



RADIO WORLD

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INSIDE

OHM SWEET OHM



• The fascinating history of the first law an engineer usually learns. — Page 22

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MIXERS AND FADERS AND PADS, OH MY!

• A product evaluation of the Mackie DL1608. — Page 26



REMEMBERING BERNIE WISE

• Readers pay their respects to the late Energy-Onix founder. — Page 29



LPFM Application Tally Surprises

Cost and complexity may have limited the number of filings

BY RANDY J. STINE

WASHINGTON — The low-power expansion of the FM dial will not include as many stations as some LPFM faithful had estimated. The FCC said some 2,819 applications were filed in the LPFM window, which closed in November.

Some LPFM supporters had predicted upwards of 10,000 applications. The typical cost for putting an LPFM on the air — cited as \$15,000 to \$20,000 by some observers — could have been a deterrent. Other observers believe self-filers may have been discouraged because they felt they lacked the technical expertise needed to file an LPFM application.

Low-power FM stations, which broadcast at a maximum of 100 watts and typically reach seven to 10 mile from the antenna, must be licensed to non-profit entities; they often are operated by community groups, schools and churches.

There were 3,258 low-power FM applications filed in the first window in 2000–2001, according to FCC data. Today there are approximately 800 licensed LPFMs.

The commission has begun processing the new applications. It was expected to reject some because of errors; it then is expected to begin issuing construction permits soon after the first of the year. That would be a “lightning-fast pace for the FCC,” according to one observer.

Texas was the state with the most LPFM applications filed at 303, followed by California and Florida with

283 and 276 respectively, according to FCC data.

The FCC said it has identified approximately 900 “technically acceptable” LPFM applications that don’t conflict with others.

Christian Community Broadcasters co-founder John Broomall is hoping about 2,000 CPs eventually will be granted once the mutually exclusive or

(continued on page 3)

Podcast Success Stories

From comedy to storytelling to science, the subjects of these podcasts could hardly be more different. So what makes them such a hit with listeners?



Page 23

Lezi Estipona

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LPFM

(continued from page 1)

“MX” applications are sorted. Two or more pending applications are considered mutually exclusive if the grant of one would effectively preclude the grant of one or more of the others.

COMPLICATED PROCESS

The response to the much-anticipated, month-long window surprised some proponents.

“Community groups are not experts in FCC licensure, and it was not reasonable to expect a complicated process would be doable for many without accessible help,” said Tracy Rosenberg, executive director of San Francisco-based Media Alliance, a non-profit that advocates for democratic communications.

“I am sure 10,000 groups expressed interest at some point in the window, but there is a distance between expressing interest in the possibility of a low-power station in your neighborhood and following through with an engineering study and a station plan.”

The Media Alliance assisted local community groups in finding available frequencies, many across northern California. For instance, it worked with Alameda Community Radio on its application for an LPFM to “replace what [Alameda] sees as a huge deficit in local news coverage,” Rosenberg said.

Several student groups at Brown University in Providence, R.I., and Reed College in Portland, Ore., applied for low-power FM stations with the help of Media Alliance, according to Rosenberg.

Providing an “alternative voice” to their communities is a theme often

The home page of Prometheus Radio notes, ‘If you did not file an application for a low-power FM license, it is highly unlikely that there will be another opportunity to do so.’ Those who did file must wait for word on construction permits, it adds.

promoted by LPFM supporters. Michi Bradley, founder of community radio advocate REC Networks, said the majority of her clients are faith-based, and that the few secular organizations she helped were proposing a community radio service that is true to LPFM.

REC Networks found that many potential LPFM filers feared the “whole second adjacent waiver” process. The Local Community Radio Act, signed by President Obama in late 2010, authorized the FCC to license additional low-power FMs. In addition, it eliminated

third-adjacent channel LPFM spacing requirements and allowed the commission to create standards for waiver second-adjacent protection requirements.

“While REC and Prometheus tried to make it a simpler process, there were still a lot of requirements and things you needed to know,” Bradley said.

Bradley also said that because the FCC used the “zero population” rule for interference instead of a “de minimus population” rule, many organizations were left out.

According to REC, the new second-adjacent waiver policy allowed for a small overlap area where an LPFM station is predicted to interfere with a full-power station operating on a second-adjacent channel; however, the LPFM applicant had to show that there were no “potential listeners” within that overlap area.

FORT HOOD

Prometheus Radio Project, perhaps the most visible LPFM advocacy group, supported more than 1,000 entities interested in applying for an LPFM license, according to its website.

“These groups were very diverse in nature, covering everything from local music to cultural preservation to workers’ rights,” said Sanjay Jolly, Prometheus policy director.

For example, Prometheus worked with the Media Mobilizing Project in Philadelphia, which plans to broadcast in the interest of poor and working people. Meanwhile, the Fort Hood Support network, another Prometheus

client, expects to use their station to broadcast programming on veterans’ rights, peace activism and local music in Fort Hood, Texas.

Prometheus, which builds and supports community radio stations, faulted the FCC for “doing very little outreach” to eligible organizations, Jolly said. “Countless more organizations would have loved to have applied for a radio station, but didn’t know of the opportunity.”

FCC officials said that the agency created a dedicated webpage with detailed information on LPFM rules, an LPFM mailbox where potential filers could ask commission lawyers and engineers questions and an improved FM channel finder tool to search for available channels. The agency also held several webinars to help potential filers with the process, according to an FCC spokesman.

Jolly also said other organizations “started the process too late” and were not familiar with “filling out obscure government forms.” But he said Prometheus was happy to see “fewer bulk-filers” in this window, which also could have contributed to the lower total.

Nexus Broadcast, a broadcast engineering consulting and equipment manufacturer, said the majority of applicants it helped were based in larger metropolitan areas; this likely was due to the relaxed criteria for second-adjacent protection waivers, according to the company.

“Southern states and rural applicants were very low in comparison to the previous window,” said Nexus Broadcast founder Leo Ashcraft.

“We helped large religious broadcasters through multiple branches, for example The Church of Christ, but most were single churches and local charity groups.”

Ashcraft said most applicants in this window bring no prior experience with broadcasting.

Broomall of Christian Community Broadcasters hopes radio professionals will step up and help their new brethren get stations launched. “We are inviting broadcasters and engineers nationally to become local mentors for these new broadcasters.”

His consulting firm is helping clients with settlement agreements and developing equipment packages.

NEWSROUNDUP

BERNIE WISE: A memorial service is planned for Energy-Onix founder Bernie Wise, on Jan. 25. He died in December at age 87. His son Jack said the business Wise founded in 1987 will continue to operate.

In 1962, Wise also founded CCA Electronics, where he introduced the grounded-grid transmitter to FM broadcasting. In recent years he was, among other things, an advocate of spread-spectrum STLs and a critic of the HD Radio system. In 2005, Energy-Onix installed an encoder built by Digital Radio Express at WBUZ(FM) in Nashville to demonstrate the multicasting ability of FMeXtra digital subcarrier technology.

Readers share memories of Wise on page 29.

LARRY ESTLACK: Michigan-based engineer Larry Estlack died of cancer in December; he was 64. He was technical director for the Michigan Association of Broadcasters, a job he held since 2002; he was also the state’s Emergency Alert System chairman for 21 years. Jacobs Media President Fred Jacobs knew him well; they both began in radio by teaching in East Lansing at Michigan State’s Telecommunications Department. Jacobs called Estlack “one of those rare people who was a brilliant studio engineer” who designed radio and TV studios all over Michigan. Jacobs says he learned several things from Estlack including the importance of being professional, doing a job right, taking on interesting projects and helping others grow. Funeral services are planned for Jan. 4.



WRMI Beefs Up, Big Time

Radio Miami International picks up the large shortwave facility of former WYFR

Many international broadcasters have scaled back their shortwave operations, citing changes in consumer habits, costs of operation and the revolutionary changes brought by the Internet.

So I was interested to learn that the former WYFR in Okeechobee, Fla., described as the largest shortwave facility in the Western Hemisphere, would reopen, as we reported at www.radioworld.com/wyfr.

I reached out to several people involved to learn more.

The first is Jeff White, general manager of Radio Miami International, which has bought the big station from Family Radio and is moving programming and call letters of shortwave station WRMI from Miami to take advantage of Okeechobee's bigger, more powerful signals.

Family Radio was co-founded by Harold Camping, a prominent radio evangelist known to many in the public for his headline-making predictions of Judgment Day. The organization had shuttered WYFR earlier this year in an apparent cost-cutting move. Camping died in December.

White declined to discuss the purchase details but said Family Radio had been "very generous with us." I asked how his four staff in Miami would be affected when WRMI's 50,000-watt

Wilkinson AM50,000B transmitter was turned off.

"Our office in Miami will remain open for the foreseeable future. In Okeechobee, we will be employing at



Master control of WYFR, now WRMI, where all of the audio is distributed and computers control transmitters, frequency and antenna changes.

FROM THE
EDITOR

Paul McLane



least two full-time engineers who have worked with WYFR for nearly 30 years, and probably several other part-time engineers who also worked for WYFR for many years before being laid off in recent months."

The Okeechobee facility has 13 transmitters, including a dozen 100 kW systems and one 50 kW. It uses 23 antennas that serve the Americas, Europe and Africa. Quite a step up from WRMI's 50 kW main signal.

White notes that since 1994, WRMI's primary target areas have been Latin America and North America. "With the Okeechobee facility, we will provide significantly better coverage of these targets due to the more sophisticated antennas — log periodics and double rhomboids with higher gain — and due of course to the higher-powered transmitters. And now we will have the opportunity to broadcast to other parts of the world such as Europe and Africa, which we have never been able to do in a serious way before."

WRMI originates some of its own programming, including "Viva Miami."

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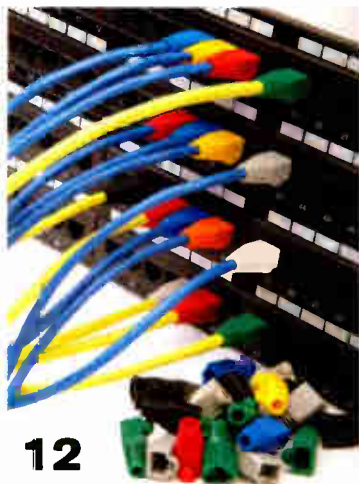
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THIS ISSUE

JANUARY 1, 2014

NEWS

- LPFM Application Tally Surprises 1
- News Roundups 3
- WRMI Beefs Up, Big Time 4
- NPR Labs Eyes Streaming
Technology 8
- Kneller to GeoBroadcast Solutions 8



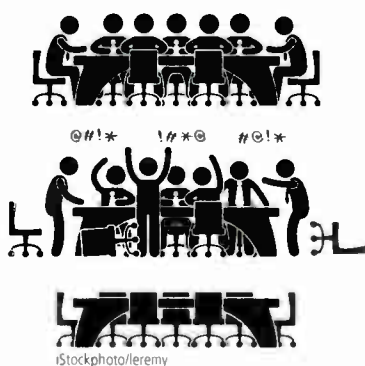
12

FEATURES

- Springs, Boots and a Rodent Trap 12
- Codecs Squeeze the Most Out
of Bits 14
- Who's Buying What 20
- People News 21
- Ohm's Formula One 22

GM JOURNAL

- Podcast Success Stories 23
- Keep Meetings Short and Sweet 24



24

STUDIO SESSIONS

- Compact Mixer Evolution:
Mackie DL1608 26

OPINION

- Radio World Talkback 29
- Digital Is a Hungry Bandwidth
Beast 30
- Reader's Forum 30



Photo by Thais White, WRMI

The dipole curtain array antenna with a 44-degree azimuth towards Europe.

heard in English and Spanish; but most of its airtime is sold to outside organizations. Part of the sale agreement is that the new station will provide Family Radio airtime to transmit programming to the Caribbean and South America. Still, most content will be brought over from existing WRMI.

"The station call letters will change from WYFR to WRMI, and the new facility will air essentially all of the programming currently on WRMI's transmitter site in Miami," White said. "This is a diverse mixture of political, religious, musical and cultural programming in English and Spanish, including a number of DX programs intended especially for shortwave listeners."

"We expect that two hours per day will be Spanish-language programming from Family Radio. About nine hours per day will be English-language religious programming from the Radio Africa network operated by Pan American Broadcasting, based in Pleasanton, Calif. In addition, we will make airtime available to other organizations, including religious organizations."

White provided me with a historical and technical overview of WYFR that I recommend; I've posted it at <http://bit.ly/17J3i1Y>. It explores the station history dating to the late 1920s and call sign WIXAL, its growth based in New England, its handoff to Family Radio, and a lengthy period of transition to

(continued on page 6)

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WRMI

(continued from page 5)

Florida starting in 1977. It also gives technical details about Okeechobee's high-level plate-modulated transmitters and complex antenna arrays.

GATORS AND SCORPIONS

Jeff White told me he appreciated the help of Dan Elyea, longtime WYFR station engineering manager, now retired, in the agreement.

"Dan presented us to Family Radio Vice President Tom Evans. Tom and the Family Radio board have given us their confidence, and we will do our best to keep this station going for many years to come." (Evans did not respond to ques-

WYFR engineers had recently replaced the dissipation lines on one of the 87-degree double rhomboid antennas directed to Africa. The lines were damaged during a hurricane a few years ago.

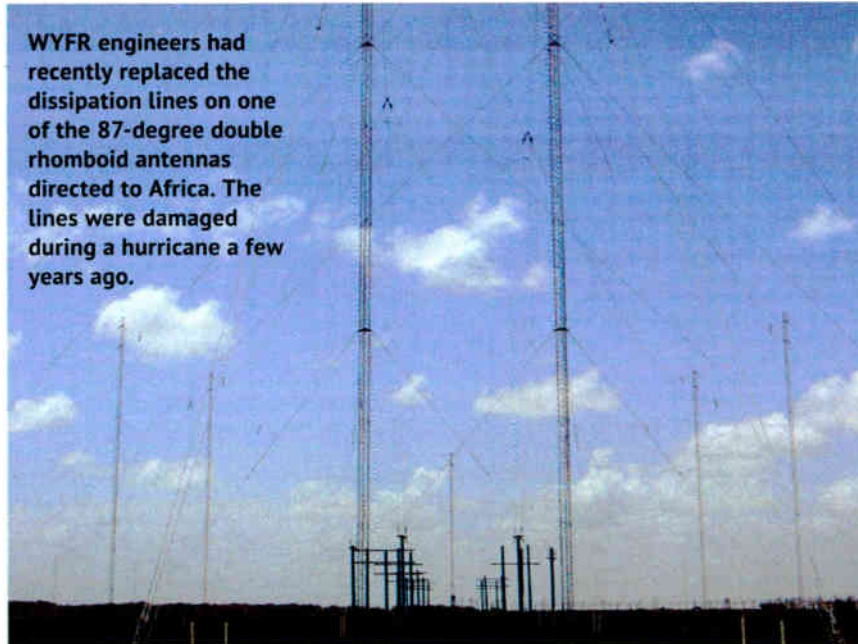


Photo by Terry Elders

ways my own life was poured into this station for 40 years. Sort of a death-in-the-family feeling. When the possibility for the site to be brought back online by Jeff opened up, I was delighted, and I have been cooperating with Jeff in every way that I can, to assist in making this return to life a reality."

'BOLO INITIATIVES'

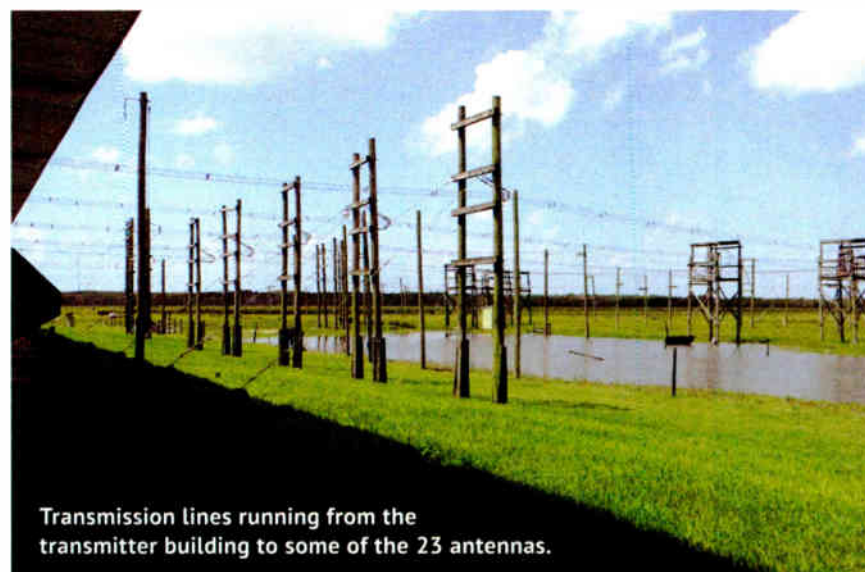
The buyer, Radio Miami International, was founded in 1989 by Jeff White and the late Kiko Espinosa, its chief engineer.

At first it broadcast via hired air-time but went on the air with its own FCC license in 1994. WRMI currently has a corner reflector antenna beaming 160 degrees toward the Caribbean and



Two of the 13 transmitters at the new WRMI Okeechobee, formerly WYFR.

Photos by Travis White, WRMI



Transmission lines running from the transmitter building to some of the 23 antennas.

tions I submitted to him for this story.)

So then I touched base with Elyea. He told me he was present at both the birth and demise of WYFR as it existed under those call letters.

"Back in 1973, after serving with radio station ELWA (medium-wave and short-wave) near Monrovia, Liberia, I joined the staff of Family Radio in preparation for the upcoming purchase of WNYW (later to take the call letters WYFR) in Scituate, Mass.," Elyea wrote me.

"At that time WNYW operated four transmitters and nine reversible rhombic antennas. The property was small, the antennas were marginal; there was no room for expansion. The management of Family Radio located a rural property in Okeechobee County, Fla., that would address numerous shortcomings of the Massachusetts site. In Scituate, I served as chief operator for the station. In October of 1976, I moved to Okeechobee to represent engineering aspects during the construction of the Florida site."

When operations commenced from Okeechobee, he was appointed engineering manager.

Elyea told me that the site, approximately a mile square, is visited regularly by tropical weather and lightning, while

icing, another concern of many an engineer, is not a factor.

Interference is another story.

"A large operation like WYFR draws various complaints of interference," he wrote, "some legitimate; many not. For a while we were plagued by calls from fire and police departments regarding interference to their walkie-talkie units. These complaints were from out-of-state.

"The comm equipment operated in the VHF range — propagation would not support such a frequency from Okeechobee, yet the complaints kept rolling in. After doing some research, we discovered that the units used an intermediate frequency around 17.8 MHz. And the cases were made of plastic. Our legitimate shortwave transmission was going right through the case and into the IF circuitry. Bad design. Our solution was to declare a range of those frequencies as off-limits for us (based on the IF bandwidth of the units)."

Because Family Radio distributes programming to many locations by satellite, he said, it's easy to misidentify a source of interference.

"One day in 2008, I got a call from the FCC monitoring station in Vero Beach, Fla. They felt that a potentially interfering transmission was coming

from WYFR. It was definitely Family Radio programming. Turns out it was a station in Germany that was carrying Family Radio programming to India. Several times, that same mode brought puzzling accusations that were related to other overseas relay sites.

"Twice FAA engineers descended on our site with vans full of equipment, attempting to identify interfering signals (to aircraft) that they suspected to be WYFR. Many hours of testing later, in each case it was determined that it was another site (once in West Palm Beach, once in Pennsylvania) that was the actual source of the interference." Same programming, but wrong location source.

You can tell Elyea loves the site. He told me about the creatures that have been seen there. Among them: aningas, doves, egrets, starlings, sand hill cranes, eagles, hawks, burrowing owls, swifts, quail, rabbits, turtles, ibis, gold silk spiders, black widow spiders, jumping spiders, scorpion, raccoons, armadillo, opossum, foxes, snakes, skunks, alligators, feral pigs, deer and vultures.

He worked there until this summer, when Family Radio shut the doors.

"The closing of WYFR disappointed me greatly," he reflected. "In many

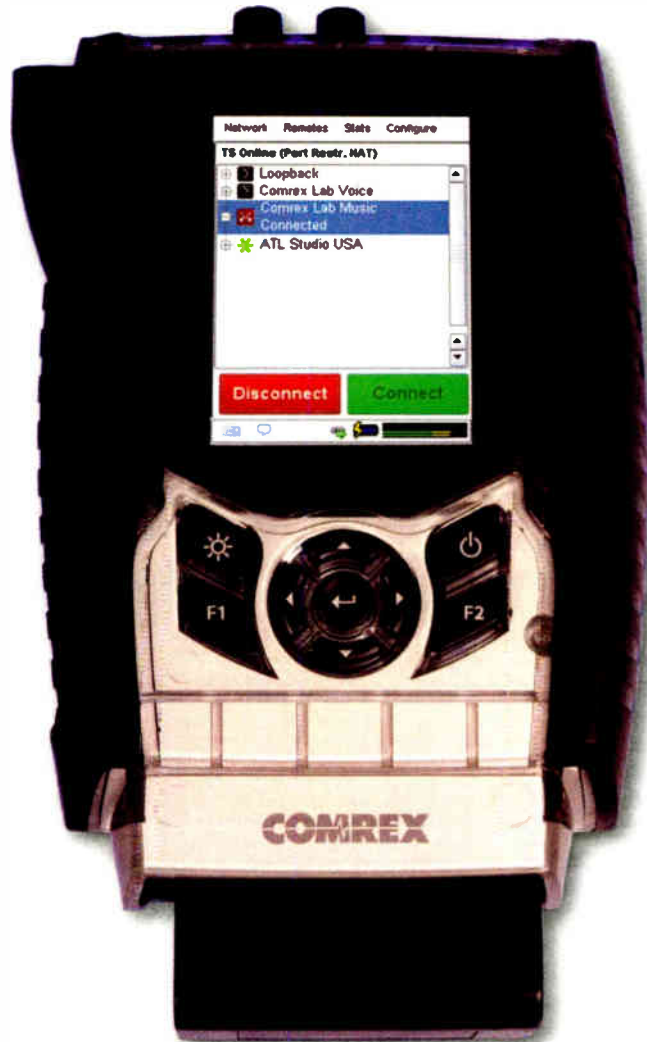
Latin America. A yagi-style log periodic antenna beaming 317 degrees toward North America is currently not used. Both of those likely will be scrapped.

White, a former radio news correspondent, also has managed commercial shortwave radio projects Radio Earth in Curaçao, Netherlands Antilles; and Radio Discovery in Santo Domingo, Dominican Republic. He is active in the international shortwave community, currently as secretary-treasurer of the National Association of Shortwave Broadcasters.

He called WYFR an important part of the heritage of shortwave broadcasting. He told me the decision to invest in the facility "is an indication that we believe that shortwave still has a bright future. Things are indeed changing. The major players on the shortwave bands are changing. But that offers new opportunities. And the shortwave receivers and listeners are still there. They have told us that. And they are waiting for bold new programming initiatives, which will be a big challenge for us and everyone else who remains committed to shortwave broadcasting."

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NPR Labs Eyes Streaming Technology

Digital audio codecs, optimum bitrate studied for streaming

BY JOHN KEAN

What is the best digital audio codec, and what is the optimum bitrate for Internet streaming? That was the question posed by NPR Digital Media, which funded an extensive study by NPR Labs to answer these questions impartially.

While the study was conducted for public radio, the premise and conclusions may be helpful to commercial broadcasters that stream audio as well.

The search for answers was more involved than one might expect, and led to other related investigations, such as the reliability of mobile wireless media, the availability of decoders in consumer equipment and the

consistency of loudness from stream to stream. (This last consideration will be the focus of a subsequent article here.)

Internet streaming and related media, such as host websites, mobile applications, digital car products, social tools and API distribution, are the fastest-growing outlets for public radio. At any given moment, there are more than 37,000 average active sessions that are listening to streams from public radio stations and NPR; and that's up 14 percent over last year.

Until recently, stations — and even NPR itself — used a variety of codecs for streams and podcasts: MP3, LAME, AAC, Ogg, etc., and even more choices of bitrates, ranging from 24 kilobits-per-second to 160 kbps. Finding a common codec would provide a more uniform quality for listeners and help ensure that the services are uniformly available to listeners on a range of playback equipment, such as smartphones, tablets, WiFi "radios" and personal computers.

Digital audio codecs make Internet streaming commercially feasible by vastly reducing the bitrate required for the audio without noticeably reducing the audio quality. Minimizing the bitrate has direct benefits for the listeners, because lower stream bitrates:

- Start faster when a stream is selected, much like a radio plays as soon as tuned in to a station;
- Restart audio faster after a dropout occurs, and
- Save potential data charges for the listener.

Experience tells us that the flow of data in mobile wireless networks is highly variable. Data capacity in a geographic area can drop, even halt during peak usage hours, and mobile handoff from cell to cell can interrupt the flow of data. These variations can affect the audio continuity in real-time streaming. We expected that lower bitrates would improve reliability (due to fewer dropouts) in mobile wireless networks.

To learn the relationship between data rate and reliability, we built a computer logging system that could record stream reliability from multiple smart phones while traveling in a vehicle. Fig. 1 shows an example of a route from northern Virginia into Washington, with dots marked in green (service) and white (no service)

(continued on page 10)

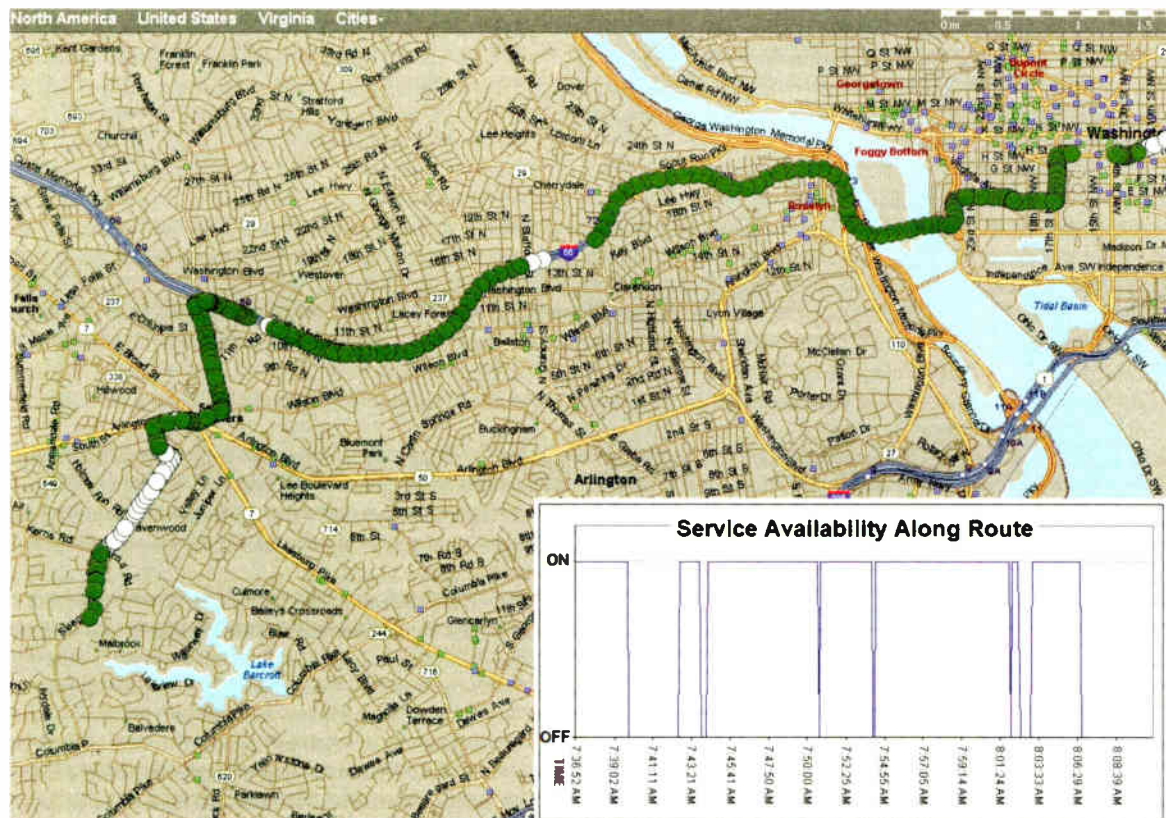


Fig. 1: This is an example of a route from northern Virginia into Washington, with dots marked in green (service) and white (no service) for one stream. The chart indicates several dropouts of varying duration along the route.

Kneller to GeoBroadcast Solutions

He'll oversee ZoneCasting, MaxxCasting and RDS-related tech

BY LESLIE STIMSON

Hal Kneller has a new job as vice president of global sales and business development at GeoBroadcast Solutions.

Founder Chris Devine says Kneller will oversee three initiatives that make use of Kneller's business development, sales as well as marketing experience.

The first of the projects is ZoneCasting, a GBS technology that allows a station to geo-target listeners for delivery of "hyper-local" content using one FM frequency network. ZoneCasting, the company says, will permit an FM station to break its coverage area into zones to broadcast separate commercial or other public service content like local flood warnings, or news briefs within those zones while minimizing on-chan-

nel interference. The company filed a petition for rulemaking about a year and a half ago at the FCC, as we've reported.

"The transmissions we set up are also effective for filling in areas of a signal that are challenged," according to Devine.

The second project is MaxxCasting. The concept is similar to ZoneCasting but focuses on simulcasting FM content to improve coverage. It can be deployed under existing booster regulations.

MaxxCasting technology is more effective than traditional booster technologies, the company says. Normally when a station installs a booster, the chances of successfully re-broadcasting the main signal are diminished without significant terrain shielding the main signal from the booster or vice-versa.

GBS has developed a system of using

several low-to-the-ground synchronous boosters that take into consideration issues like tower height, spacing, timing and distance. The height and power ratios are critical to mitigating interference, either to the main signal or to the booster, Devine said.

The third project Kneller is overseeing is RDS-related; right now, they're calling it RDS/RBDS Digital ZoneCasting for use both in and outside the U.S. The information you'd want geo-targeted is broadcast on 57 kHz. "The commission does not prohibit geo-targeting for RDS, so we could set up a system for a station so it could receive localized traffic or an alert or advertising on your RDS screen," said Kneller.



Hal Kneller

Manufacturing partners for all three systems are Harris Broadcast and Jampro Antennas.

Kneller has had a long broadcasting career, beginning as a board operator at WHCN(FM), Hartford, Conn., in 1965 while still in high school.

He comes to GBS from Nautel, where he was regional sales manager for Europe, Russia, Israel and Turkey from 2009 until June.

Previously, he was director of international business development for iBiquity Digital Corp.

He's had two stints at Harris, the latest from 2002 to 2008. His last title there was senior manager, Radio Broadcast Business Development. He also managed public radio initiatives for the broadcast transmission equipment manufacturer.

He's also a station owner. Kneller and his wife, Jan, own Heartland Broadcasting Corp., a two-station FM group in inland Florida.

ROC YOUR WORLD

The new ROC console from Logitek



The ROC is paired with the JetStream, a powerful 128-channel networked audio node.

When Logitek introduced its first ROC console back in the 1990s, it marked a revolution in audio console design. One of the industry's first router-based digital consoles, the original ROC boasted simple wiring and access to multiple sources at each fader.

Over the years, the router-plus-console Networked Audio concept has become the standard in console architecture. Although the original ROC was retired years ago, Logitek has continued to develop systems for both TDM and AoIP audio networking. The new ROC takes the best of the original design and pairs it with the latest technology and styling.

Available in multiples of 6 faders (up to 24), the ROC is housed in an attractive table-top enclosure. Durable Penny & Giles faders, OLED source indication and intuitive controls make the ROC a natural for on-air, production rooms or even in temporary studio setups. Two monitor feeds, front panel headphone connection and user-assignable softkeys will please even your fussiest operators.

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STREAMING CODECS

(continued from page 8)

for one stream. A chart indicates several dropouts of varying duration along the route.

We determined at what bitrate the chosen codec must operate while providing high-performance audio:

- Reliability decreased at rates above approximately 40 kbps, as shown in the simplified graph of Fig. 2;
- At bitrates below approximately 40 kbps reliability tended not to improve, probably because of RF signal dropouts, cell handoff issues and capacity shortages in high-use areas during peak hours

The results indicated that a “sweet spot” exists in the 40–50 kbps range, where the stream reliability and compressed audio quality is optimal.

SIX CODEC COMPARISONS

NPR Labs began testing with a comparison of six codecs by “well-informed listeners.” The purpose of this pre-test was to critically evaluate these codecs and identify two that would be presented to consumers in a final round of audio quality testing, where more time could be given to detailed comparisons, such as the impact of bitrate on perceived quality. The first round tested:

- MPEG-2 Layer III (“MP3”) — the legacy codec from the early 1990s
- LAME — a free software encoder compatible with MP3 playback
- AAC-LC (Low Complexity) — successor to MP3, used by Apple iTunes
- High-Efficiency AAC (“HE-AAC” or “AAC+”) — adds spectral band replication for quality similar to AAC at lower bitrates
- G.722.2 (“AMR-WB+”) — an ITU standard vocoder, enhanced for hi-fi speech and music
- Extended HE-AAC (“xHE-AAC”) — combines an enhanced vocoder with HE-AAC (including parametric stereo) that adapts to the program signal

This test used high-quality headphones (Sennheiser HD-600) and listening was done in quiet environments. Four women and seven men, all NPR staff or associated with NPR affiliates, listened to audio samples of all six codecs at a time, in random orders, ranking each on a scale of zero to 100. The preliminary round of testing is summarized in Fig. 3.

With these listeners, all of the codecs performed well at 96 kbps. For this combined genre, the xHE-AAC was on top, while LAME was at the bottom. (HE-AAC was not included at this rate as it exceeds the intended bitrate. At

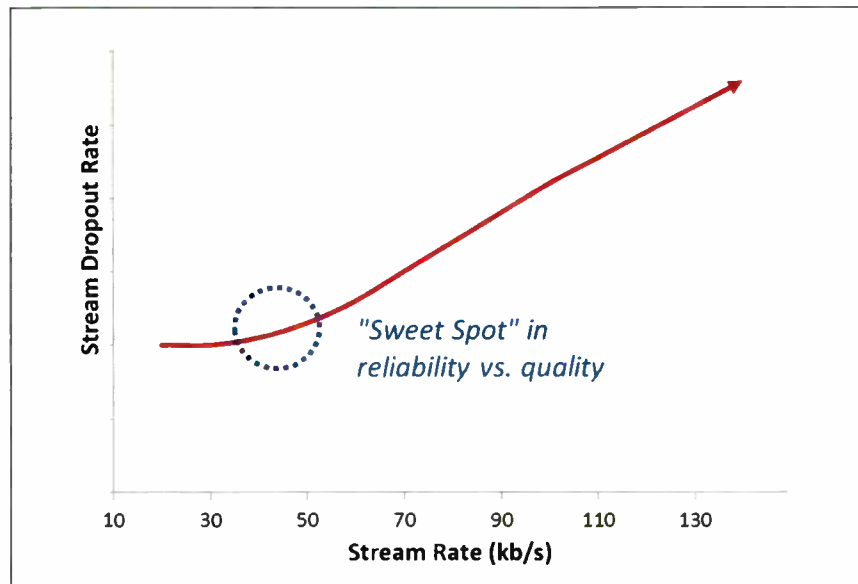


Fig. 2: Reliability decreased at bitrates above approximately 40 kilobits per second, as shown in this simplified graph.

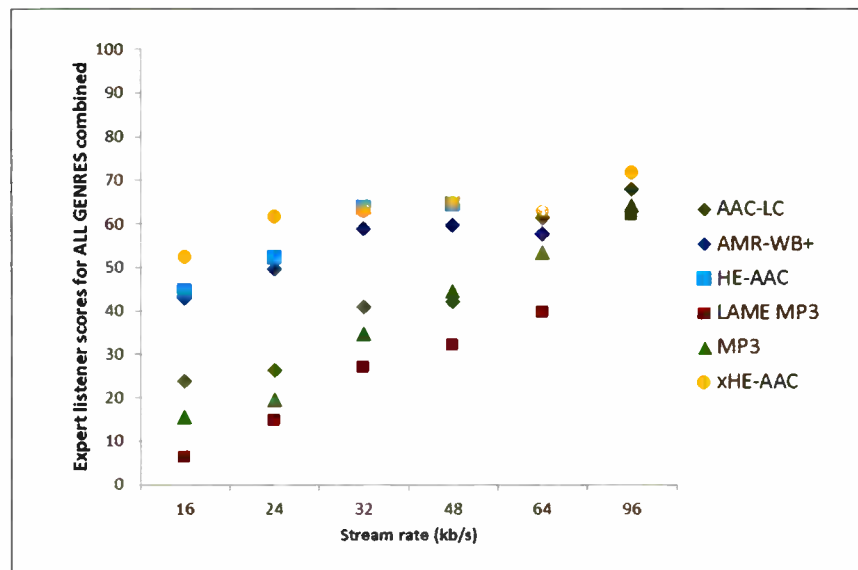


Fig. 3: The preliminary round of listening testing is summarized here.

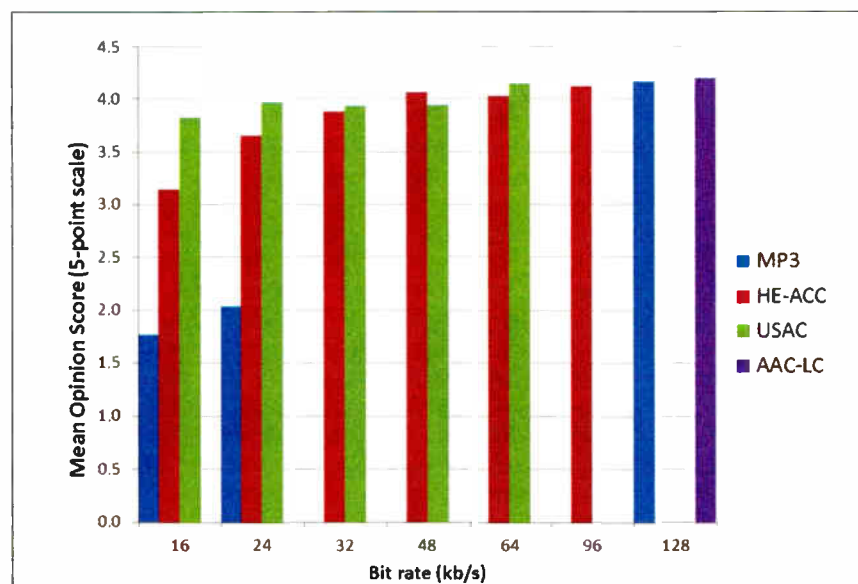


Fig. 4: To consider what xHE-AAC might do for listeners in the future, the consumer test included both xHE-AAC (also known as the Universal Speech and Audio Codec or “USAC”) and HE-AAC. The test results, summarized here, include MP3 and AAC-LC at 128 kbps, as high references, and MP3 at 16 and 24 kbps as a low reference.

this high rate, its performance would be equivalent to AAC-LC.) The positions of xHE-AAC and LAME remained at top and bottom, respectively, at successively lower bitrates. HE-AAC tied the top position at 48 and 32 kbps, but dropped slightly below xHE-AAC at 24 and 16 kbps. MP3 declined consistently, getting relatively low ratings below 64 kbps.

While xHE-AAC was a consistent winner, it is not yet widely available in consumer devices — an important consideration for a replacement of the legacy MP3 codec. The HE-AAC codec is almost universally available in portable devices operated by iOS and Android (at least since version 3.1 “Honeycomb,” according to the developer). While older Android devices may not have HE-AAC on board, these devices are now a declining group, as consumers replace their devices with newer products.

To consider what xHE-AAC might do for listeners in the future, the consumer test included both xHE-AAC (also known as the Universal Speech and Audio Codec or “USAC”) and HE-AAC. The test results, summarized in Fig. 4, include MP3 and AAC-LC at 128 kbps, as high references, and MP3 at 16 and 24 kbps as a low reference.

As expected, the chart shows AAC-LC doing the best, at 128 kbps, followed closely by HE-AAC at 96 kbps, which holds up well at 64 and 48 kbps. The score by USAC (xHE-AAC) shows its advancement in technology, over HE-AAC, at 32 kbps and continues to receive a near-“good” score at 16 kbps!

The results confirm NPR’s recommendation of HE-AAC for all live streaming, using 48 kbps in the “sweet spot” of optimum combination of reliability and quality.

We also suggested that where bitrate is not an issue, such as podcasting and file transfer, that 64 kbps provides a slight improvement. At both bitrates, we consider the efficiency high enough to rely on HE-AAC without the parametric stereo feature (which adds a “v2” designation).

Critical listening tests at NPR Labs determined that the artifacts of parametric stereo, such as a slight positional blurring and instability, do not outweigh the potential reduction in compression artifacts, which listeners indicated are already quite low at 48 and 64 kbps.

The study discovered another issue for Internet streaming: consistency of loudness from stream to stream. This led us into an investigation of the causes and potential solutions, which we will address next time.

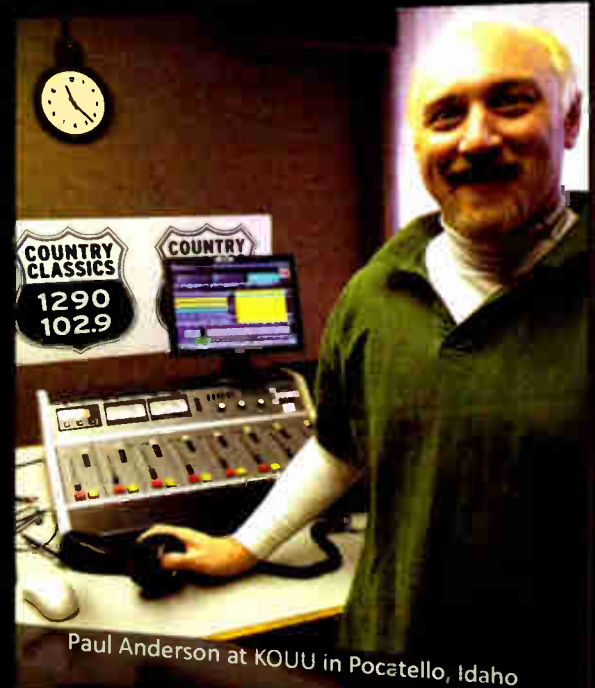
John Kean is senior technologist, NPR Labs — National Public Radio. Comment on this or any story. Email radioworld@nprmedia.com, with “Letter to the Editor” in the subject field.



Broadcast Software International

Streaming Made Simple! With Simian 2.2 Pro & Lite

By Paul Anderson & David Bowman of KOUU



Paul Anderson at KOUU in Pocatello, Idaho

Idaho Wireless Corp is a small market group in Pocatello, Idaho, and we're the only independently owned and managed radio group left in our market. As technology evolves we evaluate the costs and benefits of each change, and streaming was one of those projects.

When we changed the format January 1st on our 50,000 watt AM KOUU to Country Classics the response was immediately positive, but our audience wanted to listen in their offices and on their smart phones. We had considered streaming KOUU in the past, but the expense and complexity meant it was always a project that got pushed back to "later".

In 2009 we installed our first Simian system, replacing a beloved but tired Scott Studios system. We were ready for the benefits of a Windows based system that had more features, and we found that Simian is easy to use, powerful, and installation was a breeze. Since then we've converted all of our stations from Scott to Simian.

Simian offers many options to set up streaming. Country KOUU audio streaming is being outsourced to a third party (Crystal Media Networks) using data provided by Simian. Using the Metadata tab in Program options is where all the set up takes place. Crystal Media Networks required certain parameters to interface with their streaming player. The majority of the setup is all contained in an .xml file.

To create an .xml file, use Notepad and type in the syntax for each parameter required by the streamer (Syntax for Artist is <artist><![CDATA[%ARTIST%]]></artist>). Simian support can help with this, or a template is pictured in the Simian Pro Manual. In the case of KOUU, Artist, Title, Filename, Category, and Length of each piece of audio was provided to Crystal Media Networks. This file becomes the Template File.

Some final setup is required. The template file is loaded in the Metadata tab in Program Options in Simian. The IP Address corresponds to the computer that will be accessed by the streaming software. This computer needs to be networked to the on air Simian computer. The port and TCP/UDP address is set up with information provided by the streaming company (in the case of KOUU, Crystal Media provided this information).

All of the programming for KOUU is played by the Simian Pro system. In order to stream with more than one source (i.e. switching from local audio to network audio like a satellite receiver) Data Repeater-available from BSI-can handle multiple metadata sources and destinations.

Our streaming project for KOUU was easier than we imagined. The support team from BSI and the streaming features of Simian made it simple.

Paul Anderson is the General Manager of KOUU, KZBQ and KORR. David Bowman is the Operations Manager. KOUU uses Simian Pro, though the metadata output features of Simian Pro are also available in Simian Lite. Simian Pro & Lite contain built in metadata output templates for Windows Media Encoder, ShoutCast, IceCast, SAM Cast, Live365, Orban Optimod, and Omnia AXE. Metadata output in Simian Pro & Lite is template based, so most stream encoders not listed are compatible.

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Springs, Boots and a Rodent Trap

Keep meeces out of your transmitter with this clever trick

WORKBENCH

by John Bisset

Read more Workbench articles online at radioworld.com

When I talk to engineers about submitting an idea of theirs to *Workbench* I often hear this response: "Oh, everyone knows *that* tip!"

Judging from comments received about Frank Hertel's submission on differences between 75- and 50-ohm Type N connectors, though, quite a few readers learned something. Glad we could enlighten you. So as we start a new year, make it a point to share something you know with other engineers by sending us a tip. Email johnpbisset@gmail.com, and include high-resolution pictures if you can.

A number of years ago, when we couldn't find a presenter for our Society of Broadcast Engineers meeting, we just went around the room discussing nuggets of engineering wisdom we'd picked up over the years. I dare say no one left without a handful of good ideas. That's an idea in itself.

Speaking of good ideas, wouldn't you like a dollar for every spring-loaded microphone arm sold? There certainly are a lot of brands and styles in the field using tension springs to hold the mics in position. Yes, you can buy new springs

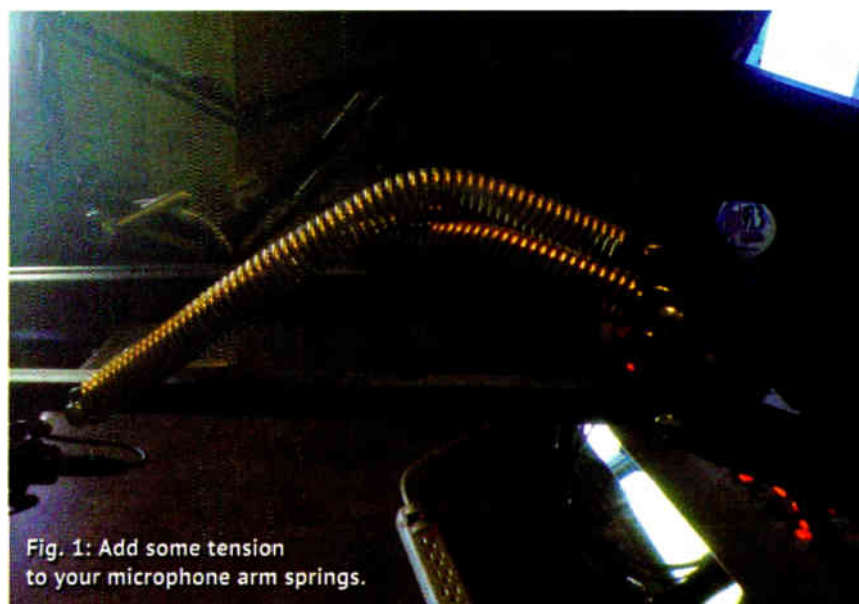


Fig. 1: Add some tension to your microphone arm springs.

when the originals eventually wear out — or you can add this tensioner using the existing weak springs (seen in Fig. 1). A simple idea, and it works.

Jim Appleton is a retired chief engineer who sent in an excellent tip — especially helpful should you need to install a new phasor.

With the power off, take the time to use a digital capacitance meter to unhook and measure each capacitor. Then with a felt marker, print the measured capacitor value right on it or next

to it. This simple step will help you check the actual measured value compared to the manufacturer's value. If something changes, you have a baseline measurement from which to compare future readings. Another advantage is that if you lose a capacitor and you have a junk box of replacements, you can choose a replacement capacitor close to the original measurement.

Once a year, Jim also took the station down for overnight maintenance and checked all capacitors, tightening all screws, nuts and bolts, remaining

careful not to over-tighten them. This is also a good time to remove any and all critters and their nests. Scattering a few mothballs in the bottom of each ATU and phasor cabinet will help ward off snake and rodent trespassers.

While you're in the doghouses and phasor, use that felt marker to note the position of coil clips on the inductors used in the networks. Again, if a clip falls off, you'll know where to reset it. Thanks, Jim, for the great ideas.

Reach Jim Appleton at jeapple18@gmail.com.

I love it when our television brothers and sisters weigh in on a *Workbench* topic.

Roberta Barmore is with Dispatch Broadcast Group's WTHR, Channel 13 in Indianapolis. With respect to our tip about substituting PVC for ceramic insulators in lower-power AM RF applications, Roberta writes that plastic supply shops still sell polystyrene, which is a better-behaved RF insulator than PVC. "Styrene" fittings, used for drain lines, are also made of polystyrene.



Fig. 2: Try polystyrene for insulator replacement.

As for ceramic replacements, Roberta suggests checking with surplus dealers or hamfests for real ceramic insulators. You can often find a "will-fit," especially for AM-band uses (as shown in Fig. 2), where there's some "wiggle room." Roberta Barmore can be reached at rbarmore@wthr.com.

Platinum Tools (www.platinumtools.com) announced the launch of RJ-45 Boots. Now shipping, the boots are

(continued on page 21)



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Codecs Squeeze the Most Out of Bits

Let's talk about low bitrates, Opus, AES67 and more

TRENDS IN TECHNOLOGY

One year ago, *Radio World* asked several experts to discuss trends in the broadcast codec technology arena (Jan. 2, 2013). It was a popular topic, so we return to it to learn more and find out what's new now in a set of four Q&As. Replies below were via email and have been edited for length.



Dr. Deepen Sinha
CEO
ATC Labs

What's the most important change in codec technology that radio organizations should know about?

Sinha: Obviously IP codecs have now come of age and are finding broad acceptance, both for remote broadcasting and STL applications. Moreover, now it possible to not just do a two-way session with a reporter in the field but also create a high-fidelity conference involving multiple reporters scattered all around the globe using a flexible mixture of hardware and software IP codecs.

Availability of quality soft codecs means you can deliver one to a reporter half-way around the globe in seconds and have him or her be set up to do a remote within minutes!

What is the "state of the art" in algorithms?

Sinha: I think there are two to three parallel evolutions.

First is in the field of conventional transform codecs, which have relatively high latency (> 30–50 ms); and these can provide broadcast-quality stereo

audio in the 32–48 kbps range. Second is in the field of *low-delay* codecs with algorithmic latency of 23 ms or so, which can provide excellent audio at 80–128 kbps. And finally a third evolution is in the field of *ultra-low-delay* codecs, which have algorithmic latency of 2 ms or lower and provide high-fidelity audio at 128–192 kbps/channel.

You have a unique background in audio compression including personal involvement in AT&T Bell Labs, Lucent, the PAC codec and iBiquity Digital. How good are low-bitrate codecs, and how much better can we expect performance to get?

Sinha: Obviously low-bitrate codecs are now good enough for a lot of applications, but I strongly feel that there is more to come, primarily given that memory

Low-bitrate codecs are now good enough for a lot of applications, but I strongly feel that there is more to come.

– Deepen Sinha

such as flash memory has improved dramatically in terms of access time and is rapidly coming down in cost.

This opens up several interesting possibilities for codec researchers, who even til recently have had to make major algorithmic tradeoff to keep the memory budget — particularly for a consumer end device. Back in Bell Labs in the 1990s, I had caught some flak from colleagues for stating that 8000 bps is a large number and 2 power 8000 represents an incredibly large number of possible audio waveforms that can be represented using these many bits in a second. What it really meant was that if we had access to a very large memory, that could be used to build dictionary-based coding, opening up hitherto unthought-of possibilities.

Is there a danger that our audio content is relying too much on compression?

Sinha: Yes, codec developers and vendors should probably not oversell compression. With the evolution in subjective testing methodologies, it is possible to make fairly low-bitrate codecs look good through suitable choice of testing methodologies. We often get a question,

"Why should I stream at 64 kbps or even 32 kbps when codec X in such-and-such test was shown to be CD-quality at 24 kbps or 20 kbps?" Our recommendation typically is that you also have to take into account subtle artifacts — which become not so subtle over extended listening — long-term listenability, listener fatigue and tandem coding issues.

For a variety of reasons it is still very much better to use a lesser amount of compression if practical for a specific situation.

What is your company's newest product or notable feature?

Sinha: We are introducing a powerful server-based studio IP codec called ALCO Enterprise Server, which can simultaneously support 12 active call-groups on a IU server. This works with a network of our IP soft codec product



Kevin Campbell
APAC/Americas APT
Sales Director
WorldCast Systems

What's the most important recent development in codec technology?

Campbell: I think the most significant would be the recent adoption of a redundant streaming approach to counteract adverse network conditions on lossy IP links. This approach is enabling broadcasters to utilize cost-effective public Internet connections to replace or backup main connections without any loss of quality compared to the traditional (and substantially more expensive) synchronous connections such as T1. It has opened up a new path for audio broadcasters and gained in popularity.

APT pioneered this field when we launched SureStream technology back in 2010 and the past year has seen a rise in "CopyStream" technologies from competitors attempting to emulate its success and in some cases retrofit it to legacy hardware. We are confident that SureStream remains significantly ahead in terms of performance and sophistication and will continue maintain our market-leading position in this field. This is at least in part due to refinements and feedback from our significant installed base.

In fact, 2013 saw the first large-scale telco deployment of the technology in a country-wide network with over 100 codec units which represents a landmark in the adoption of this approach.

It seems broadcast users should be well familiar with audio over IP, but there never

(continued on page 18)



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AOIP Testing & Troubleshooting

In the analog days, you could easily track down most problems with just a pair of headphones and some clip leads.

While you will not be able to signal trace your AoIP network the same way, a different set of procedures and tools does allow you to probe and poke the infrastructure to eliminate network segments and devices. The testing methods and tools are different, but the old divide and conquer approach still applies.

There are three levels of testing in the professional data communications cable installation world: verification, qualification, and certification. Each level provides a higher degree of parameter testing. At Wheatstone, we use some combination of these test methods and tools to commission and install WheatNet-IP AoIP systems in order to get the job done quickly and correctly.

Verification testing is essential for pre-testing all wall outlets, patch cables, and horizontal runs between patch panels and equipment racks. The goal is to...

Read the rest of the story here: INN6.wheatstone.com



Budgeting for the Good Stuff

It's that time of year again when broadcasters everywhere are working the budgets and trying to explain the finer details of audio networking to the Scrooge in charge of the numbers. (Their words. Not ours.)



We have a few suggestions.

Go gigabyte. When raising a modern audio network, our systems engineer Paul Picard says it makes both financial and technical sense to install a Gigabit CAT6 based system that is compatible with current hardware and leaves you bandwidth headroom to grow. Our WheatNet-IP Intelligent Network is a Gigabit Ethernet system for this reason. As a full, end-to-end...

Read the rest of the story here: INN6.wheatstone.com



THE INTELLIGENT NETWORK

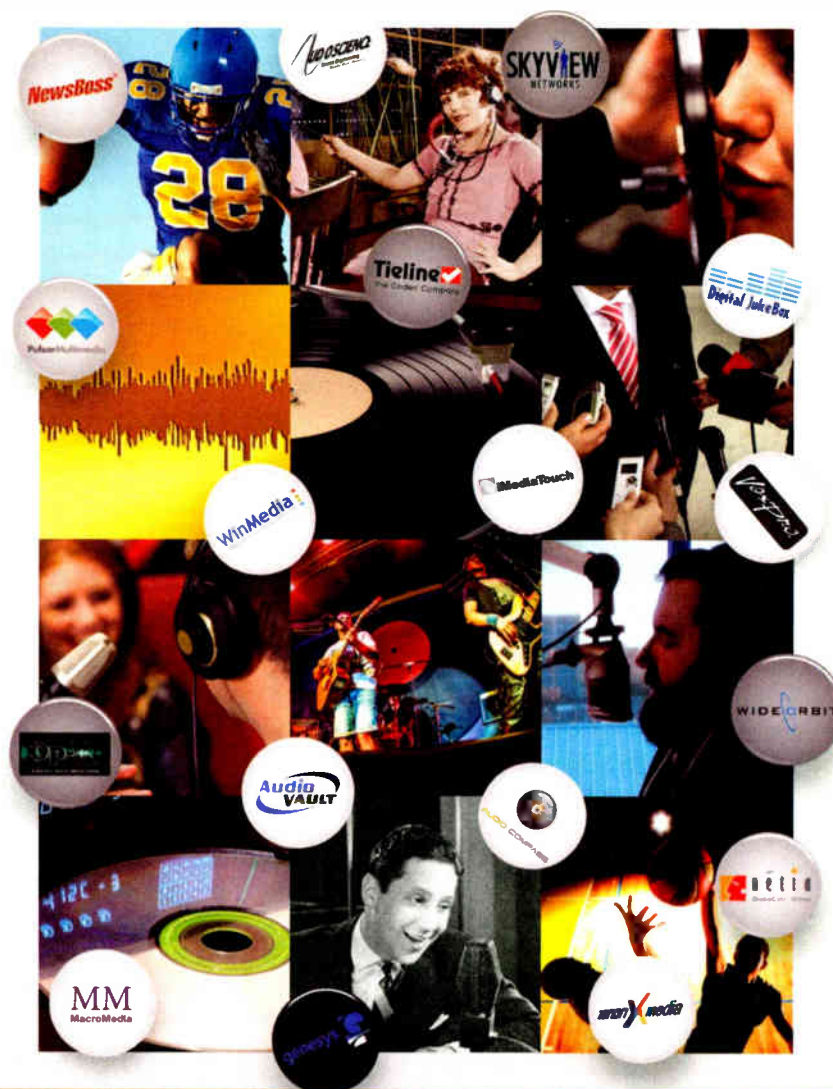
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Wheatstone's madmen talk about HOW and WHY they are so driven to perfection...

new video series premieres this month at wheatstone.com

It's Just What Wheatstone Folks Do...

The kind of fan mail we love!

When you work with some of the best in the industry, sometimes it's easy to forget why they're good at what they do. Then along comes a reminder, like this letter to our VP of Technology Andy Calvanese from Steve Shultis, CTO, NY Public Radio in New York, about our own Mike Erickson during his recent visit to WNYC-AM.



Mike Erickson

Andy,

I don't typically get the opportunity to send a note like this but I'm writing to tell you about an absolutely GREAT customer support visit we had today from Mike Erickson.

First of all I should preface this by saying that 1) We didn't know each other prior to today, even though we each worked in the same market; and 2) Mike initiated the visit as an offer to upgrade the software on our units and field any questions about their operation. The latter point alone is telling about the unique level of support we experienced today.

Mike came in this morning to the TX site, established what was on the air and what was not, explained what he was going to do to upgrade the software on each processor and performed that work.

Then the fun began: he explained how to get the desired processing out of the units, discovered and corrected at least two key engineering items on our side related to the feeds to the units and proceeded to work and show us how to achieve our desired results. At times, upon completion of key steps, he even invited us to listen to the signal in his car and then returned inside to make further adjustments.

When we were happy with the results, he even treated us to lunch and we returned when another host was on the air and made one more adjustment.

Andy, this was a thorough yet efficient and very enjoyable visit. It's not often when you meet someone whose avocation so perfectly matches their vocation - but when they do as witnessed today in Mike, it's a unique and wonderful and very productive experience for which we greatly benefited.

Hats off to Mike and Wheatstone!

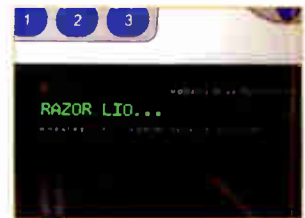
Steve Shultis, CTO, NY Public Radio

BLADE HONING 101 Bringing Logic to Ramar

How BLADES brought a 16-station hybrid network together perfectly...



When Chris Fleming at Ramar Communications in Lubbock, Texas, told us about an intermittent contact closure issue that plagued his 16-station hybrid routing system, we hoped it wasn't something too out of the ordinary.



The group's two proprietary routing systems for nine television stations and a WheatNet-IP audio system for seven radio stations seemed to talk to one another okay, but there was definitely something missing....

Read the rest of the story here: INN6.wheatstone.com

Really Great Gig

Markus Stocker of Media Engineering, Switzerland, wrote to us about one of his recent projects, which he calls the "Great Gig in the Sky." Rebuilding BAY89.7's Studio-1 in Malta with an E-1 console two years ago was fun and rebuilding BAY89.7's Studio-2 more recently with a newer IP-12 console was fun, too. But the really "great gig in the sky" was when we interconnected the two studios together with one single CAT6 cable....



Read the rest of the story here: INN6.wheatstone.com

FEATURES

CODECS

(continued from page 14)

seems to be enough information in the marketplace to meet the level of interest.

Campbell: There are still plenty of misperceptions and misinformation. The one that we still hear a lot is the fact that a link is declared free from packet drop after an engineer does a PING test. Just because a PING is completed is of little relevance in the IP codec world as the PING test operates using TCP/IP whilst the audio codec, primarily (through not exclusively) uses UDP/IP.

It's these types of persistent misperceptions that have prompted us to rewrite our successful "Practical Guide to IP Audio." We first released this primer back in 2008/9 near the start of the IP audio phenomenon and it soon became a must-read for engineers contemplating a migration to IP audio transport. We are updating the guide and plan to have the new version available before NAB 2014.

What relevance does the AES67 standard have?

Campbell: The advantages of the technology and the contributing technologies to the standard are well documented. It negates the need for punch blocks, patch panels and tons of cables in any facility and simply and elegantly replaces them with Cat-5 Ethernet cable and off-the-shelf switches. The sophistication of this solution combined with the flexibility that AES67 offers in terms of audio routing and the ease of connectivity to AES67 products makes it a "killer technology."

There is a definite trend towards a healthier industry – a little bruised and battered, certainly more careful, but definitely moving more up than down.

– Kevin Campbell

Clearly as codecs are a key element in moving audio channels between facilities, the technology will have an impact on our range. Watch this space for what we do!

What is the "state of the art" in algorithms?

Campbell: At the risk of sounding like a broken record, you can't really go past Enhanced apt-X if you are looking for a "no compromise" solution. No compromise in terms of audio fidelity and latency, the characteristics of the algorithm remain markedly close to Linear PCM and vastly superior to psychoacoustic algorithms, especially when it comes to multiple encodes or tandem coding. Enhanced apt-X is still being bought into globally by broadcasters, broadcast service providers and telcos, where quality and audio fidelity are the prime objective.

We have seen much less demand and, in some territories, very little awareness for the newer algorithms such as Opus. Licensing costs and availability of the algorithm quite often outweigh the inherent qualities of the algorithm in determining the market penetration, especially in our quite small niche sector where we purchase in the hundreds and the thousands rather than the millions like the consumer sector.

To generalize, I think the holy trinity for broadcasters could be stated as Enhanced apt-X, to be used where no compromise on quality, but bandwidth constraints; Linear PCM, to be used where there are no bandwidth constraints; and HE-AAC, to be used where the bandwidth is heavily constrained.

What is your newest product or feature?

Campbell: The latest addition to our core audio-over-IP codec range is the ScriptEasy remote control application. Known from our Audemat line of remote control devices, ScriptEasy has been integrated into APT codec units to deliver a unique way of offering advanced remote control, which would previously only have been possible using external devices.

Using powerful remote control logic, it endows the codec with inbuilt intelligence which can enable it to act how you wish it to when certain criteria are met in the internal performance metrics or from up to five external pieces of equipment. For example, you can trigger specific line backups based on packet loss experienced, you can switch schedule changes to receive local programming at specific times or days and you can implement a different audio profile should your main transmitter switch to the auxiliary.

These are just examples; the true power of the application is that it can do what you want it to do. ... In the U.S. it is widely in use within the Clear Channel group as the technology used to remotely control and monitor all studio and transmitter sites throughout the country on the Relio hardware platform.

How does the decline in POTS, ISDN and other older services affect your users?

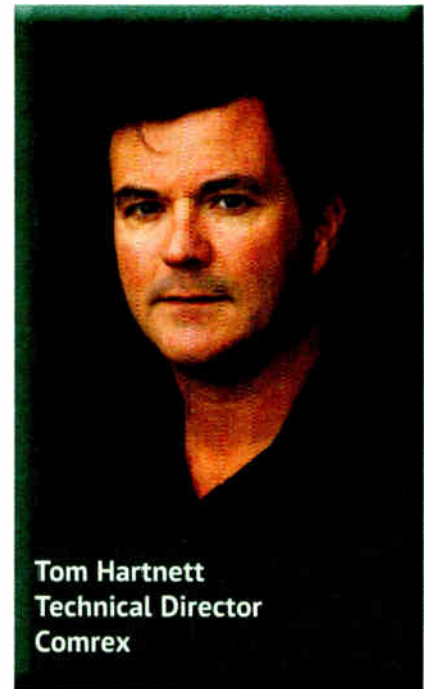
Campbell: This year we have had an announcement from Verizon in the northeast U.S. that no more new installations will be undertaken for ISDN. No one was shocked really; it's to be expected as backbones continue to change and the support personnel who know anything about ISDN continue to dwindle. Those who have ISDN at studio and remote sites (ballparks, concert venues etc.) continue to have service, albeit sometimes degraded.

I regularly speak to many customers who want to make the transition to IP; however it's the age-old problem of budget vs. necessity. The engineer believes it's necessary to make the jump now, as ISDN is really on its last legs; however management won't make the investment as the ISDN links have not yet been discontinued or no notice of discontinuation of the service has been issued. So we continue on a gradual phased transition as budgets become cyclically available.

Many have expressed concerns about the radio industry's outlook. What's your take?

Campbell: From a personal point of view, I really do adhere to the commonly spoken mantra of keeping radio local and therefore relevant to the immediate geographic area. We have all gone through our iPod/iPhone and podcast phases in the commute to and from work. Invariably I always drift back to three or four favorite frequencies on the dial because I want to hear other people's take on the issues of the day or I just want to hear a new tune from a local band. To me, that is the key for radio to thrive.

At a company level, we have seen an uptake in the number of large-scale orders this year for APT codecs as well as our Ecreso transmitter line and Audemat monitoring products. While there is still a large discrepancy in the rate of growth from country-to-country, there is a definite trend towards a healthier industry – a little bruised and battered, certainly more careful, but definitely moving more up than down. ■



Tom Hartnett
Technical Director
Comrex

What's the most important recent change or improvement in broadcast codec technology?

Hartnett: The innovation in the telecom world to include "HD Voice" modes in non-broadcast products. Mobile phones, business desktop phones and softphone apps now all consider "telco quality" audio to be outdated, and are adding in high-fidelity codecs. Skype's been doing this for years. Nobody is better positioned to benefit from that than radio. You just need studio hardware that can talk the right language.

What's "state of the art" in algorithms?

Hartnett: AAC-ELD is still the winner for remotes and will continue to be for some time, as it provides the perfect balance between low network usage and low delay.

On its heels is Opus, which has only a slightly inferior sound but a big benefit for the telecom world in being free (as in speech and beer). Opus is being adopted quickly by Web developers. For non-delay intensive application (like streaming) HE-AAC is still king.

How good are low-bitrate codecs, and how much better can we expect performance to get?

Hartnett: The algorithms themselves are "good enough" now for the vast majority of applications. Innovation in this field has moved to things like error resiliency and variable bitrate operation on poor networks.

What relevance does the new AES67 standard have?

Hartnett: It's early, and the new standard doesn't include important elements like presence and discovery. So it's not perfect. But from a product developer's point of view it now opens up opportunity in more pure-software products. Most hardware codecs

consist of analog and digital audio I/O tied to some type of internal computer. If we can now support the audio side via Ethernet (and remain AoIP vendor-agnostic), we can look at removing the custom hardware element completely and go pure software on a server. Especially for products that support lots of audio I/O channels, the idea of removing handfuls of large XLR connectors is very attractive. Of course, this only holds true for the studio side of any link, since field broadcasts are still tied to old-fashioned analog for now.

Assess the impact of the decline in POTS, ISDN and other older services on your users.

Hartnett: It can be frustrating for a broadcaster to have to change his paradigm, and expensive to buy new gear. But in the case of IP, it comes with one pretty cool feature that can

high-quality audio around?

Hartnett: We find that even when a consumer-grade product starts to shadow our offerings, many broadcasters will still need to rely on pro-grade gear with solid support. I'm thrilled that budget broadcasters are using Skype and similar stuff for remotes — first off, because I believe local presence is such an important aspect of the radio business, and cheap ways of achieving that makes radio better; but also because when they hit a certain threshold of success, they'll call us for the "good stuff."

One more important element in providing "codecs to consumers" is the ability for listeners to connect to the station in high fidelity. This is something we're aggressively promoting with our STAC-VIP talkshow system. Radio will sound so much better when everyone calls in using codecs!

I'm really excited about the work being done by Web companies like Google in integrating real-time, high-quality media streaming into their products.

— Tom Hartnett

be quite enabling: wireless over 3G/4G. If 4G coverage is good (and you're not trying to cover an event with thousands of mobile phone users present), this becomes the ultimate broadcast tool — completely portable with zero setup, no installation cost and great audio. And 4G networks are getting better deployed every day.

What is your newest product or notable feature?

Hartnett: Our BRIC-Link Product, which is our entry-level simple hardware codec, is a huge seller for us. One of the many notable features of this box is the ability to push an Icecast-style stream to your webstream hosting company. We're enhancing that aspect of the product by supporting an HTTP push mode that delivers FLAC (lossless) compression. This way the streaming company gets a perfect signal to start with before compressing to MP3 or AAC, eliminating any lossy transcoding. BRIC-Link can even act as a small-scale streaming server itself, delivering dozens of HE-AAC streams to listeners using web players directly.

Given advances in consumer audio and IP infrastructure, do you foresee a day when broadcasters don't even need specialized "broadcast" codecs to move

Comrex has spent a lot of time and resources on the video side of the industry. Will we see more of that?

Hartnett: Our LiveShot product does for video what we've done for audio, but that doesn't make it a TV-only product. We're finding the line is blurring, and it's not an either/or thing. Radio stations are making the transition from audio providers to media providers via the Web, and often via cable TV.

There's also a nice side effect of all the video development we've done in recent years. It turns out moving video over 4G networks is a lot more challenging than audio, due to the ten-fold increase in network required. But we've licked that, and now we're busy backporting all the R&D we've done to make our audio codecs more resilient on bad networks.

Anything else we should know?

Hartnett: At the risk of sounding a bit cagey, I'm really excited about the work being done by Web companies like Google in integrating real-time, high-quality media streaming into their products. I can see this stuff being available on every browser and on every computer or smartphone soon, and it gives radio an opportunity to forever rid itself of poor-quality telephone audio. We'll be talking a lot more about that in 2014. ■



John Lackress
VP Sales Americas
Teline

What's the most notable improvement in codec technology?

Lackness: Rapid improvements to IP network infrastructure have led to broadcasting over the public Internet becoming a new paradigm for many radio engineers and even some codec manufacturers. Cost pressures and

demands to improve the bottom line have also driven broadcasters away from leased lines, ISDN and satellite IP into terrestrial IP networks for STL and audio distribution more generally.

Many engineers have traditionally been concerned about broadcast reliability over unmanaged IP networks, so I believe the most important recent innovation in codec technology is the establishment of STL-grade reliability over imperfect IP networks like the Internet. This is achieved using codecs capable of dual redundant IP packet streaming.

These codecs simultaneously send redundant data streams from different Ethernet ports. This delivers seamless redundancy by switching back and forth, without loss of audio, from the nominated primary data link to the backup link if one fails and then subsequently recovers. Using IP links from two different IP network providers delivers optimal redundancy over mission critical STL connections.

A number of other IP strategies can work in tandem with this technology to optimize reliability and audio quality; elements like forward error correction (FEC) and automatic jitter

(continued on page 20)

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CODECS

(continued from page 19)

buffering, which adjusts packet buffering according to the prevailing health of the IP network at any given time.

What's "state of the art" in algorithms right now?

Lackness: Without doubt the audio codec making the biggest impact globally in a multitude of applications is the open-source codec Opus. Tieline sees Opus as a game changer for the industry, just like MP3 was in the 1990s, and has added it to the Genie and Merlin codec families as well as the Report-IT Enterprise smartphone app.

Opus incorporates technology from the well-known SILK and CELT codecs and is adaptable to both low-latency speech and high-quality music applications. As a variable bit-rate algorithm it is ideal for a wide variety of broadcast applications because of its capacity to deliver high-quality, real-time audio over IP at low bitrates, and ultra-low delay audio at higher bitrates.

Opus has been ratified by the IETF and validated by the EBU, however development is continuing in order to further improve the current implementation.

You released new firmware in one of your codecs; why is it notable?

Lackness: A recent firmware release delivered four innovative new audio distribution configuration options for Genie Distribution and Genie Distribution WheatNet-IP audio codecs. These solutions were developed as part of

ongoing product improvement as well as customer feedback.

New connection options include broadcasting 3 x bidirectional stereo connections, or 2 x stereo and 2 x mono bidirectional connections, or 1 x stereo and 4 x mono bidirectional connections, or 6 x mono bidirectional connections. These solutions are ideal for broadcasters distributing different programs from a single site to different IP addresses, depending on the number of streams in use.

Another firmware release due in early 2014 will allow these codecs to

Bridge-IT Xtra is recommended for low-cost studio-to-transmitter links (STLs), studio-to-studio links and affordable remote broadcast links. The codec has dual internal power supplies and supports six stereo multi-unicast audio streams over the public Internet. You can also combine Bridge-IT Xtra with Tieline's Report-IT Enterprise smartphone app to create a cost-effective, high-quality remote solution.

Standard broadcast algorithms include Tieline Music and MusicPLUS, LC-AAC, HE-AAC v.1 and v.2, AAC-LD,

Tieline's technology partner Wheatstone Corp. was an active contributor to the AES X-192 project group, which defined the AES67 standard. WheatNet-IP equipment will be compliant with the standard; however total interoperability also requires logic control for all peripheral equipment at the control layer — elements such as routing control, turning sources on and off, and gain control. This will require agreement on additional standards for interoperability between competing IP ecosystems.

Genie Distribution with WheatNet-IP and Merlin PLUS with WheatNet-IP codecs will offer AES67 interoperability via their onboard WheatNet audio card.

I believe the most important recent innovation in codec technology is the establishment of STL-grade reliability over imperfect IP networks like the Internet.

— John Lackness

multi-unicast three different stereo audio streams to up to 15 connections each, or broadcast three separate stereo streams in multicast server mode and distribute each of these streams to unlimited endpoints over compatible IP networks.

Other important new or features as we come into spring NAB season?

Lackness: Tieline launches 2014 with the release of a new cost-effective, high-performance, point-to-point and multi-point stereo IP audio codec called Bridge-IT Xtra.

AAC-ELD v1 and v2, aptX Enhanced, MPEG Layer 2, G.711, G.722 and MP3 playback. It also features an SD/SDHC card slot for MP3 or linear audio backup.

What relevance, if any, does the new AES67 standard have on you and your users?

Lackness: The new AES67 standard addresses the audio transport mechanism and the clocking scheme required to achieve interoperability over competing IP standards, but this is only part of the story.

Assess the impact of the decline in POTS, ISDN and other services.

Lackness: It is true that POTS and ISDN services are declining in importance throughout the U.S. and parts of Europe as IP becomes the predominant transport for carrying broadcast services. Drivers of this change include the rapid improvements to wired and wireless IP infrastructure and the cost advantages offered by IP networks. Telcos are also influencing change by removing copper infrastructure in some places and not installing new ISDN services in others.

Nonetheless, ISDN and POTS services will coexist with IP for some time yet in many regions, so flexibility is paramount. Engineers can choose broadcast codecs capable of connecting over more than one audio transport, which provides opportunities to connect over IP, ISDN or POTS as required. This will assist as they transition to IP-only technology over time, or allow them to integrate backup connections on alternative transports should IP services become unavailable.

Do you foresee a day when broadcasters don't even need specialized "broadcast" codecs?

Lackness: In a perfect world of fiber to every premise, it is conceivable that specialized broadcast codecs may no longer be required. However in a world where terrestrial fiber is unlikely to be installed on such a large scale any time soon, broadcast codecs are here to stay for the foreseeable future.

Running fiber to isolated STL transmitters over large distances with difficult terrain presents other infrastructure challenges. Not to mention cost considerations, and the integration of reliable backups over alternative networks in case primary connections fail due to a backhoe severing the fiber! ■

Comment on this or any story. Email radioworld@nbmedia.com with "Letter to the Editor" in the subject line.

WHO'S BUYING WHAT

West Virginia Radio Corp. has selected **Matrix Solutions** to help manage advertising sales across its 29 radio stations, as well as the Metro News Statewide Network. Matrix Solutions' Web-based platform provides CRM and sales analytics functionality. The system is scalable, and sales managers can see summary views of the business as well as know how one account, category, station or account executive is performing.

Radio Mercado has purchased two **Harris Broadcast Oasis 12** digital audio consoles for studios in Sherman Oaks, Calif. The purchase was made through **SCMS**. The organization will use these studios to provide in-store programming to its supermarkets. The purchase and installation were by John Cooper, president of **Rudex Corp.** in Los Angeles.

Separately, **MBC Grand Broadcasting** of Grand Junction, Colo., has purchased four Harris Broadcast NetWave

16-channel digital audio consoles, one of which is shown at right. **MBC** will use the NetWaves on their four FM stations. The purchase and installation was completed by Vala Berry, the market's chief engineer. **SCMS** provided the consoles.

Wheatstone listed recent sales. **Lotus Communications** of Reno, Nev., purchased five IP-12 network consoles, three WheatNet-IP Blades, a LIO-48 high-density logic Blade and an Aura8-IP audio processor Blade through **BSW**. **Central Michigan University** in Mount Pleasant, Mich., purchased two E-2 consoles. **Mississippi Public Broadcast** of Jackson purchased three E-6 consoles, an E-1 console and an IP-12 network console. **Entravision** in



Los Angeles purchased a MADI card and MADI Blade. Washington's **WHUR(FM)** purchased a VP-8IP multi-mode audio processor, and **WVOX(AM)** in New Rochelle, N.Y., purchased

an Aura8-IP audio processor Blade. **Entercom's Greenville, S.C.**, operations replaced mic processors in its facility with M1 mic processors. And its Austin, Texas, cluster purchased an FM-531HD on-air audio processor. **Townsquare Media** of Killeen, Texas, purchased two VP-8IP multimode audio processors. **Wilkins Communications** of Easley, S.C., also bought a VP-8IP multimode audio processor. **Beasley Broadcast** in Las Vegas purchased an M4 four-channel mic processor Blade.

PEOPLENEWS

HHB Communications Ltd. has named Mike Rigby as technical sales support engineer. He previously worked as technical manager at Technical Earth.

CRN International has named **Jim Alkon** as marketing director. He joins CRN following various marketing endeavors. **Robert O'Mara** has been promoted to managing director, strategy and business development, and CRN has added two sales managers who will report to O'Mara.

International Datacasting Corp. has named a new chief financial officer and vice president of products and has restructured the company's global sales force. **Steven Archambault** is IDC's new chief financial officer, and IDC's outgoing CFO, **Rick Clements**, will continue until Jan. 31. IDC's new Vice President of Products **Steeve Huin** joins from Irdeto. **Walter Capitani**, previously vice president of product management, has been named vice president of marketing. **Peter Neuman** is now regional director, Americas. **Berry Eskes** is regional director, EMEA North; **Berend Blokzijl** is regional director, EMEA South; **Doug Pierce** is regional director, Asia-Pacific. **Virginia Lee Williams**, former vice of global sales, has decided to pursue other opportunities. **Doug Lowther** will serve as interim vice president of global sales, in addition to his responsibilities as president and CEO.

Clear Channel Media and Entertainment's national sales division has promoted **Amy Stanek** to vice president/director of sales for Clear Channel Radio Sales. Clear Channel Allentown (Pa.) says **Steven Mills** is now pro-



George Flora **Libia Delucca**

gram director for **WZZO(FM)**, and **Craig Stevens** has been promoted to program director for **WRFY(FM)** and **WRAW(AM)**. **Clear Channel Phoenix** has announced that **George Flora** and **Libia Delucca** have joined the company as general sales managers.

John T. "Jack" Dominic has been named executive director of the **National Voice of America Museum of Broadcasting** in West Chester, Ohio.

Texas Public Radio tapped NPR Chief Administrative Officer **Joyce Slocum** for the position of president and CEO of TPR.

Wink Martindale received a **Hollywood F.A.M.E.** for Lifetime Achievement Producer/Host last month. Martindale got his start in radio, first in small-town Jackson, Tenn., then to Memphis, Tenn. (DJ and TV host) and then "the big time" — the 1960s in Los Angeles.

Alan Blum has been named to the newly-created position of vice president, branded content solutions for **CBS Radio**, and **Jennifer Morelli** has been named vice president of integrated marketing. **CBS Radio Houston** has named **Bruce Logan** as vice president of programming and operations manager for the cluster.

Entercom Seattle's Leslie Scott expands her role to be the market's digital program director.

WORKBENCH

(continued from page 12)

designed to work on standard RJ-45 and EZ-RJ-45 connectors. The boots reduce the chances for broken or damaged connectors and locking tabs, as well as wire stress. The boots are color-coded and can be supplied in a variety of colors such as black, white, red, orange, blue, gray, green, yellow and purple — seen in Fig. 3.

For pricing and information on Platinum Tools and its product line, visit www.platinumtools.com.

Frequent *Workbench* contributor Hal Schardin shared a couple of links on the Pubtech forum, and thought our readers would benefit as well. The links describe a resettable mousetrap, which can be really useful around transmitter sites (and hopefully not needed around the studio).

The beauty of this device is that it uses commonly available parts: a bucket, soft drink can or bottle, a coat hanger and some peanut butter. To borrow a slogan from a famous infomercial, "You set it, and forget it!" Rodents of any type can wreak havoc at a transmitter site. The object of this trap is to offer something better than wire to chew on. Placing this resettable trap outside the building is effective, as described in a YouTube clip you can find by searching "Bucket Mouse and Rat Trap" (posted by user "maryannscupboards").

Slight variations of construction exist. Hal chose the cola can and a coat hanger for wire to suspend the can. He also used two pieces of 3/4-inch PVC pipe to keep the can cen-

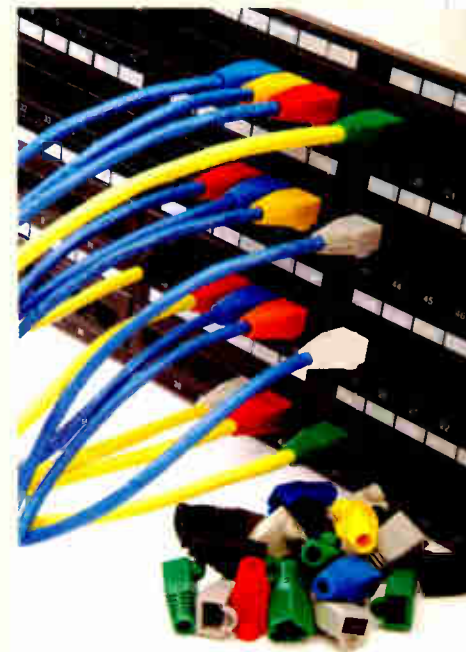


Fig. 3: Colorful RJ-45 boots protect connectors.

tered. This link shows the mousetrap in action: <http://bit.ly/19vtqfh>.

Not, perhaps, the most humane trap, but then neither is a glue trap, and I've seen those traps snare birds. Thanks Hal for helping us keep our sites rodent-free.

Contribute to Workbench. You'll help your fellow engineers and qualify for SBE recertification credit. Again, please send Workbench tips to johnpbisset@gmail.com. Fax to (603) 472-4944.

Author John Bisset has spent 44 years in the broadcasting industry and is still learning. He is SBE certified and is a past recipient of the SBE's Educator of the Year Award.

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Ohm's Formula One

The first formula that engineers learn is still one of the most useful

TECHTIPS

BY JIM WITHERS

In 1827, a German physicist and mathematician published a scientific paper in which he put forth the principle that voltage, current and resistance in an electrical circuit were interrelated. When the value of one changed, he said, the others would change, and in a predictable way.

The paper included a formula that described those interactions. The equation is fundamental to the understanding of the way electrical circuits work. The physicist was Georg Ohm, and his seminal formula is known all over the world.

Ohm's Law says that when resistance in a circuit is unchanged, voltage varies in direct proportion to current. The formula is written as $E=IR$. This simple mathematical statement was an amazing addition to the knowledge of electronics and is one that engineers learn at the beginning of their careers.

More importantly, it led to a whole slew of electrical "laws" and formulas that, together, determine how every piece of equipment broadcasters use is designed and operates.

LIGHTNING IN A BOTTLE

Ohm worked out his law when the knowledge of electrical force itself was not yet 100 years old. The Greeks knew and wrote about "static" electricity a few thousand years before Ohm and even named the electron, which means "amber" in Greek, a common source of static electricity; but it was not until the 1700s that experimenters began to work out the properties of electrical force.

As we learned in grade school, Benjamin Franklin speculated that lightning might in fact be electricity and wrote extensively about the subject in the early part of the 18th century. But it was not until 1752 that he got up enough courage to hoist his kite into a thunderstorm to prove it, by capturing the electrical discharge from a nearby strike in a glass bottle.

The bottle was called a Leyden Jar, named by one of its inventors, Pieter van Musschenbroek, in honor of his hometown of Lieden, Germany. Franklin's experiment, fortuitously performed with a Leyden Jar rather than something that might have been called a Musschenbroek Bottle, is the origin of the saying that having a great idea is like having "lightning in a bottle."

Ohm and others like him, lacking Franklin's sense of adventure, waited for a more controllable and less deadly source of electricity, and were rewarded by the experiments of two Italian scientists: Luigi Galvani and Alessandro Volta (the latter being the namesake of the unit of electric potential; the "volt" in Ohm's formula).

These men found that stacking alternating sheets

of copper and zinc between an acidic solution created a sustainable electrical force. Originally these were called the Galvanic cell and the Voltaic pile. The names of the two devices, sounding a bit sinister perhaps, soon changed to batteries.

As Ohm knew, a wire connected between the two different plates of one of Volta's batteries would cause current to flow. He also found that increasing the length of the wire decreased the current. He had discovered electrical resistance.

The exact relationship between voltage current and resistance was not understood and that is what Ohm worked out.

By the time he got around to it, though, Volta's name had already been tapped as the unit of EMF, or Electromotive Force, another name for electrical potential. That is why voltage is abbreviated with an "E" in electrical formulas.

The unit for current was similarly named for Andre-Marie Ampere, a French scientist, so that only left resistance for Ohm, and that is what he got. The "Ohm" is the standard unit of electrical resistance, and is technically defined as the result obtained when one volt of electrical force causes one ampere of current to flow in a circuit.

Much later Ohm was honored again when the people who name these things (who are those guys?) gathered together to assign an appropriate *Nom de Plume* to the unit of electrical conductance. It being the exact reverse of resistance, they named it that: The Mho. Must have been Opposite Day.

KEEPING IT SIMPLE

The most elegant aspect of Ohm's Law is its simplicity. If two of the variable quantities are known, the formula can be used to find the third. I learned the law using the simple circle shown.

By covering up the unknown parameter, you can immediately see how to use the other two to find the missing one. Covering the voltage term E leaves IR on the bottom of the circle. The value for E is found by multiplying those two variables.

If a circuit has three amperes of current I flowing through 300 ohms of resistance R , the applied voltage E equals 3×300 , or 900 volts. Using the same numbers, if the voltage and current are known, covering up I leaves E over R . Dividing E of 900 volts by R of 300 ohms gives the answer of $I=3$ amperes. And you don't have to be smarter than a fifth grader.

Ohm's Law led to a derivative, which substitutes P for power in the top half of the circle and replaces the R in the circle with the voltage term E . Power is measured in watts, named for James Watt, the Scottish inventor of the first practical steam engine.

iStockphoto/Hulton Archive/Getty Images



Georg Simon Ohm

Watt was not an electrical engineer or scientist, but made such extensive calculations of power — and in the process coined the term "horsepower" — that the unit of electrical power was named after him, again by those mysterious guys who do that sort of thing. In any event, the formula in that iteration works exactly the same as the original.

IN PRACTICE IT'S PERFECT

Both formulas are practical in ways that might not be immediately apparent and can be used to diagnose many problems that broadcast engineers routinely run into. For example, why does a power supply blow a fuse?

If we can assume that the power company has not inadvertently throttled up the grid and sent your

studio 220 volts instead of the normal 110, then according to Ohm's Law, there can be only one reason: The internal resistance of the power supply or its associated circuits has gone down, because the law tells us that when resistance goes down, current goes up.

It follows that if the resistance goes low enough, the current will go high enough to blow the fuse. And here's the thing: it doesn't even have to be a dead short (meaning no resistance at all). Ohm's Law can tell you precisely how low the resistance has to go before the current flow will exceed the rating of the fuse.

Valuable information when something needs fixing fast.

Using the power variation of the formula can help diagnose transmitter problems, or just to confirm normal operation. If you know your transmitter's operating efficiency (either tube-type or solid-state) and the output power is 5,000 watts, you can figure out how much current should be coming from the power supply, provided you know the supply voltage.

If the supply voltage is 50 volts (not uncommon in a solid-state transmitter) and the transmitter efficiency is 90 percent, the power supply current has to be 111 amps, if all is well. The calculation is 5,555 watts (the power needed for the transmitter to make 5,000 watts of RF assuming 90 percent efficiency), divided by 50 volts, which equals 111 amps.

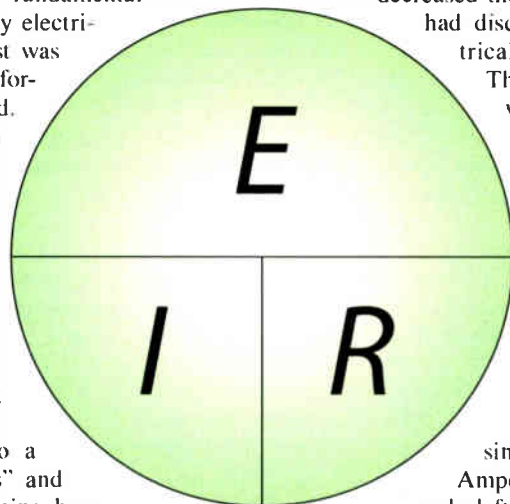
If the power supply current meter is reading significantly higher or lower than that, something is wrong.

Similarly, in a tube-type transmitter, if a current overload relay intermittently trips, Ohm's Law tells us that the resistance of the circuit being protected by the relay has decreased, or the supply voltage has increased. According to Ohm's Law, when current increases there can only be one of two reasons: Either the voltage has increased (entirely possible in a transmitter circuit) or the internal resistance has decreased.

Knowing the formula makes all the difference in diagnosing and finding the problem.

Georg Ohm died in 1854, 48 years before Marconi astounded the world by broadcasting a signal across the Atlantic and setting the stage for the future of radio. But Marconi and all who have followed him would have gotten nowhere without Ohm's Law. It's the true Formula One.

Jim Withers is owner of KYRK(FM) in Corpus Christi, Texas, and a longtime RW contributor. He has four decades of broadcast engineering experience at radio and television stations around the country.



Podcast Success Stories

Three shows that are making it work

BY ELIZA KRIGMAN

When it comes to podcasts — often defined as on-demand audio content — the only limitation is imagination. With relatively low barriers to entry in terms of cost and often production, the podcast is an incubator for creativity and a means of broadening the reach of your audience, or finding one for something new.

Listeners subscribe to podcasts through iTunes and apps like Stitcher. Used by major radio stations and one-man-bands operating out of their garage alike, it's something of an equalizer in terms of a platform to engage with listeners.

Wobegon" meets "The Twilight Zone," is a bi-monthly narrative account of the strange happenings of a small desert town. Or, in the words of writer Joseph Fink, it's a place where all conspiracy theories are true. It's framed as a radio news show but actually produced independently by Fink, co-creator Jeffrey Cranor and the narrator Cecil Baldwin.

Launched in June of 2012, "Night Vale" shot past public radio giant "This American Life" over the summer to become, temporarily, the number one podcast on iTunes. That list tends to fluctuate a lot, but "Night Vale" has gone on to be a consistent fixture in the top 10. Neither Cranor nor Fink claimed



Jasika Nicole and Cecil Baldwin at the 'Night Vale' live show at Largo at the Coronet in Los Angeles in October.

The substance and format of podcasts can vary greatly, from one person talking about serious news to a bevy of characters mulling over inane things like the worst in recent film (for that topic check out "The Flop House").

Radio World caught up with some of the folks behind three different and successful podcasts to talk about what it takes to thrive in this space and the science behind their artistic choices.

The three shows — "Welcome to Night Vale," "Put Your Hands Together" and "Radiolab" — could scarcely be more distinct from one another, but they share some overarching similarities, the most significant of which is that they are novel and niche.

STORYTIME

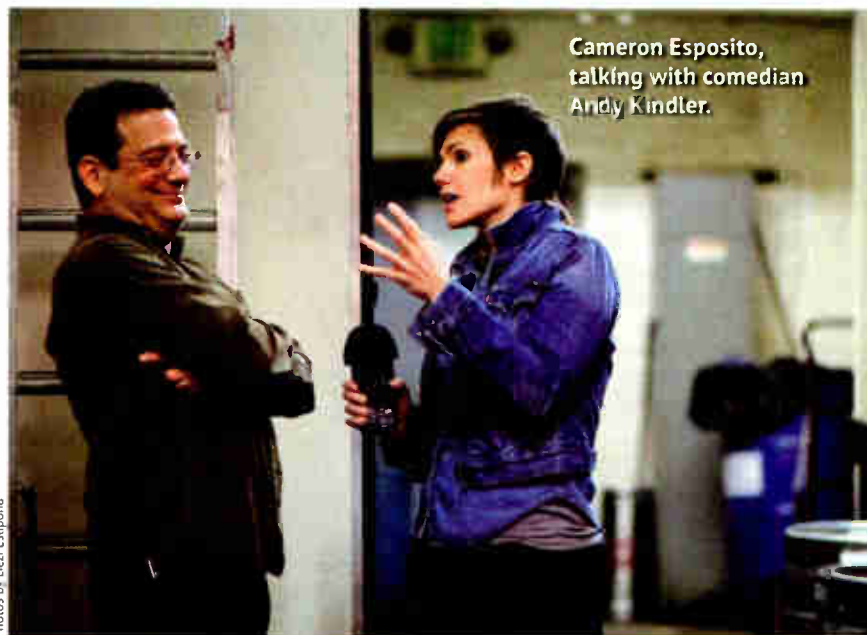
"Welcome to Night Vale," which could be described as a kind of "Lake

to have engineered such an overwhelmingly positive response, but they do think being unique is an important part of it.

It's essential to have "an idea behind it that's specific and new," Fink says. "This is a podcast about X, and everything is about that." Part of that is being a fan first, Fink says. "Listen to a lot of podcasts: see what people are doing."

HA HA POWER

Cameron Esposito, host of the comedy podcast "Put Your Hands Together," wanted to get more bang for her buck with the show she puts on at the Upright Citizens Brigade theater in Los Angeles every Tuesday. So she repurposes it as a podcast. While there is a lot of competition in the comedy podcast space, she believes hers was the first one to distribute a live stand-up routine.



Cameron Esposito, talking with comedian Andy Kindler.

Photos by Lezi Esposito

"The future of standup is more niche-oriented," Esposito said, who refers to her own particular brand as "alternative," meaning that it's less of a "strict set up and punch lines" and more "personal

stories." The podcast has increased her visibility leading to fan support in places like Kansas City, Kan., Esposito says, that might otherwise never heard of her.

(continued on page 25)


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Keep Meetings Short and Sweet

Here's how to keep these gatherings from becoming dreaded 'time sucks'

Managers often spend hundreds of dollars an hour without even realizing what they've done. How do they get away with this? It's simple. They hold a meeting.

Yes, every time a manager conducts a meeting with several people, he or she should consider the investment. Think of it this way: Convert each attendee's salary to their hourly wage for the length of the meeting. Especially when considering higher-paid employees such as department heads, well, you get the picture.

All managers, especially senior ones, would do well to be aware of the total expenditure and be motivated to renovate their meeting style and activity. For example, being better-prepared or finding ways to make meetings more efficient, and therefore shorter, can reap many benefits. During 2014, please consider the investment you are making in meetings and really make every moment count.

HERE'S HOW

Meetings must have a written agenda. This doesn't have to be circulated, nor must the group approve it. The meeting



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Radio World On Your iPad/iPhone



Radio World iPad version sponsored by



leader can even scribble the agenda on a napkin if she likes. It still counts as a written topical plan, the key to preventing a meeting from devolving into tangents and trivia. It's perfectly fine to have attendees add items to this agenda.

Ideally, they should give the meeting leader a heads-up on their addition. It can be acceptable to enter the meeting with an unseen item. However, an attendee adding a time-consuming item to the agenda without prior discussion can result in what one of my peers used to refer to as "time suckage."

Also, the topic an attendee selects may not be appropriate for that specific meeting, or perhaps the management lead would have liked some time to prepare thoughts about the topic prior to discussion.

The start time and maximum length of a meeting must be a solid contract with the constituents. If the leader of a meeting is never late, it's highly likely the attendees will be late. Meetings should rarely run over the prescribed time. They may always be shorter.

More often than not, after the leader of a meeting covers an agenda, he will proceed one-by-one around the table asking others if they have anything they'd like to report or discuss. It should be made perfectly clear that while individuals should do very brief updates, they may also choose not to say a word.

Too often, people feel pressured to say something simply because everyone

PROMO POWER



Mark Lapidus

at the table is contributing to the discussion. This is counterproductive and encourages mundane and often irrelevant topics to emerge.

Managers often exercise wisdom by cancelling regularly scheduled group meetings. This can happen during a very busy time for a station when everyone has so many projects, they don't have enough hours in the day. It can occur when a manager simply doesn't form a substantial agenda that requires an entire group. And here's one that is often missed until the late minute: Too many people are on vacation or simply not open to attend.

Meetings should rarely run over the initially prescribed time. They may always be shorter.

The most effective meetings you'll have with staff are likely one-on-one. Vary the location so that the meeting is not always in your office. Coffee shops are good. Bars can work. Outside on a bench is a nice change of scenery. The location can be mood-altering and enables the person to hear more clearly whatever compliment or correction you are delivering. Some of the most memorable meetings I've had with bosses have been during walks on sunny days.

Do all meetings have to be in person? Absolutely not! It's about time you offered more flexibility in how people join your meetings. Let them Skype in, or try Google+ for multiple on-camera abilities. At the least, allow people to literally phone it in without punishment.

Should meetings have a smartphone rule? Yes. Discuss the "on/off" approach with your group to drive consensus. Some groups will want all phones shut down or at least on vibrate. Others will want permission to check email or voice-mail once every 10 minutes. Feel free to try different approaches and see what works best for your particular group.

Whether it's sales, programming or department head meetings, two things are certain: Everybody has real work to do; and nobody enjoys long meetings.

Mark Lapidus is president of Lapidus Media.

PODCAST

(continued from page 23)

Esposito recently landed her first appearance on a late-night talk show on Craig Ferguson.

IT'S SCIENCE

What started back in 2003 as a segment with Jad Abumrad as a curator of documentaries has morphed into the popular podcast "Radiolab." Today, the show combines dialogue with co-hosts Abumrad and Robert Krulwich with sound as narrative to address deep philosophical questions about science and the human experience. It's produced by WNYC(FM), syndicated on 450 NPR stations and downloaded by some 4 million people every month.

"A lot of production uses voice and



Robert Krulwich, left, and Jad Abumrad are Radiolab co-hosts.

Stephanie Black

Having a diversified presence on the Internet is just as valuable as actually generating revenue.

— Cameron Esposito

reporting but doesn't use sound the way we were interested in," Radiolab producer Ellen Horne said of the concept. "We sort of felt nobody else was doing this." Instead of simply running a 10-second sound clip like others might do, "Radiolab" uses sound in a theatrical way. A story that takes place in a freezing environment might include the

sound of ice cracking, for example.

It's a fine line, though, between artful and gimmicky, Horne cautions. They experimented for a while before developing the format they use today.

The fact that all three shows bring something new to the genre isn't the only thing these podcasts have in common; they also all do, or have done, live

shows in front of an audience, and are consistent in their distribution of the podcast to listeners. The latter, they say, is crucial.

"You have to have something that your audience can predict," Esposito says, they need to know "when it's coming out and what it's going to sound like."

SHOW ME THE MONEY

Podcasts may not be a get-rich-quick scheme, but they can be monetized.

"Radiolab" has sponsors, and "Night Vale" makes some money off of show merchandise. Both also take donations. When it comes to sponsorship, "Night Vale" isn't ruling that out, but is cautious about doing anything that would interrupt their storytelling format. Esposito describes "Put Your Hands Together"

as a passion project, given that it's not making any money at the moment, but maintains that it pays dividends anyways.

"Having a diversified presence on the Internet is just as valuable as actually generating revenue," Esposito said.

It needn't cost much to get in the game. The microphone "Night Vale" uses to record cost \$60 and Liberated Syndication hosts their podcast for only \$20 a month.

As far as the brains behind these three operations are concerned, the future of podcasts is bright.

"It's a great way to hone your skill without a ton of risk," Esposito said. Under the right circumstances, it can be "a sandbox of creativity for your staff," Horne said.

Fink encourages people to consider the podcast as a worthy genre in and of itself.

"At the moment, podcasting is sometimes seen as the step to something rather than the end itself," Fink said. "I think of it as an end in itself; done right, it's an art form."

Eliza Krigman interviewed NPR Vice President & General Manager of Digital Services Robert Kempf in *Radio World's* recent eBook "Streaming for Radio Broadcasters." See radioworld.com/ebooks.

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Compact Mixer Evolution: Mackie DL1608

Are actual faders a thing of the past? Can it all be done from an iPad?

PRODUCT EVALUATION

BY BRETT GILBERT

Compact mixers have been a valuable tool of broadcasters for decades. Early units such as the Shure M series were solid but due to technology limitations lacked features found in studio-based mixers. In the 1990s, Mackie began producing compact mixers giving users more inputs, equalization and auxiliary outputs in a small portable form factor.

As technology has continued to evolve digital mixing, what was at one time only available to those with a large budget has now become affordable. With the proliferation of high-power processors and FPGAs, it is possible to create digital compact mixers with features that were at one time relegated to high-dollar live or studio models.

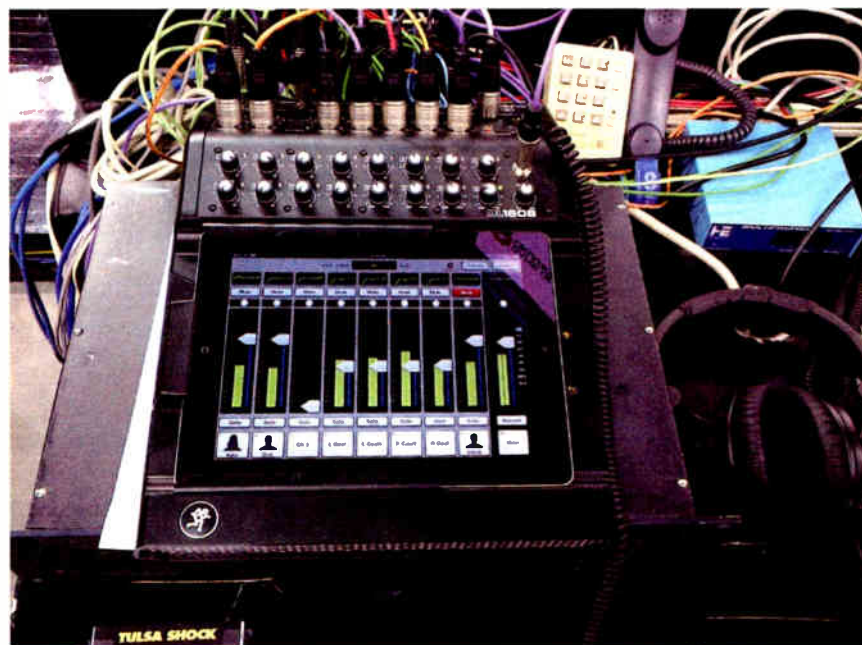
IPAD

Mackie, like several other manufacturers, has made its own foray into the digital compact mixer domain, with the DL1608 and DL806. However, the DL series is unique in that they contain no customary control surface items such as physical faders, switches or meters.

Mackie recognized that many users of digital mixers were not using the physical mixer interface, but instead were using an iPad via Wi-Fi to control their digital mixer remotely.

Mackie chose to design a digital mixer that uses the iPad as the exclusive control surface for the mixer instead of spending money to design and produce a conventional control surface. Production cost is lowered, and the size of the mixer is dramatically smaller. Thanks to the software-based design, both the user interface and mixer can be upgraded and redesigned easily, quickly and without most physical manufacturing considerations.

Since the DL series lacks the typical



The Mackie DL1608 is shown working a WNBA game.

physical controls of a mixer, Mackie has designed into the top an angled iPad docking tray. This comes with a captive bracket to prevent removal of the iPad; and the mixer has a Kensington lock port for securing the mixer in permanent installs. With the iPad placed into the tray the mixer has a similar feel as you would have with a conventional mixer but instead the user is utilizing a touchscreen for control.

When the iPad is docked in the tray, the mixer provides power to charge the iPad, a direct data connection allows control of the mixer without Wi-Fi and the digital audio in and out from the iPad provides the ability to playback and record audio.

Running the show is the Master Fader application, a free app that can be downloaded from the App Store. It can operate with or without the mixer, allowing potential buyers to demo the mixer functions prior to purchasing the mixer.

Despite the lack of typical controls, Mackie has done a good job of reproducing the look and feel of a regular mixer. The default view provides access to eight faders at a time but a quick swipe motion will allow you to scroll through the various faders. The master fader for the active layer is always available on the right side of the screen. There are up to nine layers of faders, L-R, auxiliaries, reverb and delay. At the top of each channel is an EQ image that when tapped takes you to the "fat channel" for the associated fader. From this screen

you can swipe up or down to access the four-band parametric EQ, gate and compressor, reverb and delay options.

There are up to eight outputs from the mixer, depending on the model, the main L-R output and four or six auxiliary outputs. Each output has its own 31-band equalizer and its own dedicated compressor. The auxiliary outputs can be either pre or post but the pre-feed retains the EQ, gate and compressor functions. Mackie is readying v2 of the software, which will provide a pre-DSP option allowing the EQ, gate and compressor to also be bypassed. Also, the auxiliaries can be switched to mono or stereo-linked operation.

The beauty of the DL1608 is it provides great features and numerous inputs for broadcasters in a small interface that can be taken to any stadium or arena. The parametric EQ is great for crowd and effects microphones, the individual channel compressors are great for taming announcers who like to shout during big plays, and the numerous auxiliary outputs give you the capability to have individual headphone feeds, locker room feeds, sideline feeds, etc.

As an example, I use Henry Talent Pods and I can provide each announcer with a custom feed with just what they want to hear. If they want louder effects audio or a continuous feed of the sideline announcer I can provide that in a custom mix. If I had one complaint about the DL series it would be the lack of various L-R outputs. Previous

PRODUCT CAPSULE

MACKIE DL1608
Digital Live Sound Mixer
w/iPad Control

Thumbs Up
+ Compact size
+ Touchscreen
+ DSP tools

Thumbs Down
- Lack of various L-R connections
- Preamps are not recallable
- External power supply

Retail: \$1,249.99

For information, visit www.mackie.com/products/dlseries

Mackie mixers provided XLR, 1/4-inch and RCA outputs, the DL Series only provides one pair of XLR outputs for the L-R mix.

I've found the Mackie DL series to be an easy mixer to operate via the iPad touchscreen interface. Despite the lack of physical faders I have operated up to four faders simultaneously during basketball games to control the court microphones. Additionally, even with the bright arena lighting for TV, I have had no difficulty seeing games, and a nice benefit of the backlit screen is being able to see the controls during blackouts for the pregame festivities. I have also used the mixer at other station events including an artist performance at a local mall where the Wi-Fi freedom allowed me to roam freely during the performance to listen and mix from several locations. Of course, the mixer is also equally suited for live band recording, with plenty of factory presets for various instruments and vocals.

People are impressed when they see the mixer in use because of its compact size and the number of features it has built in. While the amount of equipment I carry to a broadcast hasn't changed, the capabilities of what I can provide have increased significantly. I also get a good laugh when the talent can look down on the screen and see their names and even their picture, if I choose, on the digital scribble strip below their fader.

The DL1608 quickly has replaced my older Mackie VLZ series mixer as my primary mixer for remote broadcasts because it offers so many more features and capabilities in a compact package. The age of digital mixing for sporting and remote broadcasts has arrived and I like it.

Brett Gilbert is director of engineering and IT for Clear Channel Media and Entertainment in Tulsa, Okla.



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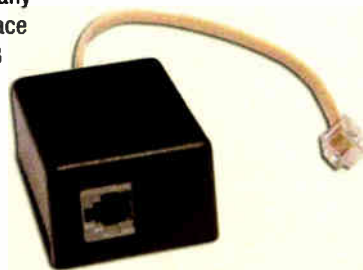
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Looking for a broadcast excerpt of a San Francisco Giant's taped off of KSFO radio from 1959, interviews with Willie Mays, Dusty Rhodes & some play by play excerpts, also features a homerun by Willie Mays and Felipe Alou stealing second base, running time is 18:02, also looking for SF Giants games and/or highlights

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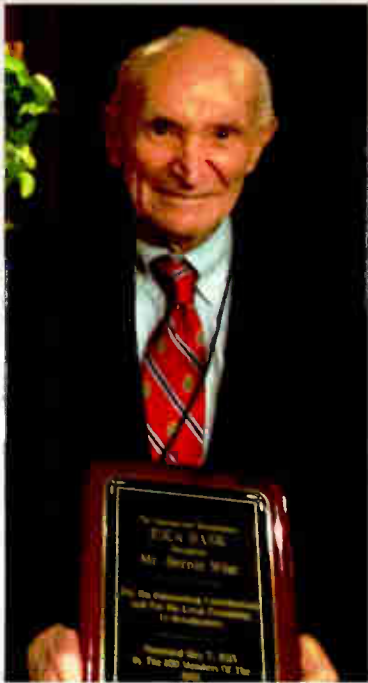
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Radio World Talkback

Comments shown were posted by readers to stories that appear at radioworld.com.

There was an outpouring of respect for the late Bernie Wise and sadness about his death, as reported at radioworld.com in December. Here are some of the comments.



The late Bernie Wise is shown accepting an award last spring from the International Broadcasters Idea Bank for his contributions to the broadcasting industry and his longtime support of the Idea Bank.

"I am very sorry to hear of Bernie's passing. He was a true radio guy and understood the business of transmitter manufacture very well. The Energy-Onix facility is located close to me and I have stopped in there often over the years, sometimes just to chat."

"I am so saddened to hear of the passing of such an intelligent and extremely nice man as Mr. Bernie Wise. It has been my extreme pleasure over the years to call him a true gentleman and friend. He has been so very helpful over the years in troubleshooting difficulties with transmitters utilizing ground-grid tubes, even orphans and those of competitors."

"I'm saddened to hear of Bernie's passing. He was a great intellect and a boon to broadcasting. It was my honor to have known him for more than 25 years and I only wish I'd met him sooner. His wit and dry humor will be missed, as will his presence at the NAB."

"Our organization owns two Energy-Onix tube transmitters. I never met Bernie in person, but spent many hours on the phone with him over the years talking about transmitters. He always wanted to know how every aspect of the transmitter was working and loved to chat to about the industry. He will be missed."

"Bernie was a great guy in his later years and helped me a lot getting into radio sales. A true pioneer in our business, knowing Armstrong personally and setting up UHF televisions frequency layout for the FCC while at RCA. He will be missed."

— on "Bernie Wise Dies, Age 87"

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Digital Is a Hungry Bandwidth Beast

A contract engineer comments on the discussion about possible all-digital AM

COMMENTARY

BY MICHAEL PAYNE

I read with great interest the commentary by Joe D'Angelo of iBiquity Digital Radio ("AM Radio: Where Do We Go From Here?" Sept. 26 issue) regarding HD Radio as a path for AM to evolve. I also read the reader posts to that piece. All interesting.

I have had the privilege to speak with a few people from iBiquity in the past and, even though our points of view differed, the conversations were always cordial. I was offered the same experience from the folks from DRM. These conversations are what make broadcasting fun and exciting, especially from a technical point of view.

Some of the reader comments to this article resembled arguments made about Microsoft's dominance of the computer marketplace. Okay, let's use that analogy to discuss the two major forms of digital broadcasting.

I equate iBiquity vs. DRM to the Microsoft vs. Linux debate. One you pay for the privilege to use, and the

other you get for next to nothing. Yet another analogy is closed source development vs. open source development.

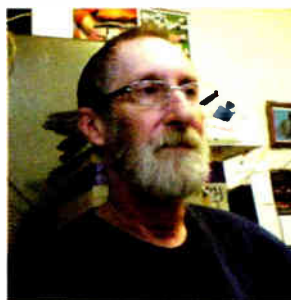
Now, let's talk about some real-world issues. Digital broadcasting is a hungry bandwidth beast. There can be no argument here. I have personally listened to the effects in several markets and it isn't pretty. Digital is not a good neighbor. Get enough digital neighbors, and you wind up in a "radio slum."

Now down to the issue of the medium-wave broadcast band and digital. (We can no longer call it the AM band.) The big questions are: At what power would one be able to run, and will it even work properly with multiple tower arrays that most of us have to run?

PRACTICAL CONCERNS

I have seen the bandwidth proof of the system I take care of and, quite frankly, it stinks. Even AM stereo would sound lousy on this array. These are facts, not pipe dreams or pessimistic ballyhoos.

Let's go a step farther with real-world performance expectations. In my case, I



Michael Payne

have a 5 kW AM (aka medium-wave) and a 100 kW FM that are at the same ground level. After a survey I determined that the two stations covered the same area. (Not a usual situation.) So, other than fidelity and noise, both were equal.

Keeping this in mind, and depending on the allowed digital power, this would equate to either 1 kW or 500 watts for the former 5 kW AM facility. (That would mean huge power savings, by the way.) But then, we have the issue of nighttime power vs. the four-tower array. This could be bad for Gotham City, i.e. 540 watts or 270 watts vs. 2700 watts analog.

Things don't look good for Batman and Robin.

Since we have to cover the same area, let's talk about this for a moment. In the case of DRM, you need a rather significant signal-to-noise ratio to get DRM to decode. The approximate same scenario also applies to IBOC.

If the SNR is not met, the listener hears nothing at all. Instant tune-out occurs, assuming pure digital. Now you have the general manager and station manager on your back after you have spent a lot of money and time to implement the new wave of broadcasting.

SALES CHALLENGE

How to sell the listener on HD Radio is the main focus. Let's be honest. It will take deep pockets and large promotions to get the ball rolling. If it is done right, the returns could be significant indeed, but it is up to the station(s) in question to sell HD Radio. Don't depend on the listener to get excited and go out and pop the money to try your grand experiment.

In this same vein, don't expect the listener to get excited when all you are presenting is lame programming. One has to present a real reason to listen. Give them something to talk about, brag about.

It is a huge investment that will take time to pay off. The upside is that there is so much young talent out there; this should not even be an issue. Get these young people excited.

Will the medium-wave band survive? No one knows for sure, although Europe is sure it is completely dead and worthless. I don't subscribe to that thinking at all. There is a lot we can do and should do.

We are truly blessed to have Commissioner Pai as our advocate. Give him a good reason to be just that.

Mike Payne is a contract engineer with Townsquare Media, Western Division in Twin Falls, Idaho.

READER'S FORUM

DON'T TOUCH THAT DIAL

Regarding "All-Digital Testing Expands" (Radio World, Dec. 4), we have satellite radio, AM and FM broadcast and, in some areas, Internet radio. The public is tired of the relentless commercials and are rapidly changing over to MP3s hooked to the vehicle radio. To force the AM band, mostly talk radio, to go digital is just a joke. AM has seen a resurgence from what was a dead mode due to the rapid proliferation of talk and sports radio. Leave it alone!

Glenn Scott
Owner
DSM Labs
Laurens, S.C.

A NICE RADIO

I recommend the Sangean WFR-28 ("Gift-Ready Radios for Holiday Season," Nov. 20). It's easy to set up and connect to your home WiFi and also has FM. It is portable with battery operation and internal speaker, but you can also plug it into AC and connect a line output to your home stereo system. It comes with a large list of stations pre-loaded, but you can also add additional stations through a personal web site. Sells for about \$125.

John Schneider
Radio Historian
Quincy, Ill.

John Schneider is a frequent contributor to Radio World. He writes the "Roots of Radio" column.

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