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*Rick Hunt, Vice President
and Director of Radio Engineering at
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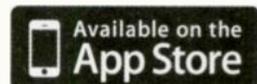
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Currents Online

Selected headlines from the past month.

Win an Expense-paid Trip to the 2011 NAB Show

Radio magazine will select a guest blogger to cover the 2011 NAB Show in April. Look for more details on page 40 and complete details in the January issue.

NATE Responds to Free-climbing Tower Video

NATE denounces the free-climbing message, saying the content was misguided and its messages should not be given credence by any viewer.

State of Idaho to Provide CAP Equipment to Broadcasters

The Idaho Bureau of Homeland Security will upgrade its emergency notification system, which will include the Internet as the primary communications link from the state.

EAS/CAP FAQ

Now that FEMA has adopted the CAP 1.2 standard, broadcasters are asking questions about the 180-day deadline to install equipment and updates to the EAS rules.

CSRIC Approves Part 11 CAP Changes

CSRIC Working Group 5A has submitted specific recommendations on rule changes, and provided general comment and analysis regarding the Part 11 regulatory structure with CAP in mind.

SBE Streams 2010 Membership Meeting

The meeting was streamed live on Oct. 27, 2010, and is available on replay.

FEMA Study Investigates Effectiveness of Alert FM

The one-year study included continuous working demonstration of RBDS alerting systems over a three-month period across three locales.

Herman Appointed Chairman of RAB

Scott Herman takes over the job from Chairman Weezie Kramer, who will become chairman emeritus.

RadioTime Releases TuneIn Radio App for BlackBerry

TuneIn Radio for BlackBerry features RadioTime's Song Search technology.

Site Features

Industry Events

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

Industry Links

Schools, museums, associations and more.

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A different Radio Show

"I didn't see you at the show." When the spring NAB Show ends, I often say this to people I know were there, but because of the size of the convention, our paths never crossed. The 2010 Radio Show is now behind us, and I can say the same thing, although for very different reasons.

The 2010 Radio Show was not like previous NAB Radio Shows. It was a smaller event. It was cosponsored by the NAB and the RAB. It was held in a new city. And unfortunately, it attracted very few engineers.

For the NAB and RAB, it is likely being considered a successful event. They work on quantity of attendees and exhibitors. From hearing comments

from NAB and RAB leaders, they were pleased in general with the event. There were some differences this year compared to previous years, and the NAB and RAB were adjusting along the way.

For a station owner, general manager, sales manager and possibly program director, it was likely a good event. There were lots of opportunities to network with colleagues with those responsibilities.

But for the engineers, I don't think the show was such a success.

Remote Up in the Air? Get it ON the Air with ACCESS!

"We were invited to ride along in a hot air balloon to help promote the Grove City Balloons and Tunes Festival near Columbus," says Matt Bruning of WTVN in Columbus, OH. "When I asked about doing a live shot from 2,000 feet up, our engineering department went straight to the shelf with our Comrex ACCESS on it. The unit did a great job...as we expected. Thanks so much for making a GREAT product like the Comrex Access - so easy even a news person can use it!"

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There were some shortcomings with the location. The hotel had rooms and events scattered on several floors. Signage was poor. The exhibits (called the Marketplace) and the session rooms were adjacent, and attendees had to go through the Marketplace to enter the session rooms.

The exhibits themselves were table-top displays. Four tables were placed in a square. The aisle between the tables were very narrow. There was little room to navigate, let alone to conduct any business with so many people – including competing manufacturers – crowded together.

When sessions ended, there was a flood of people on the exhibit floor, but they were merely trying to pass through. They weren't stopping at the exhibits.

I heard many exhibitors complain about the cost of the exhibit space. From the exhibitor's standpoint, the price per square foot to exhibit was very high. The NAB/RAB don't think of it as renting a space, but rather reaching an audience. Unfortunately, there wasn't much audience in attendance.

One major change this year: No free exhibits-only passes were issued. The only way to get on the exhibit floor was to pay at least \$450. Some exhibitors told me they had to purchase additional badges for their exhibit team to get on the floor.

With no free exhibits-only passes, the organizers excluded most engineers from the region from attending. While the desire of the NAB and RAB

was to attract a qualified audience, this move also excluded most regional engineers from dropping in for the day to see what equipment was being shown.

And there was little actual equipment being shown because of the table-top layout.

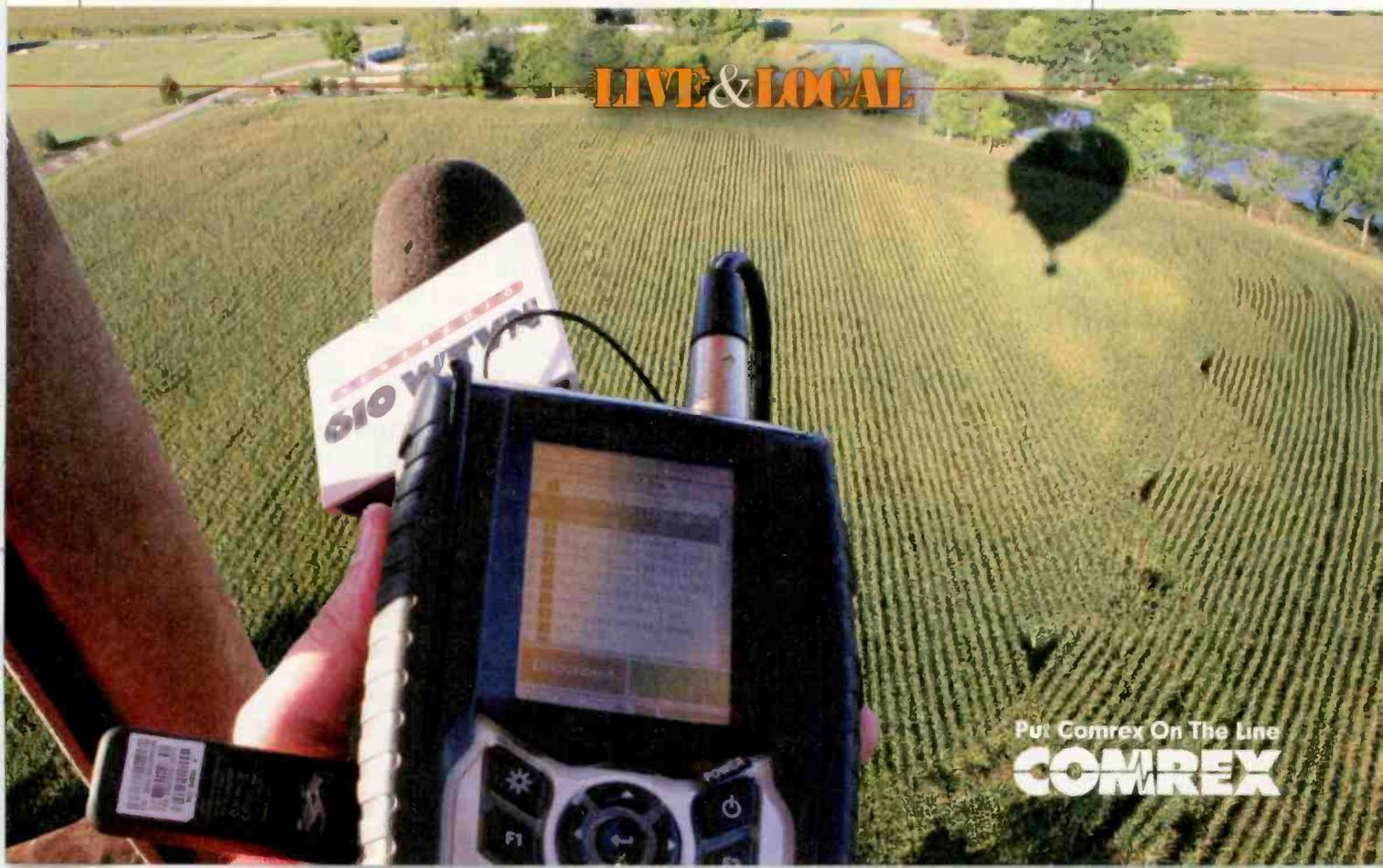
One way to describe the Radio Show: A regional conference at national convention rates. Many exhibitors told me they had no interest in returning in 2011.

According to the NAB, the Radio Board wants its own convention. Radio tends to get lost at the spring convention. I understand this, however, if the NAB/RAB want to host a fall show, the technical aspect needs to be revised. While stations will pay for managers and owners to attend, they don't want to pay for the engineers to attend. This is unfortunate (and stations need to change that), but it's a reality the show presenters must accept. With the current convention approach, I question the sense in trying to attract technical attendees and equipment manufacturer exhibitors.

The 2011 convention will be in Chicago. We'll see if anything improves.

Chris Schen

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



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Calculating STL fade margin

By Jeremy Ruck, PE

Broadcast auxiliary facilities, and STL systems in particular, tend to get relegated to the back burner. Many times this equipment is glossed over in day-to-day operations, and usually winds up being one of the latter concerns in studio relocation. Understanding the mechanics of your RF program delivery system, and maintaining a keen grasp of the associated fade margin can go a long way to diagnosing the rare, but ultimately problematic impact path failure can have.

In a nutshell, the fade margin is the difference between the received signal level at the input to the receiver and the sensitivity of the receiver. Typically this quantity is expressed in decibels. The higher the number, the more reliable the path.

Creating a path

When analyzing or designing a path, the first step is to ensure the path is viable. Paths of extraordinary length are obviously problematic as are those with substantial terrain obstructions. Cases where obstructions enter the Fresnel zones, especially the first zone, or those where reflective paths exist can also chew away at your margin. Existing operational paths imply viability; however, keeping track of signal levels and margins still makes good sense.

For reference purposes the width of the n th Fresnel zone at an obstruction in meters is calculated by the following equation where d_1 and d_2 are the distances from the link end points in meters, D is the total link distance in meters and f is the frequency in megahertz.

We will, however, neglect situations in this article where Fresnel zone incursion or reflections occur and continue the analysis with an ideal path.

$$F_n = \sqrt{\frac{nd_1d_2}{fD}}$$

Next it is crucial to know the length of the path. Assuming there are no reflection issues, etc., along the path, then the path attenuation in decibels between two isotropic antennas is approximated by the following where d is the path length in km and f is the frequency in megahertz.

$$A = 20\log_{10}d + 20\log_{10}f + 32.44$$

System components

In addition to the free space attenuation, we need to look at all of the components between the output of the transmitter and the input of the receiver. This includes all antennas and transmission lines, as well as filters, combiners, surge protectors, etc., that may lie in the system. From the manufacturer's data for each component, a gain or an insertion loss can be assigned. In some cases, especially antennas, the manufacturer will assign a frequency-dependent range of gains. Pay special attention, however, to the way antenna gains are specified. This analysis is based on

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isotropic antennas, so if dipole gains are utilized, that is dBd instead of dBi, an addition of 2.15dB to the antenna gain will need to be made. If a range of gains is specified, considering each scenario may illuminate potential problems.

Adding the gains together and subtracting the insertion losses out results in a total system gain. Typically the sum of the antenna gains will be much larger than the total insertion losses, thus your resulting total system gain should be a positive number. This gain is then subtracted from the free space attenuation number derived in the second equation above. This resulting number is the total path attenuation, or net path loss.

Next the transmitter power output is identified and converted into dBm. Transmitter powers typically range from less than a watt up to several watts depending on the model and make. If the power is given in watts, convert to milliwatts by multiplying by 1,000. Then take the base-10 logarithm and multiply that result by 10 to get dBm. Outputs of 1W will result in +30dBm, while 10W will be +40dBm, and so forth.

The net path loss previously derived is then subtracted from this number resulting in the received power level at the far end of the link. The difference between that value and the receiver sensitivity is the resulting fade margin. If the receiver sensitivity is listed in dBm then the conversion is simple. If it is listed in terms of dBmV, dBuV, µV, or some other similar unit, additional conversion must occur before the fade margin drops out of the equation.

The units dBmV, dBuV, and µV are voltage units while dBm (sometimes written as dBmV) is a power measurement. The voltage units are related to power units via the impedance of the equipment under consideration. STL systems are mostly 50Ω systems, so only that case will be considered here, with the resulting relationships as the following:

$$dBmV = 47 + dBm$$

$$dBµV = dBmV + 60$$

Note also that dBmV, dBuV, and µV are inter-related by the following:

$$dBµV = 20\log_{10}µV = dBm + 107$$

So as an example let us consider a 950MHz system that has total fixed loss of 8.5dB, a total antenna gain of 36.0dB, and a path length of 23.0 kilometers. This system also has a transmitter power of 10W and a receiver sensitivity of 4µV.

First the free space attenuation is given by:

$$A = 20\log_{10}d + 20\log_{10}f + 32.44$$

$$A = 27.23 + 59.55 + 32.44 = 119.22dB$$

The total system gain is then determined and subtracted from the free space attenuation to get the total path attenuation or net path loss.

$$A_{total} = A - (S_{gain} - S_{loss})$$

$$A_{total} + 119.22 - (36 - 8.5) = 91.72dB$$

The transmitter power output is 10W, which corresponds to +40dBm. Because the net path loss for the system is 91.72dB, the latter is subtracted

from the former yielding the received power level of -51.72dBm. The receiver sensitivity, given as 4µV, transforms to a sensitivity of -94.96dB. The resulting fade margin is 43.2dB.

A particular path

Now that the fade margin is known, how is this number used to better understand the path? For starters, the greater the fade margin is, the more reliable a particular path will be. The fade margin can, however, be so large as to be indicative of excessive transmitter power; thus care must be exercised in that regard. From the fade margin, we can also predict the reliability of a path in terms of outage time.

The probability of an outage occurring on a particular path is given by the following equation:

$$U_{ndp} = a * b * (0.0000006) * f * D^3 * 10^{-\frac{F}{10}}$$

In this equation "a" is assigned a value of 4 for very smooth terrain including over water, 1 for average terrain with some roughness, and 0.25 for mountainous, very rough, or very dry situations. The variable "b" is set to 0.5 for Gulf coast or other hot and humid areas, 0.25 for normal interior temperate areas, and 0.125 for mountainous or desert areas. The variables "f", "D", and "F" respectively are the path frequency in gighertz, the path length in kilometers, and the calculated fade margin in decibels. So our example becomes:

$$U_{ndp} = (1) * (0.25) * (0.0000006) * (0.95) * (23.0)^3 * 10^{-\frac{43.2}{10}}$$

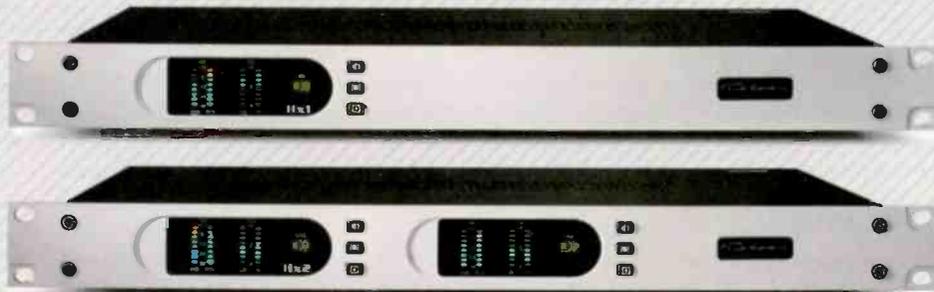
$$U_{ndp} = 8.298 \times 10^{-8}$$

This is the probability of an outage occurring. The reliability of the path is just one minus this value. In this particular instance it would be 99.999992 percent, which works out to a predicted outage time of around 3 seconds per year. This is obviously a very reliable path. On the same path, a reduction in the fade margin to 30dB, results in a reliability of 99.9998 percent. This is about 55 seconds per year of outage and exceeds the old Ma Bell reliability standard of five nines. Finally a reduction in the fade margin to 20dB increases the outage time to a little over 9 minutes per year and the reliability is now down to 99.998 percent, or just shy of five nines.

The predicted outage time typically will not occur all at once, but rather tends to be spread out. Other environmental factors including precipitation, reflections, and the Fresnel zone incursions previously mentioned can eat away at the fade margin, so if you are laying out a path, don't settle for mediocrity in the numbers. Above all, keep track of your existing paths and where they run. Don't be the engineer that wakes up one morning to find a high rise building is now square in your path. That, by the way, is a true story. 

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

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FCC plans crack-down on silent stations

By Harry Martin

The FCC's Media Bureau, troubled by a growing number of non-operating stations, is looking into how a station's failure to operate during the preceding license term might be factored into whether it is entitled to a license renewal. The renewal cycle for radio stations begins again June 1, 2011.

200 silent stations: The Commission's records show that nearly 200 AM and FM stations reported being off-the-air as of Sept. 1, 2010. And beyond that is the separate universe of stations that have ceased operation but never advised the Commission as required under Sections 73.561(d) and 73.1740(a)(4) of the rules.

The regulatory scheme: The rules permit stations to shut down from time to time, and there are many good reasons why they might: for example, equipment problems, emergency weather conditions or economic hardship. The Commission itself routinely approves suspensions of operation in six-month increments upon showings of good cause.

Dateline

For noncommercial radio stations in Colorado, Minnesota, Montana, North Dakota and South Dakota, their biennial ownership report deadline is Dec. 1.

Dec. 1 is the deadline for radio stations licensed in the following locations to place their Annual EEO Reports in their public files: Alabama, Colorado, Connecticut, Georgia, Massachusetts, Maine, Minnesota, Montana, New Hampshire, North Dakota, Rhode Island, South Dakota and Vermont.

The radio station license renewal cycle begins again in 2011, with the first batch of renewals being due on June 1, 2011, for stations in D.C., Maryland, Virginia and West Virginia.

Such officially sanctioned suspensions cannot last longer than a year, however. Section 312(g) of the Communications Act, which the FCC cannot waive except in extraordinary circumstances, provides that any station that fails to transmit broadcast signals for any consecutive 12-month period loses its license automatically at the end of that period.

Some at the Commission believe that, despite the threat of an automatic loss of license, a number of licensees are turning their stations off and keeping them off without good cause. Those licensees dodge expiration, apparently, by returning to the air for brief periods so as to

avoid a consecutive 12-month period of silence under Section 312(g). But, having operated for a while, they then go back off the air and request a new silence authorization.

The FCC has never officially addressed the question of how long a station has to be on the air to toll the 12-consecutive-month period for Section 312(g) purposes. In a 2003 decision the FCC implied that 24 hours of operation was required, but that language has not been relied upon in subsequent decisions.

Renewals may become the focus: The Commission's staff has signaled that it will consider instances of non-operation during the preceding license term as part of the renewal process. This is likely to involve a revision of the renewal application form (FCC Form 303-S) to require each renewal applicant to provide a detailed listing of instances of non-operation during the preceding license term. Such a form revision would require approval by the Office of Management and Budget, a process that would have to begin soon if the new reporting requirement is to be in place in time for June 1, 2010, renewal filings.

A focus on the renewal applicant's performance during the preceding term is squarely within the duties assigned the Commission by Congress. Section 309(k)(1)(A) of the Act specifies that, before it can grant an unconditional broadcast renewal, the FCC must first determine that, during the immediately preceding license term, the licensee "has served the public interest." It is difficult to imagine how a station could have served the public interest if it was off the air for a substantial portion of its license term.

Whether the renewal form will in fact be revised, remains to be seen. After all, the 200 or so radio stations off the air as of Sept. 1, represent only about 1 percent of all AM and FM stations. And bear in mind that at least some, if not many, of those 200 stations may be off the air for valid technical reasons, with no intent to stay off longer than necessary to fix the problem. Nevertheless, it is not unusual for a few bad actors to get the agency's attention thereby causing the FCC to impose new reporting requirements on a whole industry. 

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

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Choosing an Audio Interface



Whether you do a little or do a lot, there are many choices to meet your needs.

By Gary Eskow

The more things change, the more they stay the same; that's the cliché, right? True at times, but when it comes to the way audio is routed throughout a radio facility, the cliché is wrong. AoIP wasn't even a dream 15 years ago, and there have been many advancements made as of late in how we get audio in and out of a computer.

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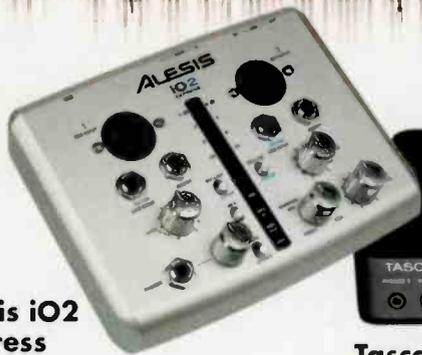
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Audio Interfaces

Alesis iO2 Express



Tascam US-2000



Tascam US-800



Yellowtec PUC2



Do a little

How to choose an audio interface mostly depends on needs. How complex is your audio routing scheme? If a facility simply broadcasts a digital play list all you'll need is a connection between the hardware that houses the audio files (and hosts the software that helps you compile the play list) and your audio console. Firewire, USB, AES, it doesn't really matter.

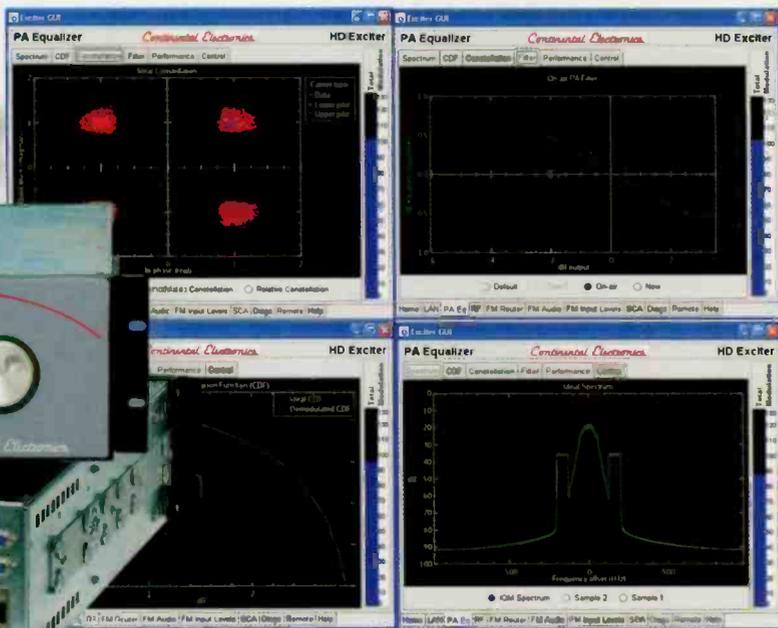
Looking a little deeper, one of the great developments in audio technology has been the democratization of quality converters. It's no longer necessary to spend tons of cash to get converters that can output digital signals up to 96kHz or even 192kHz. Manufacturers of high-end equipment will tout the design of their input stages and the ability to output a balanced signal over long cable runs,

for example, and with good reason. For many real-world applications, however, the most popular audio interfaces at all price points will do a good job.

As for the choice between Firewire, USB or AES connectivity, all of these protocols will deliver audio of equal quality; the robust construction of AES cables (especially when compared to the Alesis ADAT connections that were a popular alternative a decade ago) leads many radio professionals to gravitate toward this format. If you need AES inputs from a piece of equipment that has AES outputs only, and the ability to route an interface to a console via Firewire or USB, purchasing an interface with multiple connections will not bust the bank.

If you're looking for plug-and-go technology, USB interfaces offer convenient options. Yellowtec's PUC2 is a

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USB-powered sound card with digital and analog audio interfaces. This AES-3 device delivers 24-bit/192kHz performance. It's modular design gives the option to connect to a variety of interfaces, including analog line input/output and a microphone interface.

The US-2000 from Tascam is a 16-input audio interface condensed into 1RU. It features eight studio-grade mic preamps, with two mic inputs on the front panel. An additional six balanced 1/4" line inputs are provided, as well as four balanced line outs and stereo digital I/O. This interface comes with Cubase LE4, a 48-track workstation for Mac or PCs.

For laptop users, Tascam's US-800 is a lightweight, multichannel recording interface that offers eight inputs and four outputs. Six XLR mics feature phantom power and 192kHz/24-bit audio converters. It also includes S/PDIF digital audio/MIDI I/O.

Alesis' iO2 Express is a two-channel USB recording interface with high-quality analog-to-digital and digital-to-analog converters. It has two input channels with XLR mic input, a 1/4" TRS insert and 1/4" TS jack.

Do a lot

If a facility does more – record voice-overs, create music beds by cutting, pasting, and time compressing music library files, for example – then the choice is more selective when it comes to audio interfaces. Of course, the first decision has to be the workstation itself. It's hard to believe that less

than 20 years ago you had to cough up \$100k or so to get the recording and editing capability that any of the current off-the-shelf Macs or PCs leave in the dust.

Let's say you're charged with recording voice-overs. You know that Pro Tools has become the de facto recording platform for the video and recording industries, but why spot the cash for the full program when Pro Tools LE – the free version that DigiDesign provides with the hope that it will entice users to buy the complete program – has all the features needed to do the job?

In this case all that is needed from an audio interface is a couple of analog or microphone inputs, and a pair of stereo inputs and outputs, either digital or analog. Even if analog might do the trick, why not spend the extra couple of bucks and get an interface with both sets of outputs. Audio will need to pass through digital connections at some point. This identical scenario applies for Adobe Audition, Samplitude from Magix, or any of the other popular software front ends for a DAW. Be careful though, some of the older proprietary programs designed for radio are not as careful about upgrading drivers. You don't want to purchase a screaming new quad core i7 Windows 7 machine only to discover that your software hasn't migrated beyond Windows XP.

When it comes to PCIe cards, AudioScience has two options for analog/digital audio. The high-channel count ASI5680 PCIe audio adapter. With eight stereo playback streams fed to eight stereo outputs and one stereo record

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Lynx AES15e

stream fed from one stereo input, users can mix and route anything to anywhere.

AudioScience also created the ASI5211, a PCIe version of the ASI5111 card. It removes time-critical audio processing burdens from a PC, featuring two stereo record streams fed from either a balanced analog input or an AES/EBU digital input, four stereo play streams mixed to both a balanced analog output and an AES/EBU digital output, and a mic input. The analog I/O level has been in-

creased to +24dBu, a noise gate added and GPIO adds two opto-isolated inputs and two normally open relay outputs.

Lynx Studio Technology's AES16e-50 PCIe card offers multiple connectivity options. In addition to 16 channels of 192kHz AES/EBU digital I/O via its two D-sub ports, it has 32 digital I/O channels using AES50 technology, which provides point-to-point connection for multi-channel audio and system control over a single CAT-5e or CAT-6 cable.

LoLa from Digigram is a low-latency sound card platform for logging and multi-channel recording. Main features of the first LoLa product (the LoLa280) include eight line-level inputs, two line-level outputs and an optional eight-channel mic pre-amp in a 1RU package. It also includes a built-in mixer with automatic gain control and a software control panel.

Outside the box, or in?

This leads us to a question: Whether 'tis best to think outside the box or stay within its confines. Is it better to

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Resource Guide

Manufacturers of sound cards and audio interfaces

purchase (or stick with) a PCI or PCIe card-based audio interface or move over to a stand-alone interface? Of course, the walls break down a bit, since many PCI and PCIe interfaces have breakout cabling that increases the I/O capabilities and adds additional features (a mic pre, perhaps).

Six or so years ago adding audio capability to a Mac or PC, meant using PCI – it was the only game in town. This was a fine option if you needed a stereo pair of digital ins and outs. PCI systems are largely legacy products at this time, however. If you have an interface that uses this technology and are thinking of moving to a new computer, make sure drivers are available for the operating system – there's a good chance they're not available.

PCIe offers much more bandwidth than older cards. In a few years we should see PCIe cards that are faster than their forebearers, with even more bandwidth. But to pass 16 channels of audio with a card-based system, a number of PCIe audio interfaces are available that will serve quite well.

If connectivity requirements exceed more than a single mic pre and pairs of analog inputs and outputs it would be wise to consider an external hardware unit. USB

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and Firewire have both achieved speed and bandwidth that allows them to compete with PCIe cards, and these devices can be purchased in an almost unlimited array of configurations.

Ethernet and an all-digital pathway, from production to transmission, may be a reality that is ubiquitous in the near future. But as long as the human voice is part of the equation, microphones and interfaces that can input their signals will be a part of the chain. A wide array of audio interfaces is available so assess input and output needs and bandwidth requirements and have fun! 🎤

Eskow is a composer and journalist who lives in central New Jersey. He is a contributing editor for Radio magazine's sister publication Mix magazine. Thanks to Chris Ludwig of ADK Pro Audio for his input.

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CBC/Radio-Canada French Radio Service Upgrade

Transition to a fully digital infrastructure enables centralized network operations

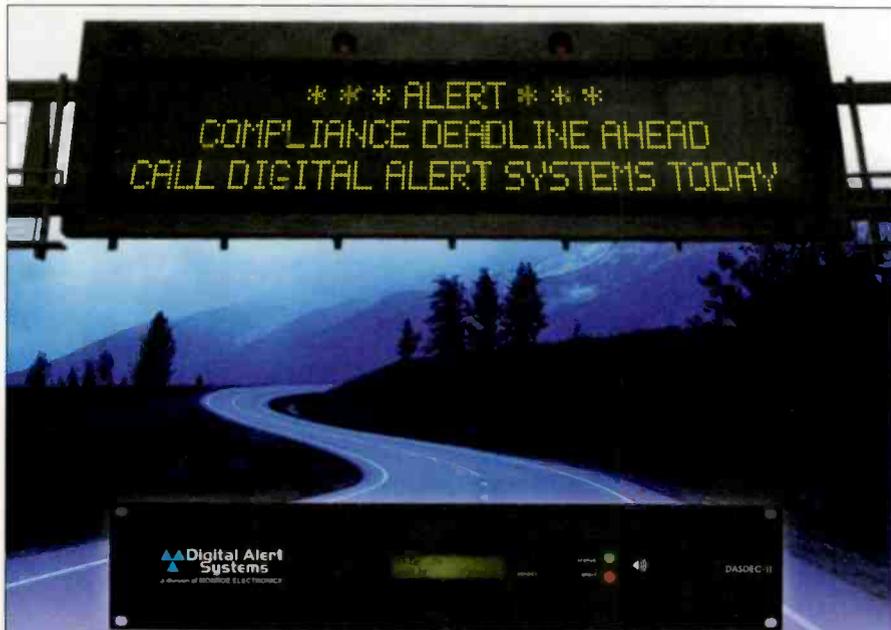
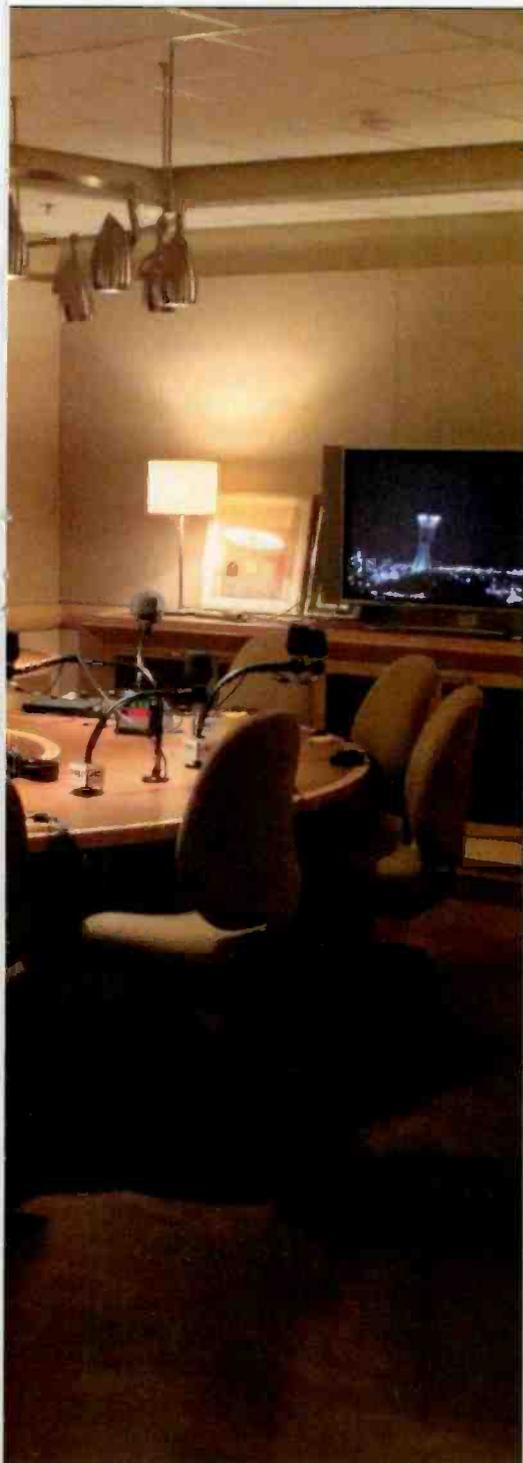
By Roger Maycock



CBC/Radio-Canada's new Studio 17 and control room (inset).

Determined to increase operating efficiencies by having a more advanced means of gathering and managing program material from multiple sources located throughout Canada, CBC/Radio-Canada's French Radio Service (Radio de Radio-Canada, www.radio-canada.ca) has reached a lofty milestone in its multi-year plan to enhance its facilities. In July, the Montreal broadcast operations center completed a major phase that dramatically upgraded the radio master control center, including the replacement of a legacy analog switcher that had maxed out its capacity and had no provisions for expansion. Following an extensive evaluation of its facilities and operations, determining a course of action that would allow for future growth, and completing contract negotiations, a new central audio router and control system for all of Radio-Canada's radio production and distribution was put into service.

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CBC/Radio-Canada

The Toronto office of Rastatt, Germany-headquartered Lawo, known for its digital audio networking and console systems, was awarded the contract to deploy a system incorporating its router and audio networking technologies in conjunction with VSM (Virtual Studio Manager) control software. Radio-Canada's new system includes the Lawo DSHS (Dual Self-Healing Star) router configuration with two fully redundant Nova 73 router cores - one located in the radio master equipment room and the other in the TV master equipment room. Each router is equipped with 54 MADI ports, three DSP boards that process 184 signals each, and 19 Lawo DALLIS frames for input/output.

Michel Leduc, broadcast engineering manager for CBC/Radio-Canada's French Services, commented on the extent of the facility upgrade, "We were aware of several new projects on the horizon that required greater switcher capacity, so the necessity of upgrading our broadcast center was vital. We were looking for state-of-the-art technology that offered expansion, reliability, along with the possibility of having control and DSP capabilities."

Routing provisions

The Lawo DSHS routing system utilizes a de-centralized architecture that literally spans all areas of the Montreal broadcast complex.



A temporary control room will be used until additional renovations occur. Completion is expected in December 2010.

For full system redundancy, each DALLIS frame is connected to both Nova 73 HD cores. The DSHS system utilizes a special application for the Nova 73 router whereby all potential single points of failure - including the rack and room where the main frames reside - are doubled. A link between the two cores ensures that if the radio core fails, the TV core will assume responsibilities. Of equal

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The Pro-Bel I/O (top) and the Lawo core (above) in the radio equipment room

significance, if any partial failure occurs, the alternate core can assume those functions while the remaining tasks are managed by the partially impaired core.

Support for existing hardware was deemed crucial to enable the project to move forward in phases – thus enabling Radio de Radio-Canada to better manage the revitalization process from both operational and financial perspectives. “We have a number of existing Pro-Bel HD series MAD1 frames and Studer mixing consoles that remain operational,” states Leduc. “The old Pro-Bel switcher is based on MAD1 communication between the I/Os and the core. To avoid replacing all the existing analog feeds, the MAD1 feeds are tied to the Lawo core. This arrangement enables us to continue using the existing analog feeds

and helps CBC/Radio-Canada make the transition to a fully digital infrastructure while maintaining interim support for legacy hardware. Equally important, this setup helps us control our costs.”

Software control

Managing the new signal routing capabilities is a VSM-based application jointly developed by Lawo and Radio-Canada personnel with a significant amount of support from Bingen-Germany-based L-S-B Broadcast Technologies, the developers of Virtual Studio Manager. Encompassing more than 34 PC-based stations with a combination of virtual panels, custom designed touch screens, or mouse control panels, the software provides a highly integrated control and man-

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CBC/Radio-Canada



The Harris, Dalet, VSM, Avocent systems in the TV equipment room.

agement system for Radio de Radio-Canada's MCR (master control room) operation. On any two independent workstations, two operators can handle the entire system. "Our other key challenge with this project," states Leduc, "was to develop an easy to use GUI (graphical user interface) that offered the necessary amount of alarms and other features to facilitate our present and future on-air radio operations."

Jean-Marc Gellatly, director of production studio radio and radio operations at Radio de Radio-Canada, commented on the considerable technological leap this represents, "We knew that today's cutting-edge technology would allow us to completely rethink how the MCRs of the future would be managed and operated and, with this implementation, we are positioned to maximize radio's role in a completely integrated content company."

The Radio-Canada/Lawo-designed VSM software

includes provisions for metering upward of 72 stereo streams as well as automatic multilayer apology, fading, alarm logging and processing for more than 150 on-air busses. The system incorporates Avocent 5010 KVM management (a switcher system for assigning control functions to any of the 100+ various computer stream/keyboard/mouse stations) and offers sophisticated XY control of 4,000 x 4,000 mono signals – the new system's present capacity. Additionally, the VSM software provides integrated alarm monitoring and logging for all Lawo components. Depending upon the actual screen/function an operator is working on, the VSM system provides tremendous flexibility in tracking all source and destination signal routing, the ability to view color-coded alarm displays for managing the status of all automated output busses, along with processing panels to address alarm conditions, plus numerous other functions.

Radio de Radio-Canada's new Lawo/VSM system also supports extensive remote access provisions. "The entire MCR is a virtual setup," Leduc explains. "Via IP protocol, the system can be controlled with ease from any place in the world and, as one would expect, includes an elaborate system of protection and security mechanisms. With full remote access to the system in the event of a crisis, operators have the ability to patch into the network and run everything remotely should the occasion ever arise – making our radio operations more secure than ever."



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Actual on-air feeds are handled by Radio de Radio-Canada's Harris 8200 Series automation system. "Interfacing with our Harris system was another crucial aspect of this project," states Leduc. "Here too, the combination Lawo/VSM setup manages production and routing feeds for all content going through the Harris system and includes stop fades or V fades of signals for smooth signal transition. The VSM supports integration for apology and router control, and enables our existing radio consoles to control the router directly."

An eye on the future

CBC/Radio-Canada's French Radio Service is now in the process of expanding the system by 18 more DALLIS frames and additional buses. In August, another 14 on-air output buses were added and an additional expansion phase will add roughly another 44 on-air output buses in 2011.

"We are extremely optimistic about the opportunities the new combination Lawo/VSM system provides," Leduc says. "The new Lawo router control system replaces our aging, analog master control room infrastructure, including a massive patchbay that consisted of approximately 11,000 patch points that were being handled manually, with a much more efficient system that offers the ability to grow as our requirements evolve."

"The new system airs all of the programming for Radio-Canada's Première Chaîne, including its top-rated morning

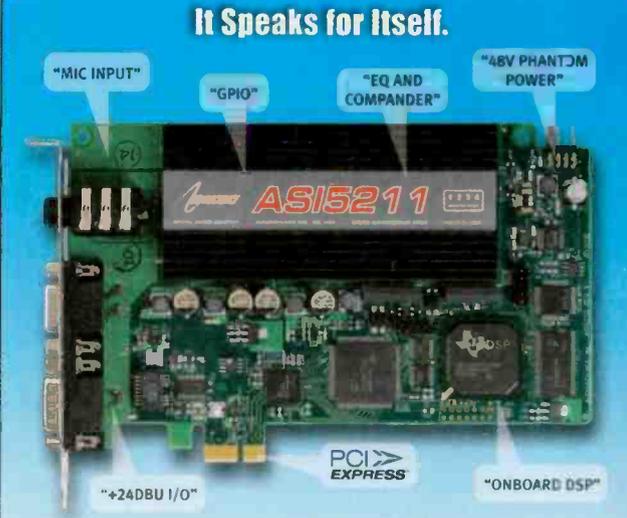
Equipment list

Avocent 5010 KVM management system
 Harris 8200 Series Automation System
 L-S-B Broadcast Technologies VSM (Virtual Studio Manager) control software
 Lawo Nova 73 HD routers with Dual Self-Healing Star topology, three DSP cards and 19 DALLIS I/O cards
 Pro-Bel HD series MADI System 3 Controller
 Studer model 963, On Air 2000, On Air 3000 digital console

show "C'est bien meilleur le matin" ("It's better in the morning") as well as its entire sister Network Espace musique's programming. While there remains much to do, our new equipment is already providing return on investment. Though we are presently in a temporary control room setup as additional renovations are being made, I fully expect the new system to dramatically increase operating efficiencies. I'm really looking forward to December when the bulk of the renovation and construction will be completed and we can settle into our newly upgraded facilities. With the integration of our existing consoles and studios, our new setup provides decentralized access to any signal throughout our complex, and this provides increased functionality and efficiency throughout the entire CBC/Radio-Canada system." 

Maycock is the owner of Mountaincrest Communications, Downey, CA.

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CBC/Radio-Canada

Lawo Nova 73 HD and VSM

Lawo's Nova 73 HD routing systems and L-S-B Broadcast Technologies Virtual Studio Manager (VSM) control software offer broadcasters unprecedented



capability for facility customization and operation. With the potential for up to 8,192 inputs/outputs—available via AES3, MADI, and ATM interfaces—the router incorporates 96 kHz operation, Dolby-E compatibility, clock-synchronized switching to video frames or internal DSP, and Lawo's Dual Self-Healing Star topology for failsafe, redundant operation. VSM is a flexible, powerful, and client-specific solution for all broadcast challenges that is able to control routers, mixers, multiviewers, video and audio consoles, as well as all third party equipment. With fully redundant operation, VSM also provides functionalities including tally, GPI and tie-line management, as well as global labeling for all attached devices without any further control devices.

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Multimedia for Digital Radio

By Timothy B. Anderson, CSRE DRB CBNT

Digital radio can deliver exciting new revenue streams to broadcasters by leveraging data and file transfer capabilities that will enhance the listener experience with multimedia elements such as album art, liner and programming notes, news, weather, traffic and sports to broadcasts. Because of its low cost, large footprint and ubiquitous nature, digital radio's bandwidth may also be made available for subscription services.

Data and multimedia capabilities have been designed into all DRB systems, including HD Radio, from the beginning. There are well-defined standards for data and multimedia applications that allow for the development of Application Program Interfaces (APIs) within the transmission and receiver ecosystems. Several HD Radio applications have already been developed and deployed. Figure 1 shows the complete audio and data signal flow of the HD Radio system.

An album art application provides the ability to deliver JPEG, GIF and PNG8 images synchronized with audio program-

ming on HD Radio broadcasts. A Software Development Kit (SDK) for receiver partners is available from iBiquity and has already been implemented in the new JVC receivers. Clear Channel is currently testing this capability in several markets. This function, now called Artist Experience, was demonstrated by iBiquity at the 2010 Radio Show.

Traffic services provide textual and graphic traffic and transportation system information in standardized transmission protocols. These can be displayed on enabled HD Radio receivers or overlaid on GPS navigational systems equipped with the HD chip set. Clear Channel's Total Traffic Network and The Broadcast Traffic Consortium provide these services to subscribers in many markets.

Journaline, developed by Fraunhofer IIS and deployed by Clear Channel in the United States, provides hierarchically structured information that the user can access on topics of interest in a magazine type format. Menus and text content are encoded in JML (Journaline Markup Language) for transmission to subscribers' HD Radio receivers.

Electronic program guide (EPG) offers users the ability to navigate, select, and discover content by time, title, channel and genre from an onscreen graphical program guide. iBiquity has developed an EPG data structure and client application specifically for HD Radio. Field trials of the overall EPG ecosystem for U.S. radio broadcasting are now underway, with funding and management provided by the NAB Fastroad program.

Conditional access provides pay-for-play and other restricted access services. The conditional access architecture for HD Radio easily integrates into the HD Radio system. The conditional access unit at the station scrambles the data streams and entitles specific radio receivers to access the content by addressing the receiver's unique electronic serial number (ESN).

Push Radio is another exciting new technology that will send podcasts and other specific information and targeted programming directly to the listener's digital radio over the air, without the need for an Internet connection. This technology is currently being developed by Beijing Jolon and Commercial Radio Australia for use on the DAB+ system. There is interest in developing this concept for HD Radio.

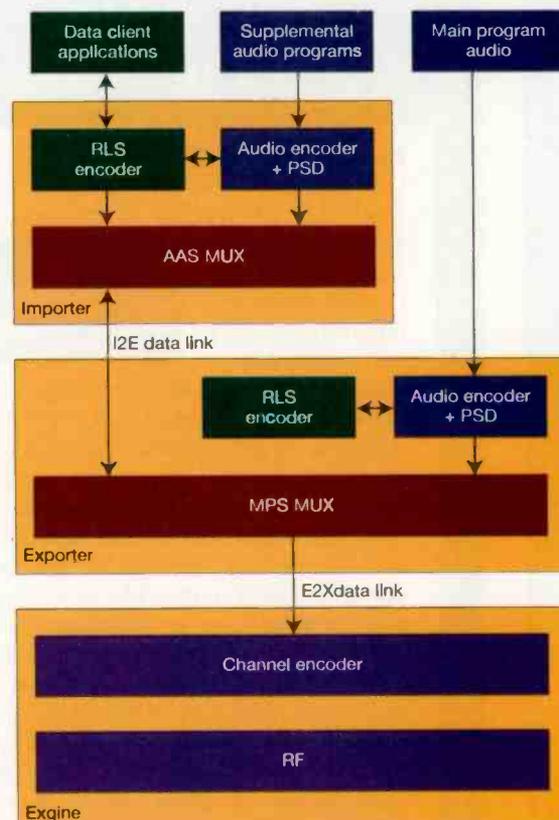


Figure 1. The complete audio and data signal flow of the HD Radio system

Data transmission system

The Importer is responsible for multiplexing all of the Advanced Applications Services (AAS), supplemental audio (HD2, HD3, etc.) and data services presented to it by the audio and data clients. The data services are encoded separately from the audio stream via the Radio Linking Subsystem (RLS) and are multiplexed into the Importer to Exporter (I2E) IP stream for transport to the Exporter.

WorldBand Media Delivers on HD2

By Doug Irwin, CPBE AMD

I'll admit it's been several years since I heard the phrase "killer app" applied to HD Radio, but I recently found out about (what is at least) a very interesting use of a station's secondary channel HD Radio capability right here under my nose in New York. I did some research and a little digging and now I want to tell you about it.

New York has its share of foreign-language SCAs on the air, but recently one foreign-language broadcaster teamed with Emmis Communications to make use of WRKS'

multicast capability to transmit its specialized format to the large southern-Asian community that lives in the greater New York area. This specialized broadcaster is WorldBand Media.

WorldBand Media's approach to delivering its programming to the New York market is

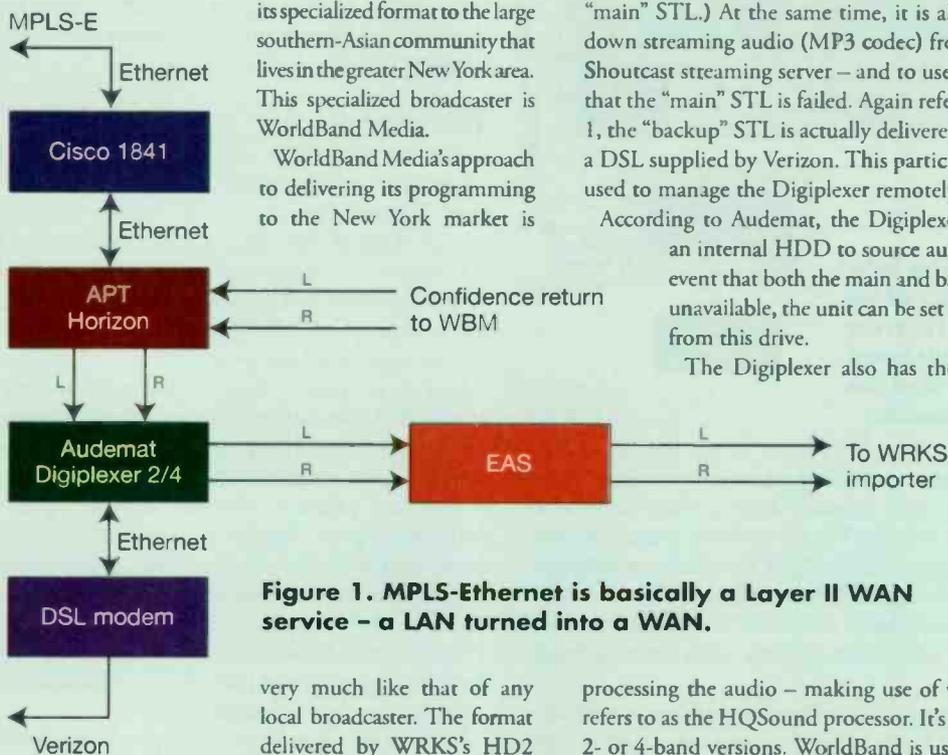


Figure 1. MPLS-Ethernet is basically a Layer II WAN service - a LAN turned into a WAN.

very much like that of any local broadcaster. The format delivered by WRKS's HD2 stream is known as HumDesi

Radio, and according to the website, HumDesi radio is the largest south Asian radio network.

The big difference between WBM and local broadcasters though is that the program itself originates from a centralized location (outside the market) and is delivered via IP to the WRKS transmitter site on top of the Empire State Building. More specifically, the connection to New York is made via an MPLS-E connection provided by a major international carrier. (Take a look at Figure 1. Basically, MPLS-Ethernet

is a Layer II WAN service. You can think of it as a LAN turned into a WAN.) This Layer II connection is made to a Cisco 1841 router. An Ethernet output from the Cisco is then connected to an APT Horizon, which takes the IP-stream in, and puts analog audio out. (The same Ethernet connection is used to manage the Horizon.) The analog outs are routed to an Audemat Digiplexer 2/4.

The Digiplexer is the heart of this system and has several critical functions. It uses the analog outs from the Horizon as its primary feed. (We'd all call this the "main" STL.) At the same time, it is also able to pull down streaming audio (MP3 codec) from an IceCast/Shoutcast streaming server - and to use it in the event that the "main" STL is failed. Again referring to Figure 1, the "backup" STL is actually delivered to the site via a DSL supplied by Verizon. This particular link is also used to manage the Digiplexer remotely.

According to Audemat, the Digiplexer can also use an internal HDD to source audio files. In the event that both the main and backup STLs are unavailable, the unit can be set to play out files from this drive.

The Digiplexer also has the capability of

processing the audio - making use of what Audemat refers to as the HQSound processor. It's available in 1-, 2- or 4-band versions. WorldBand is using HQSound for some processing effects ahead of the unit's analog outputs.

Those analog outputs from the Digiplexer feed inputs to a local EAS encoder, so that the appropriated EAS tests and messages can be sent out on the WRKS HD2 stream. The input to the EAS box is effectively the demark between World Band Media and Emmis/NYC. After that, the WRKS importer handles the audio just like any other Importer would.

Continued on page 33

Currently, the HD Radio stream can carry up to four streams of digital audio. The number of simultaneous data streams varies depending on available bandwidth, the data protocol used and the logical channel employed. Consideration must be given to the delivery time requirements of the data and available bandwidth. More bandwidth can be allocated to the data services at the expense of audio service bandwidth if faster delivery and/or larger file sizes are needed.

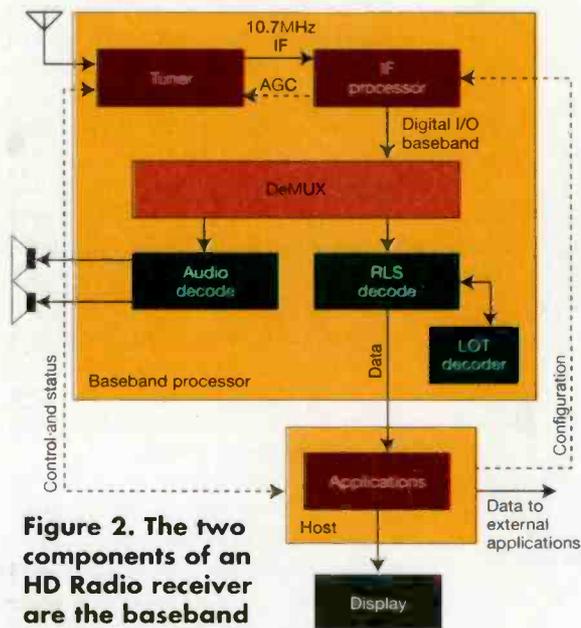


Figure 2. The two components of an HD Radio receiver are the baseband processor and the host processor.

There are four underlying transport protocols used to encode the data received from a data client prior to application into the RLS transmission stream. When transferring synchronized images, the difference between the packet delivery methods can dictate how far in advance of the associated audio the image must be sent to ensure it is available for display when the associated audio arrives:

- Standard packet encoding encapsulates a predetermined set of bytes received from the client and is best suited for non-real-time applications and file transfers where the file sizes are known and packet encapsulation is fixed by the originating application.
- Flex packet encoding lifts the packet size restriction and allows packet sizes independent of allocated bandwidth and is best suited for non-real time applications.
- Byte streaming protocol simply accepts bytes from the client as they arrive. As the bytes flow into the RLS they are buffered and the transmission system decides how best to break them up into frames based on the allocated bandwidth. Byte streaming is the most efficient method of data transfer and should be considered for custom application development that can provide message management.

- Large Object Transfer (LOT) is an Application Programming Interface (API) that allows a station or service provider to transfer large data objects of any type through the HD Radio transmission system to a receiver equipped with a LOT decoder. Album art applications use the LOT protocol.

A consideration in transmitting audio associated data, whether PSD or album art, via HD Radio is that there is no inherent provision for synchronization of audio with the data services. This makes synchronization of audio and graphics quite unpredictable without some tools and methods of synchronization.

To address this, system latencies are calculated to determine when the data client application needs to start transmission for on-time arrival. The actual presentation time of each image is controlled by including a custom ID3 "trigger" tag that is transported along with the other Program Service Data (PSD) information. Upon receiving this trigger tag, the receiver executes the appropriate command to provide display synchronization with the audio content.

Receivers

Special application software is needed on the receiver side when presenting multimedia data to the user. This software is used to decode and present a specific type of data. Standards are defined as to how the data is structured and transported, and how it is to be decoded and presented by applications within the host processor. These specific applications reside on the receiver's host processor.

As seen in Figure 2, there are two primary components in an HD Radio receiver: The baseband processor and the host processor. RF signals are received by a fairly conventional tuner which provides a 10.7MHz IF signal to the IF processor, where it is demodulated into digital I and Q baseband signals. The digital I/Q are de-multiplexed into audio and data streams, and audio is sent to the audio decoder for conversion to an audio output for amplification. All data is sent separately to the RLS decoder, where it is reformatted back into the original structure and sent to the host microprocessor. Here, the appropriate application prepares the data for presentation.

The host microprocessor contains the application software to initiate the necessary interaction with the various applications. The LOT decoder (if present) reformats any LOT data received and sends it to the RLS decoder prior to processing.

While displays and capabilities vary, the necessary hardware for these advanced data multimedia applications already exists in most of the current generation HD Radio receivers. It is up to receiver manufacturers to develop the host micro applications to make these new features available. This is where most of the development work needs to take place to provide media-rich content and data services over digital radio broadcasts. ▲

Anderson is manager, radio transmission strategic market and product development, Harris, Mason, OH.

Continued from page 31

Of course due to the nature of the IP-based system, a confidence-return audio feed can be sent back to WBM's central location as well. Everyone needs an air-monitor, right?

The second interesting aspect of the WRKS IBOC transmission here in New York is that it is the only (as far as I know, and as of the day of this writing) higher-power IBOC on the air in the market.

The determination of the correct (increased) TPO is quite simple as long as you marshal all the correct facts about the transmission system to be used. After picking the antenna to be used you will know the correct power gain (that figure comes from the manufacturer). Take the target ERP and divide that by that antenna power gain. This gives you the power you need to get right to the input of the antenna. Then, add up all the losses seen looking backward toward the transmitter itself. In the case of WRKS' IBOC transmission system, this includes combiner losses in addition to small losses due to the length of the transmission line from the output of the transmitter on the 85th floor of Empire, up to the location of the combiner on the 87th floor, in addition to small

losses from the combiner output to the antenna input. If those losses were (for example) 1dB total, then you would add that 1dB to the power needed at the antenna input itself to derive the power level ultimately needed at the output of the transmitter. Steve Pepe, Emmis' chief engineer in New York, engaged Tom Silliman, President of ERI (the antenna manufacturer) to do these calcs and to bless the various transmission lines, and antenna input power handling capability as all being up to the task of handling the higher IBOC power.

Pepe also told me that there have been no complaints about interference to the main signal from the IBOC carriers either before, or after, the power increase.

HumDesi has a section on its website dedicated to helping potential listeners find the right HD Radio for themselves. I have to believe that this is easier (and less expensive) than finding an SCA radio nowadays.

Kudos to Emmis and WorldBand Media for making use of IBOC technology in this fashion.

Irwin is transmission systems supervisor for Clear Channel NYC and chief engineer of WKTU, New York. Contact him at doug@dougirwin.net. Thanks to Steve Pepe of Emmis and Brad Herd of WBM for their help with this article.

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Tips, tricks, hints and more

By Chriss Scherer, editor

Return to the Planet of the Apps

Last month I highlighted some apps that may be useful to a broadcast engineer. We received lots of additional suggestions. While mobile device apps abound, we have received a few recommendations that are not specifically mobile apps.



One website, **Speedtest.net**, is an Internet access bandwidth test that verifies upload and download rates. And if you want an app for your iPhone, iPod Touch or iPad, one is available.



a station when you're out of town.

Tuneln Radio is an iPhone/iPod Touch app that accesses more than 40,000 streaming radio stations. While it's designed as a consumer app, it's handy to monitor



Augmented reality apps use the iPhone's camera to overlay additional information in the display. **Spyglass** displays a military-spec compass, tracker and finder for GPS locations, constant bearings, sun, moon and star locations, inclinometer, sextant, rangefinder, angular calculator, maps and other data over the active camera view or a map. Objects can be assigned a primary target to easily locate them when in view.

Augmented reality apps use the iPhone's camera to overlay additional information in the display.

Spyglass displays a military-spec compass, tracker and finder for GPS



runs on an iPhone, iPod Touch or iPad.

Want to keep an eye on servers, routers and other network devices connected to the Internet or LAN? Try **Net Status** to check availability and verify their status. The app



at data a hacker might seek, identifying potential malicious intruders on a Wi-fi hotspot, scan ports, look at which IP addresses are in use on a DHCP network and more.

Another useful app to check on the integrity of a network is **Scany**. This app for iPhone, iPod Touch and iPad performs a dozen of queries at once to see who is on a network, look



has 96 functions including 15 financial functions, four number bases and 10 statistical functions. There are 20 memory registers. It supports a portrait and landscape keypad. The company (Creative Creek) also makes calculators for Palm, Windows Mobile and soon Droid.

MathURPN calculator is a Reverse Polish Notation (RPN) scientific and financial calculator for the iPhone and iPod Touch. The calculator supports double precision accuracy and



It can read PDF, TXT, MS Office files and graphic files. Its claim to fame is that it can handle very large files (200MB+) with ease, which can be handy if you need to open large equipment manuals as PDFs. It can also highlight and mark text and create sticky notes in files. These markings can be saved and read on other computers.

Good Reader for iPhone (and iPod Touch)

is a multi-format file reader. It can read PDF, TXT, MS Office files and graphic files. Its claim to fame is that it

Satellite Sliderule Pro



used to find elevation and azimuth angles toward a satellite in geostationary orbit. By setting the satellite latitude and longitude, the calculator will return elevation and azimuth angles for the ground antenna.

for the iPhone, iPod Touch and iPad emulates a mechanical slide rule

used to find elevation and azimuth angles toward a satellite in geostationary orbit. By setting the satellite



There are several clock apps on the iTunes App Store. Two recommended to us are **Atomic Clock** from Awyse (seen left) and **Atomic Clock CS2** from Compulab. The Awyse version claims accuracy within a microsecond. The Compulab version has a familiar interface: It looks like a clock used on Gorgy Timing clocks.

Two recommended to us are **Atomic Clock** from Awyse (seen left) and **Atomic Clock CS2** from Compulab. The Awyse version claims accuracy within a microsecond. The Compulab version has a familiar interface: It looks

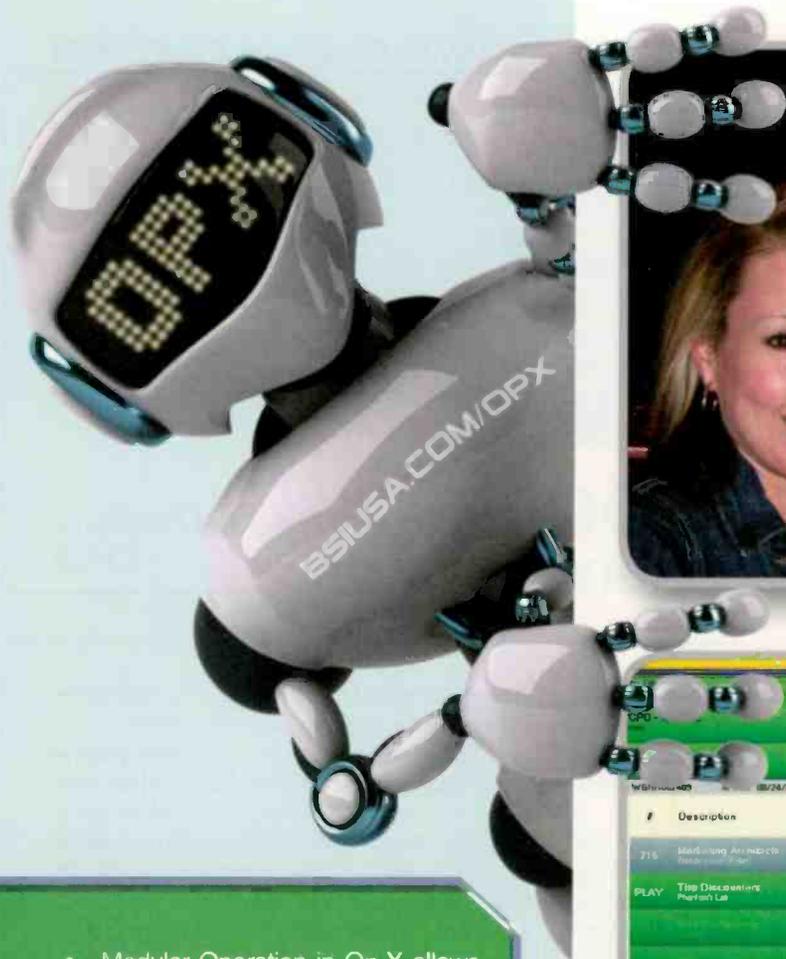
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Broadcast Tools Site Sentinel 4

By Michael Bradford,
CPBE

Tucked into a corner of the transmitter room at WILS in Lansing, MI, are two racks full of equipment that constitute the uplink for the Michigan Farm Radio Network. This satellite delivery provider began almost 30 years ago in the corner of a parking lot in Milan, MI, and served affiliates with farm market news that impacted a tri-state area.

When Saga Communications purchased the system and moved it to the present Lansing location, the expansion of services soon included uplinking the Detroit Tigers, Lions, Pistons and Red Wings. This was followed by the Illinois Radio Network with studios in Chicago, and most recently, the Minnesota News Network, with its main studios in Minneapolis/St. Paul.

For many years we have depended on various Broadcast Tools equipment to permit dial-up audio monitoring, remote switching and, most recently, Internet-based control of re-boot functions for two Nexus ISDN codecs using the Broadcast Tools

where with access to the Internet. This includes the newest Web-capable hand-held devices.

Reviewing the Site Sentinel's capabilities gave me the immediate impression the designer had been sitting in on our brain-storming sessions all along; here was a tool that included analog metering for four separate channels, status monitoring for four channels, four logic relay interfaces for direct interface with other equipment, a stereo silence sensor, a built-in power loss detector, a separate set of contacts for remote power control via a third-party device and an optional temperature probe. All of these features are programmable in numerous manners to accommodate a host of user requirements.

Every feature can be accessed over any IP network, including a private network, IP-based industrial control network and, of course, the Internet. It even features a logging system for parameter snapshots, alarms, status, metering and temperature sensing that will e-mail anyone of eight recipients with routine metering and/or alarm situations.

The device is equipped with four buffered high-resolution 10V metering (analog) channels, four optically isolated status/logic channels configured for 5 to 24Vdc wet or dry inputs (user selectable with jumpers), four channels of SPST 1A relays that may be latched on or off or pulsed with user-defined timing. It also features a separate, isolated relay with user-selectable contact assignment to interface with an external device, such as Middle Atlantic RIM-15-1C, 20-1C or RIM30-L530-1 ac controller devices to turn higher current external equipment on, off or reboot as required. SNMP and SMTP username and passwords are also supported.

Because each channel of control can be password protected, it is possible to assign security clearance for each of the four separate affiliates at the MFRN uplink its own password. This permits

Performance at a glance

Analog metering for four separate channels

Built-in power loss detector

Contacts for remote power control

Control relays

Euroblock screw terminal connections

Four logic relay interfaces

Optional temperature probe

Status/logic

Status monitoring for four channels

Stereo silence sensor

Web Switch. It soon became obvious that we needed more capability than existed with our previous dial-up units.

Affiliate access

Engineer Ralph Haines, Michael J. Ostlund from the Minnesota News Network, Dennis Mellott, Saga's GM in Lansing, Stephen Paul from the Saga Detroit office, and I all put our heads together to plan for a system that would permit access to all five affiliates' T-1, ISDN, dial-up and alternate program systems. This is where the Broadcast Tools Site Sentinel 4 entered the picture.

The recent installation of a hi-speed Internet connection into the uplink site to accommodate our Web Switch opened a whole new venue for remote control and monitoring. The Site Sentinel 4 is a cost-effective, 1/3RU device for Web-based remote control, monitoring, status alerts and relay interface with other equipment from virtually any

FIELD REPORT

everyone to monitor what's going on at any time, but limits control functions to those with specific password authority.

Programming for Internet

I called our ISP for the uplink to obtain the specific IP address, gateway, sub mask and related data necessary to program the remote control for Internet connec-

low-pressure alarm for the wave-guide in the near future.

Because the four relays can be programmed for on, off or pulse, I use them to reboot those devices that seem to want to lock up for no apparent reason now and then. The connection to these devices is via the Middle Atlantic ac controllers mentioned earlier.

The manual is clear and concise; all questions have been addressed in easy-to-understand language with screen shots of exactly what is seen on a PC monitor. Once all desired changes are made, the final IP address information and must be entered, and power re-boot the Site Sentinel 4 to set that data into its non-volatile memory. The device contains a recessed reset button to return to the factory default settings in the future.

Now we can access the remote control any time from any PC and change audio sources, check faults, extract an actual alarm/metering log and see at a glance the status of each carrier we uplink at this site. I am looking forward to the Site Sentinel 16, which is currently available. Now that I know how easy the Site Sentinel 4 is to program and the multitude of user-friendly features available, I have already planned on an expansion at the Michigan Farm Radio Network uplink. 📻

Bradford is the owner of Broadcast/Audio Services, Jackson, MI.

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tion, once I made the initial decisions for the various metering and status/logic channels. For complete programming the manual shows many options.

For instance, each of our four affiliates is assigned a separate username and password. This permits them to monitor all the metering and alarm channels, but have access to control functions exclusive to their particular network. The power failure alarm is sent to our main ops center in Lansing, with copies to me and engineering associate, Ralph Haines. We can access the site via Internet and determine what action is required. I placed the temperature probe in the exhaust stream for the HPA at the uplink, and connected the power-loss power supply ahead of the UPS ac supply. Separate summary-alarm contacts in the codecs connect directly to the remote control and are programmed to send an e-mail to the particular affiliate's engineer and our local engineers. We are planning on adding a Nitrogen



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AirTools Multiband Processor 2m

By Jeff Smith,
CSRE CBNT

There are lots of situations in a radio station where you say I sure could use some help with that audio. Maybe it's with the phones, the stream or the headphone processing.

We had such an issue here with the way our callers sounded. With people calling in on bad cell connections, VoIP connections and just plain old noisy landlines it became very clear that we needed to do something to not only boost the audio level but also help clean it up.

Right about that time our local SBE chapter, SBE 15, was having a meeting to talk about utility processors. One of the units demoed was the AirTools Multiband Processor 2m. After seeing the demo, I decided this unit was worth a try.

The 2m arrived and it installed very quickly. Our facility is mostly AES, so I liked the fact that

Performance at a glance

Analog and digital I/O

Word clock input

User configurable audio input failover

Stereo/mono/MS encode/MS decode operating modes

Multiple processing modules included

Up to 50 saved presets

Windows control software

Daypart processing scheduler

the 2m had both AES and analog inputs and outputs. I ran into a minor issue at this point; turns out the AES input did not work. I called Symetrix/AirTools support and immediately got a technician on the phone. After some troubleshooting we determined there was an issue with this unit. The tech arranged for a new unit to be sent priority overnight to me and it arrived the next morning. This one installed with zero issues. It syncs nicely to our house sync and installed very quickly. I installed in the air studio of one of our stations and ran the phone caller audio through it. I then hooked it to our network so I could control it from anywhere. Again, this all went very quickly and was up and running on the network in about 15 minutes.

Looks and software

The AirTools 2m is pretty basic on the back. It has an AES input/output, as well as stereo analog inputs and outputs. Also on the back of the unit is a BNC connector for word clock, an Ethernet RJ-45 plug, and a remote/RS-485 connection. I did not use the remote/RS-485 connection. The front of the unit has meters for the input and output levels, a small display to show presets and some basic configurations. Also on the front of the unit are indicators for power, network and a remote connection. There is also an RJ-45 on the front that AirTools places a label over, as it is not a network connection but a remote connection.

The 2m has a software utility that will auto-detect any units on the network. You can also enter a specific address. The utility allows full control over the 2m and is much easier to use than the very simple front panel on the processor. Once connected to the unit the options seem endless. I found it easiest to start with one of the 17 presets that come already installed and up to 50 presets total can be stored on the processor. These presets seemed to all sound good but with a little help can sound very good. Also simple to configure from the software is whether the box is AES or analog, the sync source and many audio parameters. The 2m allows control of filters, AGC, EQ, compression, limiting and more.

The 2m at its core is a DSP-driven, four-band processor. It responded very well for me with all sorts of input levels, I did notice, however, that if I drove the AES input very hard I could create distortion before the processor tried to fix it, resulting in

something that did not sound that great. This was only a test though and in the real-world conditions in the studio the unit performed very well.

Analog/AES

The unit is capable, as I said before, of both analog and AES audio. The analog inputs and outputs can be set as mic or line level and seem to have plenty of head room. Once the audio is in the processor it is converted to AES, if it's not already. The A/D D/A is 24-bit and does not degrade the audio at all. The A/D D/A also does not introduce any noticeable delay to the audio. The unit has a very low distortion and noise floor of about -100dB. According to AirTools it also has a dynamic range of 114dB (A-weighted), I however go nowhere near needing this much range for phone calls, so I will take their word for it.

Overall I feel the Multiband Processor 2m greatly

helped the audio quality of our callers. It helped clean up noisy calls and helped keep a consistent level between callers. Any issues I had were dealt with very quickly by AirTools support team. I would recommend the AirTools 2m processor to anyone needing an affordable solution to an audio problem.

Smith is the supervisor studio systems, Clear Channel Radio-New York.

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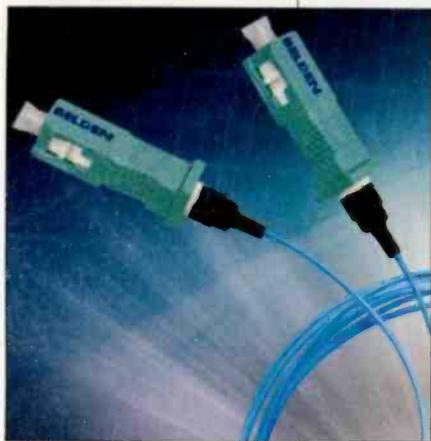
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by Erin Shippo, associate editor

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CT504/350(P), CT604/250(P), CT604/500(P):

Gepeco's branded line of Enhanced CAT-6 and 5e data communications cables feature extended bandwidths and precision tolerances to meet or exceed the latest TIA/EIA and ISO standards. Designed to deliver reliability in leading-edge networking, data and video applications, every reel is ETL Listed and UL Verified to ensure consistent performance. Available in both plenum and riser constructions, Gepeco CAT-6 and 5e cable may be installed in a variety of applications and environments.

800-966-0069; www.gepeco.com; gepeco@gepeco.com



Line mixer Tascam LM-8ST:

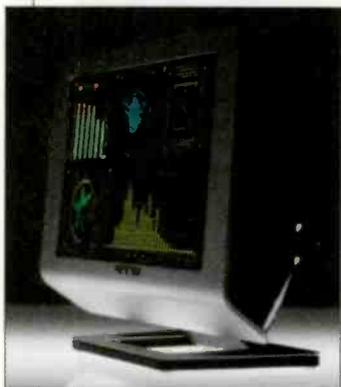
The Tascam LM-8ST is a 1RU line mixer for installation, studio submixing, keyboardists, etc. Eight pairs of balanced 1/4" TRS inputs – switchable from +4 or -10dB – can be bused to a pair of XLR balanced outputs, labeled ST1 and ST2/AUX. Pre or post-fader bussing is available for the alternate buss, and master output level controls and metering keep signals under control. A microphone input is also provided for announcements or performance.

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

Radio magazine's NAB Show Guest Blogger Contest

You could be headed to the 2011 NAB Show courtesy of *Radio magazine*! We know how hard it is to get to the NAB Show so we're making it a little easier – at least financially. Complete rules and details on how to enter will be at RadioMagOnline.com in January as well as the January issue. Stay tuned.

NEW PRODUCTS



Audio signal monitor RTW Radio-Technische Werkstätten

TouchMonitor Series: The TouchMonitor series includes the TouchMonitor TM7 with a 7" touch screen and the TouchMonitor TM9 with a 9" touch screen. Both monitors feature a redesigned graphical user interface that is equipped with a touch-sensitive 16:9 high-resolution screen. The touch screen allows an interactive, context-sensitive help feature. The TouchMonitor's modular software components allow it to be customized so users purchase only what is necessary. In addition, new instruments and functions can be added as software modules to the device at any time. Several display functions are available:

Surround Sound Analyzer, Real-Time Analyzer (RTA), ITU/EBU-compliant loudness meter, and an intelligent ident analyzer. A true-peak meter is available as a software option as well. Both models accept AES3 and AES3-ID signals and include a LAN port, a VGA output, GPIO interfaces and two USB ports.

+49 221 709130; www.rtw.de

The new PCAU-SUITE T1 Codec/
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www.pulse.com 800.841.1005

Freelance producer pool

vCreative

vCreative Producer: This service links radio stations to outside teams of creative writers and freelance producers. These producers can handle simple overflow work during busy periods like holidays, or provide regular assistance for stations short on staff. Using e-mail to outsource to producers lacks organization and can overwhelm e-mail systems with large documents and audio files. With vCreative Producer, all data and communication is organized and maintained on a Web-based system. Users can view the entire work flow process through real time status updates. This system also archives all data and tracks usage for billing. vCreative Producer integrates into all vCreative products and services.

800-605-9889; www.vcreativeinc.com info@vcreativeinc.com

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Single- or dual-link DVI Gefen

4x1 DVI KVM DL: The 4x1 KVM DVI DL Switcher supports the connection of one display using either single- or dual-link DVI, giving more flexibility while supporting resolutions up to 3840x2400. Internal EDID management eliminates the need to reboot when switching between computers, and restores the original resolution settings and desktop icons for each computer. This provides a smooth transition throughout the switching with no additional tweaking. It is cross-platform in capability, and provides a plug-and-play method of system integration without networking. It offers KVM control of four computers from one workstation, so users can quadruple the amount of data within reach at any given time.

800-545-6900; www.gefen.com; gsinfo@gefen.com

NEW PRODUCTS



Song tagging service **Emmis Interactive**

TagStation: This software application uses song data provided by Broadcast Electronics' TRE service to create intelligent matches with the iTunes music database. Whether tagging songs on an iPod Nano, Zune or HD Radio, TagStation ensures that listeners have a positive and accurate purchasing experience. Manage the automatic matches created between incoming song data and the iTunes song library with a simple search that leverages frequently matched songs. Upload an entire song library at once, incrementally, or simply manage songs as they're broadcast. Export accuracy reports and set up e-mail notifications to manage new songs – all from a single interface.

866-366-4702; emmisinteractive.com
ccampbell@emmisinteractive.com

Find the mic winner September issue

Congratulations to

Don DeBoef

of DeBoef Communications,
Oskaloosa, IA.

His name was drawn from the September issue entries. He won a 3-pack of Hosa MCL-125 mic cables.



Due to a printing error, the mic icon was not visible on the September issue cover.

The contest was opened to everyone.

www.hosatech.com

No purchase necessary. For complete rules, go to RadioMagOnline.com.

Site Control



WVRC-8 Web-enabled and Voice Dial-up Eight Channel Remote Control



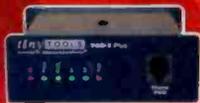
Site Sentinel® 16 Web-enabled Sixteen Channel Site Remote Control System



WVRC-4 Web-enabled and Voice Dial-up Four Channel Remote Control



Site Sentinel® 4 Web-enabled Four Channel Site Remote Control System



VAD-2 Plus Dual channel Voice alarm Dialer Web-enabled dual channel stereo silence monitor



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I/O Sentinel® 4

Web-enabled four logic/status input, four relay output module

Relay Sentinel® Web-enabled three relay module

Relay Sentinel® 16

Web-enabled sixteen open collector/SS relay module

Schedule Sentinel® Web-enabled Event Scheduler

Status Sentinel®

Web-enabled three input status/logic module

Status Sentinel® 16

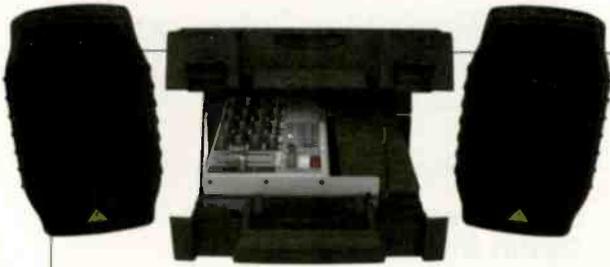
Web-enabled Sixteen-input status/logic module

WebSwitch™ (not shown) Web Remote Power Switch

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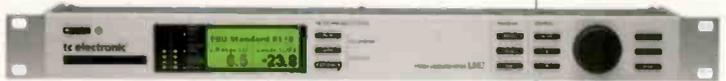
Portable PA system
Behringer

Europort EPA150: The Europort EPA150 is a portable briefcase-style PA system with 150WV stereo output and two detachable high-fidelity loudspeakers. The EPA150's power-to-weight ratio is achieved through Class-D amplifier design and the use of a switch-mode power supply. The built-in 5-channel mixer sports two balanced XLR mic inputs, a mic/instrument channel and a stereo line channel with separate CD/TAPE RCA sockets. Phantom power is provided for use with studio-grade condenser microphones. Channel EQ duties are handled via active 3-band controls (bass, mid, treble) while the overall system is managed by a 7-band graphic EQ with Behringer's FBQ Feedback Detection System.

877-672-0816; www.behringer.com
support@behringer.de

Loudness meter
TC Electronic

LM2: A full-featured stereo loudness and true-peak level meter, LM2 is for use in post and live production, broadcast ingest, linking and transmission. LM2's front panel displays the all-important numbers that reveal whether or not a certain broadcast standard is being met. It is also possible to bring up the stats display for even more details, or it can be connected to a PC or Mac via USB to get full, real-time radar screen picture via the included Icon application. It always offers a wide variety of 24-bit resolution audio inputs and outputs including AES/EBU and analog. Digital I/Os are fully synchronous while analog I/Os are scaled in the analog domain for max utilization of converter dynamic range. Analog inputs can even be trimmed at 0.01 dB precision.



818-665-4900; www.tcelectronic.com
info@tcelectronic.com

UPGRADES and UPDATES

Audemat has sold more than 1,000 GoldenEagle HD units – a modulation test device with HD Radio capability – through its Miami-based office. (www.worldcastsystems.com)...

TransLanTech Sound has inaugurated a new product registration and warranty system on the company's website. (www.translantech.com)...Ibiquity Digital launched Artist Experience, designed to add visual entertainment to the digital audio and data services HD Radio technology already delivers, at the 2010 Radio Show. (www.ibiquity.com)...Telos Systems

is shipping its new Hx1 and Hx2 digital hybrid telephone interfaces, which include audio processing from Omnia. (www.telos-systems.com, www.omniaaudio.com)

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**Loudness meter
Day Sequerra**



NLC4ST: The NLC4ST can independently process four stereo channels of audio simultaneously and apply loudness correction in 1RU. It measures and controls perceived loudness of the program audio using the industry-standard ITU-R BS.1770/1 as well as DTS-Neural Loudness Measure (NLM) and DTS-Neural Loudness Control (NLC) algorithms. NLM uses a perceptual model of human hearing to more accurately detect spectral and density difference, inter-channel relationships and temporal overlaps. NLC is a loudness leveling algorithm that applies the appropriate gain or attenuation to maintain the broadcaster-defined loudness level.

856-719-9900; www.daysequerra.com
info@daysequerra.com

**DC power backup system
Optim Engineering**

PWRgate: Optim Engineering's PWRgate PG40s is a 12V backup power system that can supply up to 40 amperes continuously from either a power supply or a battery. The equipment powered by the PWRgate instantly switches to battery during a loss of ac power or power supply failure without glitches using 80 ampere Schottky diodes that isolate the battery from the power supply with low voltage drop. It also has a built-in high-performance battery charger circuit that correctly and safely charges the battery. The built-in four-stage battery charger has selectable maximum charge rates of 1, 4, 7 or 10 amperes.



203-299-0233; www.optimengineering.com
sales@optimengineering.com



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www.bsiusa.com

For More Information Call: 1-888-BSI-USA-1 ~ Email: sales@bsiusa.com



Video editor VeriCorder Technology



1st Video: 1st Video is a media convergence tool that allows users to record, edit and send broadcast- and podcast-ready video, instantly over Wi-Fi

or from a smartphone. 1st Video is simple to use and integrated with newsroom systems for the immediate transfer of completed stories. Record video and sound with the onboard camera on a smartphone or import video and audio from an external source. Create clips from multiple audio and video sources with the touch of a finger. Videos can be sent and posted simultaneously to a newsroom site.

250-448-4954; vericorder.com
info@vericorder.com

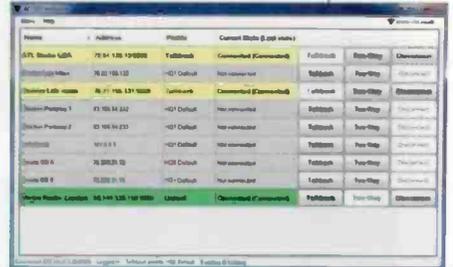
IP audio switcher Vortex Communications

Comrex Access

HotSwitch: An IP audio switcher designed to provide more flexibility to the BRIC Stereo IP audio codec line, Access HotSwitch is a Windows-based application that will allow a unit in the studio

to maintain a one-way talkback connection to several Access Portable users in the field. While each of the users can monitor a talkback feed from the studio, a full-duplex connection can be initiated from the studio with any of the remote devices simply by selecting the two-way button.

+44 0 20 8579 2743; www.vtx.co.uk
info@vtx.co.uk



Radio console network

Arrakis

AARC-NET: One of the important features of AARC-NET is that it integrates standard analog and digital consoles onto the network. Consoles already owned can be integrated into the system. AARC-NET is world standard CobraNet, not a custom one-of-a-kind network. Features include Ethernet audio networking, and cable and punch block replacement with one CAT-5 cable. It altogether eliminates or reduces the need for stand-alone routers, distribution systems, and long multi-pair cables, as well as the time and expense for configuration, maintenance and installation for traditional wiring.

970-461-0730; www.arrakis-systems.com; sales@arrakis-systems.com

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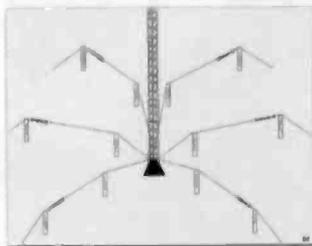
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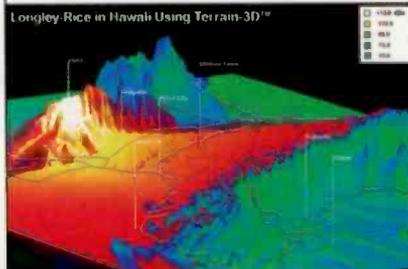


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- 📌 Trends in Technology
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- 📌 Facility Showcase
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Contributor Pro-file

Meet the professionals who write
for *Radio* magazine.
This month:
Field Report, page 38



**Jeff Smith, CSRE CBNT
Supervisor of
Studio Systems
Clear Channel
Radio, NYC**

Smith started in 1991 as an engineer for WCTC and WMGQ, Greater Media stations in New Jersey. He went on to

work as Metro Network's northeast engineering manager based in NYC and then as director of broadcast systems for Nassau Broadcasting overseeing engineering issues at all 55 Nassau stations. He is currently Supervisor of Studio Systems for Clear Channel Radio's five NYC FM stations. He is also on the SBE Board of Directors, secretary of SBE15 and chairman of the SBE's Student Chapter sub-committee.



Written by radio professionals
Written for radio professionals

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SIGN OFF

www.RadioMagOnline.com

by Erin Shipps, associate editor

That was then

A veteran radio operator, Mike Moore has been in the radio business for 50 years. He sent us this 1960 photo from the start of his career: A half-hour "Top Tunes" show on Saturday nights for WSAT in Salisbury, NC. He was 13 years old.

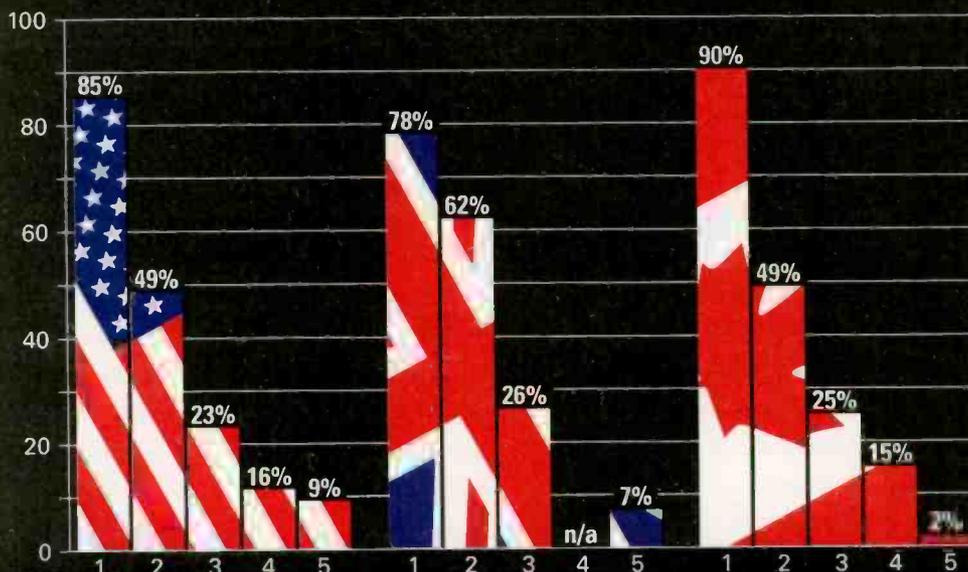
In 1972, he became the news director of WLOE Rockingham County Radio. Moore and his wife Annette currently operate 1490 WLOE and 1420 WMYN. Together they host the "9:00 Information Hour" on WLOE.

Drop by WLOE/WMYN's website at www.wloewmyn.com.



Sample and Hold Media Usage in Cars

A three-country online survey conducted by Vision Critical outlined the beginning of important changes to in-car media usage, many of which have a potential impact on radio. Vision Critical states, "Broadcast radio remains by far the most common media used in the car, followed by CDs or cassettes. However, the survey of 4,020 adult online consumers in the United States, Britain and Canada also shows that that change is on its way with the growing use of personal digital music in the car. Several major auto companies are building and promoting new technologies to put online media entertainment inside the car. This prospect is generating interest among drivers in all three countries. More than half of respondents who spend a minimum of 15 minutes a day in their cars express interest in new technologies that would bring access to online music radio services or on-demand playlists of music, news talk, and entertainment into the car."



- 1 - Listened to broadcast radio
- 2 - Listened to CDs/cassettes
- 3 - Listened to iPods, MP3 players, smartphones through vehicle's stereo system
- 4 - Listened to Sirius/XM satellite radio
- 5 - Streamed audio programs or podcasts on their smartphones through their vehicle's stereo system

Source: Vision Critical

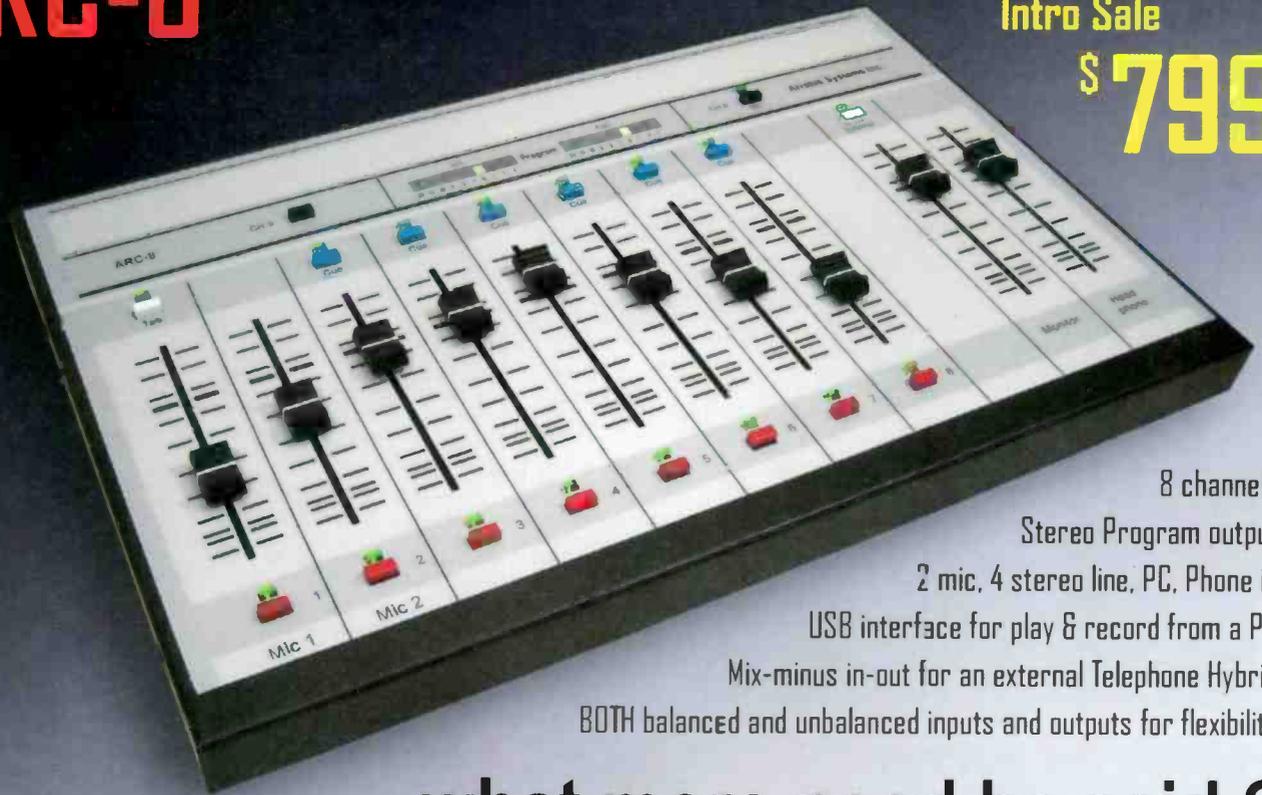
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...what more need be said ?

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IMAGINE THERE'S NO IP HASSLE. IT'S EASY IF YOU TRY.

Preface... Clear your mind. All that anxiety that you've come to associate with the typical AoIP network install is going to leave you now... Think of cool clear water flowing into the coffee maker and the sound of sprinkles hitting fresh, hot donuts... OK. Ready?

1. OPEN

Confront your boxes. You know they're there. They know they're there. But only YOU have the power to change that. Go ahead... open them.



10:03am

2. LOOK

Take a good look at what's in the boxes. You've got a control surface mixer item and rack mount BLADE something or other. They sure look pretty. And they are. Using this stuff you are gonna be a chick magnet. Or a guy magnet. Whatever, you are going to be IN CONTROL. Cool part is, THAT is only moments away!



Every BLADE has all the information about your entire network stored in it. Should any part of the network go down, the rest continues to function perfectly. Simply plug in a new BLADE and you'll be where you started in moments!

10:09am



3. RACK EM UP

Rack mount the rack stuff. OK, we're going to be brutally honest here. THIS SINGLE ONE STEP takes the longest of the entire setup process (unless you have a REALLY dull knife in step 1). Of course you'll need your own rack and screws, but hey, if it's a deal breaker, we'll work it out.

10:20am



4. PLUG IN

Time to hook them up. You knew it was coming. Your little tummy is wrapped around your throat. I mean, it's gotta be a real hassle, right? Interfacing these things? Setting them up? Getting them to talk to each other? Somebody get me an antacid.

Wait... is that a CAT-6 cable? You know what that is. And that's all it takes? Mmm Hmm. Yep. You bet.

11:02am



It's literally this easy. WheatNet-IP has all your bases covered. CAT-6 cables to hook up the BLADES and surfaces. Regular audio cables for the rest.

5. PUSH THE BUTTON

OK. Everything all hooked up (meaning, is the CAT-6 cable plugged in)? Great. Now we're gonna configure the system. We start by turning it on. Then?

Um... that's it. It configures itself. Every piece talks to every other piece and does what it's supposed to do. What? Doesn't EVERY IP Audio system do it that way?

WheatNet-IP does ALL the work of configuring your system EVERY BIT OF IT! It knows when you are adding on or when you are taking something out. You concentrate on content. We concentrate on getting it where it needs to be.

11:05am



6. IT'S WORKING!

You've got a system! From here on out, it's just like the analog stuff you're used to. Except ultimately more flexible. And much more reliable. And better sounding. And completely expandable. And such a joy to use. Yes - you heard it - I said A JOY TO USE! (Bet you never thought you'd hear an IP system described that way. Certainly not one from the other guys)

11:06am



7. CELEBRATE

Time for that cup of coffee and donut we talked about in the preface. Let's face it...the whole process was painless. AMAZINGLY PAINLESS. So painless, you are already up on Facebook and Twitter talking about what a stud muffin you are with your technical prowess. Don't get cocky, kid. But DO enjoy a delicious coffee and donut. And remember, next time you even think about installing new gear, you've gotta call your Uncle Wheaty...

11:07am



AoIP ADVANCED...

It's great to be able to say you invented something (whether you did or not). Turning that invention into a viable, workable solution for modern applications is what's needed if we are going to take this technology to the next level. The status quo was a pretty good starting point - but taking it out of the vacuum and into the workplace requires a fresh, objective yet passionate approach to advance it. WheatNet-IP certainly advances it, making your workflow everything it should be. We cost the same or less. We can handle 10 times the bandwidth. We are far more reliable. And we're poised for THIS decade as well as the NEXT one. We're Wheatstone! This is what we do! What else would you expect?



8. SLEEP EASY

With a WheatNet-IP system, rather than having to be on the phone to who-knows-where in the middle of the night, you can take your emergency engineers off the clock and let them get a good night's sleep. We ARE here, 24/7, in beautiful New Bern, North Carolina, and if you need us, we'll talk to you all night long. But with Wheatstone's reliability record, chances are much greater that those visions of sugar plums will just keep dancing in your head.

3:40am

