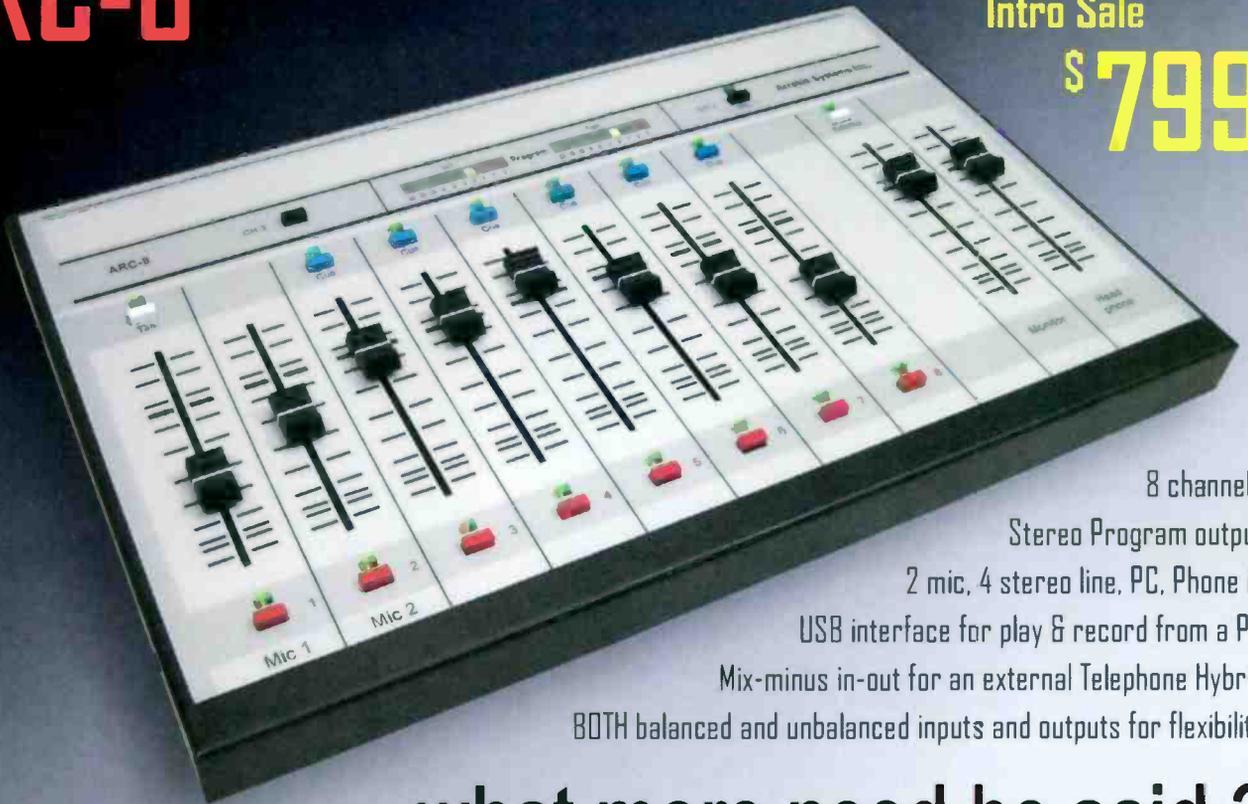
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4. Modular is better Why would you want to combine your switch, mix engine and I/O into one box? Beats us. With WheatNet-IP, you install only what you need, where you need it. We believe in not overselling.

5. Manufacturing quality is very important. Wheatstone is proud to have the best track record in the business for build-quality, reliability and intelligent functionality. With far more up-and-running installations than anyone else, this is where we really shine. An investment in WheatNet-IP and E-Series control surfaces today will reward you with a future-proof, failsafe networking/control environment that's infinitely updatable and in for the long run.

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Take a look at your entire environment. Wheatstone is a perfect partner because we are always there, always innovating. Built into every WheatNet-IP BLADE are features others just didn't think of – handy utility mixers, silence detection, crosspoint routing control, headphone monitoring of any source, lots of logic GPIO, and comprehensive metering of audio I/O, not just signal-presence indicators. And, in the hugely unlikely event that a BLADE needs to be replaced, you just plug in a new one and enter the BLADE number. That's it.

7. Wheatstone is local. WheatNet-IP and the E-Series, just like ALL Wheatstone products, are designed, engineered and built from start to finish in our New Bern NC USA facility. Everyone who works on our products is 100% knowledgeable and immediately available. You can relax – like the famous insurance company, you actually ARE in good hands.

With WheatNet-IP, we think we've done our homework. In fact, we know we have. And we're happy to say that we've got the best product on the market. To learn more, and there's a LOT more, get us on the phone or visit us on the web. We'll be happy to meet with you and get you everything you need.



Audio Networking – Simply Evolved

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