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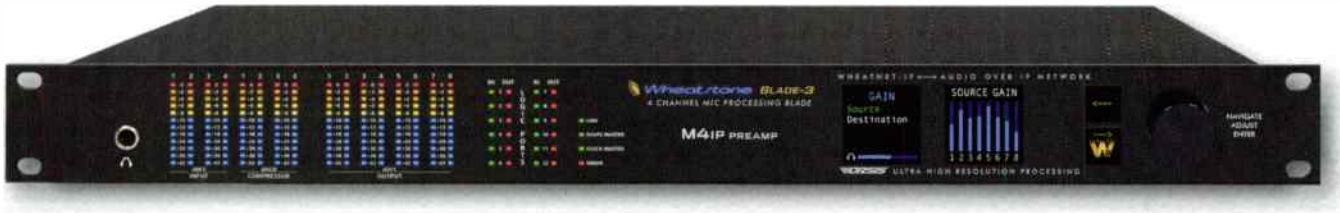

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Oh, The Voices - Part I: Tidying Up Talent Vocals

by Steve Dove, Minister of Algorithms

What you need to know about getting the most out of talent, from solving sibilance and noise issues to how to outsmart these tricky microphones.

The microphone processor has long been important but in recent years it has become vital. Mainly this is due to the recent trend of referencing audio to 0dBfs (the maximum signal level in a digital system) rather than the cozy old nominal 0dB VU. Most popular music releases are "normalized" or processed so that their highest peaks are at 0 dBfs, if they're not totally squashed and clipped to blazes up against that limit. Compared to a playout system crammed full of this and hyped-up commercials, an unprocessed announcer's voice can seem quite wimpy and out of place.

Consider also the entire radio air-chain. Sitting ahead of the transmitter is usually a Very Serious Processor, which is generally set up (in a music format) to be optimal for music, secondarily for voices. Presenting a processed voice that better suits the "big guy" can pay large benefits in on-air voice sound.

Other program distribution chains such as that produced by highly bit-reduced streaming codecs benefit from attention to the voice, whilst talk radio lives and dies by - voices. A good mic processor brings much to all these scenarios.

Let's run through the sorts of things we might want to do to a voice to tidy it up, improve listenability, and better integrate with today's technological expectations.

Get to the real meat of Steve's article...

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The same can't be said for the public internet, which is migrating to IPv6 to keep it in IP addresses. The length of an IPv6 address is 128 bits, compared to 32 bits for existing IPv4 addresses, or that unique numerical string that's needed by every device to connect to the internet. Who would have thought that the internet would blow through 4.29 billion available IPv4 addresses, the last and final block of which was allocated not so long ago? IPv6 will give us, well, a whole lot more. It's the difference between being able to fill a golf ball versus the sun with IP addresses!

What does IPv6 mean to networked IP Audio?

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The entrance to KSTP(FM)'s newly remodeled studios features large windows for clear lines of sight between rooms. Large LED displays and edge-lit LED on-air signs display the station's "KS95" branding.

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On the cover: Main operator's position in the KSTP(FM) air studio

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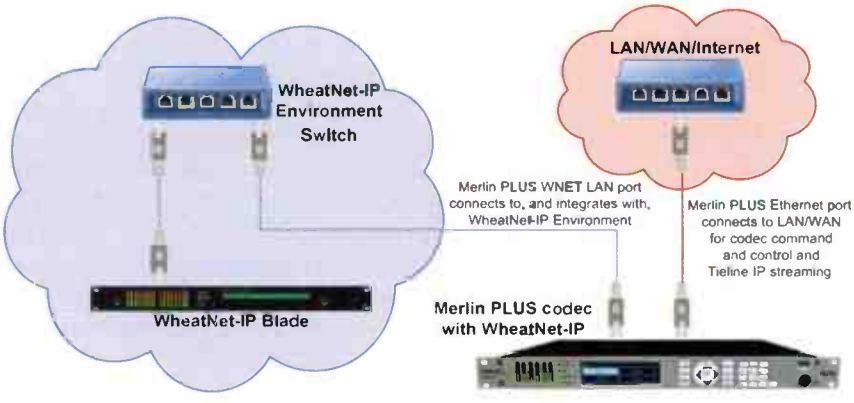

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VIEWPOINT

Radio Is Dead! Long Live Radio!

It seems every time you read the latest industry blog post, newsletter or trade publication (this one included), someone is talking about the future of radio. A number of sources both inside and outside of the industry are going so far as to predict the ultimate demise of radio; but is that really the case?

Studies repeatedly show that radio listening remains strong, particularly in cars. That said, as I have mentioned in past columns, there is no doubt that the industry is changing. Those changes most recently include disruptive technologies such as Pandora and the direct introduction of those technologies on our traditional "home turf" in the car. Now that cars are essentially Wi-Fi hotspots on wheels, any Internet-based service a listener would normally have available at home or via their smartphone is now available directly on their dashboard touchscreens (or any other connected devices that might be brought into the car).

These types of shifts are not new, and have yet to kill radio listening. If television, LPs, 8 tracks, cassettes, CDs, MP3s, satellite radio and numerous streaming options have not yet killed radio, I'm not quite ready to throw in the towel on radio because of the additional options coming our way. This is not to say that the transmission technology will not change, but I believe some form of "radio" as a medium will be with us for quite some time to come.

So what is it that really makes "radio" so special? Again, as I have mentioned, it's all about the content, particularly the "connection" between the listener and the service provided by their local radio station. The key is giving the listener something unique that they cannot get anywhere else — whether it is the actual content, or the way it is presented. The other thing that makes radio unique is the fact that it does this without any direct interaction required by the listener aside from turning on the radio and tuning in the station. Some have said that radio offers the easiest user interface of any other technology.

I traveled home to spend Thanksgiving with family this year, and witnessed something that reinforced the ongoing importance of local radio; it was in fact what triggered this column. My family was listening to a local 1 kW AM radio station from the next town over as they went about the morning's business; not Pandora, not Spotify, not some satellite-delivered content. The station had a live body on the air broadcasting music, news and the local "time to trade" call in show. Granted, this is only one small example of something that happens on a daily basis in many small towns around the country; but it underscores the fact that these types of stations are not only still on the air, they are thriving. This month, we're introducing a new feature called "Local Radio Spotlight" where we'll bring you the story of this station group.

Do you have a story of local radio making an impact in your community? E-mail us at radio@radiomagonline.com.

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Shane Toven | Editor

Radio
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Contest Rules Rewrite and EAS Issues

by Lee Petro

Radio stations have used contests for many years to increase audience share and build loyalty among listeners. I have won a few contests over the years, including a pair of tennis shoes from an AOR station in Flint, Mich., many, many years ago.

Despite the benefits to the listeners, though, the broadcaster running the contest has had to jump through many administrative hoops to avoid an enforcement action by the FCC. Establishing clear rules for the selection of winners, making sure that the material rules were aired on a regular basis, and alerting listeners of changes in the rules have all served to trip up broadcasters. Forfeitures of $4,000 to more than $20,000 have been imposed on broadcasters who failed to follow the rules, both the FCC's and, in many cases, their own contest rules. In the end, many broadcasters have found that it only takes one listener who didn't get their free hat to file a complaint with the FCC and commence a costly enforcement proceeding.

With the shift to more original content being posted to stations' websites, a petition for rulemaking was filed in 2012 by Entercom Communications to permit the posting of contest rules on the Internet rather than being aired over the station. Entercom reasoned that listeners expect to find information on the Internet, and the posting of the rules would permit full disclosure to anyone who was interested. Since the current rules only require "material" terms to be aired on a periodic basis, possible disputes could be avoided by pointing all listeners to the station's website, or some other portal with the contest rules information.

In November, the FCC released a Notice of Proposed Rulemaking, which seeks comment on the proposed changes in the contest rules. The proposed rules would require the posting of contest rules on a station's website, the licensee's website or another publicly accessible website. Further, the proposed rules would require broadcasters to alert listeners of the availability of the contest rules each time that the contest was mentioned. If the contest rules were changed, the proposed rules then would require the broadcaster to update the online rules, and provide over-the-air alerts to the public of the revised rules.

The FCC also seeks comment on several other aspects of the proposed rules, including making it easy for the public to find the online version of the rules, how to highlight the "material terms," and whether there are any other changes that should be made to the contest rules following from the proposed changes. The FCC also seeks comment on how long the rules should be posted on the website, i.e., until after the prizes are awarded, or sometime thereafter.

Each of the commissioners and Chairman Wheeler issued separate statements supporting the adoption of online-based contest rules. Comments will be due 60 days after publication in the Federal Register, with reply comments due 30 after the comments are filed.

EAS Alert — On Oct. 24, 2014, an unauthorized Emergency Alert System (EAS) message was transmitted by a syndicated radio broadcast system and disrupted viewing on AT&T's U-Verse systems in Austin, Atlanta, Detroit and North Carolina. Viewers saw a banner notice indicated that the White House had issued an emergency action notification (EAN), and the viewers channels were redirected to local broadcast stations. Given the ongoing Ebola scare, the alerts caused a significant amount of confusion and concern.

However, despite the fact that the EAN claimed to originate from the White House, it actually originated from Nashville, where a syndicated radio show rebroadcasted the EAN signal from the nationwide test in 2011 during a discussion on a recent interruption of the 2014 World Series. The alert was picked up by other radio stations and U-Verse systems, and the EAN then cascaded across several states.

In light of the interconnected nature of the EAS system, with each station relying on others for the transmission of EAS messages, the FCC is seeking comment on the impact of such errors, and methods to minimize or eliminate the impact of erroneous EAN transmissions. The FCC is also seeking comment on the adoption of proposed best practices for EAS security presented by the FCC's Communications Security, Reliability and Interoperability Council IV.

Comments on the EAS security issue are due on Dec. 5, 2014, and comments on the CSRIC best practices are due on Dec. 30, 2014.

Petro is of counsel at Drinker Biddle & Reath, LLP. Email: lee.petro@dbr.com.

DATELINE

January 10, 2015 – Issues/Program Lists for Q4-2014 must be placed in stations' public inspection files.

February 2, 2015 – Webcasters must submit forms to SoundExchange.

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Embedded Computing, With a Side of Pi

by Alex Hartman

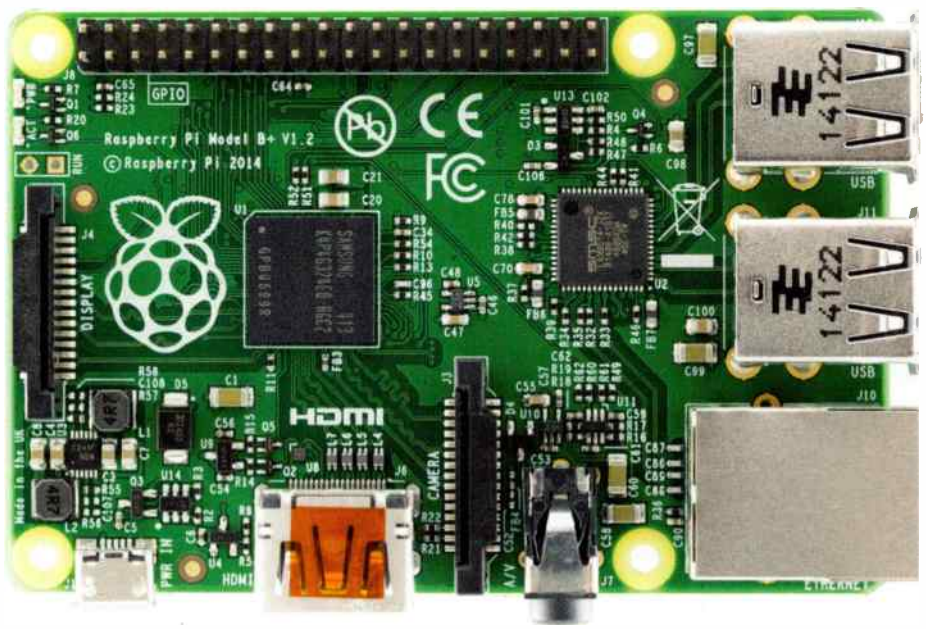
Embedded computing is not a new thing. Such devices have been around for years in industrial applications controlling heavy machinery that required full-blown PCs to perform the tasks required of it.

However, a few terms have come into common use when referring to embedded computing; "Hackerspace" and "Maker" are just a couple.

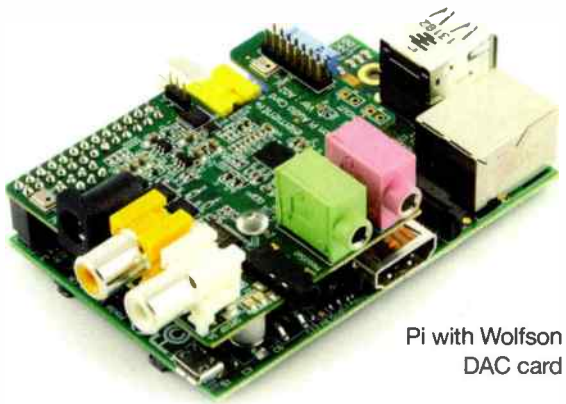
Embedded computers have become popular with the "kids these days." They're inexpensive; hobbyists have flocked to them. The Raspberry Pi Foundation in the U.K. created the Raspberry Pi to fill a need in the classroom and provide inexpensive lab classes. They never in their wildest imagination thought the platform would be as popular as it is.

You can use the credit card-sized Pi as a media device attached to a television or a whole house "smart home" controller. You can even hook it up to the coffee pot (yes, someone has done that). As a matter of fact, the Pi has created an embedded computing "movement." Tiny computing devices similar to the Pi include popular platforms such as Arduino, Beaglebone, Cubieboard and the Intel Galileo. The list of embedded computing platforms goes on.

These became so popular in part because they offer a gateway to the real world through GPIO pins and digital I/O. Each board has suitable purposes and uses, but ARM-based ones seem to be more "general purpose." The Arduino for instance is a "building block" platform for specific tasks, using components such as Atmel CPUs and other MCUs. They aren't powerhouses but can drive flip-flop relays, light controllers or any number of projects. These boards are popular for robotics projects and drones, for example.



Raspberry Pi B+



Pi with Wolfson DAC card

For the scope of this article however we will focus on the Raspberry Pi.

What does this mean to the broadcast engineer? The Raspberry Pi interfaces well with Python, but can be used with almost any language that knows how to do hardware interrupts (C, C++, J++, COBOL, Assembly, etc.). This is why the Pi has become so successful—if you know the basics of any programming language, you can learn to program the Pi to do what you want. The embedded computing platforms of today are handy little problem-solvers. A weekend of coding, a trip to the parts drawer, an order to Element14 or any vendor on the Internet and before you know it, you've got a device telling you when the coffee pot is running and a status input telling you that the fan failed at the transmitter site. These devices can even show the information on a little website for you or send you an email, with some assembly required, of course.

What can I do with them? As mentioned, these tiny little systems are problem-solvers of the digital age. I have designed an SNMP aggregation server using the Pi as a "systems management" device. One Raspberry

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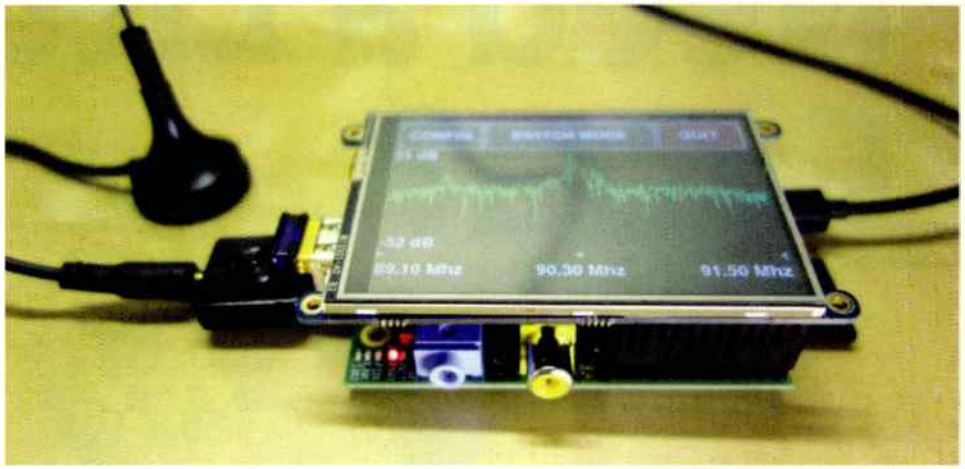
Pi is collecting all of the SNMP data on my network from various devices such as server disk space, temperature probes, satellite signal strength, audio level loss, Arbitron encoder relays, EAS, status and everything else in the plant. It's a lot of work for the small box that hides in the ceiling of my office. I have this particular machine attached to an LCD TV in my office that displays the information at a glance and alerts me if something is wrong and requires attention.

Another project that has piqued interest in the broadcast community is called OpenOB. Developed by James Harrison at the BBC research facility for remote broadcast, it runs in Linux and streams Opus encoded audio (currently only unidirectional) with very little latency. For $35, a Raspberry Pi can be deployed to a remote studio as an STL bridging the gap in place of more expensive codec hardware.

Does your facility need a security system? Yep, it can do that too — inexpensive IP webcams streaming H.264 back to the Pi as the network video recorder, door lock controller, RFID scanner, all in one box.



Raspberry Pi as a simple spectrum analyzer with RTL SDR receiver attached via USB.

Ever wanted to remotely locate the studio PC because of space, heat or noise concerns? Perhaps a virtual PC might be another solution. The Pi is VMware-friendly and works well as a "smart-dumb terminal" back to a VMware server.

Let's talk about a few not-so-traditional, not-so-broadcast uses including hobby stuff around the house. The world of "smart" and "connected" devices has been coined "The Internet of Things." There is a website called BrewPi. You guessed it, a home beer brewing controller. Add a few temp probes, some relays, a mini fridge and the Pi will e-mail you when your beer is ready!

Have you heard about these little RTL SDR USB sticks available all over the Internet? Plug one into a Pi and run the "dump1090" app. Soon it will start listening to all the ADS-B air traffic data around you and send it to your Windows workstation to be rendered on Google Earth. For those who like to listen to police scanners but want something that can decode P25 without paying the price for one of the fancy models, GNURadio offers a block-diagram system for encoding/decoding radio signals in Linux. With the RTL SDR, you can listen to anything from 60 MHz to 1900 MHz. This approach is even broadcast-friendly, as the Pi has an analog audio output. You could, for example, write a little "scanner" diagram in GNURadio to decode the local emergency frequencies and make it available to the station's newsroom. The whole system can run without a monitor with a few extra lines of code to turn on at startup.

"With the RTL SDR, you can listen to anything from 60 MHz to 1900 MHz. This approach is even broadcast-friendly, as the Pi has an analog audio output."

Are you a ham? How about building a repeater controller? D-Star hotspot controller? Echolink node? Yep, it's all been done.

The Raspberry Pi is so versatile that the possibilities for projects are virtually limitless. If you can dream it up, this little device probably can handle it. Video rendering and encoding is possible as well. Not quite as fast as a quad-core Xeon, but it will certainly do the job.

If you have a need, a bit of basic electronic and programming knowledge and some time to tinker, this is a good platform to get to know. Pretty soon you will have a small network of Raspberry Pi systems at your command doing little housekeeping chores around the facility for you.

Hartman is a contract engineer in the St. Cloud, Minn. area

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A Fresh Look at Streaming Audio

by Doug Irwin, CPBE AMD DRB

The topic of streaming media continues to be an important one. This month we take a fresh look at the technology to learn about the latest developments and the staggering pace at which the technology is moving along.

One of the most significant changes since we covered this topic in detail early in 2013 is that integrated Internet access in vehicles is now a reality. At the CES show in January of this year, General Motors announced the rollout of 4G LTE connectivity for certain models, including the 2015 Chevrolet Corvette, Impala, Malibu and Volt. The service, officially known as "OnStar with 4G LTE," will enable passengers to connect their personal devices such as smartphones, laptops, and tablets to an integrated high-speed Internet Wi-Fi hotspot. In effect, the vehicle becomes a Wi-Fi hotspot on wheels, able to accommodate multiple connected devices simultaneously. It was also reported that the service includes built-in apps for iHeartRadio, NPR, Slacker Radio, TuneIn Radio and others.

Of course "in-car" listening has been one of the remaining areas of strength for over-the-air radio. Clearly our in-car "franchise" is diminishing in importance as technology inexorably moves along. Listeners have been able to use smartphones connected to their radios via Bluetooth for quite some time, but the latest in-dash "infotainment" systems put streaming media on the same plane as broadcast radio. This is a significant event. If you weren't convinced of the importance of streaming media before, I hope I've given you more reasons to be.

With the well-established importance of reaching "mobile" users, we'll review the methods used to reach listeners via the public Internet, as opposed to our tried-and-true over-the-air methods.

There are three major components involved in reaching "mobile" listeners:

- Generating the content streams
- Distributing the content streams
- Final mile link from ISPs to end users

All three aspects are quite a bit different from what broadcasters are

Omnia A/XE software

accustomed to in delivering content over the air. As a broadcaster, you can really only control the first two of the three. The "last mile" aspect is completely under the control of the cellular provider or ISP. I addressed some particulars about the "last-mile" in another article published in Radio: *http://radiomagonline.com/IT_technology/streaming/streaming_mobile_devices_1011/*

Let's take a look at some common ways to generate and distribute the streams. First you'll notice that I wrote "streams" as opposed to "stream" because the reality is that different "targets" in the field use different decoders and therefore your encoding must obviously match. When a mobile user downloads an "app" part of the information written into that app finds the source IP address of the stream and by necessity, that stream will be encoded on the far end to work with the app on the mobile device. Not only will you expect to serve Android and iOS phones and tablets, but desktops as well. You'll be encoding streams to match all of those.

Regarding the various protocols, encoding mechanisms and server platforms; instead of just bombarding you with acronyms, let's see what they really mean (thanks mainly to Wikipedia).

RTMP: RTMP is a TCP-based protocol that allows for low-latency communication. It was developed by Macromedia for streaming audio and video between a server and a Flash player. Macromedia is now owned by Adobe.

RTP: RTP is a UDP-based protocol for the transmission of audio and

video over IP networks, developed by the IETF.

SHOUTcast: This is a cross-platform proprietary software for streaming media over the Internet. Developed by Nullsoft, it supports the transmission of digital audio content, primarily formatted as MP3s or in the HE-AAC format, to and from the media player software.

Icecast: Icecast is an open-standard media encoder that supports Ogg Vorbis, Opus, WebM and MP3 audio streams.

Wowza: The Wowza Streaming Engine is streaming media server software developed by Wowza Media Systems and is used for the streaming of live video and audio over IP networks to desktops, laptops, tablets, mobile devices, IPTV set-top boxes, connected TVs, game consoles and other networked devices.

Helix: Helix Universal Media Server, developed by Real Networks, supports a variety of streaming media delivery transports including MPEG-DASH (Standards-based HTTP streaming), RTMP (Flash), HTTP Live Streaming (HLS), Microsoft Silverlight and HTTP Progressive Download enabling mobile phone OS (Android, Blackberry, iOS, Symbian, Windows Mobile) and PC OS media client (Flash Media Player, QuickTime, RealPlayer, Windows Media Player) delivery.

Orban Opticodec-PC 1010 with Optimod-PC 1101 audio card

Flumotion: The Flumotion Streaming Platform is a Content Delivery Network that supports leading formats like Windows Media, MP3 or Flash, as well as the open standards Ogg Vorbis and Ogg Theora. It can reach nearly 100 percent of Internet users regardless of the operating system (such as Windows, Mac OS X or Linux) they use.

GENERATION OF STREAMS

From my experience the most common way to generate the streams is by using software hosted on a PC. Again, as with traditional broadcast equipment, you'll likely be interested in what your preferred equipment manufacturer has to offer — but it's important to know about alternatives as well.

The first example of software we'll look at is from Omnia and is known as A/XE. One feature is built-in audio processing. Omnia offers other software-based audio processing for streaming but we will focus on A/XE. The available codecs are MP3, AAC, HE-AAC, and HE-AAC version 2. The software supports the following media servers: SHOUTcast, Icecast, Adobe Flash Media Server, Wowza Server, Live 365 and Windows Media Server. Omnia A/XE runs as a Windows service in the background, and can be managed from anywhere through a web browser. You'll need a license for each stereo input. Each stereo program input can be processed and encoded in multiple ways, and sent to different servers simultaneously. The basic operating system requirements are Windows XP or later with 20 MB of free disk space. You'll also need to be running Microsoft. NET client framework 4.0.

If you are using Livewire take note: Omnia A/XE includes a copy of the Axia Livewire IP-Audio driver, which allows you to receive audio from and send audio to Livewire devices over the network without the need for a physical audio card.

Another option for encoding software is Orban's Opticodec PC-1010, which will

generate streams using AAC, HE-AAC version 1, HE-AAC version 2 and MP3 (for HTTP only). It will run on Windows XP, Win 7, Server 2003 or Server 2008 (32/64 bit). 128 MB of RAM is the minimum requirement, 256 MB is recommended. Servers supported are Adobe Flash Media Server, Wowza Media Server, Apple QuickTime Streaming Server (or Darwin, the open-source version of QuickTime), Helix Mobile Server, HTTP/ICY SHOUTcast servers and Icecast2 servers. Opticodec PC-1010 will generate a single multicast stream, but the number of unicast streams is limited only by the power of the host PC. Each of the unicast streams can be encoded differently so that the various devices and codecs found in the field can be supported, as I mentioned earlier. The user interface allows you to see the audio levels with peak indications, whether or not a connection is made with a remote server, the bitrate of the connection, and finally the elapsed time of the connection.

Telos ProStream

Orban's PC-1101 must be used in conjunction with the professional version of PC-1010. The PC-1101 is a combination sound card and audio processor installed in the same host computer as the Opticodec software. The card offers dedicated DSP onboard for audio processing, thus freeing up the CPU for other tasks such as encoding streams. Additionally, the PC-1101 lets you mix an analog source, two digital sources and two Wave sources. This feature makes it useful for commercial insertion in the streams. The final audio mix can also be looped through a PPM encoder, for example, before being encoded into an audio stream.

If you want to avoid adding yet another computer in your rack room you could consider a hardware solution for your streaming encoder needs. The Telos Systems Pro Stream is 1 RU device that serves the role of audio interface and streaming encoder with no PC needed. The device includes on-board audio processing. You encode directly in either MP3 or AAC streams, before sending the encoded stream off to a compatible server such as SHOUTcast, Wowza, Icecast or Adobe Flash Media. You configure the

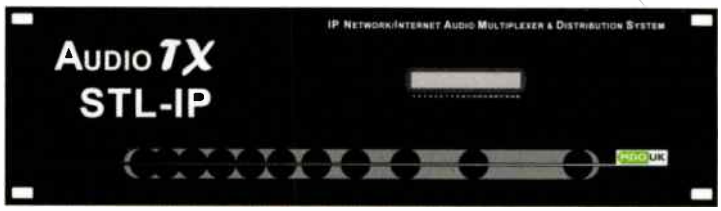
Pro Stream through a web browser. ProStream comes with analog inputs and outputs, along with Livewire IP Audio I/O. On the output side, you have access to fully processed, un-encoded audio as well as encoded audio, providing your studio with another source for processed sound. There's a built-in headphone amp with 1/4-inch jack and volume control so that you can listen to the finished product. Full network connectivity is provided via two Ethernet jacks, one for the LAN (including Livewire) and the other for the WAN and streaming.

Another hardware option we'll look at is the AudioTX WebStream. This device comes in one of three versions: a 1 RU chassis that will encode a single stereo pair in up to six streams at different codec and bitrate combinations, a 3 RU version that can encode and serve up to 12 separate streams from eight audio inputs, and another 3 RU version that encodes and serves up to 20 separate streams from 16 mono audio inputs. Supported encoding algorithms include AAC (MPEG4), HE-AAC, or MP3. The streams are compatible with SHOUTcast and Icecast servers.

DISTRIBUTION OF STREAMS

Besides generating the streams, it's important to be sure that they can be distributed in such a manner that anyone wishing to hear one can easily and consistently receive it. That's the other aspect of streaming over which you have some amount of control. If you are new to streaming it's important for you to know that you'll be likely forwarding the stream that you generate to a service that can handle thousands and thousands of simultaneous streaming connections. Since few stations have the resources and bandwidth internally to handle this sort of traffic, A Content Delivery Network (CDN) is a system that accomplishes this.

There are quite a few services out there that specialize in the widespread dissemination of audio streams for broadcasters. One well-known service provider is Abacast. Its "Clarity" service provides support for in-stream audio or video ads, pre-roll audio or video,



AudioTX STL-IP 3 RU

displays and sponsorship ads. You can "target" ads at listeners based on their location, device or demographics. Clarity provides CDN certified affidavits and can analyze listening results by play time, audience size and targeting details.

StreamGuys is a CDN and provider of streaming services for the distribution of audio via the public Internet. Aside from live streaming, it provides on-demand, subscription, ad insertion, single events and podcasting services. Customer service is set up on a one-to-one basis, so if you're new to the game, you may certainly benefit from that.

Airkast is another company looking for your business. The AirKast interactive mobile application for radio broadcasters is a service that streams audio, video and interactive graphic advertisements to mobile devices and allows these messages to be targeted based on the specific geographic location of the listener.

Triton Digital Media is one of the largest streaming services. Its latest generation of player adapts itself to the user's context, whether desktop or mobile, compact or large screens, landscape or portrait mode. Triton owns and operates its own CDN with global reach. They have multiple points of presence and hundreds of streaming servers located in data centers. They can also provide a listener analytics dashboard that shows streaming usage on any web or mobile platform. According to its web page, "These tools let you understand the traffic sources as well as enable you to better handle streaming requirements."

Though ad insertion is outside of the scope of this article, I can't mention ad insertion and streaming audio without talking about AdsWizz. It offers a means by which you can insert personalized ads into individual listener's streams. In fact, from their web page, "All your listeners are connecting to the same radio station, but will get their own ad. No extra production work is needed at your side." It refers to its system as "server-side Audio Injector for Streamers (AIS)" and it is compatible with the following server platforms: Wowza, Shoutcast, Icecast, Flash Media Server, RTMP and Flumotion Server.

Finally, let's take a look at StreamOn. They offer a "one box" solution

that accepts audio from your station (or other source) and generates AAC+, Ogg Vorbis and MP3 streams internally. From the encoder, the streams are forwarded to StreamOn's own servers, and then distributed to the listening public. Each client station receives a custom "player" (or web interface). The player displays artist and song info using proprietary software. That data comes from the station's automation system. There was an in-depth article about the SteamOn device published in Radio: *http://radiomagonline.com/IT_technology/streaming/applied_technology_streamon_smooth_spots_0901/*

WHERE DO WE GO FROM HERE?

For those of us that have been in the field for many years, the question naturally arises, "Will 'radio' via the Internet every completely supplant over-the-air radio?" I can't answer that definitively any more than anyone else can, but it's safe to say that there will be increasing use of the Internet and slowly diminishing use of broadcast over-the-air radio in the long run. Is it possible that the infrastructure that accommodates "mobile" access isn't up to the task? That question was recently asked by Teracom, an over-the-air transmission services provider to broadcasters in Sweden.

Here are their findings:

- An enormous capacity would be required to stream today's radio services in a mobile broadband network. When converted, current radio listening represents a larger amount of data than all of the incoming and outgoing data of all four mobile operators networks in 2012. (Again, this is for Sweden.)
- Given current price levels, it would cost around 860 million EUR per year (about $1.1 billion) to broadcast radio via the mobile operator's cellular networks, as opposed to 10–20 million EUR per year ($13 million to $25 million) for equivalent capacity in the terrestrial broadcast network.

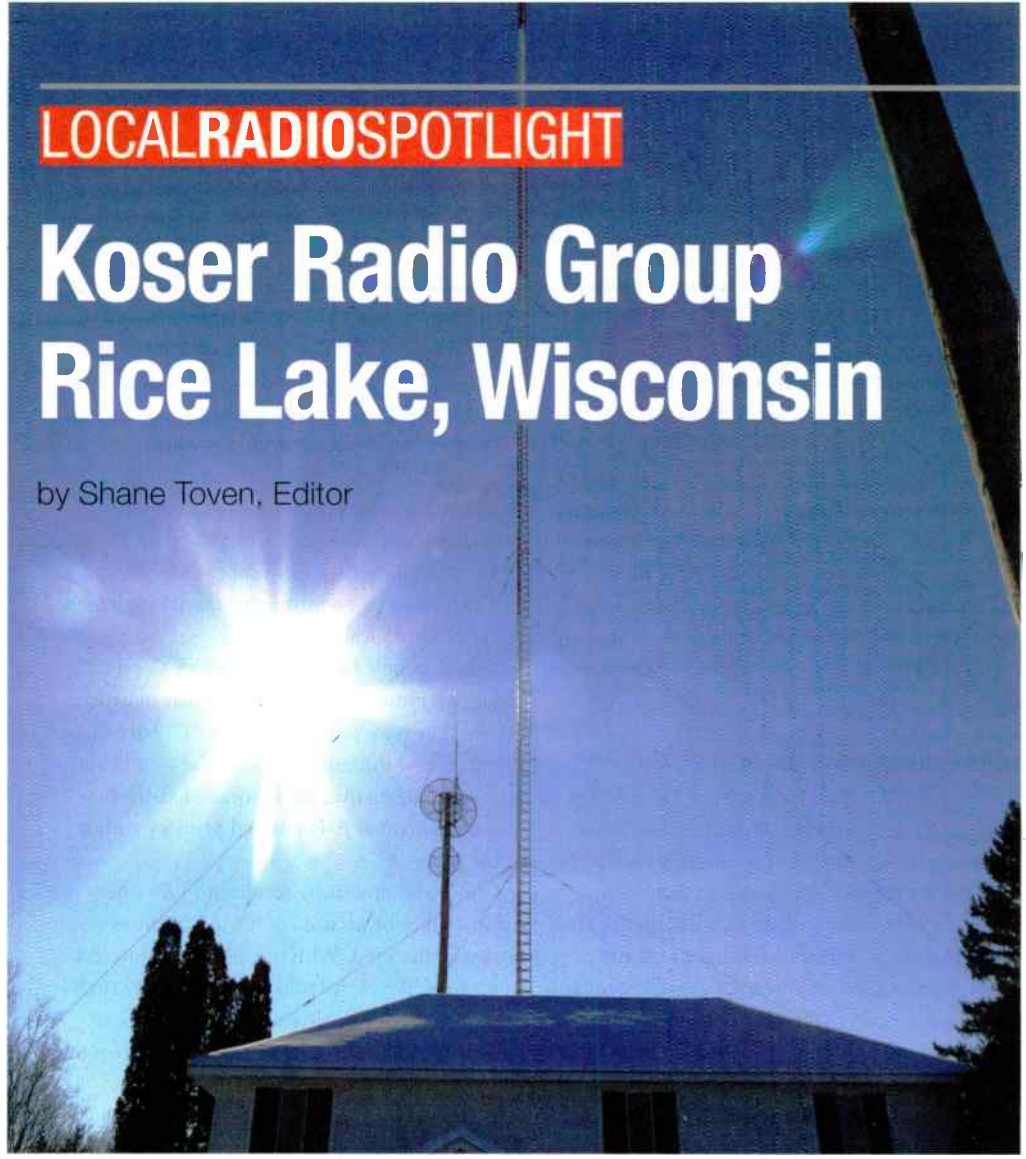
"Some people believe it is possible to replace broadcast radio with radio via cellular networks. Surely, they have not done the math. I have done the math and the conclusion is clear — it is not a realistic alternative," said Göran Hedström, senior consultant at A-Focus and primary author of the report.

Those are interesting results but I for one don't want to be accused of having my head buried in the sand. With the increasing interest in services like NextRadio and technology such as RadioDNS, I believe we'll be making use of OTA radio for some time to come, and I'm not the only one. In a recent blog entry, Stategic Analytics wrote the following: "The crossover between terrestrial and IP is creating a 1+1=3 scenario that is stimulating additional listening and expanding the market for both content delivery propositions." I for one am all in favor of that.

LOCAL**RADIO**SPOTLIGHT

Koser Radio Group Rice Lake, Wisconsin

by Shane Toven, Editor



Every day, radio stations around the country function as pillars of information and entertainment in their communities. We're starting a new column here at Radio magazine that will highlight stations, owners and groups serving their communities with their own unique flavor of live and local programming.

This month, we visit with Tom Koser of Koser Radio Group in Rice Lake, Wis. Koser owns 11 stations: five in Rice Lake, Wis., five in Escanaba, Mich., and one in Hayward, Wis. All are locally programmed and operated. I sat down with him to chat about his perspective on the industry and his approach to radio.

Radio: *Tell me a little bit about your background? Where did you get your start?*

TK: Well, I went to UW Platteville in their broadcast management program with a minor in business. It was my goal at the time to own and operate radio stations. I'm one of the fortunate few who are actually doing what they set out to do. I feel really blessed to be able to accomplish that.

From Platteville, my first job in radio was with Midwest Family in Madison. I started out in sales at WISM(AM). I was with them for about 8 years, and then I moved down to Midwest Family's two-station property in Springfield, Ill., as their sales manager. I managed a sales staff of 10 people. That was interesting because I was 24 at the time, and I was managing staff members that were twice my age. It was a great challenge and a great learning experience. Tom Kushak was really a great mentor for me.

After a couple of years in Springfield, I became the general manager of their two Rockford, Ill., properties, and was there for four years. I was a partner with Midwest Family. With that organization, the key players in all of their markets were also shareholders, and so I was a partner with them during my last four years there.

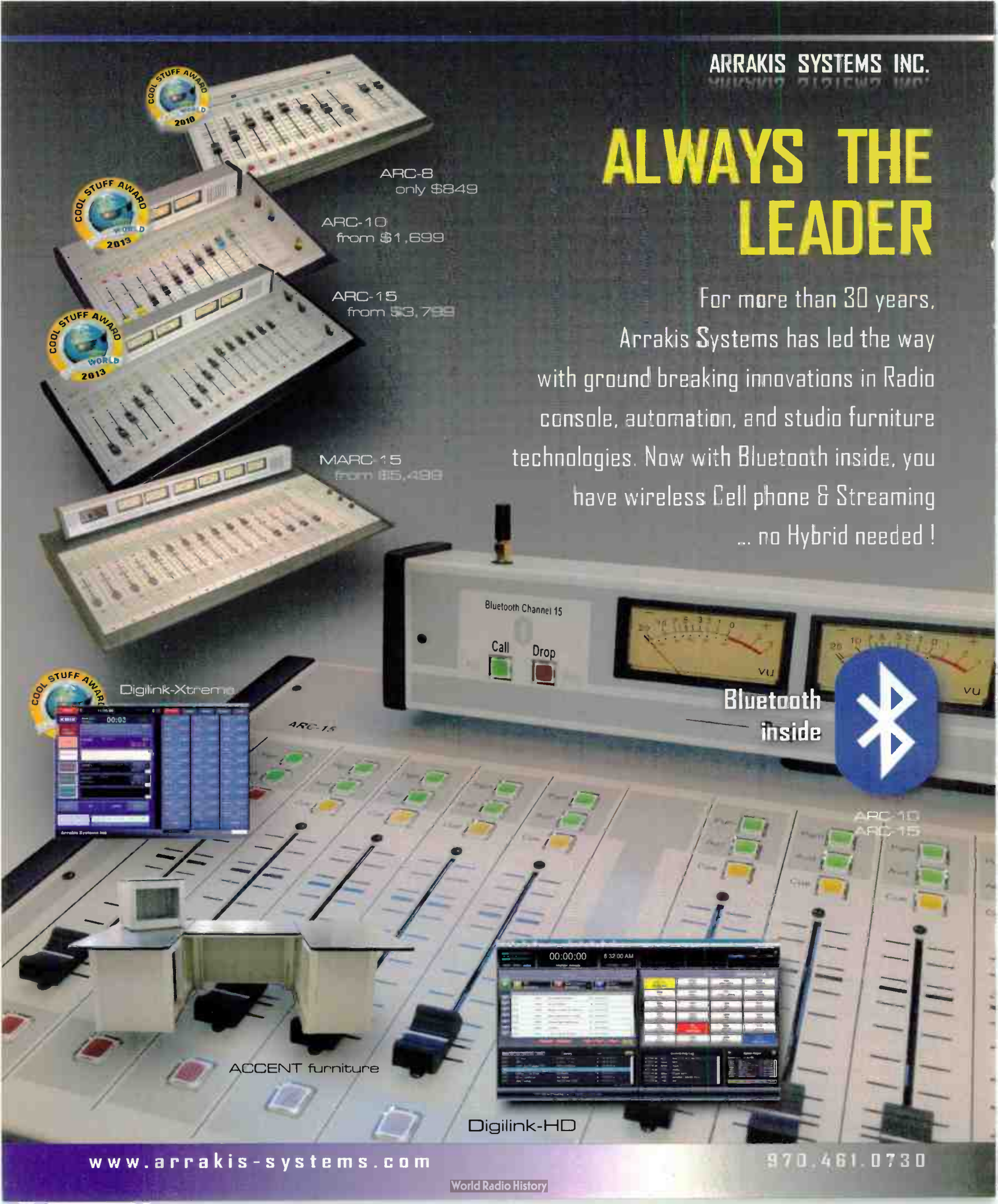
As Midwest Family was looking to buy more radio stations, I was designated as the person to go out and identify new potential markets and stations. As I kept looking at that, I thought I could probably do this myself. This is my home. I grew up in the Barron County area. What I was

looking for at the time (whether for Midwest Family or for myself) was a regional signal, like a 100,000-watt FM that could be the "big fish in the small pond." I had seen others employ this technique in other markets, so I felt it could work here as well. WJMC, the AM and heritage call letters, had been here since 1939. They also had a 100,000-watt FM which was fairly underutilized, really only marketing to Barron County. As I looked at that, I felt perhaps it could be a good opportunity and could really be turned around. I thought it could be a regional operation and cover all of Northwest Wisconsin, even though we're based out of Rice Lake.

The Janesville Gazette printing company owned the stations at the time. I was in Rockford, only 30 miles away, so I visited them and asked if they would be interested in selling the radio stations. WJMC was not for sale, but I brought the idea up to them. Fortunately, they said "sure." I bought WJMC in 1989, so those were my first two stations.

The main transmitter for WJMC(AM) delivers information and entertainment to the area.

Two years later, I bought two stations in Rhinelander, then a year after that added WRLS in Hayward in 1992. Shortly after, Midwest Family asked me if I would be interested in buying their Escanaba, Mich., stations. Things were going pretty well, but the stations really didn't fit their model after selling their Traverse City stations. They were more interested in larger markets, so I bought those two stations in 1994. After the 1996 Telecom bill that enabled ownership of multiple FM stations in one market, I went to work expanding my Rhinelander market, and put another FM station on the air. I had 14 radio stations as of 1997. After that I bought two more stations in Escanaba, so I had a five station group there, then in the fall of 1998 I bought the competition across town in Rice Lake, WAQE(AM/FM), and simultaneously put another FM on the air here in Rice Lake, 50,000-watt WKFX. We really quickly grew to having five radio stations based out of Rice Lake, one in Hayward, three in Rhinelander, and a five-station group in Escanaba. In order to finance the five-station group here in Rice Lake, I sold the Rhinelander stations and consolidated into the Rice Lake market to be even more productive. So that's how I ended up with the current 11-station group. We've operated at 11 stations since 1999.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Radio: *Who were some of your biggest influences and mentors in broadcasting?*

TK: I mentioned Tom Kushak in Springfield. He taught me a lot about management, but also a lot about involvement in the community. You take your living from the community, and you need to give back. I learned a great deal from Tom. My biggest mentor in broadcasting was Bill Walker of the Midwest Family group. Bill taught me so many things. He taught me that people make the difference in broadcasting. At a time when everybody was moving away from and trying to eliminate as many positions as possible in broadcasting, the Walkers of Midwest Family invested in people.

A whiteboard in the newsroom gives an overview of story assignments for the programming staff.

Phil Fisher is another one — both of them are in the Wisconsin broadcasters hall of fame. Phil was really the sales guru of the Midwest Family group. He taught me a lot about the sales and marketing systems that we still use today. Chuck Mefford is another. He's one of the top sales consultants in the country. He and I have been partners for many years. The real key people in the Midwest Family group have been tremendous and I wouldn't be doing what I'm doing today without those guys.

Radio: *What are your thoughts on the current state of the radio industry? You mentioned earlier investing in people when other stations were trying to consolidate and minimize the human element. You guys kind of took a different approach.*

TK: I think the industry future is very bright, because radio is so flexible and radio continues to reinvent itself. That's its history. When television came in, people predicted the death of radio. All the big radio shows like "The Lone Ranger" and the soap operas moved over to TV and everyone said radio is dead. Radio reinvented itself as a music entertainment medium. When FM came along, the prediction was that AM would die and it would hurt the radio industry overall. They said nobody is going to want AM radio stations anymore. Along came personalities like Rush Limbaugh and talk radio was born. Now, talk radio is the number two format in the nation next to country music. It saved AM radio. The digital revolution came in with all of the new places to get music and other audio. They said, "Who's going to need radio anymore?" Radio has reinvented itself with localism. Yes you can hear all of the songs from other sources, but you can't get the other things that radio delivers, whether that be the local news and information, school closings, severe weather, news during natural disasters and other tragedies ... Hurricane Katrina was a perfect example of that. When the disasters hit, everyone including local law enforcement turned to local radio because it was still on the air with emergency backup facilities. The cell systems and other communications went down,

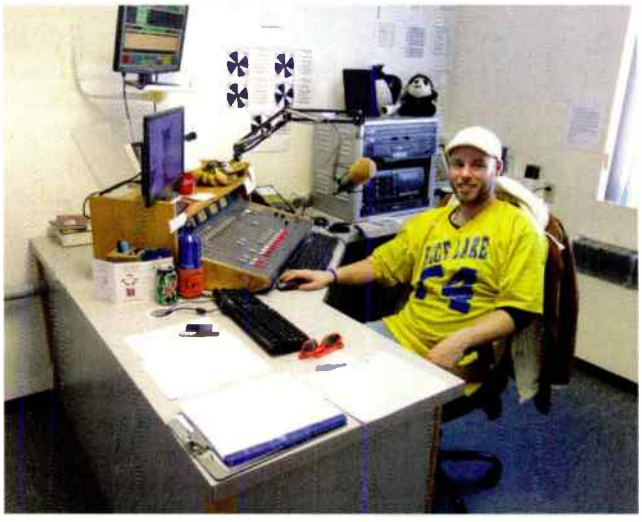
but radio was still there. I think radio now is positioned very well because we've reinvented ourselves as the perfect complement to the digital age. People can be using their smartphones and other devices, accessing whatever content they want and at the same time listening to radio. FM radio is still one of the most requested apps on cell phones.

Radio: *So you must be following the NextRadio project then?*
TK: Exactly. We're in the process of getting involved with NextRadio and TagStation as well. As long as radio continues to adapt, I think the future for local radio is bright ... and as long as we focus on localism. I use the term hyper-local. Our focus here is to be hyper-local. Anything that's happening in any of our communities within our 50-mile radius, we're all over it and we're involved as much as possible.

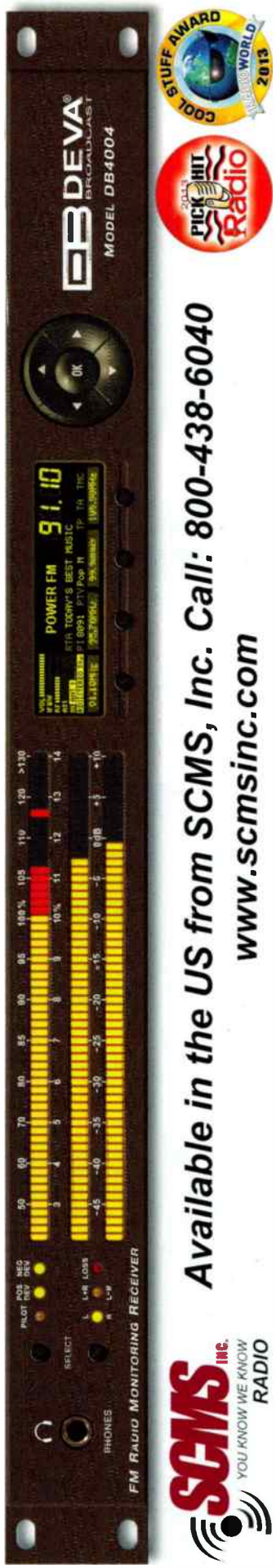
Radio: *Along those lines, what does the phrase "live and local" mean to you?*
TK: It means people, first of all. Number one, you have to have people to be live and to be local. Is that an investment? Yes. There's no question that we have maybe 2–3 times as many people as a typical operation in a market this size. Some operators would look at that and say that's crazy — you're spending so much money on all those people, but I say we make the money that we make because of the people. All of our morning shows on all of our radio stations are live. Do we utilize voicetracks? Yes, absolutely we do, but not at the key times ... Morning shows, some midday and afternoons. If you really want to provide the content that makes you local, you need to have the people. So that's the first thing ... Live and local means people. Good people.

Radio: *What percentage of programming would you say is live vs. voicetracked or satellite?*
TK: It depends on the station. Our AM information station, 1240 WJMC is kind of like the WCCO of our local area. We're probably 70 percent live. The other 30 percent is either syndicated programming or sports, whether that be the Brewers, or the Bucks, or the Badgers, or the Packers. On our FM stations it's probably about 50/50 between live and voicetracked.

Radio: *But you don't use any syndicated music satellite services?*
TK: We don't. We generate all of our music locally, and it's all customized for each station. In fact, we do all of our playlists internally. We don't use playlists from any particular service. We monitor a lot of services, but generate all of our playlists kind of the way it used to be done — it's not like monitoring Billboard all the time but it's pretty close. Occasionally we'll be in touch with some record labels and things, but there's so much information that's available now via the Internet that you can monitor what key stations in key markets are doing and then customize it for each format. We do it locally.


Morning show host Ryan Quinn in the WAQE(FM) studio

Radio: *So what do you see as the role of local radio in the current media marketplace? Consumers are flooded with choices now — you kind of touched on that earlier.*
TK: I think it depends on the size of the market. The smaller the market, the more local you need to be. But then again, look at a market



like Minneapolis. The more and more I listen to Minneapolis radio, the more I hear local involvement. The fact that they've got FM sports talk now I think is a really good example of how important it is to be local. For us, a small market like we are, local content is really vital to our success. What I mean by local content is interviews and talk shows with people in organizations that make a difference. Every day we have a half hour on one of our AM stations designated to public affairs programming, which includes school superintendents that come in and talk about the last board meeting, village presidents and mayors who are coming in after every city council meeting or county board meeting--you know, talking about issues and things that are being decided at those meetings. We also cover organizations that are important to the area for other reasons. The deer-hunting opener was two days ago. We had the Department of Natural Resources game warden on the air answering questions live about deer hunting regulations and those kinds of things. Our news department is kind of unique. We have one full-time news guy, but we have three others who are participating and generate local stories and features every day. We'll generate four features every day about various things that are going on in the community and things that are happening in our region. We don't spend a lot of time on investigative reporting, but our stories are a reflection of things that are going on in our community. Instead of simply viewing ourselves as announcers, we view ourselves as content generators. It's all about content. You can't have local content if you don't have the people to be able to generate that local content. I think local content is vital to the success of any broadcast operation.

Radio: *How have social and digital media impacted what you do as a broadcaster? What about other Internet-based outlets like Pandora? Do you see that having an impact, particularly on your music formatted stations?*

TK: We're such a hybrid with all of our stations. We've got a classic hits FM station, we've got a today's hits FM and we've got a country station. Those three FMs are here in Rice Lake and the same in Escanaba, but we also combine it with a unique mix of local news and information in the mornings in particular, and local sports. We do high school play by play on all our FM stations. That's interesting because there is always a pushback from programming types — "Boy, you're going to stop your music and put 2–3 hours of a high school game on the air?" I say yes, because one of the greatest forms of live entertainment, local entertainment in the area is local high school sports. We aren't just a music station playing 56 minutes of music an hour — even our commercials are viewed as being information. I'll never forget a listener that came up to me while I was doing a live broadcast from a furniture store. She thanked me for all of the great information that we give out to tell her where all the sales are, because she would never know where all the great deals are otherwise. It struck me that people view commercials a lot differently than maybe the broadcast industry does. Listeners view it as helpful information — if it is done correctly. If we do it creatively, if we do it innovatively ... we'll even do two- and three-minute infomercials on our FM stations.

A McMartin audio console still in operation and used for producing stories in the newsroom.

Radio: *I see a lot of the industry talking about reducing spot load. Clearly that's not the case here.*

TK: We'll run up to 20 minutes an hour in commercials on our FM stations. Again, if we do it correctly, the listeners will stay with them. They need to be creative, they need to be innovative and they need to be informative.

Digital media has had some impact, but we've embraced it. We've got our own Facebook pages, the station Web pages, and some of our announcers are tweeting. We try to use social media in some of our contesting and those sorts of things to make radio and social media partners.

Radio: *Have you been following the trend in the auto industry of the connected car and the digital dashboard?*

TK: Again, I see it as an opportunity for radio. We need to stay ahead of this. iHeartRadio was kind of a pioneer in all of this with all of their stations. People need to be able to find you. When it comes to the connected car, you need to make sure you're there and that you're a part of it. Car listening has been a huge boon to the industry and we need to make sure that listeners stay connected to us in their cars! The traditional two knobs on the dashboard with the dial in between are going away very quickly, so the ability for listeners to find you on that screen is very important.

The original broadcast monitor speakers loom large over the tiny WJMC(AM) control room.

We need to stay involved with dealers and the auto industry. I think something as simple as getting together with your local car dealers and asking them to show car buyers how to find your stations on AM and FM radio in that center screen as they are showing them how to use the other features in their new cars can be extremely valuable. Make it a partnership with those dealers to promote both your station and the dealer. I think that's important so that radio isn't left in the dust when people can't find it anymore. The number one asked question by car buyers today is where's the radio? How do I get my radio stations?

Radio: *Overall, what would you say some of your biggest strategies for success in a rural market have been?*

TK: Number one, finding, hiring and training good people who want to live in your market. Turnover is the biggest thing that hurts any operation. It isn't just the broadcast industry — this applies to any business. If you've got constant turnover of your employees, then you are constantly putting a lot of time, energy and effort into finding, hiring and training good people. If you're continuously doing that, then it means you're not accomplishing the other things that you want to do. Find local people who really want to live in the area. This is where they want to be and where they want to raise their families. It may not always be cheaper. You might have to pay more to find those kinds of people, but that investment I think is worth it. Invest in people and find good people.

Second, be involved in the communities. That means not only the ownership and management being involved, but all of your people being involved in organizations — whether it's the Rotary club, the chamber of commerce, the Kiwanis, churches, schools or anything else. We've had school board members; we've had city council members. Be the president of the chamber, be the president of the Rotary. If you're going to be a member of an organization, be the best member and contribute the most. Don't just be there in name only. Be involved and be leaders. Being a leader in your community is a huge thing. It's a lot easier to give money than it is to give time. Those that give time end up getting back so much more in return than they have given — at least I have, personally. I've been president of the chamber; I've been a past chair of the Wisconsin Broadcasters Association and on that board for a number of years. You think about all time, the meetings, the fundraising ... What we get back from that is so much greater than what we've ever given.

Radio: *Finally, what do you see as some of the biggest challenges facing the industry as a whole going forward? If you could communicate something to the industry as a whole, what would that be?*

TK: I would say continue to adapt. Technology and the world around us are changing rapidly every day. Embrace that change instead of being resistant to it. Any opportunity that we have to innovate, to be different, to be new, we've got to embrace that. Don't be afraid to change. Every time we change it's uncomfortable, but we grow. Any time you're out of your comfort zone it's not fun, but you get better. That's the biggest challenge we face. Can we change quickly enough in order to adapt to what people need. We've got to be able to give them what they need.

Radio: *Thanks for your time, Tom, and thank you for your contributions to local radio.*

Hubbard Upgrades With Wheatstone

by Shane Toven, Editor

This month, Radio magazine visits the headquarters of Hubbard Broadcasting in Saint Paul, Minn. Hubbard Broadcasting owns 30 radio stations around the country (along with numerous television stations) and recently announced plans to purchase another group of radio stations in Northern Minnesota.

HISTORY

The Hubbard family has a long history in Midwest broadcasting dating back to the 1920s, when the call letters KSTP were heard on the air for the first time in the Twin Cities. Hubbard was a pioneer in many broadcasting technologies, including a purchase of one of the first television cameras available from RCA in 1939, the start of what would ultimately become KSTP(TV). The company also was instrumental in launching direct-to-home satellite television service when it started United States Satellite Broadcasting in 1981, then later merged that operation with DirecTV in 1999.

STATIONS

KSTP(AM), KSTP(FM) and KSTP(TV) remain fixtures in the Twin Cities market, and indeed around the region. KSTP(AM) features a sports talk format, while KSTP(FM) broadcasts adult contemporary music. The group of stations in the Twin Cities market also includes another FM station, KTMY, carrying a second talk format, which is branded as my Talk 107.1. Hubbard also distributes a selection of programming via satellite syndication through its Hubbard Radio Network.

TIME FOR AN UPGRADE

The radio studios at Hubbard's historic St. Paul headquarters have been updated many times over the years, most recently with PR&E consoles in many of the studios and an Sierra Automated Systems 64,000 crosspoint router at the core. STL was handled via Intraplex frames and T1 lines out to the transmitter site. This equipment was state-of-the-art for its day (and very reliable) but it was time to upgrade once again and join the audio over IP era.

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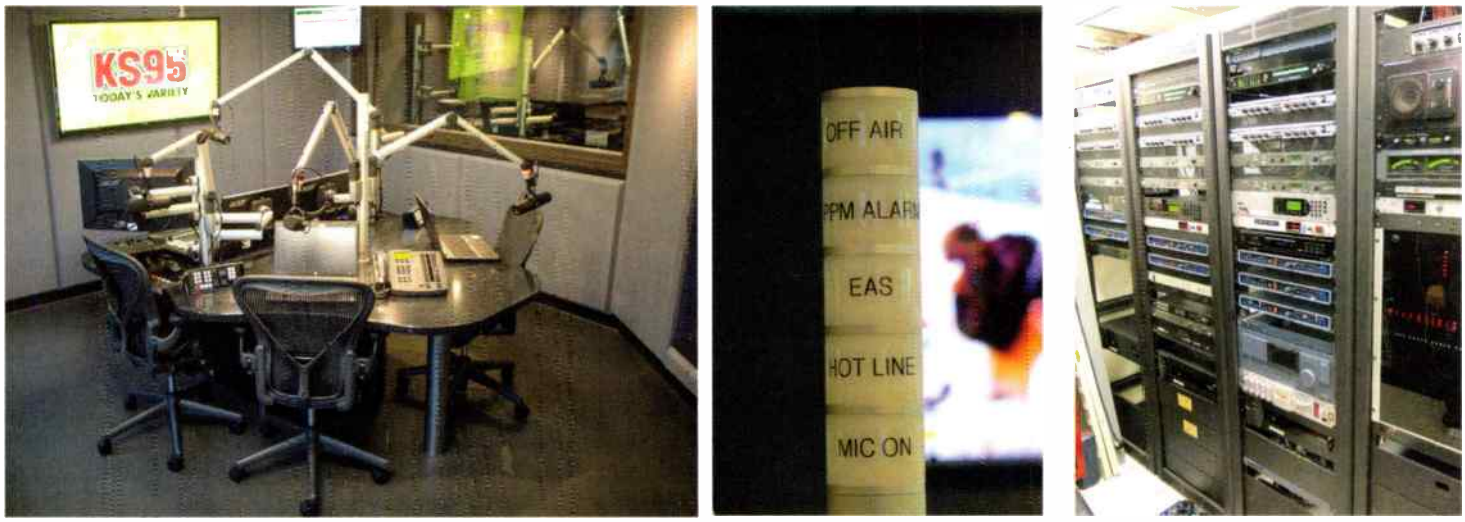


Left to right: Main control room and talk studio; LED annunciatortower; Rack room with existing analog equipment and new "Blades"

Director of Engineering for Hubbard Broadcasting's radio group Jon Blomstrand recently completed a comprehensive overhaul of the air studios for KSTP(FM), along with Mike Weber and Paul Black from the Hubbard Radio Engineering staff.

IT'S THE CONSOLE THAT COUNTS

Once the decision was made to proceed with the upgrade, the first phase in the project was finding a control surface that the operators would be comfortable with. The air staff represents various levels of technical skill and experience, so it was important to find something that looked and felt as close to a "traditional" broadcast console as possible. This would simplify training and ease the transition between their existing equipment and the remodeled studios. The station has a very active morning show and afternoon drive, so it was important to choose equipment and plan studio transitions carefully prior to starting the remodel.

After spending a considerable amount of time looking at options for broadcast consoles on the floor at the NAB Show, the station programming and engineering staff chose the Wheatstone LX24. The ability to change between studios and reconfigure the surface with a single button press was a key feature. Talent stations were specified as part of the design to allow control of the system from each mic position.

The furniture was constructed locally. The main control room and talk studio is a "sit-down" branding and features. Edge-lit LED on-air signs outside of each studio also feature the station's branding. Since the morning show actually occupies multiple studios, sight lines were critical. Large, well-placed windows between studios allow the team members to see one another. There is a primary control room and talk studio with multiple host and guest mic positions, a second control room with room for a producer and a dedicated call screener position. Additional LCD monitors on the wall opposite talent mic positions allow them to see the automation system and monitor playback of elements during the show.

A Henry Engineering "Multiport" panel allows quick access to audio and network I/O.

CONSTRUCTION

From start to finish, the project was done primarily with in-house resources. One big advantage of a large radio and TV group such as Hubbard with extensive physical plant facilities is that they are able to do in house what normally would be contracted out, such as electrical work and physical construction. This saved a considerable amount of time and money.

The new studios are bright and appealing, with large LCD monitors on the walls displaying station

WheatNet switch and Blades in the rack room provide an AoIP STL

Racks for equipment that does not require immediate operator access are tucked out of the way, integrated with the furniture.

The production studio looks directly into the main studio. Furniture can be adjusted for either stand-up or sit-down operation.

configuration while the other studio's furniture can be adjusted with motorized actuators for either stand-up or sit-down operation. Microphone and LCD arms are from Mika. Another feature integrated with the mic and LCD arms is a small LED light tower to indicate various alerts. Support equipment for each studio that does not require frequent operator interaction is placed in racks built into the furniture that are readily accessible, yet out of the way.

CHALLENGES

One common challenge in studios is the number of keyboards and mice that are inevitably required between automation, show prep PCs, phone editors and other systems.

The engineering staff's first approach to this was to use wireless keyboards everywhere (some with integrated trackpads) to cut down on the clutter, but they quickly discovered that only so many wireless devices can coexist in a small area. As a result, some systems ended up using wired keyboards and mice, while others used wireless.

Another challenge was the integration of the existing analog studios and audio routing with the new IP environment. Wheatstone Blades were used as a bridge between the existing analog infrastructure and the AoIP network. There are still a number of punch blocks in the rack room to allow for interconnects as well.

An LCD monitor and LED on-air sign outside one of the studios display station branding.

STL UPGRADES

Moving to AoIP allowed a major upgrade in the STL system for the radio stations as well. The transmitters of KSTP(TV) and KSTP(FM) are collocated. Since the television station operates a microwave STL system with a considerable amount of available bandwidth, it was relatively simple to add the WheatNet traffic to the link and use that same path for both radio and TV. The existing Intraplex frames and T1 links remain in place as backup.

While KSTP(FM) was the first station to receive a studio upgrade, the other stations are slated to receive upgrades soon. The installation of WheatNet will make this process somewhat easier as different parts of the facility can be linked directly over the network without discrete tielines.

With the foundation of a new audio over IP network in place, Hubbard will be in a good position to continue its heritage of broadcast technology innovation for many years to come. Q

Have you done a studio, RF or other project recently? Tell us about it. Email stoven@nbmedia.com.

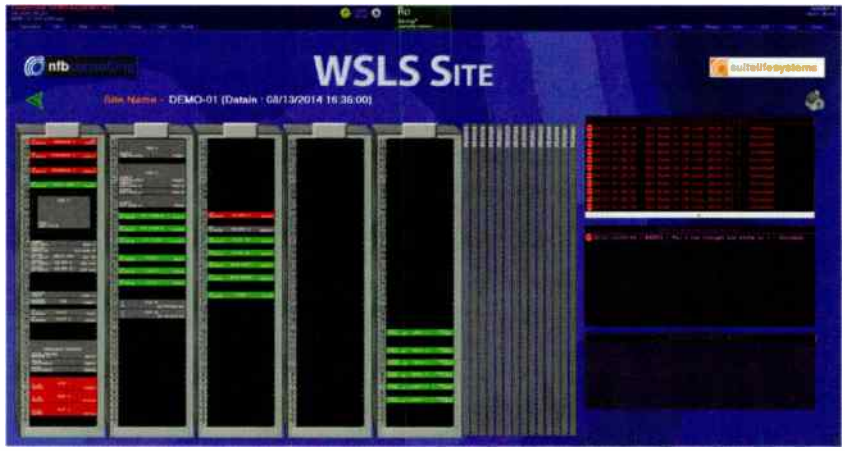
Radio Studio Monitoring & Management

by Kenny Miller, Director of Sales, NFB Consulting/Suitelife Systems

The power of knowing how the key parameters of your broadcast facility are functioning at all times is difficult to manage at best. With so many points of failure within a multi-channel, multi-formatted studio, it is even more difficult to foresee the technical failures before critical mass hits the fan.

When the fault event occurs, you are working diligently to troubleshoot the problem while, oh by the way not only are you are off the air, but there are several system components down, and you just can't get to the ultimate root cause. These types of events may occur with your content air chains, your facility power, or numerous other parts of the operation or your facility.

This is where enhanced monitoring technology can come to the rescue. You proceed to set up each of the individual management systems that will report errors that occur in UPS systems, automation servers, and hardware processing gear. That seems good, but when four different alarms ping you from four different management systems, which one do you attend to first?



Rack OVI

Detecting and preventing faults that can cost thousands in lost revenue when your signal is knocked off the air is the first priority of a properly established monitoring system. Alarm management based on the principle of monitoring by exception allows engineers to filter faults, so they can discern which faults are critical vs. those faults that may be not be relevant.

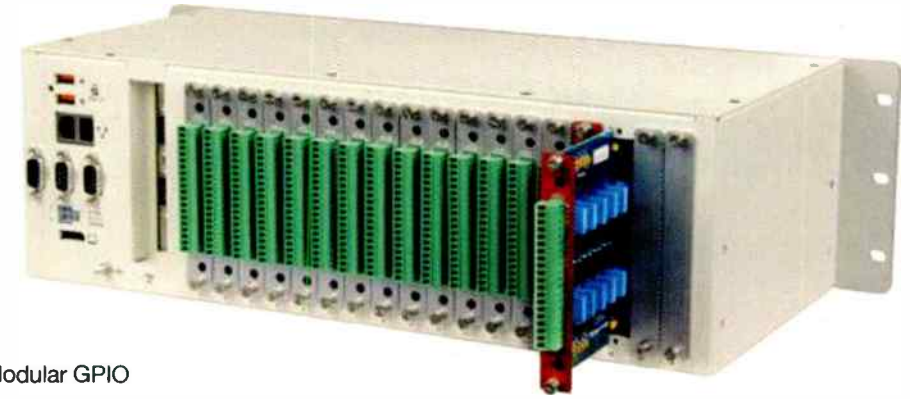
Nigel Brownett, president of Suitelife Systems, provides insight into the current industry needs and the solutions Suitelife offers for better fault monitoring and management. "Today, engineering is staffed short, but still expected to manage projects, support various events daily or weekly, and yet still keep the plant running fully operational and on air. The Axess Management System aggregates data from all devices and managers with careful data grooming rolled up into custom graphical interfaces empowering engineering and even operations to quickly identify the problem, in many cases before faults occur."

Nigel goes on to share how an Axess Management System interfaces with facility systems and technology. "Growth of SNMP-enabled devices in the studio as well as transmitter sites promotes greater functional monitoring. Axess can browse into a MIB and pull only the data required for an operation, liberating engineers from rigid device driver applications that may actually miss on delivering the desired monitoring functionality. This data can be harvested into a graphical form, which we call an OVI — 'Operator Visual Interface.' From this interface, engineering can locate a problem quickly, in many cases preemptively, and perform a root cause analysis to drill down to the core problem."

Server Fault Monitoring

This level of data manipulation can be used to develop reports for management, establish hysteresis for component performance trends and interface with trouble ticket and scheduling programs for even greater functionality.

The Axess Management System may also employ a WMI windows-based agent to manage performance of content, automation and storage servers. Monitoring



Modular GPIO

functions like CPU usage, memory and hard drive space can be presented into digital or analog meter readouts. Axess has been used to monitor network device services, switching and bandwidth performance in many critical business broadcast environments.

Axess also utilizes GPIO connections for status, control and monitoring. While many broadcasters utilize these connections primarily at the transmitter sites, Axess users may deploy serial IP addressable interface units in increments of 8 to 240 inputs at the studio or TX site. These connection types can help grow overall monitoring coverage and are ideal for power and environmental applications.

"The same system that monitors the studio may also monitor remote transmitter sites," states Nigel. "In this application, Suitelife Systems is introducing GPIO connectivity that is modular with multi-pin connections that will interface with legacy wiring from older hardware based systems." Studio management can coexist with legacy TX site monitoring systems already in place, or easily replace these systems to bring all technical operations to one screen.

Nigel adds, "A key operational aspect that Axess offers is an agnostic approach to application and device connectivity. Regardless of your greatest monitoring priority or the technology component a broadcaster chooses to deploy, if an interface is available to connect to, Axess can aggregate the data into a graphical OVI customizable to display the data the way you or your operators need to see it. Whether it is heating and air, power, content delivery or key infrastructure devices, connecting to thousands of devices over hundreds of sites is what Axess does — monitoring, management and control, with high intelligence."

Automated control of failovers that are programmable based on user-preferred thresholds allow engineers to identify problems before they occur and manage the event unattended without loss of air time or system outages. Definitive control of the data points programmed into the SCL (Status Control Logic) or macro gives a high level of confidence. When an event occurs and the cutover is made, the event is logged and data is available to assist with the troubleshooting efforts.

Such data point control enables integration into third-party trouble ticket systems, which can send the trouble ticket to the appropriate engineer or resource in charge of the system with descriptive data on what occurred and when it happened.

Getting a handle on the technology and facility conditions that an engineering team is responsible for is achievable with a proper monitoring system. The return on investment is very favorable compared to spending time trying to explain to management why an 'off-the-air' event took place. Effective monitoring and control can turn the conversations with management to how engineering is working to prevent downtime while using the data gathered to make future technology decisions.

Applied Technology is Radio magazine's column for manufacturers and other companies to share how their products and technology can be applied in the broadcast environment.

Side-by-Side: Compact FM Transmitters (under 5 kW)

by Shane Toven, Editor

Nautel VS series | www.nautel.com

- Available in power levels up to 300 watts (2 RU), 1 kW (3 RU) and 2.5 kW (5 RU)
- Integrated Ethernet interface with AUI web GUI control standard
- GPIO port for external remote control and preset selection
- Analog, AES/EBU (192 kHz), composite, Livewire, and Icecast/Shoutcast audio inputs available with automatic failover including USB audio file playback.
- Integrated stereo generator and limiter, SCA generator, RBDS generator
- Configurable FSK ID for translator applications
- Optional internal Orban audio processing
- Capable of HD Radio operation with external VSHD exciter and Exporter Plus.
- Available as LPFM certified (VS300)
- 13 month standard warranty with extended warranties available

GatesAir Flexiva Compact | www.gatesair.com

- Power levels from 50 W up to 3850 W Analog FM (3100 W FM+HD) in 2 RU, 3 RU or 4RU chassis depending on power level
- Features Integrated stereo encoder, static RDS generator, 2 AES, 1 analog L/R and 2 composite program inputs with automatic failover switching, and digital MPX/composite input over AES192 interface with fail-over switching
- Full remote control capability including web-based HTML GUI interface, SNMP, parallel control and monitoring, fault, warning, and operational parameter logging
- N+1, dual transmitter and main/alternate automatic switching capability
- Optional GPS receiver for SFN synchronization
- Optional internal Orban Optimod multi-band audio processor
- HD Radio capable with optional Gen 4 HD Radio Exgine modulator card and HDE-200 exporter
- Standard 15-month warranty includes tech support during normal business hours and after hours off-air emergency support, 5 day advance exchange of parts, software updates and bug fixes, access to tech support knowledge base. Additional options including 24/7 support and next day advance exchange of parts are available.

BE STXLP Generation II | www.bdcast.com

- Available in 1 kW, 2kW, 3 kW and 5 kW configurations (Field upgradable; from 4 RU up to 21 RU depending on power level)
- Integrated digital exciter with analog and digital audio inputs including 192 kHz composite over AES
- HD Radio & DRM+ Compatible
- Integrated IP Connectivity with web GUI and SNMP
- Front panel control and metering via LCD interface
- Internal low pass filter
- Redundant fan design
- Backup Exciter and Controller Options for additional redundancy
- One year standard warranty with additional options available for extended service and support

BW Broadcast TX V2 | www.bwbroadcast.com

- Available in power levels from 5 watts up to 2500 watts
- XLR analog and AES/EBU digital inputs, composite input
- Internal stereo generator with pre-emphasis, and audio limiter (RBDS encoder will be standard as of February)
- DSPX multi-band audio processor standard
- Slide-in power supply (300 watt model and above)
- Gold clamp FETs allow easy replacement of power devices
- RS232 interface, Ethernet interface with SNMP management and web GUI, parallel I/O for external remote control
- Full monitoring and logging including silence detection
- FSK ID for translator applications
- LPFM certified models available
- 2 year warranty

Crown E Series | www.crownbroadcast.com

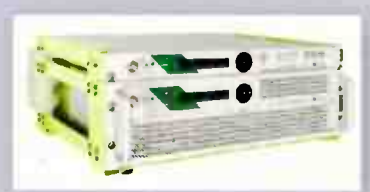
- Power levels from 20 watts to 5 kW (up to 2kW in single chassis)
- Direct-to-channel digital exciter design
- Internal stereo generator and limiter, FSK for translator applications
- Optional advanced RBDS encoder
- Analog, composite, and AES/EBU digital inputs up to 192 kHz
- Silence detection and failover to alternate audio sources including optional internal backup audio playback
- Optional Ethernet interface featuring "Advanced Metering Interface" (AMI) web GUI and SNMP management
- Additional remote control interfaces via RS-232 and GPIO
- LPFM certified model available
- 3 year warranty standard, upgradeable to a 10 year warranty with "Expert Maintenance Reporting" to intelligently report faults to tech support personnel (Requires Ethernet interface)

PTEK Gamma and ES Series | www.fmbroadcast.fm

- Available in power levels from 2 kW to 5 kW (ES series from 150 watts to 1200 watts)
- Integrated exciter on all except 5 kW model
- FM150ES and FM300ES type certified for LPFM
- Internal stereo generator/limiter
- FSK ID for translator applications
- Hot swappable power supplies (Gamma series)
- Front panel LCD metering
- Parallel remote control interface

DB Elettronica Mozart Transmitters | www.dbbroadcast.com

- "Modular" and "Compact" series available
- Compact series available up to 3 kW
- Modular series available in various power levels including 5 kW in 5 RU
- Modular series features an external exciter, compact series has an integrated exciter
- Optional internal stereo generator/limiter
- Internal RBDS generator Optional digital audio input
- Silence detection with automatic failover between audio inputs (if equipped)
- Optional Ethernet interface with web GUI and SNMP
- Optional parallel remote control interface for N+1 remote power and frequency changes
- Front panel LCD and controls for monitoring and adjusting transmitter parameters
- External access to fans allows easy replacement without disassembly



Armstrong LCD Series | www.armstrongtx.com

- 30, 100, 150 and 300 watt exciters (FMX30 Pictured)
- 500 watt, 1 kW, 2 kW or 2.5 kW amplifiers (2.5 kW amp is 8 RU)
- Combined systems for higher power levels available
- Remote control and monitoring via parallel GPIO
- Optional internal stereo generator/limiter
- Optional digital audio inputs
- FSK ID for translator applications
- External sync input for booster applications (FMX100)
- Composite and multiple SCA inputs with adjustable level control

Elenos Indium Series | www.elenos.com

- Power levels from 20 watts to 2 kW in 2 RU, 2.5 kW to 5 kW in 4 RU
- Integrated exciter
- Composite input standard
- Optional internal stereo generator/limiter with analog or optional AES/EBU input
- Automatic audio failover between inputs
- Front panel OLED display and jog wheel for monitoring and configuring transmitter parameters

- Serial port for transmitter diagnostics, optional Ethernet interface for monitoring via web GUI or SNMP
- Optional parallel remote interface for external control including transmitter frequency and power level
- Switching power supplies accept a wide range of input power configurations

OMB HE Series | www.omb.com

- "Compact" series available in 500 and 1 kW power levels, "Hot Plug" versions available up to 5 kW
- Higher power levels available with external combiner
- "Compact" series features internal exciter
- Optional internal limiter and stereo generator
- Optional digital audio input
- Front panel LCD control panel
- Hot swappable power supplies available on selected models
- Ethernet interface with SNMP monitoring available on selected models

- Parallel GPIO interface for remote monitoring and control

Simplify Remote Testing For Remote Broadcasts

by Doug Irwin
CPBE AMD

Like many broadcast engineers, I've done countless remote broadcasts. I usually had an uneasy feeling right up until the time I would call the studio to make sure the remote was "coming through." If the studio said they could hear me, I was able to relax for a bit. Otherwise, it was time to troubleshoot the problem quickly.

Back in the days when the station was staffed 24/7, there was always someone there to put the remote in cue and to listen to it as show time approached. As the years have gone by, however, there were more and more times when no one was at the other end.

Let's talk about some ways to minimize the difficulty of testing remotes when there's "no one home" on the far end.

Marti portable RPU transmitter

RPU SHOTS

This is the simplest way to carry out a remote; and the testing methods are the most simple as well. The "old school" way to test RPU shots was to hang a phone coupler on the RPU receiver audio at the studio and to leave the squelch open (or at least set to a lower threshold). Once out at the remote site, call the coupler, then minimize the noise coming out of the receiver by turning the directional antenna at the far end.

A variation: If the RPU receiver is at the transmitter site, find a signal strength indication such as receiver AGC voltage and connect that to an analog input on the remote control. Call the remote control and read the signal strength value while you adjust the antenna on the remote end.

A further variation: Build a simple voltage to frequency converter, feed it with the AGC voltage, and send the tone output to a phone coupler. As the voltage increases, make the tone frequency increase. Call the coupler from the remote end and adjust your directional antenna while listening to the pitch of the tone.

ISDN CODECS

ISDN codecs are great for many reasons, the first of which is that you can tell that the codecs are connected. However, since the transmit direction and receive direction can have different algorithms, sample rates and data rates, you can't know for sure that anything is being heard at the far end just because you hear audio coming back to the remote site.

My old station back in New York (which was actually located in New Jersey—kind of like the Giants and Jets) had multiple ISDN codecs. One in particular rarely, if ever, was used. So, on that one I set both the appropriate receive and transmit configurations, then physically looped the audio from receive OUT to transmit IN. Thus when I was in the field, I could test my remote by connecting to that particular codec, at which point I would hear whatever audio I sent echoed right back to me. However, this wasn't really much more than a "feel good" test because it didn't eliminate the potential problem I mentioned: a codec mismatch. To be certain things are working requires a closer look.

Telos Zephyr XStream ISDN codec

REMOTE ACCESS

In order to be test the system fully and make sure that a remote truly is ready to go, you need remote access to your studio rack room from the remote site. I'm not going to get in the merits of one method vs. another. They all work. Here are several options:

- Public Internet access to a remote desktop through mechanisms such as VNC, LogMeIn or TeamViewer where you can then gain further access to devices remotely
- Port-forwarding to the various devices from an external IP address
- VPN access to the appropriate internal network at your facility

When my old station was consolidated with a cluster in Manhattan, a decision was made to "pool" all of the ISDN codecs. At first I objected based on previous negative experiences with this approach. However, the remote access software for the codecs worked so well that

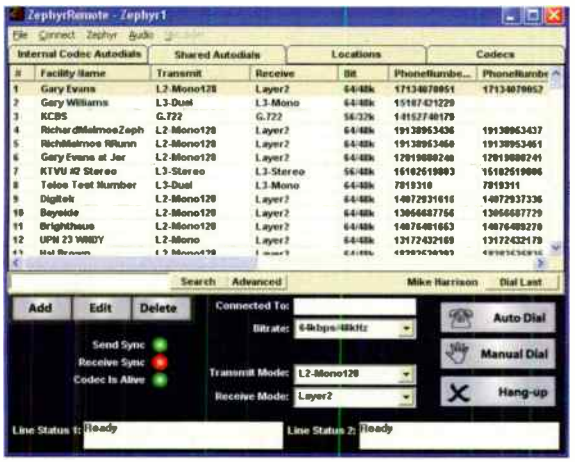
WE NEED YOUR TIPS

Tech tips may be suitable to earn SBE recertification credits. Send your tips to radio@RadioMagOnline.com.

RESOURCES

Software Authority | softwareauthority.com/products-zephyrremote.shtm
LogMeIn | www.logmein.com
Team Viewer | www.teamviewer.com

my initial concerns were rapidly forgotten. We were using a group of Telos Zephyr Xstreams, and software known as "Zephyr Remote" from Software Authority. This software allows you to see if you are truly connected on the far end, and to change the configuration if necessary.



ISDN codec remote control software

IP CODECS

The latest step in the evolution of remote broadcasts is the use of IP codecs. The full-duplex nature of the connection is great but again, as with ISDN, you'll need a way to ensure that settings are matched and audio is really coming out of the codec on the far end. If you are using an IP codec, remote access shouldn't be an issue. Most codecs have some form of web interface that you can look at to be sure that audio truly is emanating from the codec outputs on the studio end. Since the connection is via IP, you can likely also access this management interface on the far end codec from the remote site via the IP connection.

Tieline Bridge-IT IP audio codecs

Irwin is RF engineer/project manager for Clear Channel Los Angeles. Contact him at doug@dougirwin.net.

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Broadcast Software Int'l	33	888-BSI-USA-1	www.bsiusa.com	Omnirax	18	800 332-3393	www.omnirax.com
Broadcasters General Store	19	352-622-7700	www.bgs.cc	RF Parts	40	800-737-2787	www.rfparts.com
CBT Systems	39	858-536-2927	www.cbtsystems.tv	RF Specialties Group	4, 15, 24, 26, 30		www.rfspecialties.com
CircuitWerkes	40	352-335-6555	www.circuitwerkes.com	Sandies	12	215-547-2570	www.sandiesusa.com
Comrex	7	800-237-1776	www.comrex.com	SCMS	20	800-438-6040	www.scmsinc.com
Deva Broadcast	26	855-428-7272	www.devabroadcast.com	Smarts Broadcast	17	800-747-6278	www.smartsbroadcast.com
DM Engineering	41	800-249-0487	www.dmengineering.com	Studio Items Inc.	35	815-669-2070	www.studioitems.com
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50 YEARS SBE. 1964-2014

This Month in SBE History

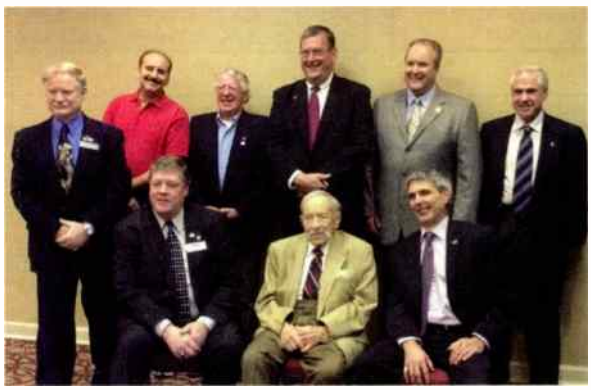
2014 Marks the 50th Year of the Society

SBE Presidents

by Chriss Scherer, CPBE CBNT

The Society of Broadcast Engineers today has more than 5,500 members around the world. From its humble beginnings in 1964, the organization has grown to provide education, certification, professional networking and a variety of other services to its members.

One benefit to members for being part of an organization is to take advantage of various services offered to groups. To borrow a familiar marketing phrase, membership has its privileges. For the SBE, one early member benefit was to enroll in insurance benefits.



Nine SBE presidents attended the 2011 SBE national meeting in Columbus, Ohio. From left: Row 1: Scherer, Battison, Thomas. Row 2: Hogan, Lopez, Farquhar, Kelly, Miller, Benedict.

As SBE membership grew in its first few years, some members expressed interest in obtaining health and death benefits through the organization because they were either contract engineers and had no employer to provide these benefits, or they worked for small stations that did not provide these benefits. Al Chismark, the third SBE president, appointed a committee to investigate the idea. In December 1970, the SBE first offered its members a package of insurance benefits, which proved to be an attractive offering for many members.

Today, the SBE, through insurance provider partners, offers life and extended care coverage insurance, auto and homeowners insurance, and general business insurance to SBE members.

Historical source: "The History of the Society of Broadcast Engineers, 1964–1981," by Bradley L. Dick, CPBE.

Scherer is a contract engineer and recording engineer in Kansas City, and former editor of Radio magazine.

50 Years of Leadership

In its five decades, the Society of Broadcast Engineers has been led by a talented group of directors and officers. While they all deserve credit for the contributions, trying to list every one of them would fill this issue several times over. But we can note the 28 people who have held the president's chair. Here's to the next 50 years for the Society of Broadcast Engineers.

28	2013–2015	Joe Snelson, CPBE 8-VSB
27	2011–2013	Ralph Hogan, CPBE DRB CBNT
26	2009–2011	Vincent Lopez, CEV CBNT
25	2007–2009	Barry Thomas, CPBE CBNT
24	2005–2007	Christopher H. Scherer, CPBE CBNT
23	2003–2005	Raymond C. Benedict, CPBE
22	2001–2003	Troy D. Pennington, CSRE CBNT
21	1999–2001	James "Andy" Butler, CPBE
20	1997–1999	Edward J. Miller, CPBE
19	1995–1997	Terrence M. Baun, CPBE CBNT
18	1993–1995	Charles W. Kelly Jr.
17	1991–1993	Richard Farquhar, CPBE
16	1989–1991	Bradley Dick, CPBE
15	1987–1989	Jack McKain, CPBE
14	1985–1987	Richard Rudman, CPBE
13	1984–1985	Roger Johnson, CPBE
12	1983–1984	Doyle Thompson Sr., CPBE
11	1981–1983	Ron Arendall, CPBE
10	1979–1981	Robert Jones, CSBE
9	1978–1979	James Hurley, CSBE
8	1977–1978	Robert Wehrman
7	1975–1977	Glen Lahman
6	1973–1975	James Wulliman, CPBE
5	1971–1973	Robert Flanders, CPBE
4	1970–1971	Lewis Wetzel, CPBE
3	1968–1970	Al Chismark
2	1966–1968	Charles Hallinan, CPBE
1	1965–1966	John Battison, P.E., CPBE

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