NEGATIVE TOWER | PUBLIC FILES | NEW PRODUCTS AND CONFERENCE PREVIEW ›

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IP's a Ten Gallon Hat

It's been said that radio is made up of the same eight people wearing different hats. That could explain a lot about Marc Hill, who has worn the music director hat, the talent hat, and the technology hat in his 30-plus years in broadcasting. More than 20 of those years have been spent acting as the IT Manager for what is now iHeartMedia in West Michigan.

We got to know Marc while working with him on a new Wheatstone WheatNet-IP networked facility for the seven-station cluster. He said he "wandered" into IT in the late '90s when he unwittingly volunteered to install the Prophet/Wizard automation system. He worked the overnight shift at the time, and eventually traded in his talent hat for IT - a ten-gallon hat that now includes streaming, mobile, and, more recently, IP audio networking. He still laments that he gave up his talent gig before he could try out the new automation. "That was kind of unfair because I never even got to use it. I came off the air overnights to install it so someone else could use it," he says.

Read the rest of the story: INN32.wheatstone.com

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For more IP Audio News: INN32.wheatstone.com

Taking The Aura8-IP Beyond Broadcasting

By Scott Johnson

When you think of Wheatstone processing, you naturally think of broadcasting. But if an audio engineer tucked an Aura8-IP under his arm and left the station, would he find other uses for it? The answer, I found out recently, is a resounding yes!

Wheatstone processing gear has myriad applications in the broadcast world. There's almost no corner of a radio facility where a Wheatstone processor can't be of assistance. But we rarely think of what we might be able to do with, say, an Aura8-IP outside the station's doors. I did wonder. There's a big, wide world of audio out there, waiting to be tamed.

Read the rest of the story: INN32.wheatstone.com

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Etta Foto courtesy of Skb Architects

KEXP features a radio studio, recording studio, live room, TV master control room, live performance venue, audio editing bays, video editing bays and two audio mastering suites.

FEATURES

COLUMNS

DEPARTMENTS

On the cover: KEXP's on-air studio incorporates a primary DJ position, a TurnTable DJ position and a Wheatstone LX24 console. Every screen is individually assignable through an HDMI Switch.

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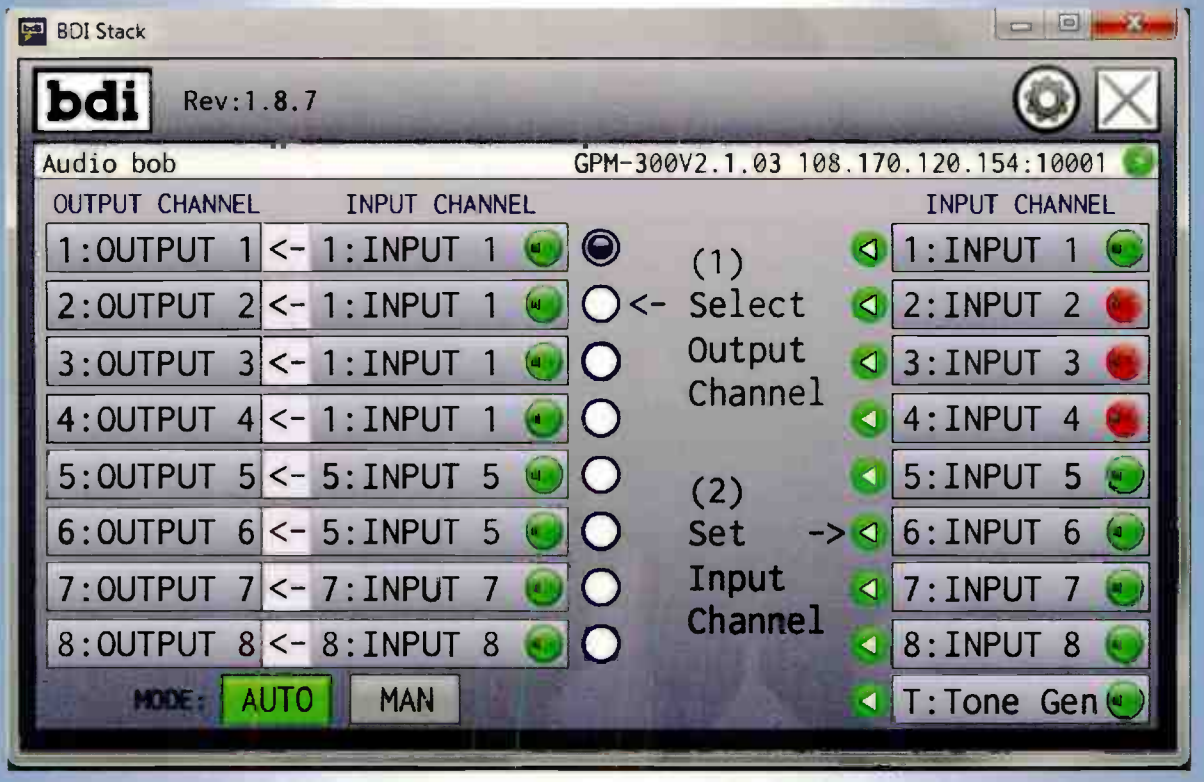

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VIEWPOINT

Spring Fever

Even if you're reading this in mid-March, you still have time to put together a plan to go to the spring NAB Show. I know some readers probably need a certain amount of convincing, so this month we've included a short primer on how to go to and then enjoy the convention, in addition to a preview of some products you'll see on the exhibit floor. If you haven't been, you really need to head to Las Vegas.

The spring show takes center stage here, but there are plenty of good reads on other subjects in this issue.

Seattle's KEXP recently finished a fantastic new facility build, and we're covering it for you in great detail this month. As cliché as it may sound, I really believe this is the facility of the future.

Jeremy Ruck returns with an article on maintenance of AM antenna systems — this time around, he considers the directional antenna.

Lee Petro explains the particulars of recent rule changes pertaining to public files; and, we have an article on using AoIP codecs, not for remotes, but for nailed up, permanent connections (ready for an all-AoIP STL yet?).

Is the transmitter site a place you want to escape from, or is it your sanctuary? The Wandering Engineer discusses the nuances of the two site types you will encounter. Sign Off may be in the back, but feel free to read it first.

I hope to see you at the NAB Show. Say "hi" if you see me on the floor!

Doug Irwin, CPBE AMD DRB | Technical Editor

Radio
THE RADIO TECHNOLOGY LEADER

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Radio Hall Map & Booth Listings

Radio March Issue Advertiser

Booth information provided by the NAB, current as of February 12, 2016.

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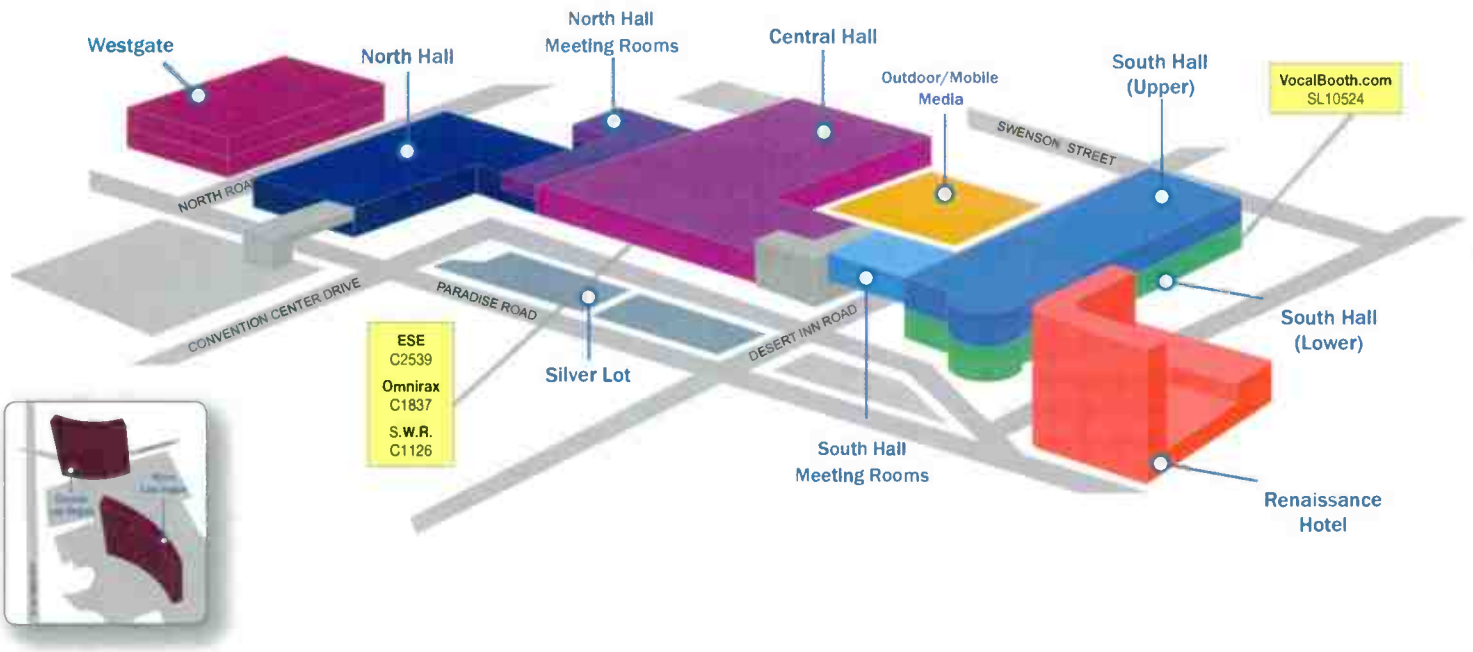
Las Vegas Convention Center Overview



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The Much-Maligned Negative Tower and Other AM Challenges

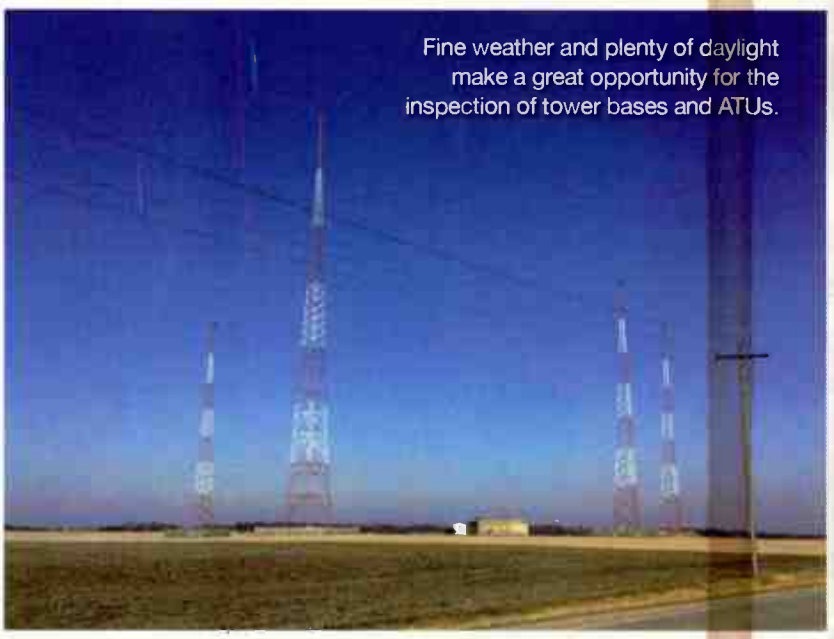
by Jeremy Ruck, PE

A few months back, we discussed AM antenna systems as living and breathing entities. At that time, we looked at establishing a maintenance program for them. With the recent increased interest in AM, due to the revitali[illegible]on orders, it seems fitting to consider some of these items.

This month, we will consider several AM topics. Some are theoretical, while others may be more immediately practical.

The existence of a negative tower in an array is one condition that seems to strike fear into the hearts of many station engineers.

So maligned are negative towers that they have become known as the bane of all things AM. They either are blamed for anything that goes wrong with an array, or are spoken of the way disagreeable neighbors are discussed. Admit it: You have made similar comments.



Fine weather and plenty of daylight make a great opportunity for the inspection of tower bases and ATUs.

The reality is that a negative tower can sometimes be a problem, but is not always so.

This phenomenon arises in a directional antenna system when the array is active. Each element, or tower, in the array has a self-impedance. This is the impedance of the tower by itself when the other towers are appropriately detuned from the array. When the array is active, however, the self-impedance of the towers changes as a result of the interaction between the array elements. Some configurations result in a situation where the resistance component of the impedance is less than zero. The result is this particular element delivers power back into the phasor, instead of the phasor delivering power to it.

A negative tower can be problematic when the value of the drive point resistance is close to zero ohms. In reality, towers with a near zero positive impedance are also problematic, as environmental or other factors can cause wandering of this value back and forth about zero. Such swings result in array instability, which manifests itself with parameters, including monitor points, frequently being found to be out of tolerance.

Many of the negative tower problems in old arrays have been reworked over the years. Their original existence, in some cases, is owed to lack of computing power, while in others, negative towers are a consequence of certain array geometries, and are not so easily eliminated.

Even in the simplest of array geometries, the in-line design, negative

towers pop up frequently when the nulls are set forward of 90 degrees off of the tower line. To put it another way, consider a directional antenna comprised of three 90 degree towers with 90 degree array spacing oriented along an azimuth of zero degrees. If the array is designed such that the major lobe is at zero degrees, and the nulls are north of due east and west, then frequently, one of the towers in the array will be negative.

Over time, many arrays with these problems, and others, have been redesigned or reconfigured to reduce these, and other issues such as bandwidth. Old arrays with such problems may pose a special challenge, especially at night when the newer stations are accepting interference. The proposed changes in the AM protection rules may allow for the possibility of reconfiguring problematic arrays, especially for daytime operation.

Tower bases should always be surrounded by well-maintained fences, and completely free of weeds, even with a skirted array.

VERIFICATION OF EFFICIENCY

We are all familiar with checking monitor points to examine the condition of an array. Monitor points, though, are not really there for the benefit of the station licensee. Rather, they exist for the *other guys* on the frequency.

One of the stations owned by a group I represent has a monitor point on the tip of their major lobe during nighttime operation. This is a somewhat unusual situation, as monitor points are typically found either in, or very close to, a null. Because of their usual locations in a low signal region, it is usually assumed all is good with the pattern if the monitor points are well below their limits. That is not always the case, except for the other guy, because lower monitor point values imply a decrease in received interference. Other than cases like the station belonging to my client, monitor point values generally do not tell you what is happening in the major lobe, which directly affects your coverage. I have generally agreed with the streamlining of the requirements for a partial proof of performance.

Monitor points are not really there for the benefit of the station licensee. Rather, they exist for the other guys on the frequency.

Indeed, the current AM revitalization order proposes further reductions in the requirements. The current rules require measurements on the monitor point radials. If the pattern has fewer than four monitored radials, then adjacent radials are to be considered. Under the current proposal, the adjacent radials would be eliminated, and only the monitored radials considered.

The problem with the current and proposed rules regarding partial proofs is they are geared towards the other guy once again. By looking only at the monitor point radials, which are generally in the nulls, the radiation in the tips of the lobes may tend to be ignored. A significant reduction in the field strength in the lobe locations as compared to the previous full proof may be indicative of an efficiency problem with the array, which could significantly affect coverage. Unfortunately, by not

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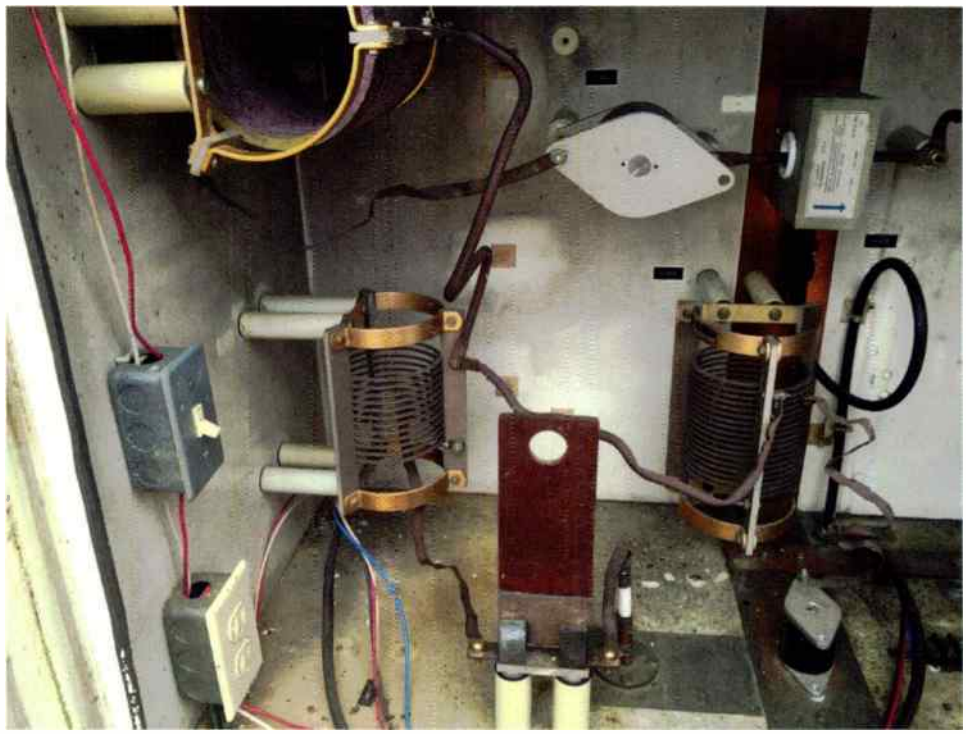
requiring measurement of the main lobe radials, such a problem may lie unseen for a long time, which we will consider shortly.

To verify efficiency issues, several measurements should be performed in both the directional and non-directional modes. Half-a-dozen points are usually more than adequate to establish a trend. These measurements should be performed at known locations from the last proof, and the ratio between the DA and ND values computed. If the ratios are similar to those in the last full proof, then the observed problem of low field strength may be a conductivity change. An oscillation in the ratios is a good indication of re-radiation, which may also be seen by field strength peaks off bearing. Finally, if the DA to ND ratios are similar, but higher than at the last full proof, the radial looks to be hot, and the pattern is probably out of adjustment. If the converse is noted, then an efficiency issue should be considered.

Sometimes a change in the efficiency can be identified by a change in the base current values. The base current ratios, which are determined by dividing the base current at each tower by the base current of the highest current tower, will generally remain close to the licensed value if the pattern is correctly adjusted. A swing in the actual base current values, while maintaining the ratio, may be an indication of an issue with the antenna



As ATUs get older, components age and become corroded; connections can loosen from daily heating/cooling cycles. Keep connections tight, and dirt out, to the extent possible.

ground. A change in the currents is indicative of a change in the drive point impedance, which is impacted by not only the coupling between towers, but also the impedance of the tower by itself. Variations in the latter tend to arise from changes to the ground system.

Although less common today, an impedance shift in a particular tower could also be the result of the joints between the sections. All AM radiators should have the flanges between tower sections welded on at least two legs to ensure a solid connection. Sometimes this requirement was ignored, with the problems not developing until many years later after corrosion had started to set in on the connection hardware. A sudden shift

in impedance on a tower that is known to have welded sections may indicate a crack in welds, which could be as simple as a defective weld, or more sinisterly a structural integrity problem.

COMPONENT FAILURES

Several months back when we discussed capacitors, the recommendation was made to check capacitors at the very minimum with an LCR meter, and more preferably through an RF bridge. Interestingly enough, this very issue recently reared its head in a DA-2 array. One pattern was found to present a very high reflected power to the transmitter. Upon a visual inspection, a failed mica capacitor was found, and replaced. This returned the pattern to operational parameters close to the licensed values. The problem was that the high reflected power condition remained.

Based on these symptoms it would be expected that a component failure occurred in the common point trim circuit, or a sufficient number of components failed together to bring the phase monitor parameters to the licensed values, yet throw off the input impedance. Obviously, the former situation is the more plausible, and indeed that is exactly what happened. The mica capacitor in the shunt leg of the input network failed, however, to a simple capacitor checker, it presented the proper capacitance. When measured using both an RF bridge and a specialized AM network analyzer, the impedance of the capacitor was found to have a resistance component in excess of 60 ohms. Clearly, that is an undesirable condition for a part designed to provide an almost pure reactance.

One very basic method for checking the component integrity in an array is through heat. Components in an array may be warm to the touch, but any component that is hot to the touch is definitely suspect. It is understood that when testing via touching, the transmitter must be turned off and locked out. Only then should you carefully reach into a cabinet to check. Touching the components can be avoided if an infrared thermometer or thermal imager is available for use.

Finally, it is important to remember that while antenna systems do occasionally require a touch-up on the tuning, they tend follow a version of Newton's First Law of Motion: Unless some force acts on the antenna system, it will remain in its current state. Reversing that force to bring it back to the desired state is the goal. Avoid applying other forces through blind adjustments, which will most certainly shove things into a different state.

Ruck is the principal engineer of Jeremy Ruck and Associates, Canton, Ill.

Online Radio Public Files and Ownership Reporting Changes

by Lee G. Petro

Immediately before Washington, D.C., was shut down by a snow storm, the Federal Communications Commission experienced a clipper system of its own by making several regulatory changes for broadcast stations. At its January 2016 meeting, the FCC adopted a schedule for radio stations to move to an online public file system and also adopted changes to its broadcast ownership rules.

First, the FCC adopted a two-stage transition for all broadcast stations to maintain their public inspection files on the FCC's cloud-based system. Television stations initiated this process in 2012, first in the larger markets, and then for stations outside the top market. Now, radio stations in the top 50 markets, with five or more full-time employees, will need to begin posting new materials into their public files upon the effective date of the new rules.

COMPLIANCE

Commercial stations outside the top 50 markets, all noncommercial radio stations, and those stations in the top 50 markets with less than five full-time employees, will need to come into compliance with the new rules by March 1, 2018. This group of stations may elect to migrate to the online public file before the March 2018 deadline, but they must notify the FCC of this decision, certify that their transition is complete, and the FCC made clear that these early adopters will not be able to rely on their paper copy of the public inspection file to demonstrate compliance with the rules.

Stations required to comply with the 2016 transition date will not be required to immediately upload materials that are currently in their public files. Instead, these stations will have an additional 60 days after the effective date to post earlier-prepared information. For example, if the new rules become effective July 1, the affected stations will need to post online their second-quarter 2016 issue and programs list by July 10, but will have an additional 60 days to upload the earlier-prepared lists.

Further, while the FCC has indicated that applications and ownership reports filed in CDBS will automatically migrate to the online system, it warned licensees to double-check their files and upload any missing information.

The FCC took note of the ongoing election season and provided relief to broadcasters that must transition in 2016. Specifically, the FCC stated that the first-wave of transitioning licensees will only be required to upload information required to be kept in the political file on an ongoing basis, i.e., these stations do not need to upload political file information already placed in their file.

OWNERSHIP REPORTS

The FCC also made several changes to its rules relating to the preparation and filing of ownership reports. First, the FCC took note of the short period of time between the date on which the ownership information must be accurate, i.e., Oct. 1, and the past deadline of Nov. 1.

In the last two reporting cycles, the FCC had pushed back the deadline to Dec. 1, and the FCC revised its rules to make this change permanent.

Next, the FCC established Dec. 1 as the deadline for noncommercial broadcast stations must file their ownership reports as well, and the new form will require the submission of demographic information

similar to that in the commercial broadcast ownership report.

Most significantly, the FCC attempted to resolve an ongoing problem with individuals obtaining FCC registration numbers. Every individual listed on an ownership report must have an FRN, and to obtain an FRN, individuals are required to provide the FCC with their complete social security number. In response to privacy concerns, the FCC created an alternative to providing this information, whereby individuals could obtain a "special use" FRN without providing their social security number. Difficulties arose from the use of SUFRNs because it was possible to have multiple SUFRNs, which prevented the FCC from completing its studies relating to the diversity of media ownership.

In response to these issues, the FCC created a new class of FRNs, the "restricted use" FRN. To obtain a RUFRN, the individual will be required to provide its full name, residential address, date of birth and the last four digits of its social security number. The individual will also be required to provide any previously obtained SUFRNs. While SUFRNs will still be available, the FCC will require documentation of the good-faith attempt to obtain a RUFRN, and the FCC held out the chance that it will seek enforcement action against these parties.

Petro is of counsel at Drinker Biddle & Reath LLP.
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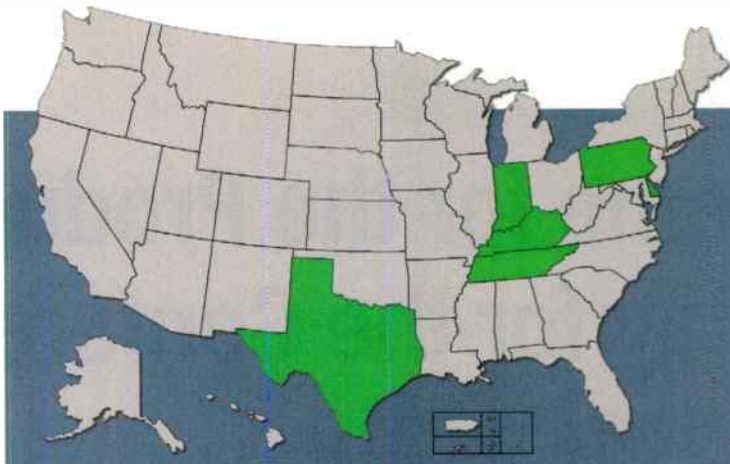


DEADLINES

April 1, 2016 — Broadcast Mid-Term Reports due for radio stations with 11 or more employees in Indiana, Kentucky and Tennessee.

April 1, 2016 — Annual EEO Public File Reports placed in stations' public inspection files in Delaware, Indiana, Kentucky, Pennsylvania, Tennessee and Texas.

NABSHOW
Where Content Comes to Life

SHOWPREVIEW

Come for the Products, Stay for the Conference

by Doug Irwin, CPBE DRB AMD

It's the middle of March, and the 2016 NAB Show is about a month away. Have you made your plans?

If you answered in the affirmative, I hope to see you there. If you don't have any plans to attend… well, why not?

Let me try to explain just why attendance at the NAB Show is one of the most important choices you can make to further your career.

THE FLOOR

The 2016 Radio Hall is highlighted in the insert found in this issue. This is also where you can find both a map and a list of radio and broadcast company booths, and naturally there will be some that are "must see."

For any first timers reading this, note that in order to even get on the exhibit floor, you at least need either an Exhibits or Guest Pass. These can often be acquired via codes from one manufacturers or broadcast sales organization exhibiting at the show. Obtain an exhibits-only pass courtesy of Radio magazine by entering code LV9443 during registration.

Once through the door into the exhibit hall, what then? You'll find that the major players will have signage to get your attention almost immediately. When at their booths:

- Take a leisurely look at products you are interested in.
- Perhaps more importantly, see what else is new and whatever else catches your fancy.
- Exchange cards with sales people. Let them know who you are.

It's always very important to build in some time for meandering around the floor and seeing what catches your attention.

Depending upon the amount of time you have allotted for the trip, prioritize the booths that you want to see before heading over to the convention center.

My recommendation is that you see them as early in the show as you can; exhibitors, like the rest of us, get tired as the show goes on, and may not seem quite as enthusiastic on Thursday as they do on Monday morning.

It's always very important to build in some time for meandering around the floor and seeing what catches your attention. You'd be surprised what you can learn and what ideas you can pick up in casual conversation.

Likely you will learn two things: First, well known manufacturers might make some products of which you weren't aware previously. But my favorite part is discovering manufacturers of which I had never heard and which are making cool stuff that I had no idea existed.

Keep an open mind. Let an exhibitor try to convince you that his or her product is better than what you've been using. Ask questions — test their knowledge. You will also come to realize just what you know, and don't know, about certain items.

When the show is over, take these ideas home with you — and hopefully put them into practice. Hopefully it makes the radio station a better place. And guess who gets the credit then? You do.

Exhibitors are handing out ideas for free — they want you to have them.

BEC SESSIONS

As I look at the Broadcast Engineering Conference's list of sessions, I feel like a kid in a candy store. Where to start? Again, this

is where planning comes in; you'll need to squeeze in sessions between your booth visits. (You can take the opposite stance, squeezing booth visits in between sessions, depending on your priorities this year.)

I almost hate to use this phrase but I'll do it this time: You can "geek out" to your heart's content, learning about any topic in which you are really interested.

For example, I've earmarked "Multiple Input, Multiple Output RF Systems for Electronic News Gathering," as well as "Extending IP Audio to the Transmitter Using Part 101 or Unlicensed IP Radios," two particular topics I happen to be interested in.

I invite you to look at the full list, which is available online at *www.nabshow.com/attend/broadcast-engineering-conference*, to see whatever piques your interest.

Now, unlike complimentary Guest Passes that can get you on the show floor, the sessions aren't free. Registration package pricing varies by type and is subject to change. Student discounts are available. Check out *http://www.nabshow.com/attend/registration-packages* for registration details and cost specifics.

OTHER THINGS TO DO

There are several reasons the spring show has been in Las Vegas for over two decades.

First, the show is huge, and Las Vegas can accommodate it. That's obvious.

But if you haven't been to Las Vegas, you might be surprised by how much fun it can be. It's a great place for entertainment, and perhaps more importantly, food.

And with proper planning, you might just be able to bring your "better half" along. I can think of no better way to add fun to on-the-job training than by making the trek to Las Vegas for the NAB Show.

DISPENSE WITH THE EXCUSES

Sure — you're convinced that attending the show would be great. However, for any number of the reasons I'm about to list, you can't go. Let's see if we can shoot them down.

The trip to Las Vegas is too expensive. In order to get the most for your money on a trip to Las Vegas it is necessary that you plan it out well in advance. When the convention is in town, lodging costs naturally more. My advice is to arrange your hotel as early as possible. You can cancel if your plans change, up to a certain number of days ahead of the show. Cancellation policies vary by hotel.

I recommend you stay in a hotel that is located directly on the monorail. Don't expect to rely on cabs, which are very expensive. There are other hotels that are within walking distance of the convention center, and not on the monorail — but I strongly suggest you look at Google Maps to see just how far you would need to walk. A "block" in Las Vegas can be very long — especially with the sun beating

©NAB 2015; Photo by John Staley

down on you, as it often does, even in April. If you aren't flying, make sure that parking is included in your daily hotel rate. If not, expect to be paying on the order of another $25 per night for the privilege of parking.

Airfare will always get more expensive as your travel dates get closer, so buy your airfare as early as you can. Fortunately quite a few different carriers go there.

The trip probably won't be described as "cheap" no matter what you do, but consider it as an investment in money and time that will benefit your career.

I can't find anyone to cover my station(s) while I'm gone. This is a real problem, of course, for many radio engineers, but the situation isn't any different than the times you took vacation or otherwise had to be out of town for a while.

Anyone established in a market will know other engineers in the same area, and likely an arrangement can be made to have that person cover for you. If he or she also goes to the show, see if you can go in alternate years — you cover for them one year, and they for you the next.

You will be in Las Vegas on business; make sure you have your phone, laptop and remote access all ready to go so that if you need to solve a problem remotely, you can do so with a minimum of stress.

So there you have it: a short primer on attending the NAB Show.

NAB SHOW
Where Content Comes to Life

NEW PRODUCTS SAMPLER

More coverage in future issues.

ASI5810 and ASI5811 | AudioScience

Audio card specialist AudioScience has two new cards available, the ASI5810 and ASI5811. Both are 192 kHz-capable half-height PCI Express cards.

The ASI5810 provides one stereo analog and digital input, one stereo analog and digital output, two record streams and four play streams. Audio formats include 8-, 16- and 32-bit PCM. The GPIO features consist of four opto-isolated inputs and two relay isolated outputs.

The ASI5811 adds a low-noise microphone preamp with a software-adjustable gain.

Both analog and AES/EBU interfaces are standard on the ASI581x cards. AudioScience says that the analog interface is balanced and uses 24-bit oversampling converters to deliver more than 100 dB of dynamic range with THD+N better than 0.002 percent at sample rates from 32 kHz to 192 kHz. In addition, the AES/EBU input features a hardware-based sample rate converter with a range of 32 to 192 kHz.

The ASI5811's balanced microphone input is designed to work with professional studio microphones requiring 48 V phantom power. Gain is adjustable from 20 dB to 60 dB. Processing effects for the ASI5811's 32-bit floating point DSP include a compressor/limiter/expander, and a three-band parametric equalizer.

Each has SoundGuard technology to prevent damage from lightning strikes and voltage surges.

The cards are Windows 7-, 10- and Server-compatible, along with Linux-compatible. Both are compatible with AudioScience's Multi-Rate Mixing technology for playback, recording and mixing. They will ship with XLR breakout cables.

http://www.audioscience.com/

Folded monopole 50 kW antenna system | Ampegon

Ampegon says its new folded monopole 50 kW antenna system features a "new design concept and optimized antenna structure."

Fully grounded and not requiring a base insulator for antenna placement, the new system streamlines antenna setup, explains Ampegon, simplifying maintenance of components and auxiliary systems.

Constructed as a single unit, the folded monopole antenna comprises a mast and a radiating element. The guy ropes supporting the mast are each divided by a single insulator. The upper section forms the "antenna cage," which is connected to the mast on one side, and by ropes to the insulated feed point at the base of the antenna.

As a result, says Ampegon, all parts of the steel structure and ropes are fully grounded, which eliminates the risk of "floating" and means there is no electrostatic discharge or flashover.

A minimum number of advanced insulators (featuring silicon protection and able to handle extreme environmental conditions) are installed, thus maintenance requirements are simplified and minimized, says the firm.

http://www.ampegon.com/

iLoud Micro Monitor | IK Multimedia

IK Multimedia will bring a small powered monitor, the iLoud Micro Monitor.

The two-way monitors are biamplified by a pair of Class D amps. The bass is handled by a three-inch woofer, and a 3/4-inch tweeter handles the high notes. There is a simple –3 dB EQ system along with a volume control. The units operate in a master-slave relationship, not untypical of desktop monitors. Inputs include RCA, 1/8-inch and Bluetooth wireless.

Frequency response is listed as 45 Hz–20 kHz (with EQ).

http://www.ikmultimedia.com/

Automation Control Interface | Wheatstone

Wheatstone has announced that its control protocol Automation Control Interface is now compatible with DaySequerra's M4.2 TimeLock HD Radio receiver/processor.

ACI is resident in Wheatstone processors and allows for the control of third-party equipment. DaySequerra's M4.2 TimeLock is a receiver/processor designed to eliminate FM-HD Radio time alignment errors by measuring such errors and sending compensation information back to an on-air processor.

A firmware upgrade with the DaySequerra hardware will provide the needed compatibility.

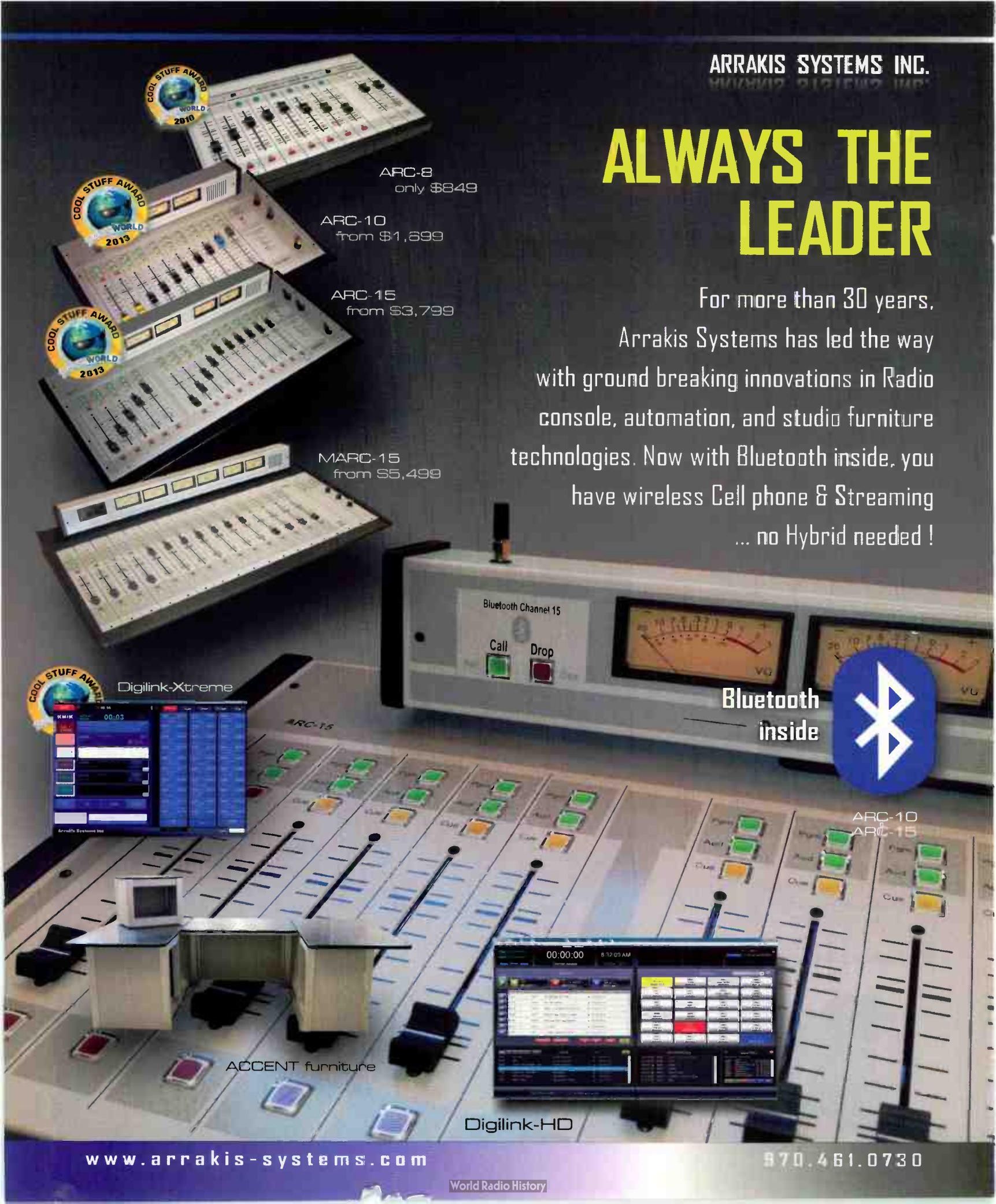
http://wheatstone.com/

K series headphones | AKG

AKG has a new group of "K" headphones available — K52, K72 (shown) and K92. These are aimed at the "affordable" market of working audio professionals.

All models have 40 mm drivers and a closed-back design. AKG says, "The closed-back design features an innovative acoustic chamber, which eliminates audio bleed and preserves privacy, keeping the sound in the ears of even the most mobile listener." Other features include replaceable earpads, a 3-meter cable and a 1/4-inch plug adapter. According to AKG specs are: K52 — 18 Hz–20 kHz; K72 — 16 Hz–20 kHz; and K92 — 16 Hz–22 kHz.

http://www.akg.com/



NEW...

ARRAKIS SYSTEMS INC.

ARC-8 Blue

Bluetooth, wireless, Cell phone interface & Stereo streaming

NO Hybrid required

long life switches,
conductive plastic faders,
Socketed ICs for fast on site repair.

- Eight channels
- Stereo Program output
- 2 mic, 4 stereo line, PC, & Phone in
- USB interface for play and record from a PC
- Mix minus in-out for an external Telephone hybrid
- BOTH balanced and unbalanced inputs and output for flexibility

The BEST of both analog and digital. With the NEW Bluetooth built in, the ARC-8 features a wireless Cell phone interface for telephone talk shows and wireless audio streaming from any Bluetooth device such as an MP3 player. The ARC-8 Blue also features a built in USB sound card to play and record in digital directly from both Windows & Apple *PCs. With BOTH balanced and unbalanced inputs and outputs, the ARC-8 works out of the box in any Radio application.

Fast, easy installation:
- RCAs for unbalanced IO,
- Cat5s for balanced inputs,
- XLRs for mics & Program output

Bluetooth enabled !!! The #1 selling ARC-8 advanced Radio console has gone 'Blue'... Bluetooth enabled that is! This means that Channel seven on the console can be paired to any Bluetooth enabled audio device such as your Cell phone, MP3 player, MP3 recorder-editor, and more. Just pair your cell phone to the ARC-8 and answer your incoming calls with the 'Call' button and drop them with the 'Drop' button, just like a standard phone hybrid. The Caller receives the console bus mix ('minus' the caller audio) so there is no feedback. OR... you can pair any Bluetooth enabled audio device such as an Ipad, Tablet device, or MP3 player and stream full bandwidth, high quality stereo (A2DP) audio to channel seven on the console. If a paired Cell phone call comes in, then the stereo stream is dropped and the call can be answered. While an external hybrid is not needed, Arrakis does all of this while still allowing an external phone hybrid to be connected if desired. Your imagination is the only limit with this amazing console !!!

list price **$1,099**

*USB sound card supports USB HID compatible PCs

www.arrakis-systems.com 970.461.0730

Media Assist | NETIA

Netia will offer a new update to its Media Assist software suite at the upcoming NAB Show. The software suite combines Netia's audio automation and video management products with an optimized search engine for a multimedia asset management system that enables users to capture, record, monitor, index and search audio or video assets.

Netia has added a new feature to the Media Assist system that will be displayed at the show, an on-demand media logging tool. The new feature is for users who need to simultaneously capture and review numerous audio and video feeds, allowing for real-time recording and monitoring locally through the platform or from anywhere via the software's web-based interface.

The software provider will also have its AirPlayList 2.0 module for the Media Assist software suite available for demonstration. Fully integrated into the Media Assist suite, the system can automate playout of multiple radio channels simultaneously.

http://www.netia.com/

Firmware updates | Comrex

Codec specialist Comrex has announced that it has upgraded the firmware for its Access, BRIC-Link II, LiveShot codecs and STAC VIP phone system.

The new version, 4.0, adds CrossLink, has "a new reliability layer that greatly enhances stability on challenging networks. While CrossLock provides higher reliability on single-network usage, it also allows the use of multiple networks simultaneously on Access, in either a 'Bonding' or 'Redundancy' mode."

The company also says, "Additionally, forward error correction and other Access reliability tools are included with the firmware. Firmware 4.0p3 is only available for Access at the moment, but will soon be made available for BRIC-Link II."

http://www.comrex.com/

525N Modulation Monitor | Inovonics

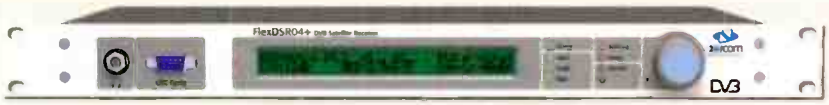
The 525N is an off-air AM mod-monitor that features an IP-networking interface. The system can function remotely via a PC, tablet or smartphone. It also features programmable alarms that are dispatched through email or text notifications to selected personnel.

The company also plans to showcase its 531N FM modulation analyzer with network interface. The unit includes features necessary for station setup, regulatory compliance and remote FM signal monitoring. It also features a tuning range of 76 MHz-108.1 MHz in 100 kHz increments; dynamic web interface displays for RDS, data, baseband FTT, audio XY and peak density readouts; remote control and monitoring via Web; and email/SMS error notification.

http://www.inovonicsbroadcast.com/

FlexDSR02+ and FlexDSR04+ | 2wcom

The FlexDSR02+ and FlexDSR04+ units are professional audio satellite system tools that offer a combination of capabilities in a 1U IRD for audio contribution over satellite and IP. These units include the ability to streamline station ID handling across multiple locations.



The hourly station ID scheduler is time synchronized, offering time zone configuration and time checking via NTP. It also features FlexDSR's Satellite In-Band Remote Control for the deployment of station ID files. Inputs for up to four different programs with analog and digital output, full regional insert solution, automatic weightbalancing of parameters and program source switching are also available.

Other products 2wcom plans to bring to the conference include its FM2TS MPEG encoding gateway; FM02 all-in-one FM receiver solution; FM single frequency network system solution; and FlexNsert/FlexXtract DAB+ distribution system via IP and satellite.

http://www.2wcom.com/

DASDEC v3.0 and Audio Management System v2.0 | Digital Alert Systems

The common alerting protocol and emergency alert systems equipment provider will spotlight two of its new products, the DASDEC v3.0 and Audio Management System v2.0.

The DASDEC v3.0 software upgrade is designed for advance EAS/CAP compliance. Among its functional and operational improvements is Alert Agent, a way to selectively process EAS messages from a variety of sources, as well as to streamline menus and reduce compliance complexity. V3.0 is compliant with upcoming 2016 FCC requirements.

V2.0 of Digital Alert System's AMS features new functions for more refined compliance with the 21st Century Communications and Video Accessibility Act. One such feature is the auto-recue function, which keeps original message contents for repeated playout until it is replaced by new content.

Digital Alert System will also have its DASDEC M series decoder and encoder, DASDEC II emergency messaging platform, and Multiplayer four-channel audio player and program switcher on display.

http://www.digitalalertsystems.com/

N/Dym microphone series | Electro-Voice

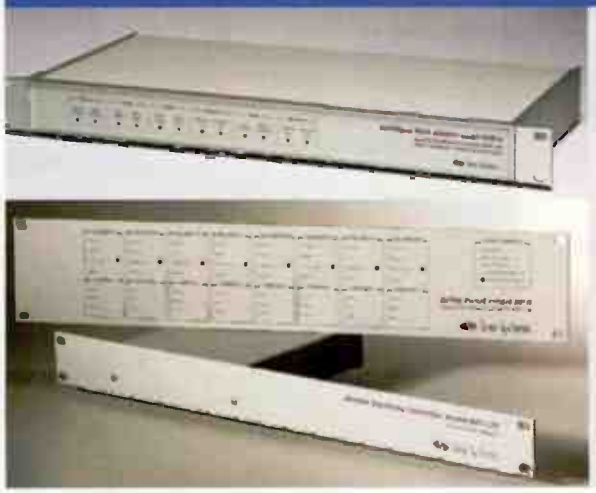
Electro-Voice has a new group of microphones available for instrument and voice use in studio or live applications. The company calls the ND series successors to the long-serving N/Dym series. The family starts with four vocal and four instrument microphones.

The core of the ND series is a capsule built on the N/Dym foundation. Other features include Memraflex grilles, humbucking coils and internal shockmounting.

The ND76 and ND76S are cardioid vocal mics; the S model has an on/off switch. The ND86 is a supercardioid with increased off-axis rejection while the ND96 is a supercardioid designed for loud environments.

The instrument models are the ND44 clip-on aimed at drums; the ND46 dynamic swivel mic; ND66 small-diaphragm condenser pencil-style mic; and the ND68 dynamic kick drum mic.

http://www.electrovoice.com/



Voice-Track and Radiovision | WinMedia

WinMedia will demo its newest tools WinMedia Voice-Track and WinMedia Radiovision.

WinMedia Voice-Track is a multi voice-tracking feature for the WinMedia Radio suite that lets users localize voice-tracks for regional broadcasts. Embedded in the WinMedia Mixing module, the voice-tracking feature consents users to edit mixing points, control all voice-tracks at once and have on-air talents record voice-tracks of the same length. Featuring multi-zone capabilities, the on-air module triggers the right voice-track for each broadcasting zone from a single playlist.

With automatic camera switching, WinMedia Radiovision allows broadcasters to air visual content and graphic overlays in real time along with their radio broadcasts. The module permits DJs to directly control video playlists without having to feed and operate separate workflows, explains the company.

http://www.winmedia.org/index.php/en/radio-solution

The recording studio control room supports a plethora of microphone pre-amps and the Avid S6 console supporting all the audio engineer's independent preferences.

KEXP's Seattle Home Is a "Wild Mix of Old and New"

by Mario Hieb, CPBE

Alternative community radio station KEXP has moved to a new broadcast complex at the Seattle Center Campus in the heart of the city's arts core. This continues a print and online series that takes a closer look at how this facility was constructed.

The new KEXP home in the Seattle Center's Northwest Rooms Building is multi-purpose, featuring a radio studio, recording studio, live room, TV master control room, live performance venue, audio editing bays, video editing bays, two audio mastering suites, a cafe and a record store. You can send audio to or from anywhere in the facility and, likewise, broadcast from any of the rooms in the facility including the live performance stage. The KEXP performance space is open to the public; at any time you can walk into the space and look through the control room windows to see who is on the air.

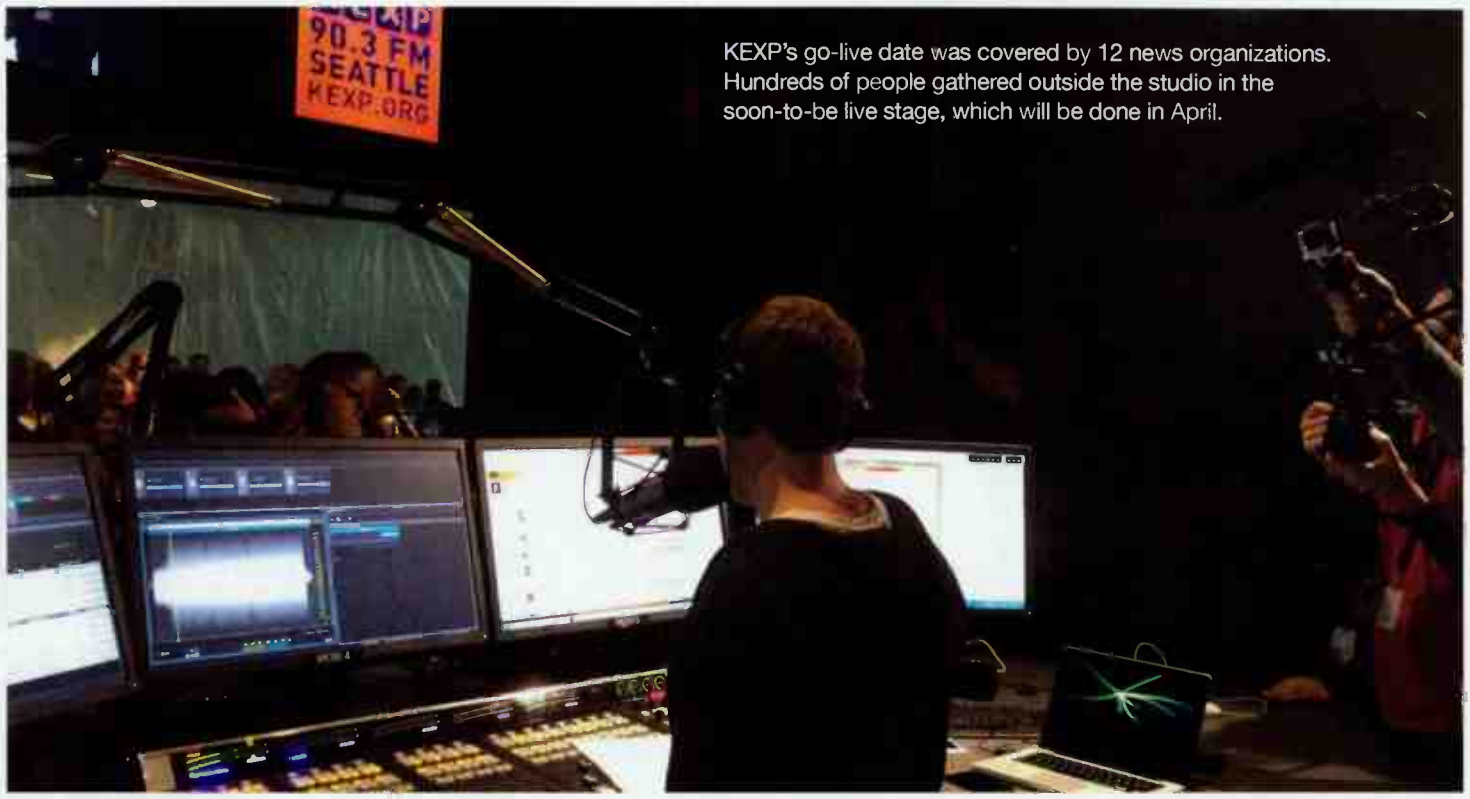
The project designers were systems designer Bradley Murphree from Mizzen Media, acoustician Walter Storyk, architect of record SKB Architects and general contractor Sellen Construction. Jamie Alls and Chris Kellogg from KEXP handled the production side of the design, and AJ Van Buren oversaw the IT infrastructure.

ARCHITECTURAL DESIGN

The KEXP project started with design firm Walters-Storyk Design Group and KEXP defining the scope.

Walters-Storyk drafted architectural drawings, basic systems one-line drawings and acoustical designs.

WSDG Project Manager Joshua Morris describes the architectural philosophy: "KEXP is in an odd…and in some ways, idyllic…spot in the industry. Our overriding mandate was to wed the function and aesthetic of the rooms in our scope as tightly as possible and to make KEXP as accessible as possible to their public while maintaining the safety and security of



KEXP's go-live date was covered by 12 news organizations. Hundreds of people gathered outside the studio in the soon-to-be live stage, which will be done in April.

their personnel."

The new technical facilities include a 400-square-foot on-air studio, a 1,090-square-foot live room, two production rooms, two audio and two DJ booths, two video edit rooms, a video control room, two DJ iso rooms, a green room, production/mastering, open office space, a library, conference rooms, a 4,500-square-foot reception area/audience space with a stage for live performances, a record/retail store and a café.

Live music performances are an important element of the station's format. The building layout was designed with musician and engineer needs in mind while simultaneously considering fan comfort and line of sight. The 28,000-square-foot footprint includes a 1,100-square-foot live room performance space with an adjacent area for audiences of up to 50 attendees.

Our overriding mandate was to wed the function and aesthetic of the rooms in our scope as tightly as possible and to make KEXP as accessible as possible to their public while maintaining the safety and security of their personnel.

— Joshua Morris

"When you have bands of all shapes and sizes coming in off the road for a 30-minute performance, there is a lot of quick changeover in between sets — lots of road cases to find homes for, instruments to tune, trouble to shoot; it can get quite hectic when that's the only thing you're

doing," says Morris, "The complexities compound exponentially when you have a station and an office to run on top of that."

As any remodel would, the building presents many architectural challenges; fortunately the space was purpose built to be flexible; it was designed originally as exhibit space for the 1962 World's Fair.

"Our MEP engineering team was critical to the performance of these rooms," says Morris, "A room can sound great all day long, but if it is too hot, too cold or the air is too loud, then it can be rendered unusable. McKinstry [mechanical and plumbing] and Nelson [electrical] did a superb job on all counts."

The lead designers and architects of record, SKB Architects, were vital in managing the design efforts, coordinating between the trades and ensuring the project stayed on track. The general contractor, Sellen, not only built the project, but also worked side by side with the team throughout the design process to assist in developing the budget.

ACOUSTICAL DESIGN

The on-air studio was positioned in such a way that it was naturally separated from other critical areas. On the other hand, the DJ booth was positioned directly adjacent to the public gathering space, and as such required fully decoupled construction to ensure the sound isolation of the broadcasts.

Etta Foto courtesy of SKB Architects

KEXP Audio Engineer Kevin Suggs at the Avid S6 Control Surface.

Also, with as many as three live on-air performances per day, KEXP is in constant motion changing over bands and performers. The load-in sequence was something analyzed constantly to ensure that it was as foolproof as possible.

Being in an urban center with mixed commercial and residential use, designers paid attention not only to environmental noise, but made every effort to protect their neighbors from whatever sounds the facility might introduce into the vicinity. The goal was not only to be a good neighbor, but to also satisfy local noise ordinances.

The on-air studio features Denon DN501C CD players and an Inovonics 531N modulation monitor.

SYSTEMS DESIGN

Systems integrator Mizzen Media of Los Angeles and Nashville designed and wired the new technical facility.

"KEXP is a Wheatstone facility utilizing the Wheatstone LX-24 console in DJ room one, and smaller L8 Consoles in the edit bay," says Mizzen CEO Brad Murphree. "Pro Tools is in the control room with an Avid S6 control surface to drive their productions; Blackmagic video switchers were installed for the TV production side; and KEXP is using Dalet for their playout service."

Signal routing is handled in the Wheatstone infrastructure. The Central Machine Room consists of 5 Wheatstone blades, (2) IP-88AD(s) which feature both analog and digital I/O, (1) IP88-D which only has digital I/O, and two Aura 8IP(s) which have both Analog and Digital I/O.

There are two Aura 8IPs which connect to different switches; this allows an alternate signal path in the event of a single point of failure. A Tieline Genie is the studio to transmitter link to extend the AoIP network straight to their transmitter site; it actually comes up as a destination in the routing infrastructure. Wheatstone also allows you to save different template views of your routing.

The facility is a wild mix of old and new gear, analog and digital signals and audio and video technology. KEXP employed analog-balanced audio anywhere it could. "There were a few items that had unbalanced outputs, however for a good engineering practice we tried to convert from unbalanced to balanced as soon as possible," explains Murphree.

Once the systems wiring was complete, cabling was tested by Mizzen. "We used analog audio, digital audio cable, CAT6 and a lot of coax. We ended up testing every cable before we moved the equipment over; once we started bringing the old equipment over from the old site we continued testing that as well," tells Murphree.

KEXP is quite happy with their Wheatstone system. "Once I had I/O set up on the blades, the cutover was basically a few mouse clicks," says Chief Engineer Jamie Alls. "The flexibility of an IP-based system is something I'm still wrapping my brain around."

The Wheatnet-IP network is extended all the way to the transmitter to feed an FM-531 HD audio processor. The Nautel NV 7.5 transmitter can accept the Wheatstone baseband192 signal, providing an all-digital air chain.

DOCUMENTATION

The "secret weapon" in the build-out was a

PARTIAL EQUIPMENT LIST

- Adobe Audition
- Avid Pro Tools HDX System
- Avid S6 Console
- Avid 16X16 Converters
- Belden Cable
- Blackmagic ATEM video switcher
- Blackmagic ATEM Production Switcher
- Blackmagic ATEM Broadcast Panel
- Blackmagic Router
- Dalet Playout Music
- Dorrough Loudness Monitors
- Electrovoice RE20
- ESE GPS Antenna, Master Clock, and Distribution Amplifier
- Focusrite Rednet 5
- Genelec 8050B studio monitors
- Inovonics 531 off air monitor
- Middle Atlantic Wire/Cable Management
- Neumann KH310 studio monitors
- Opticom Optiva Series STL
- Orban 6200S Voice Processing
- Pro Tools HDX
- Telos X-Stream
- Telos Zephyr
- Tieline Genie
- Technics Mark 4 and 5 turntables
- Wheatstone LX-24 console
- Wheatstone L8 consoles

We began the process by cutting over our distribution infrastructure first, while keeping the on-air operation going at the old facility.

— Jamie Alls

proprietary software package developed by Mizzen Media. At the beginning of this year Mizzen Media revamped their old Robotic Operational Build Software, renaming it Mizzen AI v1.2. This design program allows them to sit down with clients during the design phase and create a drawings package. This includes everything from equipment elevations, conduit infrastructure, video, audio, network, power and control connection drawings.

"Every single thing is metadata…we've learned that the design phase is usually roughly a 70 or 80-percent plan and as the project unfolds it starts to transform over time with design revisions and updates that cannot be planned for," said Murphree.

The software allows Mizzen to automatically make updates to the drawings and, because the metadata is embedded into one source, it allows them to extract that metadata into different reports. "So for example it is the link between the drawings, run lists, power calculations, weight load calculations, project management, operations, labor scheduling, task assignments, bill of materials, and if overtime is going to be required to bring the facility up on time," said Murphree, "It also allows us to have vision into these elements before they occur so it's not a surprise to anyone."

Once the facility is complete, an "as built" drawing package can be generated, documenting the whole project.

CUT OVER

The transition from the old facility to the new one went smoothly.

"We began the process by cutting over our distribution infrastructure first, while keeping the on-air operation going at the old facility," says Jamie Alls. By the time KEXP moved their all-manual, play-to-air operation to the new facility, they had already cut over the live streaming, STL and core asset management infrastructure.

"We were essentially doing a 'remote' from the old facility to the new facility. The DJs were the last to move, and the cutover consisted of potting down one fader on the board

and turning on the mic at the new facility," continues Alls, "Now, I'd say we're about 70 percent complete. None of the public spaces are ready, and we still need to build two large production rooms, a second air booth, a south office space and a handful of smaller production spaces."

VIDEO STREAMING

"We went with equipment from Blackmagic Design for a majority of our video infrastructure," says Alls, "Even though our largest audience for the content we produce in house is on YouTube, our core business is radio. We easily could have eaten up our entire budget just outfitting the video control room with a production switcher and cameras."

Using Sony PTZ (pan, tilt, zoom) cameras and switcher, the video outputs go through a Blackmagic ATEM router which acts as the main house router. Even security camera feeds for the facility feed into it. For streaming to the world, KEXP uses the Teradek Slice.

Audio edit bays feature Wheatstone L8 consoles and Genelec 8050B powered monitors.

CHALLENGES

The biggest challenge for KEXP was finding a software platform that would accommodate the manual, hand-crafted way that they program, and at the same time, give the DJs access to a large digital library.

"Pretty much all radio software is geared towards automation. The closest you can get to a manual mode for most systems is a form of 'live assist.' That wasn't going to cut it for us," says Jamie Alls, "After an extensive search, we came to Dalet Galaxy. They had a new version of their RadioSuite software that seemed like it would provide the flexibility to allow us to program on the fly, hand mix every crossfade, yet still take advantage of file-based playout, and the metadata efficiencies that provides."

Dalet worked with KEXP to develop their Cart paradigm, a layout so that DJs can drop songs onto carts and quickly cue them. The carts are fired from the Wheatstone board and the audio is sent to Wheatstone via their PC ASIO audio driver.

Another challenge was the unique nature of the facility. Along with standard radio operations, the new facility also supports video production, post-production, a recording studio and mastering suite, digital and physical media library, and a public live performance venue with theatrical lighting.

HOME SWEET HOME

So what's it like being in the new facility? "It's great and kind of surreal," said Alls. "After being in such cramped quarters for so long, it's taking some time to adjust to the new facility. For instance, there is a lot more walking involved going from 6,000 to 28,000 square feet."

"It's almost impossible to describe," says John Richards of "The Morning Show" on KEXP. "Even though we still have some work to do to finish the building and the studios, it feels like the grownups are going to show up and take it away from us."

Hieb is a Park City, Utah-based consulting engineer.

NEW for NAB 2016

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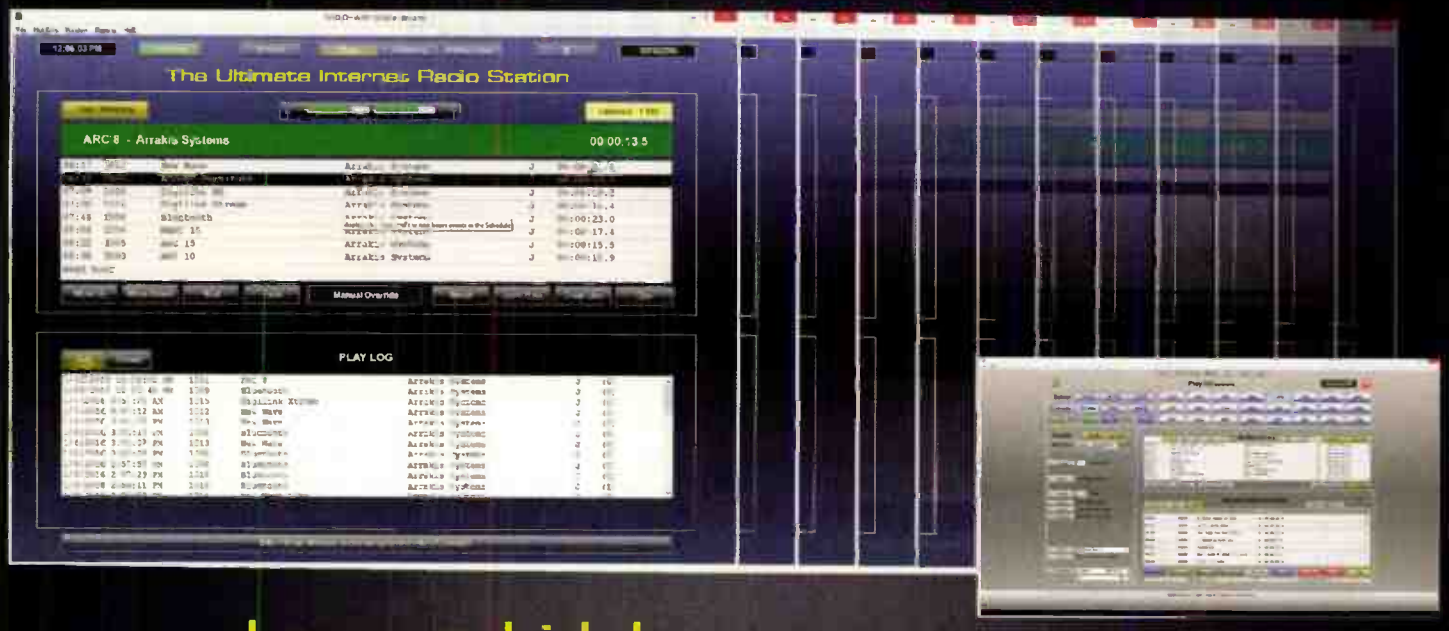

built in scheduler also support DHD-Tools

Incredibly Inexpensive !!!

- Easy to use interface
- For Novices and Pros alike
- Drag-drop control of the Play list
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- Library manager for audio files
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- Fast Voice track recorder
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- Use start-kill dates
- Compatible with DHD-tools
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RADIO~wav is a 'NEW' radio automation software product from Arrakis that is designed to support up to 32 simultaneous internet radio stations on a single PC at a single low price. Each station would stream to your internet radio hosting service who would broadcast your programing to your listeners.

RADIO~wav supports Shoutcast and Icecast protocols with whats playing metadata, real time display and logging of your listeners, and creates Sound Exchange reports.

RADIO~wav is full featured with all of the hard disk audio functionality of Arrakis' DigiLink-HD flagship automation software.

Come see us at NAB Booth N2835

www.arrakis-systems.com

970.461.0730

If You Can't Beat the IP Crowd, Join 'Em With AoIP Codecs

by Doug Irwin, CPBE AMD DRB

Let me start off by telling a little story to which I'm sure quite a few of you can relate.

We have a mountain top RPU receiver located in the Verdugo hills (near Burbank, Calif.) that recently went silent. Naturally, we looked into it and determined that the 5 KHz telephone circuit we had been using to backhaul the audio was dead.

A call to telco resulted in the following response: "We're sorry, but the equipment is obsolete; we don't have any spares, and by the way, the techs who worked on it, and know how to make it work, are all retired now. Why don't you put a full T1 in to replace it? We know how to make that work."

Clearly, putting in a full T1 isn't something we're going to do to backhaul a single, low-bandwidth channel. After the laughing died down, though, we were still in need of a solution.

IP TO THE RESCUE

If you can't beat them (which you can't) then you might as well join them. Your local telco is more than happy to sell you a high-speed IP data link, as opposed to an old-fashioned wireline circuit.

Likely you'll notice a few advantages:

The circuits can be far more economical. Sure, all you need is a T1 to the transmitter, right? But you could find, with a little research, that a circuit with 10 times the data capacity costs only twice as much. (Check your local tariffs.) Will you find a way to use that extra data? It's very likely, yes.

Customer service is far better. My experience has been that the telco personnel dealing with "big" data circuits are far more responsive and adept at getting circuits back up and running. No leased circuit is infallible; but you do want fast turnaround on repairs, obviously.

Ease of use. You'll find (especially if you have more of an IT background) that the newer data circuits are far easier, and cheaper, to make use of, than are T1 circuits (not to mention higher-speed TDM circuits, like T3).

Metro Ethernet or some other variation is an option in many cases now. Both Verizon and AT&T offer their own flavor of it. (You might find that your usual telco rep doesn't deal with high-speed IP connectivity, so be forewarned.)

Basically, metro Ethernet provides a layer-2 connection between both ends. The amount you pay is going to depend upon your service level agreement; its variables are the overall amount of data capacity and the latency.

As an example, for my station group in Los Angeles, we pay for our studio end, with 100 mbps total capacity; for the transmitter site end, 20 mbps total capacity; and finally, our SLA guarantees less than 15 ms of latency.

While it's common knowledge that ISDN is going away, what about other wireline circuits? Verizon has been selling "copper" assets for quite some time. "Verizon has had a long history of offloading wireline assets after its predecessor Bell Atlantic completed its multi-billion dollar merger with GTE, one of the largest non-Bell telcos, in 2000," according to FierceTelecom (*http://tinyurl.com/jls7xoz*).

So what does that mean for us? I'm not saying wireline is going away in general; I'm just pointing out that the owners of the infrastructure gear used, for any type of wireline circuit, may one day change. If your telco is selling their wireline assets, they're not likely to maintain them, or care about them that much.

The good news is that you're not limited to using telco to provide IP connectivity. You could develop your own means of moving packets from A to B, either because you want complete control of your own data circuits, or

xNodes are normally operated in an Axia IP network, but can also be used independently.

perhaps to hedge against Telco troubles. (In other words, you could make use of a data circuit from Telco, while backing it up with your own private radio link.)

Two options are:

Licensed microwave link. There are bands inside of which you can license your own very high speed data circuits. Study part 101 for the details. (Also, be on the lookout for our upcoming May issue for more information on part 101.)

ISM band radios. If you are slightly more daring, you can always make use of the unlicensed spectrum (the ISM bands) for IP connectivity between two points. (The Ubiquiti Rocket series comes to mind, although there are many others.) These can provide a great solution if you are in a time crunch, since the gear is cheap and readily available.

AOIP CODECS

After building your network transport you'll still need a way to encode and decode the audio. Audio over IP codecs come in all different shapes, sizes and price points. All have much in common in terms of functionality (moving audio from one point to another via IP) and most of them also have full duplex capability, meaning they move audio in both directions. Each can be configured via Ethernet—either via an embedded web server, or by way of a proprietary user interface. Another common feature is analog line-level inputs and outputs, via XLR connectors; many feature AES-3 inputs/outputs as well.

Let's take a look at some of the commonly used codecs that are on the market.

Axia xNode. xNodes are half-rack-width devices that are integral pieces of an Axia AoIP network, but you can use of them in a standalone configuration on their own network (which could be made up of a set of IP radios).

xNodes are available in analog, AES/EBU, microphone-level, mixed-signal and GPIO versions. The audio version can be configured for four stereo channels, or eight mono channels, and uses RJ45s or db 25 connectors for its audio ins and outs. They're AES-67 compatible.

A particularly germane feature, in the context of this article, is their dual NICs: You can connect the xNode to two separate networks, using its "automatic failover" capability to send its IP traffic over a backup network in the event that the primary goes down. Configuration is done via the embedded browser.

Instreamer, and its complement, the exstreamer, are used to move audio in one direction only.

Barix Instreamer/Exstreamer. Barix makes an economical set of devices used to move audio over IP in one direction only: the Instreamer and Exstreamer.

Each has a very small form factor and uses dual IHF inputs/outputs (-10 dBV level). Instreamer is the standalone IP Audio Encoder with support for MP3, PCM and G.711 (uLAw/aLaw) audio codecs, at data rates up to 320 kbps, using the IP streaming standards TCP/IP, RTP, SIP and multicast. Both it, and its complement, the Exstreamer (decoder) are configured via an embedded browser. The pair supports serial communication as well, as high as 230,400 baud.

Comrex BRIC link II. The Comrex BRIC-Link II is another economical solution for audio over IP transport. BRIC-Link IIs occupies half-rack width; XLR connectors are used for audio input and outputs, while DIN connectors are used for contact closures, serial data, and its power supply input. (Alternately, the Left I/O connectors may be switched to AES3 digital audio format).

BRIC-Link II offers a stereo or mono linear mode that does not compress audio; for situations where reduced bandwidth is required, BRIC-Link II offers AAC/HE-AAC modes as standard, in addition to its Opus audio compression, and the VoIP standards G.722 and G.711.

Configuration is done via an embedded Web server, allowing the user to access all controls. The Web page also displays connection status, extensive network diagnostics, and audio level meters for remote monitoring.

BRIC II pairs operate in a full-duplex mode.

The DB90TX is a model of simplicity; paired with the DB90RX, it moves audio in one direction.

DEVA DB90-TX and DB90-RX. The DB90 TX/RX pair, like the Barix options, operate together to move audio over IP in a single direction. They are small in form-factor and use RCA connectors for analog audio inputs, but they support S/PDIF digital audio, as well.

The TX can be used as an Icecast compatible server, Icecast Source Client or Real Time Protocol sender. The DB90-RX utilizes one main and two backup audio sources; the user can choose between IP sudio, Icecast or the RTP Audio Player. The source priority is user-defined; if the audio signal of the main source disappears, the device will switch to the first available backup source and vice-verse: when the main audio signal is recovered, the RX will automatically switch back to it.

Both TX and RX are managed through a standard Web browser. iOS and Android devices are supported as well.

GatesAir IP Link. IP Link comes in two different versions: the 100, which is for a single stereo bi-directional transport; and the 200,

GatesAir IP Link pairs make a full-duplex codec set

which supports two stereo bi-directional channels. IP link is a single RU device; the 100 uses XLR connectors for audio ins and outs; digital ins and outs are via AES-3. (The 200 uses RJ45 connectors for audio i/o on its second set of channels.)

Standard coding algorithms are linear PCM, AAC-LC, Opus, and G.722. (Optional algorithms are AC-HE, AAC-HEv2, AAC-ELD, MPEG2 and 3, and EaptX. Support for AES over 192 kS/s is also an option, allowing transmission of FM composite over AES.) IP Link makes us of RTP, SHOUTcast/ICEcast and MPEG-TS protocol encapsulation.

IP link features three separate Ethernet connectors, supporting three different networks; this also gives it some other capabilities that important in the current context. For example, the user can configure the decoder to switch back and forth between alternate stream sources (from different networks) as necessary.

Bridge-IT is a half-rack width, full-duplex AoIP codec.

The user can also configure FEC, programmable time diversity and interleaving of streams to combat "burst" packet losses. As an option, it features "dynamic stream splicing" which is GatesAir's methodology for mitigating the effect of lost packets by sending duplicate streams over multiple links.

Configuration of IP link is done via its embedded Web browser.

Tieline Bridge-IT. The Bridge-IT is a 1/2 rack width, full-duplex codec with XLR connectors for audio ins and outs as well as for AES-3 digital ins and outs. Codec Algorithms include Linear PCM, Enhanced apt-X, AAC-LD, AAC-HEv1, AAC-HEv2, AAC-LD and AAC-ELD. Tieline's "SmartStream IP" software automatically manages jitter buffering and FEC. Bridge-IT also features 2 relay inputs, 2 relay outputs, and RS-232 for remote control applications. It has the full complement of front panel controls for configuration, via an LCD display, PPM metering and a key pad. Naturally the user can also configure it via its embedded Web browser.

Worldcast (APT) Encoder Silver and Decoder Silver. The Silver encoder/decoder pair represents another economical means of audio transport via IP. The form-factor is ½ rack width, with balanced audio inputs and outputs via XLR connectors. Standard coding algorithms include linear PCM, Enhanced apt-X, MPEG 2 and 4 (HE-AAC versions 1 and 2). Serial data transport, up to 115,200 baud

supported via db9 connectors, as is auxiliary data (which is bi-directional, done via UDP). The Silvers are N/ACIP compliant, and also supports Dynamic DNS (which is important if one end of your link doesn't have a static IP address. See our February 2016 edition for more on the topic.) The Silvers are configured via their embedded web servers.

The IP Silver has a single Ethernet port, but still comes standard with Worldcast's SureStream. In this case, two streams would be configured, and the time delay between the two is used to mitigate the effect of lost packets.

APT Silver encoder/decoder pairs are used to move audio in one direction only.

Wheatstone Edge provides the interface between Wheatnet-IP and longer-latency IP networks.

Wheatstone Network Edge. The Network EDGE blade was designed specifically as an interface between AoIP studio networks (i.e., WheatNet-IP) and longer-latency IP networks. Typically located at the studio, the Network EDGE interfaces directly (via Ethernet) to an IP wireless radio or commercial leased line to provide point-to-point connectivity between locations. Network EDGE can be used with any of the major IP radio brands currently on the market, according to Wheatstone.

The Network EDGE is a single RU device that includes local I/O (two AES and two stereo analog) and 12 programmable logic ports.

This list is not meant to be exhaustive; I've only mentioned one product per manufacturer, as you can see, to give you some idea of what is available. I strongly recommend that you take a look at the other devices offered by these same companies.

The ubiquitous nature of IP gives the radio engineer many options of ways to connect point A with point B, whether for STLs, for remote broadcasts, for talent that wants to work from home, and the myriad of other reasons neither I nor you have thought of yet.

If one of your legacy methods is the use of telco audio circuits, you should plan for the day they disappear. It could be closer than you think.

GALLERY

This Kind of Nesting Makes Your Life Easier

by the Wandering Engineer

In my career I have encountered only two kinds of transmitter sites.

The more typical one has a transmitter or two; a tiny workspace piled high with a collection of burned out and misfit items; a few garage-sale-quality hand tools; half a roll of paper towels; some print outs of sections of various manuals; and a half-dozen science fair projects that once were cans of pop and fast food. Often there's no garbage can around, or it's full if it exists. Excavating to the bottom of it would reveal much in terms of the station's history.

Another tough day up on Mount Watchamacallit. It's beautiful outside, but are you comfortable if you get stuck inside?

At the other type, the engineer has "nested." The site cost an additional $200 and a couple of hours more effort to stock. It has a few reasonably comfortable folding chairs and a card table to work on. There's a mouse-proof Rubbermaid container with a selection of cans of Spam, Spaghettios, sparkling water, paper plates and clear plastic utensils. There's another container with a cheap, light sleeping bag, air mattress and toiletries. There is a complete set of all the basic stuff from the discount tool store, and an old grill, a second-hand mini refrigerator with an integral block of ice, a $69 microwave, a coffee maker and a can of Folgers, a repurposed stereo and speakers to hear whatever over the sounds of the fans. The biggest luxury of all, if it fits, is a clean, mouse-free, comfortable-but-dated couch.

There is nothing like having a nested site where you can work until you're done, with proper hydration, sustenance and rest.

It all has to do with how you see the transmitter site.

If visiting the transmitter is the best of times — legitimate, productive away time from the station — you are probably a nester.

If you are the kind of engineer who doesn't want to leave until it's all over, the kind who will go to the site as the storm hits, knowing it might be a few days before they open the road to get out, there is nothing like having a nested site where you can work until you're done, with proper hydration, sustenance and rest.

Everyone at the station thinks riding the storm out on Mount Whatchamacallit is tough, dirty work. Only you know that there just isn't any finer moment in this world than when you keep the old girl on the air, then settle in, peeking out at today's version of the storm of the century. It's a sight few will see or experience.

You call home to tell the partner you're just fine and exchange some chit chat about the day. You call the station to leave a lasting impression of courage and raw radio guts. You assure the GM that you can handle it and subtly suggest that you might be a little undervalued.

There was a day when just about any remote transmitter site had what you needed to keep your humanity when the project went on and on or the weather hemmed you in. There was a day when a transmitter site had tools and spares and jumper cables and a few good books — even if they were by Harold Ennes. There was even a day when some sites were built and stocked to survive Armageddon.

Transmitter time is sacred; it shouldn't be frustrating, dirty, unhealthy or unduly unsafe. It should be downright uplifting and free from want. For people like us, it's the one place where we can be in the moment, lost in thoughts, bolstered by the chord an antenna sings in the wind.

There is no better gig on this planet. I have no idea why anyone would want to make it anything less.

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