Radio Guide

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January-February 2015 – Vol. 23, No. 1

We Call It a Bladefest

POWERCLAMP *"Surge Suppression-101"*

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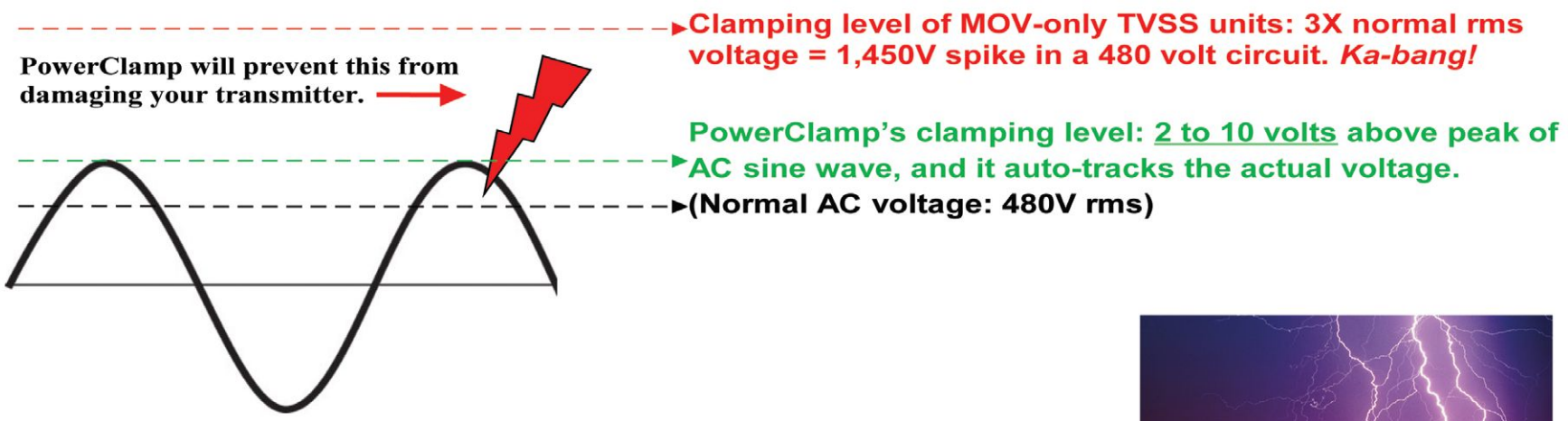

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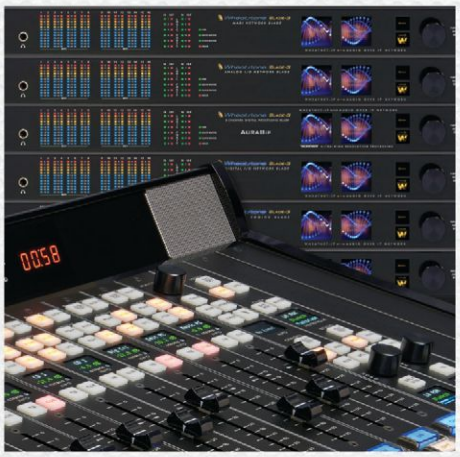

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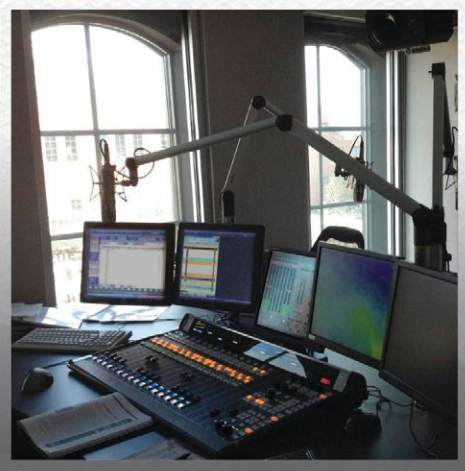

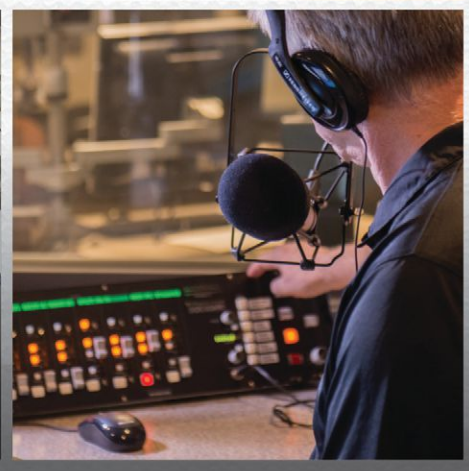

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Cover Photo *(left to right)*: Paul Picard, Kelly Parker, Dominic Giambo, Dave Breithaupt (in front), and John Pruitt (in back).

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Starting the New Year: *"Most transmitter sites have some form of remote control system that uses either a telephone line or the Internet. Putting a cheap PC out at the site, and using some inexpensive security cameras that you can access remotely, will give you an "eye on the ground" at your site."*

Correction: In the Nov/Dec-14 issue of Radio Guide, we ran a redux *Survival Guide* – "What Your Momma Taught You," by Rolin Lintag. Unfortunately, I forgot to add his byline under the title. Although my Momma taught me to give credit where it's due, I missed that one – ***Editor***


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Cover Story

It's a Bladefest

by Dee McVicker

When was the last time a bunch of guys got together for the purpose of breaking something?

I can tell you.

It was in the fall, when the Wheatstone crew of engineers and thrill seekers strung together 52 BLADEs, half a dozen digital audio consoles, Talent Stations, automation systems, control panels of all sorts, SideBoards, audio codecs, audio processors – AirAura X3, FM-55, FM-531, VP-8, M1, M2, M4, Aura8-IP — and the complete family of Wheatstone software applications, into a large WheatNet-IP audio network for that very purpose.

We called it BLADEFEST.

Our intention was to test for interoperability of all these things with our new BLADE-3 I/O hardware and software, plus qualify the system behavior under various power and network failure scenarios and Ethernet switch versions.

Altogether, we gathered up more than a third-of-a-million dollars worth of WheatNet-IP gear – a large assembly of Wheatstone studio equipment representative of what we've installed in major market facilities. The whole of it lined up into a U shape with a table down the middle – ironically forming a huge "W" in the middle of our production plant in New Bern, NC.

And the "BLADE Runners" for the weeklong adventure? Officially, our fearless engineering manager Andy Calvanese, ace field engineer Kelly Parker, software engineer Scott Gerenser and hardware engineer Dave Breithaupt made up the core team with additional support from our project engineers as needed. Unofficially, though, you'd have to include just about every one else in the factory who stopped in on their lunch break, or whenever they could find an excuse to see what was happening.

The idea behind BLADEFEST was to subject the WheatNet-IP system – in real time – to the toughest studio demands possible, with bonus points given to anyone who could break it.

So, of course, they pushed buttons, ran ridiculously complex software routines and power outage tests, and stressed the system to the max – at one point running 462 channels of audio between two points over a single gigabit network cable. They had more than 2,500 audio sources to play with and two Cisco core switches trunked together, plus a dozen Cisco edge switches. Audio from the head of the chain could be looped back and forth through all the BLADEs (because each one has a built in router), all the control surfaces, and all the audio processors, and come out the other end having passed through each audio device in the entire system.

If there was a failure, our BLADE Runners could see immediately where the audio trail ended on a "wall of meters" on a PC screen that monitored every BLADE, console and processor in the system. To monitor all 80-plus items in the network, they had to replace a run-of-the-mill PC for one with a beefier graphics card.

The BLADE Runners were able to get really creative with our Screen Builder custom application. As they would think up new devious ways to break the system, our software programmers and scripters would write code to test their theories.

Getting Along

We were most curious about how our new third-generation BLADE-3 I/O access units would interact with the network software, and coexist with our second-generation BLADEs. We had already tested them singly and grouped together in smaller networks, but not until now had we been able to put them together in one large system to see how they reacted to one another. At the same time, we were also testing out new Cisco switches to make sure we could advise our clients correctly when they asked about switch choices.

The BLADE Runners discovered immediately that they could tune a few adjustments to the setup software in order to get them all to play together more efficiently. Like its BLADE-2 counterparts, BLADE-3s "elect" a master in the network that all the others slave to based on uptime, version, and user preferences. Usually these are civil elections, but as our BLADE Runners soon discovered, the process needed optimization during an initial system boot-up with a cold start on the switches. Because the BLADEs boot up way faster than the Ethernet switches themselves, a 52 BLADE system first becomes 52 *single* BLADE systems while waiting for the switches to boot, before it can resolve to the single system it is supposed to be. A software change corrected the tuning, and our customers will be glad to know they can expect the same kind of easy setup with new BLADE-3s as they've gotten used to with our BLADE-2s (just unbox the units, press a button, choose an ID, and all the IP addresses and system setup routines are done automatically – unless of course you want to do all this grunt work manually).

Testing ... One, Two, Three

Once our BLADE Runners got the system up and running, they spent the next three days trying to bring it to its knees and testing recovery times in the process. We wanted to know how fast the system could recover from losing a switch or from losing power, for example.

We found out: Less than a minute-and-a-half (yes, you read that correctly) to bring all 80-plus elements in the network back on-line. That's 52 BLADEs and six consoles, among other pieces, cold started and back up and running all the audio streams in a minute and a half. This is way faster than the actual time it takes the switches themselves to boot up (the core switches take 5 to 10 minutes, depending on model), proving once again the value of UPS and fail safe power supplies for these important pieces of an AoIP system.

Stressing Out

The BLADE Runners performed many stress tests and repeated them over and over until they were sure of the results. Some of these were:

Cold Start Test – everything powered on simultaneously to simulate a system recovery after a major power outage when UPS or backup power had not been deployed.

Reboot Test – switches all left "on" but all BLADEs repowered simultaneously to show how the system performs after a software update and subsequent reboot.

Fracture Test – disconnecting various Ethernet links between switches so the system fractures into several smaller systems, and then connecting the links again showing how the system recovers from broken trunk links or a switch failure.

Splinter Test – all switches are off and each BLADE becomes a stand-alone system and then the subsequent recovery as the switches are turned back on.

As to be expected, our BLADE Runners were especially preoccupied with jamming as many megabits of audio down the system as possible. Our BLADEFEST quickly turned into an episode of Myth Busters at one point – with the engineers re-cabling the system so that one half of the BLADEs were on one side of the room and the other half on the other side. Each side was connected to Cisco core switches, which were then connected together over a single Gigabit Ethernet link.

The BLADE Runners then started routing audio through the link it to see how many signals they could push through from one side to the other before it started to break down. Once a stream had been sent across the link they would send it back in the other direction and bring it in to the next port and send it back across the link. In this manner they could zig-zag the same audio many times through the link. Because each BLADE has a built-in headphone output with system-wide routing control, they could listen to the audio at any point in the chain and could, in fact, monitor it at the end after it had zigged and zagged hundreds of times across the link. In this way, they could watch for audio drop out or distortion or cascading jitter problems and so forth.

The system was happy and the link held up well as they approached the gigabit data rate. In fact, the system still held together as they taxed the switch fabric and began to see audio problems. The issues they first saw were occasional random clicks in one or another of the hundreds of audio streams they were monitoring as the audio buffers ran out before the switch could get the next packet onto the needed port. They'd only hear the clicks if the audio was a tone, but they quickly discovered how close to the cliff they were, as adding a few more streams quickly made all the audio channels break up as the switch/link ran out of steam. Up to the breaking point, the audio was as clean and steady as if it were the only channel on the cable. And, more importantly, there was no break up of system integrity; apparently enough control packets were making it through to keep the system holding together.

Overall, our BLADE Runners learned what we had known all along in theory. The WheatNet-IP audio network can transport the upper limit of Ethernet traffic. Until then, there's virtually no packet loss through the system; with the gigabit link, 462 channels of 24-bit uncompressed audio were streaming across the one cable in one direction with a few hundred more going back the other way.

Incredibly, even after stress testing more than 80 pieces of Wheatstone gear, the engineers found only one faulty BLADE – it had a problem with the onboard flash memory chip which became apparent as they loaded audio clips onto the built-in clip player.

BLADEFEST was a great opportunity to test and demonstrate the capability and capacity of the WheatNet-IP system, check out the new functionality in our version 3 BLADEs, and remind ourselves once again just how cool it is to have one interoperable system with all these different components (mixers, automation, controllers, codecs, processors, and software applications) working seamlessly together over IP.

For more content on the Wheatstone BladeFest (including additional text, photographs and video) go to: http://bladefest.wheatstone.com

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Dee McVicker has been following changes in broadcasting for more than 20 years, more recently as a part of Wheatstone's marketing team. This is her first BLADEFEST. Email to: deemcv@grassrootsco.com Phone at: 480-545-7363

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Studio Site

Long Distance Dedication

Station Keeps Visual/Audio Tabs on Distant Repeaters

by George Zahn

As stations join together through Lease Management Agreements and other cooperative ventures, it's becoming far more common for one station's main studio to be the programming source for one or more other stations within a community or region. There are also more and more regional "networks" of stations in both public and commercial radio sectors, and keeping track of which stations are on the air or may be having "technical difficulties" may be a major problem.

Silence sensors which automatically call managers or engineers are one of the creative options, but at least one radio station has helped to put the power of observation in the hands, and eyes, of the host in their studio. Silence sensors generally are "reactive" and may not alert station personnel until several minutes after a station goes off the air or loses its audio feed. Setting the silence sensor to too short, and a silence interval can cause many false alarms, especially if you have programming with fairly wide dynamic range.

WEKU-FM in Richmond, Kentucky, the main source for four different signals for news/information programming (88.9 WEKU Richmond/Lexington, 90.9 WEKH Hazard, 90.1 WEKP Pineville, and 88.5 WEKF Corbin) is also a separate classical and jazz program source for an "LMA" with a fifth station, 102.1 WKYL Lawrenceburg, Kentucky. The station is using DSL connections to feed the stations.

"We would have outages because of a bad DSL connection (on 102.1)", says Associate Manager/Program Director John Hingsbergen. He "deputized" dedicated listeners in Lawrenceburg who would notify him via Facebook. or his personal cell number. when the outages would occur, so the staff could be more proactive to get things back on the air. Hingsbergen adds, "102.1 was driving me insane with so many messages and so many calls."

WEKU Richmond studio showing American Audio VU meter returns for each repeater (to upper left of the console).

Different Point of VU

Hingsbergen approached Chief Engineer Bill Browning, requesting some type of VU meters to be placed in the studio to visually show that stations were on the air. "I told him 'There must be something inexpensive we can find'" adds Hingsbergen, "I envisioned the old swing style VU meters." Browning did some research and found American Audio LED VU meters and purchased one for each station, including WEKU and its three main repeaters, plus 102.1 FM.

A quick check on several vendor websites show the VU meters can run as low as between $60-$90, and are rack mount units. The American Audio dB Display Rack Mount Level Meter has RCA inputs. Other American Audio units also have additional XLR connections. Broadcast vendors as well as musician/mobile DJ sites often feature these devices.

Many Happy "Returns"

The key to making these VU meters work is the "return" feature of WEKU's STLs for their stations – Tieline Commander G3 units. At each transmitter location, the station has placed a tuner, which receives the off-air signal and feeds audio back through the Tie Line Commander G3 to WEKU. That audio feeds the VU meters in WEKU's main studio.

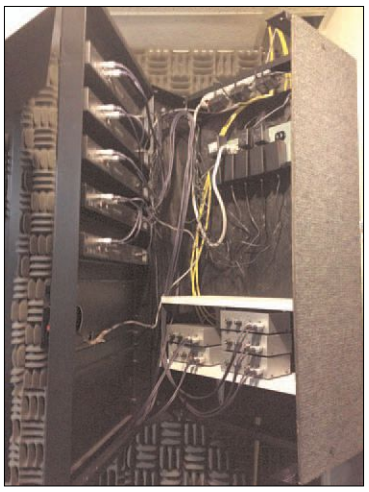
WEKU rack with TieLine Commander G3 units.

Not only is this a more pro-active (and fairly inexpensive) solution to a real headache for broadcasters with regional coverage on multiple stations, but it also adds a "wow" factor for station tours, since the LED VU meters put on a veritable light show while still having true utility. Obviously, WEKU also allows for in-studio audio monitoring of the return signals, but the visual cue can help the station react more quickly, and make an immediate audio check to confirm the technical issue.

Hingsbergen adds that WEKU is working on other major upgrades to studios including a new Logitek digital console as well as a new HDTV for following local happenings such as weather radar. WEKU also adds more visual stimulation by using a Beta Brite indoor LED display for EAS. This is a device (about 26 inches wide with 2-inch tall letters) you may have seen in a local business with a scrolling text message. WEKU has programmed green text for a test or watch, and red text for an actual alert.

While each station's return may be slightly delayed because of the DSL connection, the staggered VU meters still add some peace of mind that each station is actively on the air. "When an EAS happens, you can look up on the meters, even if you're in a newscast, and see the EAS may only be on one station," says Hingsbergen. The bottom line is that these extra visual monitors allow WEKU to stand more firmly behind their commitment to the extra communities they serve.

The Sounds of Silence



Inside the rack showing the interface to the individual VU meters.

The days of a station being off the air, and the program host waiting for an engineer to call to start the music again, have been long gone. Even if the broadcast transmitter may be temporarily off the air, many stations are still streaming or supplying programming to other repeaters or LMA stations. These meters also keep that reminder to keep broadcasting right before the hosts eyes.

For those stations using DSL connections for your STL on repeater stations, especially those too distant to easily monitor off-air, it's very good to check the return capability – and for a small expenditure, you can create a decent extra display to back up other alert systems for station malfunctions. This is a good responsible move for broadcasters.

My initial personal exposure to regional radio repeaters dates back to the early late 80s and early 90s when I worked for a university that would eventually have stations in Ohio, Indiana, and Michigan. In those pre-DSL STL connection days, we were using Ku-band satellite to deliver audio over the extreme distances. Then, return paths via the same system were cost prohibitive. Instead we depended on dial-up interface boxes at each station to check the off-air reception for the repeaters.

To prepare for creation of the university's new multi-station network, some of our staff took a road trip to Eagle, Colorado, to observe a home radio station that, at the time, was using Ku-band satellite to program multiple stations from Idaho to New Mexico. It was a sobering and exhilarating experience, and when I observed a host using alternate satellite channels to background record wildly separate weather forecasts for each station on the network, it brought the awesome responsibility of regional broadcasting to light for me. One station was providing different specific program elements for stations separated by hundreds of miles of mountain range.

After we built our satellite network in Ohio, there was still always a slight feeling of "disconnect." Even with staff at the other stations ,and silence sensors which would be set to automatically call our engineer, I often had a sense of insecurity at the home base, especially with one station up to 500 miles away (somewhat measly compared to the breadth of the coverage of the Eagle, Colorado network).

Thanks to John Hingsbergen and WEKU General Manager Roger Duvall. I'd love to hear from other managers and engineers who may be using DSL STL returns for improved monitoring. Is anyone else using creative technology such as WEKU in Richmond to ensure consistency of service in your studio setting?

George Zahn is a Peabody Award winning radio producer and Station Manager for WMKV-FM at Maple Knoll Communities in Springdale, Ohio. He is a regular contributor to ***Radio Guide*** *and welcomes your feedback. Share your stories with others by sending ideas and comments to: gzahn@mkcommunities.org*

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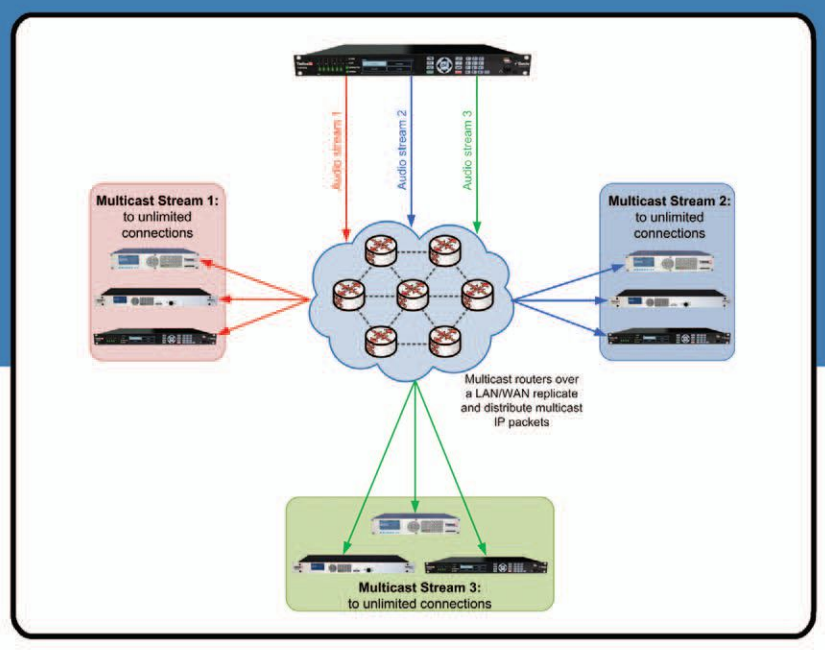

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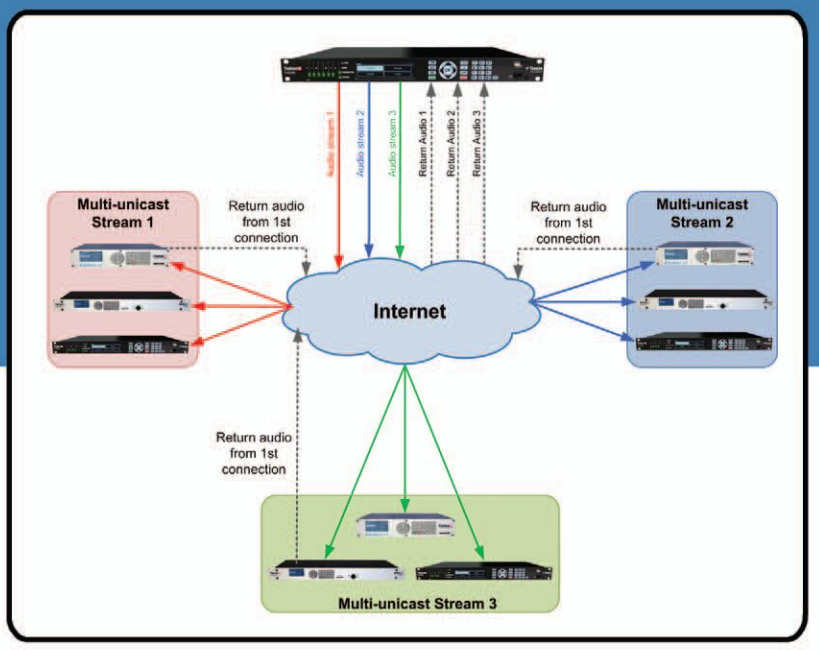

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Transmitter Site

The Need for Speed? Yeah, We Can Do That!

by Tom Bosscher

Having an Ethernet link to the transmitter site is beyond a luxury today. Having that pipe gives us so many options – like looking at the transmitter site computer, looking directly into today's transmitters, having access to your office computer while you are at the transmitter, and the best of all are those toy-like but useful IP cameras.

Many stations have gone to the higher microwave bands with licensed and unlicensed data radios. Many years ago, Moseley came out with their Lanlink radios. The first unit gave us 500 Kbps in both directions, with the H version doubling that to 1.0 Mbps. Inside that great looking rack mounted box was an existing industrial 900 MHz radio and a unique diplexer that passed your 946-952 STL to the existing 950 antenna, and then passed a huge 902-928 slot to the industrial radio. I have a Lanlink HS in service feeding a tower across my campus, about 3,000 feet away. Having the link is nice, but 1.0 Mbps has limited usefulness.

One of the best things to do in broadcast engineering is to network with other engineers. I was having lunch with a much younger lad, Mark Wittkoski, who receives a paycheck as a broadcast engineer from WGVU, Grand Valley State University here in Grand Rapids. I mentioned my concern about the slower speed. I told Mark I was waiting for spring to install a 5.8 GHz Ubiquiti system. Mark looked at me and said, "Hey Slick, why not use one of Ubiquiti's new high speed 900 MHz systems?" Huh? He went on to say they run 100+ Mbps on the 902-928 band. When I got back to work, I looked the radios up – five minutes later, a pair were ordered from Amazon. I ordered two Nanostation M900s which, while it has an internal antenna, it also has a reverse polarity SMA for an external antenna. Well, Amazon showed a RP-SMA pigtail, to a male type N for $10.00, so I ordered a pair of those.

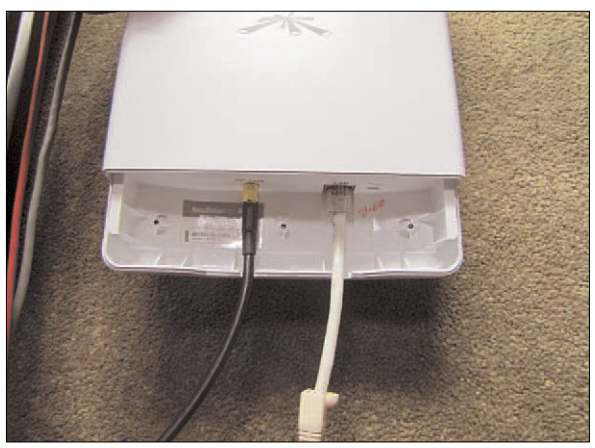

Figure 1: 3' pigtail from the studio Ubiquiti unit.

Three days later, I opened up the Ubiquiti boxes and programmed the units. One, of course, has to be an Access Point (AP). I modified a few other options, and the two were talking across the room just fine. I unplugged them and plugged them back in a few times to make sure they found each other on power up. Every time, they did.

I programmed the link as a simple bridge, as the nine IP equipped devices at this transmitter site were already on my instudio network IP range. I then took one of the new radios over to the existing Lankink system at the studio. I pulled its power, unscrewed the N connector coming from the Lanlink 902-920 MHz radio, and screwed on the 3' pigtail from the studio Ubiquiti unit. I plugged it in and went to the other end. A picture of the pigtail connected to the radio is shown in **Fig 1**.

At the transmitter site, it took less time to switch over than it does to talk about it. Same basic process as the studio end. When I plugged in the transmitter site Ubiquiti, it came up in 30 seconds, but no signal. Turns out that I had not yet gone into the Ubiquiti menu and switched the radio over to the external SMA connector. It's always the simple things. Now, with the Ubiquitis looking into a good antenna system, the radios were screaming of signal overload. In the configuration setups for both ends, I dropped the power from +28 dBm, down to +6 dBm. Keep in mind that this path is only 3,000 feet and uses 4' grid antennas, an existing cross campus 950 MHz STL system. But it was a screaming signal, and in the automatic mode, I was seeing 60 Mbps. **Fig 2** shows the system installed at the transmitter site. For $300, this made my day.

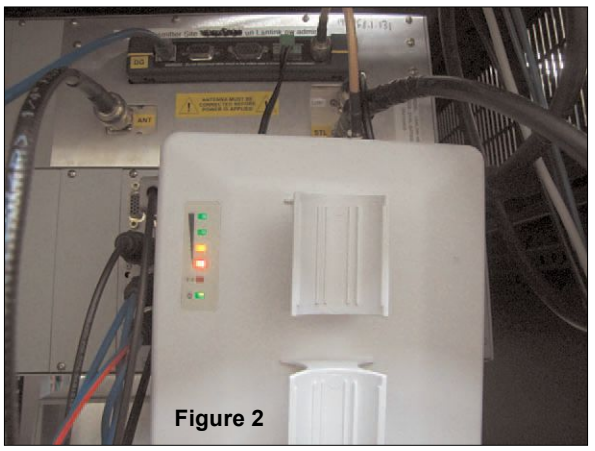

Figure 2

The RF jumper cable I used is described on Amazon as a "N Male Connector to RP-SMA Male Antenna Pigtail Cable 1M" and the Ubiquiti radios are a pair of Nanostation Loco M9 – around $130 each.

Status, It's All About Status

In a past article, I wrote about how, for decades, I have installed 120 or 240 Volt neon lamp assemblies across the AC input blocks on my transmitters. These served two functions for me – with a quick look see, I can tell whether or not the transmitter is receiving power and, more than once, the glowing lamps reminded me that I forgot to disconnect the service power.

I was more than thrilled when I installed my first Nautel transmitter, a NV-10. Right at the bottom of the back of the transmitter, they glow amber-orange, all three of them. Or, when you are single phasing, only two of them. Within two weeks of that install, that combo studio-transmitter site had a single phase power failure, with almost all building lighting and electronics running off the two valid 120 Wye legs. But a simple phone call to the GM, asking him to tell me what the three lamps on the bottom of the transmitter looked like, told me the problem. As an aside, that site now has a generator.

But Those Cool Glow Eyes Were On My Mind

Packed in with the spare parts for an NV-20 I put in, was one spare 220 volt LED assembly. Being 62 years old, I used the shop's 50X magnifying lens and pulled off a part number. I then sauntered off to the Internet, and found a company in Canada called Jentronics, located at www.jentronics.ca . Information on the LED assemblies themselves can be found at http://technapower.com/ledtec.html

Nautel uses the 220 VAC version, which has the part number of LEDTECA220AC, Amber. There is a 120 volt version known as LEDTECA110AC, Amber.

I desired to build a box that would monitor all three phases at my main transmitter site of WCSG, 91.3 in Grand Rapids. One only has to have three 220 VAC LEDS across the three legs to do the job, but I was on a roll. Since my service is 208 Wye, I have three legs that are 120 VAC to the neutral. So I went for three 120 VAC and three 220 VAC LED assemblies. I installed the LEDs right on the ATS, or Automatic Transfer Switch. I arranged them in a triangle formation, shown in **Fig 3**. The three corners of the triangle have 120 VAC LEDs, tied to the neutral. The three LEDS between the three corners are 220 VAC LEDs, tied from leg to leg.

Figure 3: 3-Phase Monitor Lights

Is having six LED's overkill? Yes. Is it cool? Yup. When you walk into the transmitter room, there is no doubt that you have a wall of lights, and that means all is well. If you look carefully at the picture, you will see that I have six small pilot holes to the right of the six amber LEDs that monitor the incoming utility feed. What are those six holes for? Well, Jentronics makes these cool LED assemblies available in red. Red. I think I will choose red to monitor the emergency generator.

Tom Bosscher is the Chief Engineer at Cornerstone University Radio. Email him at: tom@bosscher.org

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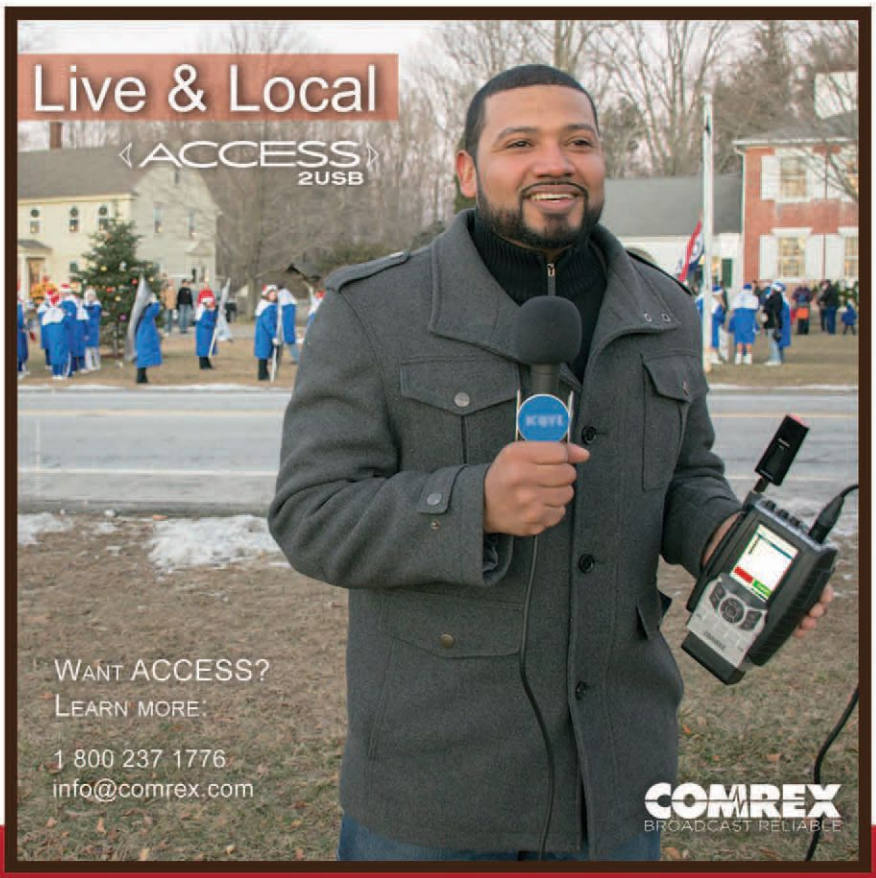

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Tower Topics

A Tale of Two Towers – *Part 2*

by Steve Callahan

It's been a very productive few months since I shared the details of starting to rebuild a single tower AM site into a 5 kilowatt two tower array. Let's pick up where we left off in Part 1. *(Radio Guide, Sep/Oct-14)*

The concrete guy anchors were poured above-ground and then conveyed by two mini-excavators to each of the three anchor points. This turned out to be a great alternative to pumping concrete through a 300 foot hose or trying to get a concrete truck into a swamp – and then hopefully back out again. The two mini-excavators got the anchors out into the field using a "bucket-brigade" procedure so that the impact on the swamp was minimized. The excavators rested on large pads that prevented the machines from sinking into the soft spots.

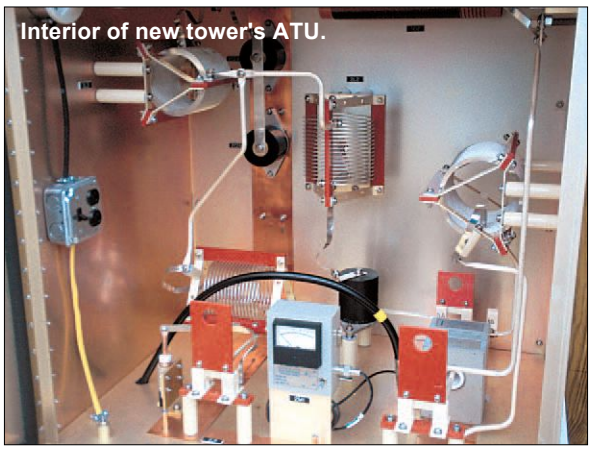
The entire excavation, placement and backfill of three guy anchors took just one afternoon from start to finish. While the crew was busy placing the guy anchors, they had already rebarred the base pier, had it inspected and had used wheelbarrows along the new boardwalk to bring out enough concrete to finish the pier. Once again, the impact to the site was minimized and the crew made the most of their time on the site to get all the work done on schedule.


New ATU box and tower base.

After a couple weeks of concrete set-up, my tower crew returned to start stacking the new 180 foot tower. As always, the first sections are the hardest because you have to take extra time to attach temporary guy lines, and make sure the sections are plumb and the guy wires are at their proper tension. Trying to use a crane to raise the tower sections was out of the question for the same reason we couldn't get a concrete truck into the property, so a gin pole was the preferred tool to raise the tower section by section.

The tower crew got the first half of the tower up in a couple of days but then the winds picked up, so we needed to take a couple days off. As the stacking continued, the crew was very careful to install the guy anchor levels at the altitudes specified in the engineering drawings. As often happens at multi-tower sites, one set of the guy wires of the new tower had to cross the existing tower's guy wires but some pre-planning made that easy to accomplish. Topping out a new tower is always a good day!

Kurt Gorman of Phasetek was next on the site with a new line tuning unit for the new tower. I've always been impressed when Kurt personally delivers his equipment to a site and then jumps right into the installation and tune up. On the projects we've worked together on, he's always had a natural knack of knowing what will, and what won't, work in an ATU or phasor. I had acquired a gently-used three tower phasor and had already removed most of the parts associated with the third tower, so this got me some spare caps and inductors for future use and made the phasor ready for Kurt to modify and tune up.


Interior of new tower's ATU.

Fortunately, Charley Hecht, my trusty consultant, and Kurt Gorman had modeled my proposed directional pattern and they set up the starting parameters relatively quickly.

The first step called for a set of non-directional field strength readings at 25% power to help establish the conductivity of the area. I probably could have used the Method of Moments to proof the array, but I personally like doing field measurements, so I got to work. The non-directional proof went quite well and then we jumped into the directional portion of the field measurements. With Charley's assistance, we optimized the directional pattern and I set about visiting the same points I used in the non-directional mode, but now in directional mode.

With just two field measurement points left on one radial, I quickly noticed that the signal was now at almost the same level as on the non-directional measurements. Either I had found a way around the laws of physics, or there was a problem back at the antenna array. When I got back to the transmitter building, I saw that that the transmitter had folded back from 5 kW to 3 kW and now had a lot of reflected power. Switching to non-directional showed a lot of reflected power from the old tower, so after opening the breaker on the transmitter, I headed out to Tower #1 to check the mica caps and tap connections on the inductors.

It's not unheard of to get a bad cap out of the box and have it fail prematurely, but all the caps in the ATU were not cracked, not leaking tar and were not even warm. The inductors were also OK and their connections were still tight. However, I thought I smelled a burning odor but nothing in the ATU looked burned or arced. As I leaned on the side of the ATU for inspiration, I glanced at the tower base and saw one isocoupler were there once had been two!

I had installed two coffee-can sized isocouplers on Tower #1 – one for an STL and the other for an RPU. If you ever contemplate needing an STL or RPU, it's a lot easier to proof the array with them already in place than have to reproof and readjust the array in the future – especially with two or more isocouplers. Now I see that the STL isocoupler, that I had been given as a gift, was now just a pile of ash. Isocouplers are a bit fragile because inside they have two plates, one on the transmitter side and the other on the antenna side separated by an insulator plate. This allows the STL or RPU signal to pass across the hot AM base insulator.


New isocoupler at old tower.

Two isocouplers installed on Tower #1

Isocouplers really don't work very well when water gets inside them or when the insulator plate is pierced by lightning. I suspect that the toasted isocoupler had been hit by lightning and had continued to work at the 1 kW station where it was located. However, when presented with a higher operating voltage, the previous arc-over through the insulator plate started arcing again and continued to arc until there was no isocoupler left. Fortunately, I had a spare iscoupler of the same brand, and with a known operational history, so when I installed it, all of the parameters came right back to where they were before the flame-out.

My construction permit specified that I had to identify two prospective monitor points in the directional nulls. With that requirement in the back of my mind, when laying out the radials, I looked for two good locations that were at the proper distance from the transmitter, had easy access, no power lines, and provided good, repeatable signal strength numbers. A favorite monitor point location is in cemeteries because they are wide open, rarely have any above ground wires and the residents never ask what you're doing.

The rest of the directional proof went well and without any issue. I had to wrap up all the field readings quickly because it was going to get very cold and they all had to be taken during the same environmental conditions. Charley Hecht crunched all the numbers and prepared the necessary exhibits for the FCC Form 302A. The filing is still submitted on paper, so now the waiting for a license begins!

Steve Callahan, CBRE, AMD, is the owner of WVBF, Middleboro, Mass. Email at: wvbf1530@yahoo.com

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FCC Focus

Station Files Going Internet

by Peter Gutmann

In a purely competitive sense, broadcasters tend to view the Internet more as a rival than an ally – and often with good reason nowadays. Yet with two recent proposals the FCC has begun to move radio towards the Internet, for better or for worse.

Contest Rules

To take the more positive development first, the FCC has proposed enabling broadcasters to post contest rules on the Internet rather than having to bore listeners with lengthy and often comically-rushed, incomprehensible and thus useless on-air disclosures.

The current rules require that all material contest terms be broadcast periodically. The updated rule would permit disclosure either through periodic broadcasts or on a station's website (or, if a station has no website, then on some other publicly-accessible website). If web posting is used, then a station would have to announce the availability of rules and identify the website address every time the contest is mentioned.

Unchanged would be the requirement of disclosure of material terms when the audience is first told how to enter or participate. Any changes to the terms would have to be announced and reflected in any website posting of rules. Of course, all announcements concerning the contest must conform to the formal set of rules available on line.

All five Commissioners released statements enthusiastically supporting the rule change, so its implementation seems certain, although not until after the usual period for evaluating comments and routine bureaucratic delays. But at some point in the near future broadcasters can look forward to relief from the burden of on-air disclosure.

Now if only the Federal Reserve Board would follow suit and lighten the need to disclose all those credit terms in broadcast spots.

Public Files

The other Internet development may meet with a more mixed reception from the radio community – a proposal to require radio stations to keep their public inspection files in an FCC database. Since a similar proposal had been implemented for TV in 2012, the extension to radio was expected. Fortunately, no significant changes are proposed to the contents of the public files.

Although concern has already been raised as to the ability of the FCC servers to handle all the new information, the FCC seeks to minimize disruption by beginning the on-line requirement for commercial stations in top-50 Nielsen markets with five or more full-time employees, and then two years later extending the obligation to all other commercial stations with five or more full-time employees.

To avoid network traffic jams the FCC is considering staggering the filing windows for its EEO and ownership reports. It is also considering a permanent exemption for noncommercial stations and commercial stations with smaller staffs.

In practice, the change might not prove unduly burdensome. The FCC plans to automatically incorporate into a station's on-line file all materials filed electronically, including ownership reports, EEO reports, applications, authorizations and the like. Stations would only be responsible for uploading their quarterly issues-programs lists, certain agreements and other materials not otherwise filed with the FCC. Since these additional materials are currently required to be placed in the physical file, and since no format is being mandated, they simply would be scanned and emailed to the FCC (at least for now – a searchable format requirement is being considered for the future). Letters and emails from the public could continue to be kept at the studio. In addition, only new political materials would need to be uploaded; the existing political file would be kept at the studio for the rest of its two-year retention period.

Somewhat ironically, the FCC appears to have less than full confidence in the reliability of its proposed on-line system, as it plans to require that stations keep backup copies of all political file materials.

So this promises to be both bane and boon. On the one hand, stations should be relieved of concern over misplacing file materials and having to deal with the distraction of inspection and reproduction requests (although admittedly these are rather rare). But on the other hand, the FCC will have a quick way to check the completeness and currency of each station's public file without the need for a field inspection, and public interest groups will have ready access as well. (Indeed, stations with websites would have to publicize the location of their on-line public files through a link on their home pages.)

As with the contest rule proposal, all five Commissioners seem to be in favor of the public file change, so it's probably more a matter of when than if.

And How About EEO?

Despite these signs of finally recognizing the prevalence of the Internet in our lives (and I suppose it's about time – the public has accepted it for an entire generation), there is one area in which the FCC remains firmly committed to tradition.

Recently it fined two large radio clusters for having failed to properly recruit for their full-time job openings. The problem, according to the FCC, was that they relied upon job postings on their websites, private contacts, word-of-mouth referrals, internal postings, broadcast spots, walk-in applicants and the like. Logically, that would seem a reasonable way to locate the most enthusiastic and experienced applicants for most, if not all, media positions nowadays. After all, when a potential employee takes the initiative to seek you out and to follow up through further contact, isn't she more likely to fit in with your professional expectations for talent and loyalty? And isn't the goal of many of the outreach initiatives that the FCC requires of all but the smallest "employment units" (job fairs, career days, school presentations, etc.) to stimulate interest and collect resumes for future work at a station?

Yet, the FCC faulted the licensees for disseminating notices of job openings in ways that "cannot reasonably be expected, collectively, to reach the entire community." Although the Commission did not mandate the use of any particular means, it appears to cling to traditional (dare we say old-fashioned?) means. Presumably these would include newspaper ads, postings at area schools, and notifications to local job banks and agencies.

Note that there is nothing in the FCC's EEO rules to require the use of any specific type of source. Rather, the relevant rule (§ 73.2080(c)(1)(i)) requires an employment unit to "use recruitment sources for each vacancy sufficient in its reasonable, good faith judgment to widely disseminate information concerning the vacancy." Although the FCC has afforded rather wide latitude in applying that admittedly vague prescription to specific situations, it is clear from the latest decisions that licensee discretion is limited.

In fairness, the FCC did not suggest that more modern and activist sources could not be used – just not exclusively. Indeed, judging from broadcasters' recent experience as reflected in annual public file EEO reports, it would appear that nowadays the vast majority of successful applicants in fact come from the very sources that the FCC considers inadequate. And that seems quite logical – wouldn't someone eager for employment leave no proverbial stone unturned? Nonetheless, while stations are likely to place significant reliance on social media and other modern resources, efforts cannot stop there.

In addition, the two recent cases serve to emphasize the on-going need to send a full-time job vacancy notification to every local organization that requests to be notified. Although this remains of prime importance, the licensees apparently failed to do it on a consistent basis.

The final blow is that when EEO lapses are found, even if only in recordkeeping, the FCC further concludes that the licensee in question could not have engaged in meaningful analysis of its recruitment program to ensure that it had been effective in achieving its goal of broad outreach to potential applicants. That, in turn, becomes a further violation of FCC requirements (which mandate on-going self-evaluation of EEO programs in order to determine if adjustments are needed).

While the fines of $1,500 per station that the FCC levied are unlikely to send large groups into a financial tailspin, it coupled them with a far more severe sanction – three years of reporting conditions, requiring annual submission of detailed recruitment information for each full-time position, together with full documentation to verify all such efforts – with the implicit threat of more severe penalties if performance were to fall short.

So while the FCC seems to be on the verge of joining the rest of the world in accepting the Internet for purposes of posting public files and contest rules, it somehow declines to do so for EEO recruitment. Go figure (but while you're figuring, be sure to supplement any modern recruitment approaches with traditional ones).

And finally, speaking of FCC enforcement, you'd better be really nice to that FCC inspector the next time he or she pays a visit ...

The Legal Times reported that in his annual testimony to Congress this past Fall the FCC's Inspector General requested that his staff be equipped with guns, claiming that he needed armed investigators to interview witnesses in some cases. The article aptly observed: "Keep in mind that these interviews are, by definition, about potential violations of communications regulations. The FCC doesn't pursue gun runners and drug dealers. Lawyers all over America, within and outside government, conduct witness interviews under much scarier circumstances than an FCC investigator is ever likely to face." Even so, the article noted that, even without their own stock of munitions, Inspectors General already can call upon firepower when (if?) actually needed. So ... be nice!

Peter Gutmann is a partner in the Washington, DC office of the law firm of Womble Carlyle Sandridge & Rice, LLP. He specializes in broadcast regulation and transactions. His email is: pgutmann@wcsr.com

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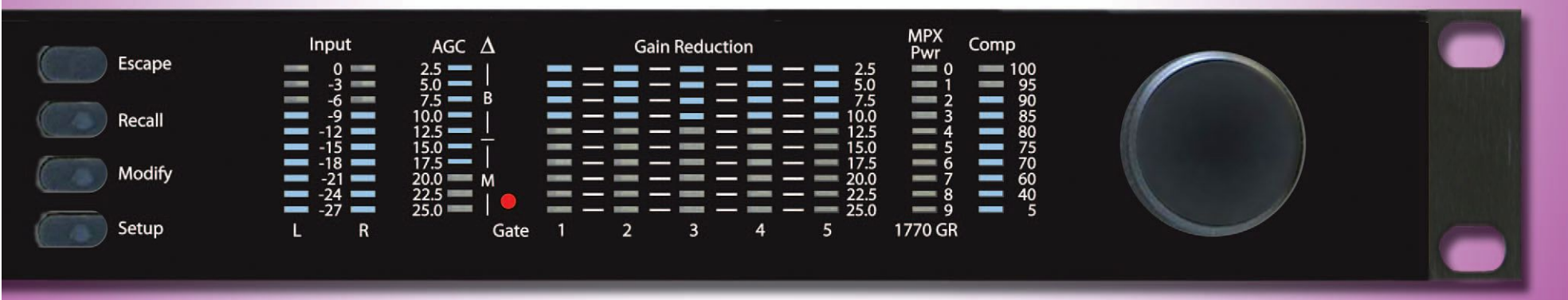

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Audio Guide

Maintain Headroom When Recording Audio for Internet/Mobile Distribution

by Paul Figgiani

Radio Stations and Independent Producers have recognized the viability of Podcasts and now view the medium as a legitimate method of content distribution.

There are a number of best practices for recording audio destined for Internet/Mobile delivery. Segments will require *Loudness Normalization* to a higher average loudness target compared to what is specified in the now ubiquitous Broadcast/TV specifications. This is due to Internet/Mobile device deficiencies and less than ideal media consumption environments.

Since the Internet/Mobile distribution platform requires a higher *Integrated Loudness* target, positive gain offsets are inevitable. When you add gain you run the risk of introducing distortion into audio segments throughout any workflow.

One of the most important aspects of ensuring a distortion-free recording is efficient management of *headroom* during sessions and throughout post production. This will yield high quality masters suitable for lossy encoding.

Prior to recording, proper gear selection and implementation is imperative. I'm referring to the mic, the quality of the gain source (preamp), the interface, and the recording device (hardware or software).

if you are using a low output mic, maxing out your preamp trim in order to drive the mic is not recommended. This will result in problematic noise that will eventually need to be removed. Aggressive noise reduction in post never turns out well, especially when using low quality software tools that may introduce artifacts.

Recording

Here are a few tips on how to handle dealing with a low output mic plugged into a voice processor to record audio slated for Podcast distribution:

With the mic plugged into the processor, route the output to a line input on a mixer with a gain trim. The mixer's output should feed the computer/DAW. Finally, insert a software gain trim on the channel that's receiving the mic signal.

Basically I'm recommending efficient gain staging. By using a combination of three stages, the signal will exhibit lower noise and will be much more suitable for recording and post production.

The preamp on the voice processor is the initial stage of gain, set to a moderate level – in fact nowhere near it's maximum. The gain trim on the mixer's input channel provides additional gain while still maintaining a minimum amount of noise. Lastly, the software gain trim setting will produce a signal that is hot enough to record with ample headroom.

How much headroom should one shoot for? Well that's subjective. There are many variables including the skill level of the producer, the gear, and the availability of proper audio processing tools. I would say that anything close to -3 dBFS or less would be risky. I would be more inclined to suggest that you leave 6 to 8 dB of headroom.

Obviously inherent problems in the source will be problematic. Persistent problems need to be addressed *before* you take the recorded audio into post. If your post production processing introduces distortion, most likely it can be corrected.

Post Production

Let's assume you were able to record a fairly clean segment of audio with ample headroom. In most cases it will be unsuitable for distribution due to insufficient Integrated (perceived) loudness for this type of media. Eventually the audio will need to be bumped up to the platforms's recommended targets.

The first thing you need to do is assess the dynamics and decide whether dynamic range compression is necessary. For spoken word I recommend that you maintain a much tighter dynamic range than you would for music. I'm not suggesting overly aggressive compression. The point is, if the recorded source is highly dynamic with levels all over the place, it's going to be difficult to properly bump things up in post.

Use a Compressor plugin to tame your dynamic range, if necessary. Start with a 3:1 or 4:1 Ratio, fairly fast Attack time and moderate Release. The Threshold will vary based on how hot the signal is at the source. You will need to experiment with a combination of all settings in order to achieve the desired results, where transients (peaks) are tamed without overly compressing.

After this initial pass of dynamics processing the audio will be suitable for bumping things up to the recommended distribution loudness targets.

Note that I didn't make any references to additional aspects of any post production workflow (equalization, noise reduction, etc.). These processes will also play a major role in the end result.

Bumping Things Up

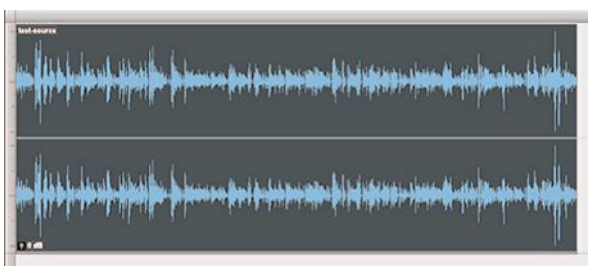
As far as processing to specific Integrated Loudness and True Peak targets, the *Match Volume* options in Adobe Audition warrant consideration. Note that in the "Loudness" mode, the Match Volume processor does not support user defined peak ceilings.

Auphonic (the web service or stand-alone application) is also a viable option. For advanced producers who are comfortable using various plugins for "manual" processing, your choices are endless.

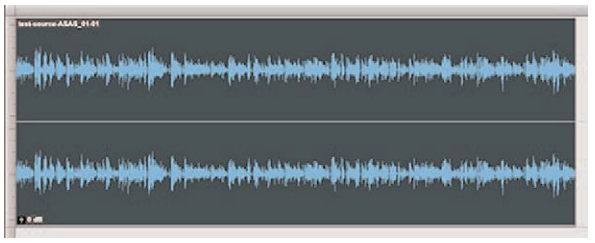
Here is an example and exercise. You'll need a Compressor plugin and *LoudMax*, a free, cross platform loudness maximizer plugin.

The following source example was actually a distributed Podcast. In essence it is not a source level recording. However I think it will serve the purpose of displaying various stages of processing that will result in a distortion free piece of audio suitable for distribution.

This is the recorded source. In order to make it suitable for loudness processing, we need to tame the dynamics:



The following image is the result after the initial stage of compression:



At this point additional processing has been applied in preparation for final loudness processing. Let's refer to this as the Processed Source:

Lastly, the Processed Distribution Master:

In your DAW of choice, try to replicate the various stages using a (clean) source recording. As noted you will need to manage dynamics and handle what ever else you deem necessary.

When you reach the Processed Source stage, using the LoudMax plugin, set the lower Output slider to -1.5 dB. This is the Peak Ceiling.

Play the audio clip through the plugin and pull down the Threshold slider. You will notice an increase in perceived loudness. Also be aware of the amount of gain reduction (vertical level meter).

Use your ears and get things to where you feel comfortable in terms of loudness. Finally, bounce your audio clip through the plugin. This is sort of an arbitrary exercise. If your recording was in good shape, and you managed headroom well throughout the workflow, the resulting audio should be significantly louder with no hint of distortion.

For this exercise I did not suggest shooting for any specific targets. My intent was to demonstrate the process as it evolves. Remember that audible problems in the source will be much more noticeable after bumping things up to specified targets.

Next in this series – Loudness requirements for Internet/Mobile audio distribution and necessity for revised standards.

Paul Figgiani is an independent audio producer/engineer with extensive experience producing Podcast Audio since 2004. He is the founder of www.producenewmedia.com Paul currently provides media post-production services and consulting for a select group of clients. Email: ptfigg@producenewmedia.com Twitter: @produceNewMedia

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Considerations When Buying a Transmitter

The Physical Trade-Offs of Small vs. Tall Transmitters and Rack-Mountable vs. Self-Standing Integrated Racks

by Scott Marchand, Nautel Limited, Bangor, Maine

Introduction

While a lot of focus is spent on comparing specifications, performance and efficiency when buying a new transmitter, there are many physical attributes of modern transmitter design that also deserve consideration. Much of this may be common sense, but it doesn't hurt to take a moment to review the physical trade-offs of small vs. tall transmitters and rack-mountable vs. self-standing integrated racks.

Ergonomics and Safety Considerations

What is the weight of the rack-mountable transmitter? Does it imply that two or even three people may be needed to lift the system safely into and out of the rack? Are those people always readily available? If it's on the heavy side, does the rack-mountable transmitter come with slide rails? Can slide rails be easily installed? Does the transmitter's weight compromise safety and rack-tipping considerations? What cabling accommodations are necessary to allow for easy sliding in and out?

The good thing about a self-standing, integrated transmitter is that once you have it in place it rarely needs to be moved. However, it is still important to consider the weight of the more commonly-removed components such as power modules. Can these components be safely lifted in and out of the transmitter? Are the commonly-removed components located high or low? Does the transmitter door have adequate space to swing open fully? Do you have room to easily access the back panels?

You'll also want to consider the ease of access to controls on both rack-mounted and self-standing, integrated transmitters. Are the controls and displays located near eye level or might you be reaching up or stooping low? If it's a rack-mountable system, can the screen and controls be placed high enough without compromising safety and creating an easily tipped rack?

Heat Load and Ventilation Considerations

Consider heat load and ventilation, as well as intake and exhaust paths. Even though rack-mountable transmitters are designed for rack mounting, you should still consider the other components in the rack and the significance of their radiated and exhausted heat (i.e. what is being dumped into the shared rack) to ensure the ambient temperature for the transmitter is maintained within specification.

Specified rack units (RU) may not factor in the required blank space above and below the unit, which effectively adds to the total RU of the transmitter; ensure you have the required space. It may be necessary to purchase open-frame vs. closed racks in order to aid in cooling; something that should be known in advance of receiving the equipment as a new rack may have to be purchased. Existing racks may already have doors on the front or rear, with locks required for security; ensure adequate cooling can be achieved.

Self-standing integrated transmitters tend to have defined ventilation paths with heat load and proper de-rating already factored into the design. These types of transmitters are typically easier to adapt to intake and exhaust ducting; whereas ducting for rack mount units (assuming the heat load must be ventilated out of the room) tend to impede access, so a common ventilation system would be required for the entire room.

Installation Considerations

How easy will it be to move a self-standing, integrated transmitter in to the facility? For example, you'll want to consider the transmitter's weight, the door widths of the facility and transmitter room, turning space, etc.

Regardless of rack-mounted items or standalone systems, an allowance has to be made in calculating door openings to accommodate the equipment in its packaging. A standalone system may be several inches larger in all dimensions than the final physical dimensions, due to the need to have it crated for shipment. Will the system need to be uncrated in order to get it in most doors?

After putting the transmitter in place, you'll want to consider other installation elements like connections. Will there be heavy coax hanging off a rear RF output connector? How accessible are the remote interface connections? Are the remote connections terminal blocks or harder-to-wire D connectors? How accessible are the AC terminal blocks or input connectors?

In the case of a rack-mountable transmitter consisting of several units connected or combined together, how complex is the wiring between the units? Could this complexity lead to future potential points of failure via loose or defective connectors, especially in the case of RF connections which may be prior to protection circuitry? How easy will it be to ground the system for proper lightning protection? Are ferrites provided for surge protection on AC, RF, remote and audio wiring entry points? Or are they provided separately for customer installation – or not provided at all?

Maintenance and Support Considerations

Can maintenance be easily performed while the transmitter is in the rack? If not, have you allowed for a work area close by? How easy is it to access the parts that fail more often, like fans or blowers? Similarly, how easy is it to clean the air filter, if there even is one? Can maintenance be accomplished while on the air via hot swappable components? While there are some exceptions, this is where a self-standing, integrated transmitter can have a big advantage over a rack-mountable system.

How easily can you access components? In the best case, you simply slide out a downed component. Worst case, you might require two staff to remove a heavy unit from a rack and transport it to a work bench, and then remove bottom covers and multiple boards, wire harnesses and components to reach the failed item.

When considering manufacturer support, what might you need to return to the factory or service centre? Is it just a module or might you need to return the whole transmitter for service.

Total Cost of Ownership Considerations

While the basic purchase price of a rack-mountable transmitter can be much less than an integrated system, don't forget to factor in the funds for a quality rack and rails if these are not currently available in your facility. Also, there's a significant difference between the basic purchase price of a transmitter and its long-term cost.

Ensure that your maintenance needs are going to be met by your chosen system and that the long-term maintenance costs are factored in to the total cost of ownership. The initial savings of a compact, rack-mountable transmitter could become insignificant when compared to potential off-air costs and more complex maintenance.

Transmitter Weight Considerations

Although the technology exists to make a 5 kW and even 10 kW FM transmitter in a rack-mountable format, they typically weigh 100-200 lbs and over. That is a major consideration if the transmitter needs to be pulled in and out of the rack for service.

General occupational health and safety guidelines would suggest these designs are too heavy to lift comfortably. For example, the maximum weight allowed for your airline baggage is 50 lbs. Nautel engineers have designed our rack-mountable transmitters to be lifted comfortably; for example the VS300 is just 23 lbs, the VS 2.5 kW is 65 lbs and the J1000, 1 kW transmitter, is only 50 lbs.

Ease of Access for Maintenance

To make our rack-mountable transmitters even easier to maneuver and access, the J1000 transmitter weight of 50 lbs is split between two boxes, and the VS2.5 transmitter is shipped with slides that, when correctly installed, give easy access to components without removal from the rack.

Reliability Considerations

Squeezing a lot of components and power in to a small box presents challenges in keeping everything cool. To achieve minimum design enclosure size, many manufacturers are forced to configure fans in the pull mode at the air exhaust position. While this may seem innocent enough, it means that air is heated by first passing over hot circuitry before flowing through the fans.

Hot air in a fan increases the fan failure rate since a fan's bearing life is related to the temperature of the air flowing through the fan. Contrast this with the Nautel design philosophy which is to ensure that fans are utilized in push mode so only cool air passes over the fan bearings. The result is optimal fan life, fewer fan repairs, and greater transmitter reliability. Nautel designs also address filter placement such that you can change filters without taking the transmitter off the air.

Redundancy and Hot-Swap Modulaes

A key trade-off between compact rack mount designs and tall self-standing rack systems is the impact on redundancy and hot-swap modules. A transmitter designer needs mechanical space to build-in redundancy and hot-swap-ability. Rack-mountable transmitters tend to not have "hot-swappable" power components (i.e. those components that are more likely to fail) as access to those components is quite restricted while mounted in the rack. It's a good idea to investigate and understand which components are "hot-swappable" prior to your purchase.

Self-standing integrated racks have more flexibility in their design to house redundant RF modules and power supplies. Consider Nautel's NV10LT transmitter. It houses four parallel RF power modules, easily accessible for removal in the event of a failure, without taking the transmitter off-air for servicing. Each of those RF modules has four parallel RF power amplifiers. The transmitter also has eight power supplies (two per RF module) that are easily hot-swappable. These parallel devices provide the advantage of soft-failure. Soft-failure means that components can fail, but rather than go off air the transmitter either fully accommodates for the loss of these redundant components or stays on the air at partially reduced power.

Small rack-mount boxes tend to compromise on redundancy, as there is typically not enough space to accommodate two of everything. That is why Nautel focuses on applying redundancy where needed; on RF power amplifiers and critical power supplies. Even the compact VS2.5 has four parallel power amplifiers and three parallel power supplies.

Conclusion

Over four decades of experience and listening to our customers has shaped the design of Nautel's transmitters. From an engineering standpoint, we not only consider the basics of size and weight, but also critical quality elements like reliability, robustness, high-operating efficiencies, and built-in redundancy. And from the customer's perspective, we know that while some prefer small, compact transmitters others place a higher value on having plenty of room to access the inside of the transmitter for easy maintenance.

So just when does it make sense to build a rack-mountable transmitter versus a self-standing, integrated-rack transmitter?

At Nautel, we think rack-mountable makes sense when the transmitter can be designed to weigh less than 80-100 lbs, and when hot-swap maintenance is less of a consideration. – *RG* –

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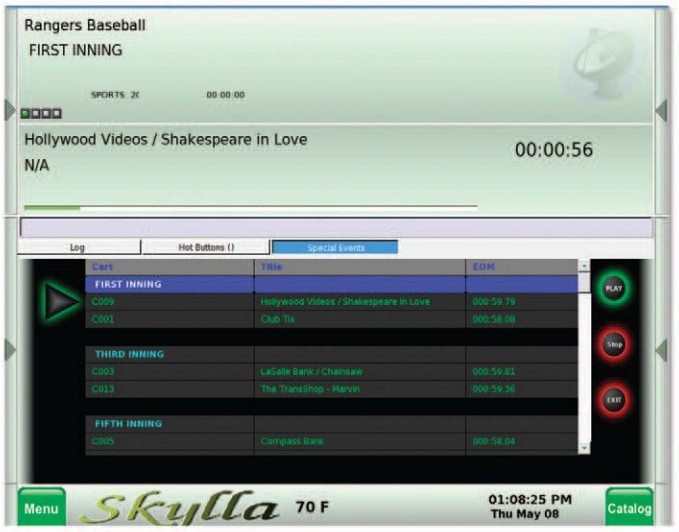

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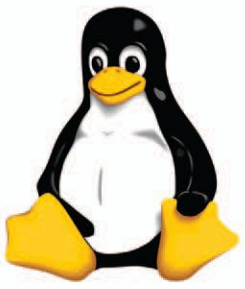

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Remote Guide

No More Skype Ducking

by Mike Phillips

Using Skype to bring in a Remote Host can be frustrating because Skype is a half-duplex service, meaning that only one person can talk at a time. If the Control Room and the Remote Host talk at the same time, the louder of the two is going to cause the other person's audio to duck or attenuate. Ducking can be a real problem when a show is about a hot topic and the Remote Host and a caller (fed from the control to the Remote Host) are really motivated. It's also a problem if the Control Room plays music and the Remote Host wants to talk over the music.

There's a simple solution to prevent Skype from ducking during calls. When you hear it, you'll wonder why you didn't think of it already. The trick to eliminating Skype ducking is to put the Remote Host and the Control Room on two different channels. With this configuration, the host and Control Room audio are not competing with each other for whatever bandwidth Skype requires, and the audio flows smoothly in both directions at the same time. With this technique, it doesn't matter that Skype is half-duplex since you're sending audio in only one direction on each channel.

The simplest solution for two simultaneous Skype connections is to use two computers. However, you can separate the Remote Host and Control Room audio using two instances of Skype on the same computer. Start a second (or third) instance of Skype by using the "/secondary" switch. The procedure is described in full at http://j.mp/skypesecondary. Make an icon for the second instance on the desktop to make it easier to access the secondary account.

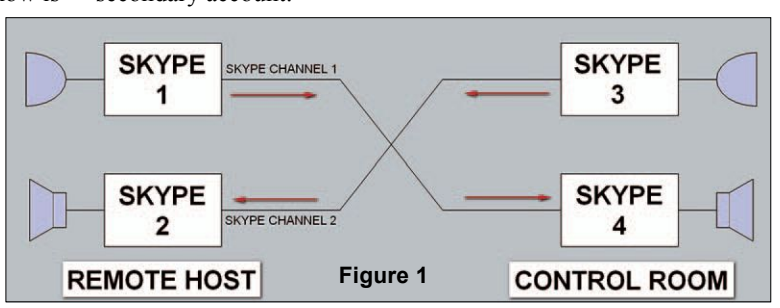

Figure 1

By way of illustration, start first and second instances of Skype on each computer. Have the Remote Host call the Control Room on Skype like normal. Log into the second instances of Skype with second Skype accounts. Have the Remote Host call the Control Room's second Skype account using the Remote Host's second Skype account. At that point, you have two simultaneous Skype conversations in progress using four instances of Skype. Your setup should look like the illustration in **Figure 1**.

The microphone and speaker settings for the Windows version of Skype are found at Tools|Options|Audio Settings. On Skype 1, set the Microphone to the computer's input driver. It doesn't matter which output driver is you select for the Speaker. On Skype 2, set the Microphone input to an unused driver, and/or turn the input Microphone Input Level control all the way off. Set the Speakers to the sound card output you're using to feed the headphones. On Skype 3, set the Microphone to the computer's input driver. Likewise, it doesn't matter which output driver you select for the Speaker. On Skype 4, set the Microphone input to an unused driver, and/or turn the input Microphone Input Level control all the way off. Set the Speakers to the sound card output you're using to feed the audio to the console.

Sometimes there will be a mysterious interaction between the two instances of Skype on the same computer when you're adjusting audio levels. That interaction is a result of the way audio drivers are written. If you find that adjusting the Microphone level on one instance simultaneously adjusts the Microphone level on the other instance, select an unused input channel from your sound card for the Skype instance that you don't want to send audio (Skype 2 or 4). If you don't have an unused channel, get a $3.00 USB sound card, install it, and select it as the Microphone input.

The key to eliminating ducking is to make absolutely sure that no return audio is sent by the Control Room to the Remote Host on the channel that is sending audio from the Remote Host to the Control Room (Skype 3 to Skype 1 on Skype Channel 1) and vice versa. In our experience, it's always best to *not* select "Automatically

(Continued on Page 22)

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No More Skype Ducking

– Continued from Page 20 –

adjust microphone settings" or "Automatically adjust speaker settings" in Skype. You're better off controlling levels manually.

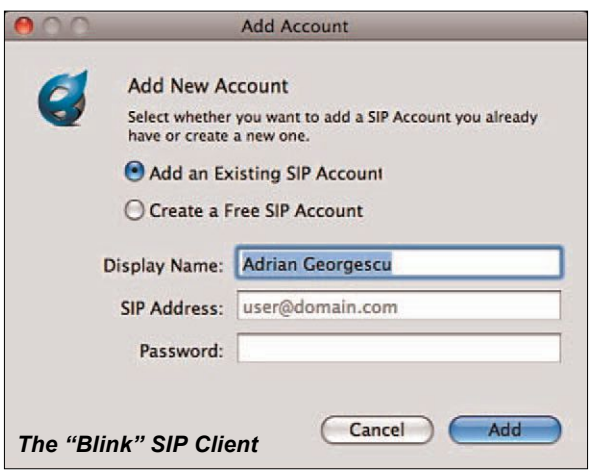
Return audio from the Control Room to the Remote Host does not need to be full, wideband audio, like Skype provides. If the Remote Host is already bandwidth-challenged, this configuration will contribute to the problem.

To minimize bandwidth requirements, it's possible to use a lower bandwidth return channel. This setup takes advantage of a free technology called SIP. The SIP client of choice is Blink from http://icanblink.com. Clients are available for PC and Mac.

A SIP client needs a SIP account to connect through the network. Both the Remote Host and the Control Room need their own accounts. When you start Blink, it asks if you want to add an existing SIP account or create a free SIP account. Even if you already have a SIP account, the first time you start Blink, follow the instructions on the screen and create a new one.

Blink automatically configures itself to use that account, which will be something like <remote_host>@sip2sip.info and <control_room>@sip2sip.info. Make a SIP-to-SIP call with the other side by "dialing" <remote_host>@sip2sip.info from your <control_room>@sip2sip.info account, substituting your actual account names. If you're not able to communicate with each other, solve the problem before proceeding.

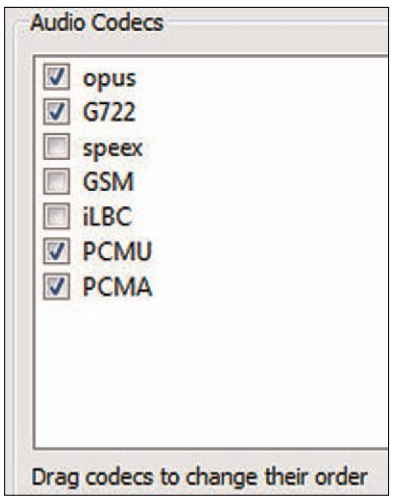
The configuration using Blink for return audio is the same as the dual-Skype configuration above, except that the Blink connection replaces Skype Channel 2. Use the same audio input settings for Blink at the Control Room that you would use for Skype 3, and use the same settings for Blink at the Remote Host that you would use for Skype 2. One benefit that Blink has over Skype is that you can select "None" for an input device. With None selected, no audio is sent from the Remote Host to the Control Room.



The "Blink" SIP Client

This system is used for Rick's House Radio Show at http://mixlr.com/rickshouse/showreel. On the January 26, 2013 show, you can hear Rick easily talk over the music without any audio ducking. He is not hearing any ducking of the music in his headphones when he talks. The Control Room is in North Carolina. Rick is in Tennesee using an Audio-Technica AT2005USB microphone to send audio over Skype while listening to return audio with Blink through his laptop's onboard soundcard.

This configuration sounds more complicated than it really is. Once you understand the concept of sending audio over Skype on one direction only, you're good to go.



If you're doing a remote that has very limited bandwidth, there may be a bonus solution here for you. Try doing the remote using just Blink with a SIP connection. Now that Blink includes the Opus codec, the audio quality is pretty good. Make sure you have the Opus codec enabled and positioned at the top of the list.

If you have unlimited money, you can find stellar IP solutions that don't require a lot of your time to set up. However, if you're on a strict budget and really like to get a good result for free, or if you're in an emergency situation, give this configuration a shot. If you just can't get things working correctly, let me know, and I'll try to help. My email address is below.

Mike Phillips started in the radio business in 1962 at his family's radio station in Laurinburg, NC. Over the years, he has been engineer, on-air, sales, and management. He is presently an attorney in Cary, NC and provides audio help for broadcasters and podcasters. You can reach him at radioguide@mikephillips.me

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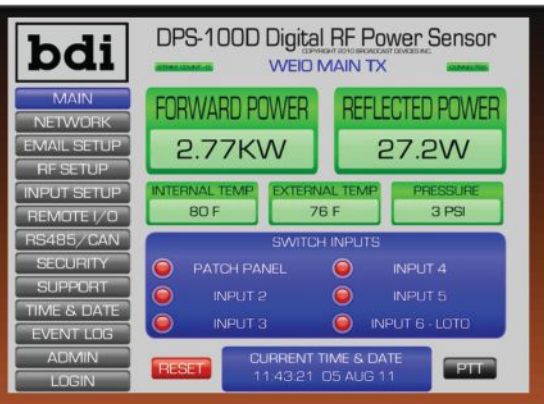

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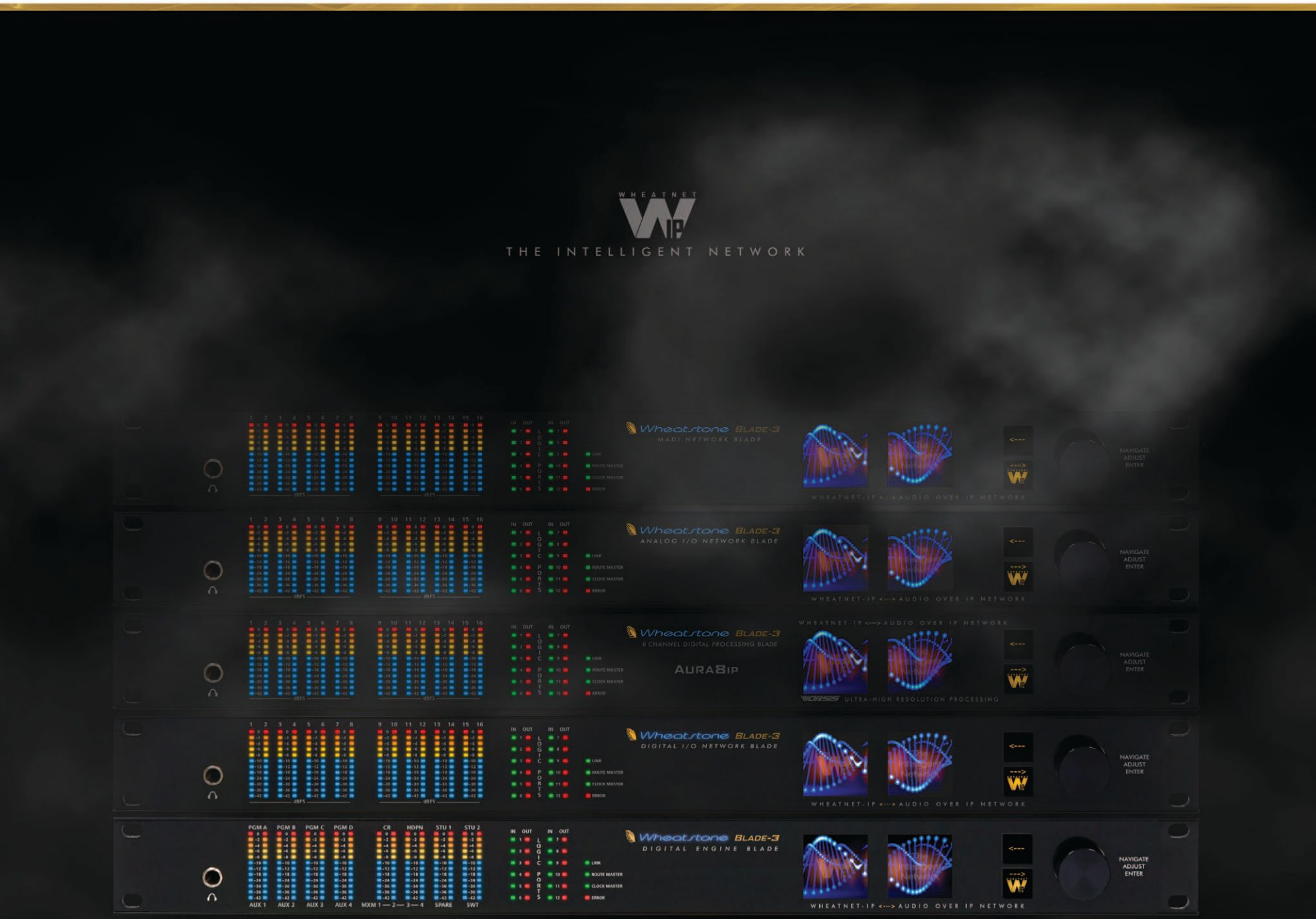

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  All BLADE-3s use Gigabit Ethernet. This makes all the difference in network capacity, near-zero latency, throughput, reliability – in short, everything.

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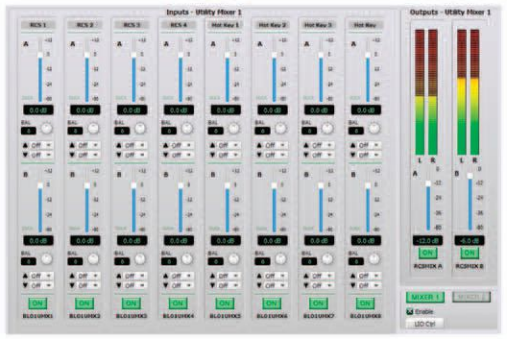
  BLADEs are built to handle and convert native analog, microphone, AES/EBU, SPDIF, AOIP, MADI, SDI and AES67.



- **Two 8x2 Utility Mixers**
  Each BLADE has two 8x2 utility mixers that can be configured in many different formats. Two 8x2, four 4x1, etc. These internal mixers are full featured and include panning, channel ON/OFF, fader levels, and access to any source signal in the system. They also include a full ACI (Automation Control Interface) allowing remote control, ducking, auto fade, channel on/off, levels, source assign, etc.
- **Audio & Control Routing Matrix**
- **Source & Destination Control**
  Each BLADE has the ability to route any system source to the destinations on that BLADE.
- **Front Panel Logic Indicators***
- **12 Universal GPI/O Ports**
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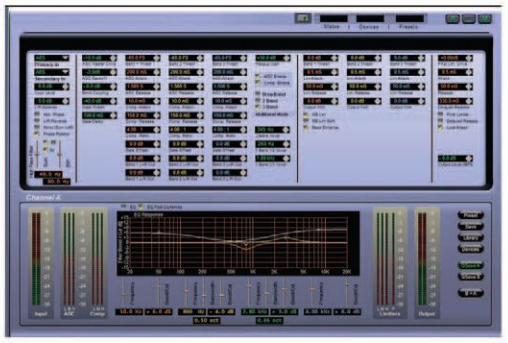
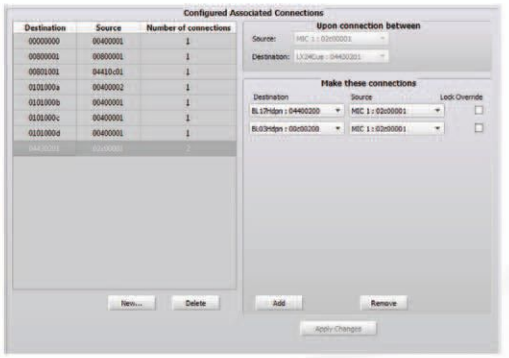
  Used to interface with software switches, indicators, and control functions throughout the system.
- **Built-in Audio Clip Player***
- **Silence Detection**
- **Dual OLED Displays***
- **LIO/SLIO Logging***
- **Aliases***
  Allows the same source to be identified by different names. Multiple aliases can be used so different operators can share logic functions, source feeds, routing, etc.
- **Auto Mono Summing**
- **Signal Splitting**
- **Gain Control on Every Input & Output**
- **Balance Control**



- **Stereo Audio Processor***
  Each BLADE-3 has a stereo multiband processor with the following: 4-band parametric equalizer, 3-way crossovers, 3 compressors, 3 limiters, and a final lookahead limiter. This is a "routable processor," meaning it is not limited to the local I/O on the BLADE – it can be considered a network resource.
- **Onboard Intelligent OS**
  Each BLADE has its own intelligence/operating system that allows it to be a powerful standalone router, part of a larger system or control the entire routing system.



- **Associated Connections***
  This is a great feature in BLADEs for callers, codecs, networks, remote broadcast & live talk shows that require a mix-minus. You can create a predetermined back haul, IFB feed or mix-minus for each device based on its location in the system or on a fader. If you have a shared resource connected to your system, such as a codec, the software will "automagically" give the proper return feed to the codec based on its destination. When a base connection is made, up to ten additional connections can be made. This significantly helps streamline studio routing, phone and codec selection.
- **44.1 or 48K Sampling Rates**
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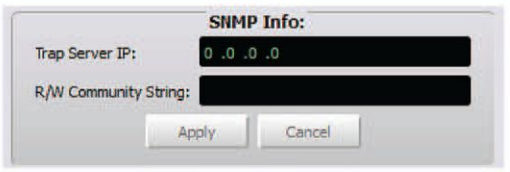
- **Automation Control Interface**
  This is a "tool box" that every BLADE has that allows full control of the BLADE's functions such as routing, ducking, panning, full logic control, mixing and silence detection. Each BLADE supports up to 20 ACI connections which can be used with devices like Talent Stations, GP panels, SideBoards, etc. It also allows control of our partners'/third party equipment.
- **Front Panel Headphone Jack and Source Selection**
- **Salvos/Macros**
- **Studio Bypass**
- **Front Panel Input and Output Metering**
  There is metering for every input and output on the system – 12-segment, multi-color LEDs that can be used for metering inputs and outputs as 8 pairs or 16 mono signals.



- **SNMP**
  SNMP gives you centralized monitoring over large distributed systems. You can configure alarms and set thresholds to get notified if and when a problem occurs. The instant alarms and notifications help you take quick corrective actions through e-mail, SMS, and executing custom scripts.
- **Connection Choices**
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Tech Management

Helping Others to Reach Achievement

by Dick Burden

Some time ago, I was asked to address a group of high school students on career day. In preparation, I looked back at my interests during that period of my life and reflected upon those individuals who influenced my path.

Making Choices

I remember my dad asking me what my plans were following high school. My answer was "to retire." Not surprisingly, Dad took a rather dim view of my reply and turned the matter over to Miss Cameron, the Guidance Counselor at school.

She looked at my grades and found not much to go on there. She noted that I played football and basketball, but that baseball was my real love. She was painfully aware of my single-performance acting career, which made me a permanent member of the stage crew throughout my high school years. So, how do you build a career out of this?

Miss Cameron started by giving me an aptitude test, perhaps to see if there was any aptitude at all. She followed up by talking with my teachers. I bet there were some interesting conversations there! My Latin teacher likely did not to expect me to do well in languages. Mr. Bates, physics teacher and baseball coach, was not impressed with my performance, neither inside nor outside the classroom. His advice to future coaches was not to count on me in a pinch.

To be honest, Mr. Bates was annoyed because his physic experiments often seemed to depart from theory – Ohm's Law measurements did not match the equation. Of course, voltage dividers and shunts behind the meters will do that.

The Mentor

Meanwhile, enter my friend Jack Mulley. Jack had opened a little radio shop at the foot of the hill near the school, following his return from World War II in the Pacific. I would stop by to see him whenever I had a problem with a sound system for a school dance or a stage show.

Jack became my mentor. He taught me to understand what I was doing – and he made it interesting and fun. He encouraged me to do some of the repair work and paid me in Pepsi Colas. This fostered my interest in radio and electronics.

Sadly, all good things come to an end; Jack and his family moved from the area. I promised Jack that I would be a mentor to others, and I have done that.

Brining the Parts Together

Meanwhile, Miss Cameron was entering the home stretch. The aptitude test somehow had shown I possessed organizational skills. She then found a small college that would actually accept me in their economics program and wanted me to play baseball for them. Out of the ashes grew a rose; Miss Cameron had won the perseverance contest!

In spite of myself, here was an opportunity. Soon after my arrival on campus, I found that the students had a Carrier Current station and I became a member of the technical team. It was relatively safe: those were the days when the engineer was on one side of the glass and the talent was on the other. There was no danger of my getting on the air.

We had a great sports crew and, along with our remote technical crew, broadcast the football, basketball and baseball games. I also did a few remote big band broadcasts. Our mixers had only three or four mixing

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Helping Others to Reach Achievement

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positions, so one microphone covered the basic orchestra, the second for the vocal, and a third on the piano was pretty much as good as it got.

New Mentors

As I completed my year of economics and baseball, the radio bug had bitten me pretty hard and I wanted a career change. I left Lafayette and entered RCA Institutes. It was at RCA that I gained a real fundamental background in broadcast technology.

My instructors had years of experience in the field prior to teaching a course. But what I really had there were mentors who understood the practice as well as the theory and had a way of presenting it so that it was properly captured in our minds. This strong background offered me the ability to design circuits, write tech manuals, work in a think tank, be part of a project management team, teach at the Signal School at Fort Monmouth, and do a tour of military duty with Armed Forces Radio.

Along the way I was blessed with the opportunity to work with well-respected engineers on interesting projects, as well as participate in broadcast technical standards. I really have enjoyed my career in radio.

Reaching Today's Youth

As I addressed this group of young people and reflected upon this scenario, I realized how blessed I was to have a Miss Cameron, a Jack Mulley, and a Mr. Bates, as well as many others who made significant contributions to the quality of my life. I needed to make them aware of the difference between a job and a career.

What did these kids have in comparison? The answer, in reality, was probably nowhere close what I had. The question is: how do we instill an interest in any profession without putting forth an effort to reach them? And then, once we develop interest, where is their mentor? Where do they get a formal training? How can we help prepare them for a satisfying career?

To start off, I told them to dream. I told them to identify the profession that would fulfill that dream, and put forth an effort to learn more about it. I encouraged them to seek out advice from someone employed in that field. Ask for a tour of his or her workplace. Above all: make your own choice about your career – and promise yourself to do well.

I told them to love their chosen profession and always keep on learning. I told them to always give their best to their profession and to their employer in whatever they do.

How to Make Radio More Inviting

When that young person steps forward, comes to you, and wants to learn more about what we do, the question is what will you do? I hope it is not simply saying "I don't have the time for that."

How does this profession hope to capture the mind of a young person today? How do we encourage his interest and give him an opportunity to fulfill his capability? Ham radio historically offered an introduction to radio and electronics and many broadcast engineers came via that route. With fewer new hams as a pool, how do we develop an interest in what we do?

It takes both employer and employee to create a good working atmosphere. Where the atmosphere is not conducive to productive employment, the logical choice is to further educate oneself and move on.

Attitude is important and many broadcast engineers feel already overworked and under-appreciated – and thus do not feel any obligation outside of working hours. This is an error in judgment and a potential stalemate in a career. Management that does not encourage an atmosphere for keeping up with technology is equally shortsighted. A change in both these attitudes needs to happen.

If we are going to bring new folks into radio engineering, we need to meet these challenges.

Contact Dick at: rwburden@pacbell.net

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Survival Guide

Starting the New Year Off Right

by Tommy Gray

Around here we are gearing up for another year, but still finishing up last year. Our budgets all go by the fiscal year, so technically we are mid cycle. They have to be turned in by early spring for our next year's operations and equipment budget. Even though Christmas has passed, we are just now starting to look at what projects we want to do next year, and the anticipation of all the possible new equipment and "toys" is running high. In my last article *(Radio Guide, Nov/Dec-15, Pg. 30)* I was talking about staying alive in a pinch. I mentioned several things one could to keep alive when something decides to fail. We were talking about different types of monitoring, and control as well as backup options.

This past year we managed to complete several milestones in our departments, and got a lot done in a great way. I made myself a promise a long time ago that I would never operate in such a way as to only be putting out fires all the time. I have some friends that operate that way, and I can tell you that the stress level is high all the time. Every time the phone rings, the first thought for them is, "OK what is down now?" I lived there ,early on in my career, and it is no fun. I have to confess that I have also been there in past years, through no fault of my own, due to budgetary constraints and a lack of cooperation on the part of those who held the purse strings.

When you are in those "tight" situations, you become very innovative if you plan to survive and keep your hair. Implementing as much backup equipment as possible is one way to do exactly that. A good way to help keep your stress level way down is to plan ahead and to do as the Boy Scouts used to say, "Be Prepared."

Lock 'Em Up Baby!

In many parts of the nation, broadcasters are waging war with the copper thieves. I am constantly reading stories about AM ground systems being stolen, copper strap and coax being stolen, buildings being vandalized, etc. These incidents are becoming more frequent. There are a few ways that you can protect yourself to a degree. Most transmitter sites have some form of remote control system that uses either a telephone line or the Internet. Putting a cheap PC out at the site, and using some inexpensive security cameras that you can access remotely, will give you an "eye on the ground" at your site. No internet? Use a dialup on the computer. Most security cameras come with some kind of software to record. The ones we use are relatively inexpensive (a three pack for about $250) and they come with free software that will do "motion sensing" recording so that they do not fill up your hard drive. The files are stored on the drive for later retrieval.

Don't leave valuable equipment or supplies in plain view or they may not be there when you return. One real problem these days is when you have a crew working on your site, (tower, building contractors, etc.) and there is a requirement to stockpile supplies at the site. Thieves seem to be "construction magnets" and when they spot a site with spools of coax, guy wire, etc., on the ground, they target your site at night or weekends, and you are hit with a large, expensive loss. Please note that some insurance companies will not pay for items stolen from construction sites as they feel that you did not offer sufficient protection, etc. There are specific types of insurance that will cover you while things are being built or upgraded.

Many times temporary fencing is worth the expense and time to protect your valuables. Concertina wire instead of barbed wire is becoming a necessity, as thieves have figured out that simply throwing a blanket over the barbed wire will allow them to easily climb over the fence and do what they want to.

But Wait ... It's Winter!

For some of you, this time of year is a time to stay inside and warm, as the snow is deep and spring is a long way off. You are simply thinking about what to do next spring. For us here in the Deep South, even though it is the middle of winter, we do not deal with the weather extremes some of our counterparts in the northern exposures do. We rarely get snow and ice, and if we do they are for a day or two and then they are gone. Extremely cold days are at a minimum. As a result, our spring starts early. In starting off our new year, we are already looking to first quarter maintenance. You do preventive maintenance, don't you?

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Survival Guide

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Things like generator service, building repairs, and site inspection are starting to be put together. We like to take advantage of annual inventory to examine all our equipment to make sure there are not red flags such as excessive heat, dirty filters, noisy fans, etc. When I arrive at a site, since my nose is especially sensitive, I immediately can detect overheated transformers, resistors, etc. As a result, I usually take a tour of the facility listening for bearing noise, and sniffing out overheating, etc. When I detect something, I quickly attempt to locate the source and fix whatever is going on before it dies at 2:00 a.m.

It was once our practice as engineers to go in every week (we usually did maintenance every Sunday night after midnight) and inspect all the wiring for loose or charred connections, tighten all the screw terminals, etc. I cannot tell you how many times I have averted disaster by finding an electrical connection that was overheating due to a loose bolt or screw.

Back in the day, our automation systems consisted of 8 or so 10" reel-to-reel machines and a controller, accompanied by a huge cart array of some kind to play commercials. I have had to maintain cart machines in older automations with as many as 50 slots or more.

All these tape machines required frequent cleaning and adjustments to assure consistent quality reproduction of the audio content. Things like adjusting phase, azimuth, etc., were common. These days, however, our audio is on computer and requires almost no maintenance. However, this is where a lot of us get into trouble. Since it is not necessary to do regular PM, some folks do no maintenance at all, until something dies and they are in a pinch. As a result, programing and management are unhappy because of a failure and they end up looking bad. Preventive maintenance is still a good thing and will still help you to maintain a reliable plant and output consistent quality. Setup routine maintenance schedules and force yourself to stay with them. Make up a log to remind you of requires tasks.

Even the computers require maintenance. Filters need to be cleaned, machines need to be dusted out, and there are host of other things that we sometimes forget. There is an old saying, "Out of sight out of mind." The machines are under desks, in racks, and sometimes it is a pain to get to them during the day. Well, I know you don't want to hear this, but that is where scheduled after hours maintenance is helpful.

To their credit, our IT guys here voluntarily schedule server maintenance once a month. They come in on a Saturday, and do cleaning, software maintenance and a list of other things they feel are important. All it takes is a little initiative on your part. These days, it seems that no one in radio stations thinks about the engineers or IT guys until something is not working. All the accolades always go to the programming team as they are the most visible, and in charge of the end product. Never forget that they could not do what they do without you, and do a good job anyway! *(Note to the GM here ... from time to time, take your engineer(s) out to lunch. Let him/her know that they are appreciated. Even though you rarely see it, they do a heck of a lot of work to keep your ship afloat. Brag on them occasionally in staff meetings. It is sometimes lonely at the top, and that is where engineers are whether or not you realize it!).*

I apologize for this month being a little short on substance. Immediately after the holidays, and just getting back into the groove, there is not a lot going on to get the creative juices flowing. Right now all I can think about is putting some parts together to build an electronics keyer to bone up on a little CW. Yeah, you can tell I might be a little bored right now. Today is the coldest day of the year and being inside does feel pretty good!

Where to Go?

If you are a person with an inquisitive mind there are a lot of things you can do to improve your skills and become a better engineer. The Society of Broadcast Engineers has a lot of webinars (several are free). The costs are modest. They also have the SBE University courses that are pretty good for the price. Upgrade your Ham ticket or pull out the old electronics books and refresh those old brain cells. The Internet is a valuable resource for you to become a better engineer or IT person.

I usually tell anyone who asks, "Where do you come up with all that stuff?" Around here I've found that "Google is your friend!" For example, I recently got on a "study kick" and reviewed Smith Charts, AM antennas, and a lot of things that I had not looked at in years. I am glad I did, as invariably, something will come up that requires some of that info, and it is fresh on my mind! Until next time ... keep them on the air!

Tommy Gray, CBRTE, CBNE, KG5FAN/AE, *is the Director of Broadcast Engineering/Technology/Facilities at KSBJ/NGEN Radio Networks. He may be reached at: tgray@ksbj.org*

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Translator Topics

How About Those AM Translators

by Jim Turvaville

It is a new year and we have a new Congress taking control in 2015 – and everyone expects at least some policy changes coming from the FCC. Since the FCC acts under the direction of Congress, it is typical for a change in the controlling party in Congress to signal some changes in policy within the halls of the Commission. One thing which we all are hopeful to see is action on the "AM Revitalization" which has been in the works for well over a year.

With the release of Public Notice FCC 13-139, the Notice of Public Rulemaking MB Docket No. 13-249, on October 31, 2013 the Commission outlined a series of six proposed initiatives which were designed to bring improvements to the AM broadcast service. A full text of that NPRM is located at https://apps.fcc.gov/edocs_public/attachmatch/FCC-13-139A1.pdf if you care to review the 32 page document.

A few of the introductory comments bear repeating and are relevant to this article – specifically those which detail some of the impetus for the revitalization plans proposed therein. In the first paragraph of that document, the Commission said:

"*We seek to revitalize further the AM band by identifying ways to enhance AM broadcast quality and proposing changes to our technical rules that would enable AM stations to improve their service. We believe that this in turn will help AM broadcasters better serve the public, thereby advancing the Commission's fundamental goals of localism, competition, and diversity in broadcast media.*"

For most AM owners and operators, particularly those in smaller markets with only an AM signal, these words have been decades in coming from within the Commission hallway. While it is a relief to know that someone at the top has realized the status of the AM broadcast band, we all know better than to put too much hope in a quick solution. Everything involved with an NPRM takes time, allowing for comments, replies, counter-proposals and the entire spectrum of bureaucracy. The quickest and most effective changes are most easily done via the technical side of things at the Commission, and that is where most of the improvements we have seen affecting our industry have taken place in recent years.

From as long ago as 2009, the FCC acknowledged that the AM operator was at a disadvantage, and noted that in the 2009 Translator Ruling which allowed AM stations to utilize FM translators and eventually began precipitating what ended the 10 year log-jam of outstanding translator applications from 2003. In that Ruling, it was noted that FM translator service could become a valuable addition to local AM service; and now several hundred authorizations down the road that has been proven true many times.

So it is no coincidence that the AM Revitalization NPRM begins with the very first of the six proposals being to open an FM translator filing window exclusively for AM licensees and permittees. Much speculation has been made on the timing of such an action, which at the time of this writing is still unannounced; however, it is likely to happen in this calendar year. With that in mind, I wanted to outline the technical side of what that would entail and how it may play out for AM owners.

The Filing Window

As in every spectrum availability since 1999, the FCC utilizes a "window" system of accepting applications for new facilities. The AM translator filing window will follow a similar method, with a formal announcement being released, which will specify the date period in which applications will be acceptable for electronic filing, as well as administrative directions. The AM Revitalization NPRM specifies that only AM licensees and permittees will be allowed to make application, so there will be no chance of speculative filing by outside parties involved in the Auction. If you are an AM licensee, or one of the several dozen active permittees in the service, be sure you begin to look at the spectrum in your area or contract with someone who can give you an assessment of the viability of participating in the coming filing window.

While the idea of allowing every AM station to have an FM translator is appealing, the fact is that in most of the top markets the recent LPFM filing window and the conclusion of the Auction 83 translator processing from 2003 has

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Translator Topics

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probably precluded the availability of any channels. I have not researched completely, but from my casual overview it appears that most all of the top 50 markets have no FM spectrum available for this use; and much of the markets ranked up to 150 will be questionable. However, a huge number of AM stations still exist in the rural markets; many of which will be able to benefit from this filing opportunity.

The Application Process

The actual application process will begin with a detailed channel availability study for your specific location. While there is no requirement that the FM translator be co-located on your AM tower, it may be convenient to do so if the tower is centrally located in your desired coverage area. I recently did a study for an AM station which is located several miles outside of the city of license; putting the translator on the AM tower would not practically cover the community with a reliable FM signal, even at the full 250 Watts allowed. This decision will always be made on a case-by-case basis for what is best for the specific AM station.

Also, one of the technical restrictions of the FM translator is that is must keep its predicted 60dBu (1mV/m) signal fully within the licensed daytime 2mV/m AM contour, as well as a theoretical 25 mile circle from the AM tower. While both of these have been suggested to be amended or removed, at this time there is no determination on the change in this technical restriction. While many AM stations will not have any serious concern over this, those with complex directional patterns, or a pattern with a deep null may find this a challenge. Fortunately, FM translators can utilize "off the shelf" directional antennas instead of the complicated custom-designed directional antenna arrays utilized by the full power counterparts. There are several manufacturers which offer affordable antennas for this purpose.

FM translators used for "fill-in" service, like the AM translator, have a slightly different set of technical rules from a non-fill-in translator. Specifically, they are allowed an ERP of 250 Watts at any height as long as contour protections and other technical limitations are met. This can allow an AM to logistically serve a large portion of their primary AM contour, if channels and tower locations are available; these should be carefully analyzed in order to maximize your filing potential.

No licensed facility is allowed to cause interference to any other station on co- or adjacent-channels. Because translators are auxiliary services, they are allowed to receive interference within their primary contour, while not causing it. In a nutshell, this means that translators operate where other facilities would not ordinarily be permitted; specifically on the third and second adjacent channels of other low and full power stations. This is the "Undesired to Desired" ratio calculations under which many FM translators operate already; and new facilities under the AM filing window will also be permitted to show this as a way of utilizing an available channel. In the U/D calculations, the closer you are to the adjacent channel station, the higher that ratio and the more power the translator can be authorized. If you are in a location where a U/D showing is needed, finding space on the same tower as the adjacent signals is the optimum.

The New Facility

When authorized, an AM translator permittee will have 36 months in which to complete construction and file for license to cover. The technical parameters of the translator will be already stated, but some other considerations are important to keep in mind.

As a fill-in signal, the delivery of the audio is permitted to be accomplished by any means available. That is typically a direct audio feed, if co-located with the studio, or by STL microwave or high quality digital feeds. A separate STL can be authorized for the FM translator, associating it with the AM station license. The translator is permitted to operate on an unlimited (24/7) schedule, even if the AM is restricted to Daytime only; with the provision that the AM has operated in the past 24 hours. The full, actual legal ID for the translator is required three times a day, instead of hourly, and program imaging on the AM can reflect the translator as if it is a full power FM signal as long as proper identification of the AM is still made at the top of each hour.

Many AM operators already enjoy the benefits of an FM translator; I certainly hope many more licensees gain that opportunity in the very near future.

Jim "Turbo" is semi-retired from 34 years of active Radio Engineering and maintains a small clientele of stations under his Turbo Technical Services (www.jimturbo.net) operation providing FCC application preparation and field work.

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Practical Processing

The On-Air Processor Adjust with Finesse

by Mike Callaghan - KIIS, Los Angeles (retired)

With the possible exception of traffic, chances are that the engineering department is the smallest at many radio stations. Yet, fewer departments have such a wide ranging influence.

As the chief engineer, there are many talents you must bring to the table. You have to understand everything from how the air conditioning system works to the nuances of the EBS system and the federal requirements behind it. You may be summoned by anyone, from the program director who wants the station to sound different on the air, all the way to a secretary with a broken caster on her chair. In each case you are assigned a task which you must prioritize and act on accordingly.

The caster on the chair is a simple fix. You turn the chair upside down, and then pull out and replace the caster. Maybe five minutes of time spent, and you have a grateful secretary.

A program director who wants the station to sound different is an entirely different story. This isn't going to happen in five minutes, and even after your best efforts, you can't be positive that the program director is really, really satisfied. Many program directors find it difficult to express what it is that's missing, or precisely what they want. They just want it to "jump out more" or "sound more aggressive." This is what leads to loudness wars, which come and go and benefit no one. I worked for a major chain that developed it's own composite clipper. It was easy to set up, worked well and was reasonably priced. Many of the stations in the chain bought them. But, after they made their initial splash, many of the stations retired them. It just didn't make enough difference in the way the stations sounded. And it was one more thing in the program path to worry about. There are other worthwhile ways to make a station stand out besides sheer loudness.

Changing the Aural Signature

There are a number of ways to approach changing the station's sound. Probably the worst thing to do is make a radical change all at once. Finesse is called for here; unless you're changing format and the old sound is radically wrong for the new one.

In that case, you don't really have a starting point; you need to dial in what seems right and then use finesse to fine-tune the changes. But most of the time, formats don't change and the tweaking may be the result of a competitor putting a new razzle-dazzle processor on line and making you sound anemic by comparison. In this case, you'll want to make careful notes of all the processor settings before you change anything. These notes can guide you back to a safe starting point if an adjustment is counter-productive and hurts rather than helps.

If your processor has knobs rather than digital settings, use notations like the hour hands on a clock to document which way the knobs are pointing. And keep these notes in a safe place.

Make the changes just a little bit at a time. Remember to keep the aural spectrum in balance; don't crank up the bass without spending some time on the treble. After each set of adjustments, give the air staff and the program director a little time to listen to at least a few tracks, or even a few hours of tracks, before you decide what the next changes should accomplish. Be aware that you are much more conscious of the station's sound than 99.9% of your listeners. Just because someone else on the dial may sound better to you, your audience isn't going to desert you abruptly and rush over to a different sound that suddenly appeared on the dial.

Try and keep the processor away from the air staff; we once had a situation where the processing would change overnight and I'd have to go back and tweak it in when I got to work in the morning. The adjustments were screwdriver-slotted pots, so I started marking them with nail polish so I could tell if they were changed.

(Continued on Page 40)

Practical Processing

– Continued from Page 38 –

Everything was fine for a few days, then the sound started changing again. But the nail polish remained intact. This drove me crazy until I found the overnight jock had gone out and bought his own bottle of nail polish!

Is Old Age a Problem?

If your processor is obsolete and just can't compete in the audio wars, all you can do is make it sound as good as possible and occasionally do a minor tweak if you notice deficiencies you can adjust your way around. In situations like this, it's best to avoid getting into deep discussions with the program director if he feels your station is lagging behind the market. There's no point in asking for frustration. New processors are expensive, and many people further up the food chain may be hard to convince the cost is really worth it. It's helpful to have the program director in your camp when you start campaigning for a new processor. Station managers may be more likely to listen to him than to you when the discussion involves an expense worth thousands of dollars.

If you work for a station where capital expenses are budgeted a year in advance, remember to put in ten or twelve thousand dollars for a new processor. The justification is simple – this is your "war chest." Chances are the funds won't be used, but if the situation in your market changes, you may need to spend the money to insure you can remain competitive. Make sure your manager understands this strategy. No one can predict the future, much less what the station across town is going to do.

A Good Backup Is a Necessity

When and if you do get a new processor, make sure you keep the old one in the rack, with a switch so it can be put on the air quickly and easily. Nothing lasts forever, and even the newest pieces of equipment break down occasionally.

It would be nice if current processors were as easy to repair as the old ones that used op-amps plugged into sockets. Then, you could take a handful of 5532's and fix just about anything. These days, with surface-mount devices, you need a microscope and a surgeon's dexterity to change most active devices. As a result, a lot of equipment gets sent back to the factory for repair.

We, the people that used to trouble-shoot and trace out difficult circuits, have become mere shipping and receiving clerks as we pack this stuff up and hope for a quick return.

This adds up to a greater need to always have spare backup devices available, and this includes not just the main processors but also everything in the program chain. And this backup gear really needs to be suitable for the task; it may need to run the station for the two or three weeks it can take for the repair depot to return a critical device.

I've worked for stations that had just one transmitter, one antenna, one program path, and one remote control system. I didn't sleep very well at night. When the money came through and I was able to install a backup transmitter, I remember thinking, "Wonderful; now I have two transmitters. What will I do if they *both* break?" So now I wanted three transmitters. I think this is why most engineers rarely get rid of stuff; there's just always the chance that equipment, no matter how old it is, might be pushed into service someday.

Are More Features Better?

Some processors even have the ability to use different parameters during different dayparts. It's almost as if the station was changing formats hour by hour. I've never seen a situation extreme enough to require this degree of versatility.

Many of the newest FM processors include a stereo generator with the option to disable half of the stereo sidebands. Having less energy in that part of the spectrum is supposed to reduce multipath and improve stereo performance. This is a worthwhile option and should certainly be included in the "features" list when deciding on a new processor.

The on-air processor is probably the most important piece of equipment in your entire audio chain. It's what you use to draw and captivate your listeners. So when it's time to make that investment, choose wisely and strive for the best unit you can afford.

Mike Callaghan was formerly the Chief Engineer at KIIS-FM in Los Angeles, CA. His email is: rg@mike.fm

Small Market Guide

Christmas Chimes by Ghosts of Christmas's Past

by Roger Paskvan

The town was Hibbing, a small market mining town in the northeastern part of Minnesota, close to where I grew up.

Just out of school, I was a younger man, full of vinegar, energy and adventure, ready to take on the world. I was a full time broadcast engineer back then, and in any small town everybody knows you and what you do best. This is a true Christmas story of ghosts of Christmas past.

As this story unfolds, it was the night before Christmas, and I had opt to have a drink of Christmas cheer with an old friend named Santi ... tis the season. My friend was an amateur radio operator (Ham) by hobby and a baker by trade. He owned the best bakery in town with two apartments above – one for him and one that he rented out. After a few brews, he started talking about his problems with renters and how no one would stay in his apartment longer than a few months. "They keep telling me it's haunted, and the ghosts play chimes early in the morning. " He went on to further say that the past three renters left in the middle of the night and refused to go back. Rumors were spreading around this small market town that his bakery apartment would be a bad place to rent. I could see that he was seriously in trouble. He was also a man of integrity and he wasn't making something like this up?

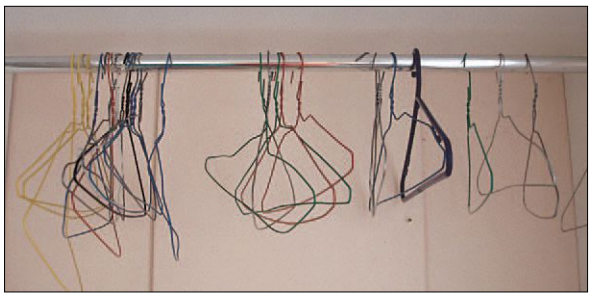
I listened intently, factoring in the effects of his three drinks – I didn't believe in ghosts, and definitely Christmas ghosts that played music in the middle of the night, even though it was the right time of year. Yes, sure, you bet, and on and on the conversation went. "No," he kept insisting, "I cannot keep a renter more than a month in that place." I said okay, "what do they tell you?" He went on to say, "early in the morning before sunrise, you can hear very faint chimes somewhere in the apartment. Sometimes they go on for minutes and sometimes much longer. They sound like wind chimes. I'm told that they occur only at night after they go to sleep. Sometimes they occur early in the morning but never after sunrise. They say the chimes come from one or more bedrooms and sometimes both bedrooms. One girl told me they sounded like Christmas music. No one has stayed long enough to give me a better description."

Was my friend telling a tall tale or was this some freak story that had an ulterior descriptive meaning to the discoverer. He wanted me to help him get to the bottom of this. I agreed to help him and told him I would go through the apartment after Christmas and check it out with him. Well, the following day we met and spent a good three hours going through the place. I looked at the plumbing, heating, wiring, windows, and couldn't find a thing that would possibly make any sounds. "Sorry but the tale must be a myth or crazy Christmas ghost story," I said.

That weekend, his sister came to visit for the Christmas season with her kids and needed a bigger place to stay – the open apartment was a good alternative to a motel. Like a bad brother, he didn't tell her about the folklore and the rumors that haunted his apartment. What a nice guy. That night, about 4:00 a.m., she came running into Santi's apartment yelling that someone was playing chimes in that house! "Please believe me! Come listen!?" Santi ran next door and sat on the bed with his sister for a half an hour listening. *Not* a single sound? What a mystery.

He explained it all to his big sister, and she wasn't happy. I received a call the very next day describing the whole story. He asked me if I would spend a night in his apartment and tell him if all these people are nuts or is this a haunted Christmas ghost story. Was I crazy? I guess so, since I agreed. The very next night, I bravely spent the evening alone in his spooky apartment.

It was hard to sleep, so I stared at the ceiling with a small light on from 10:00 p.m. to 3:00 a.m. All was quiet. After I dozed off for a few moments, I suddenly opened my eyes and sat up. Yes, I could hear faint chimes. Getting up and moving around the room, I listened for the source. Then they quit! A few more bars of ding-ding-ding and then ... silence. I yelled, "whos there?" No answer and the chimes continued. By this time, I had localized the tingling sound to the master bedroom closet. Grabbing the closet door handle with fear of what I would see, I pulled the door open! It was empty! I stood there like a fool. It was plain empty! The chimes had stopped. I waited forever it seemed – silence! As I was turning away, they started again. Almost like a melody, clear but distinct chimes. Lo and behold, the hangers were playing a song – metal hangers that sounded like chimes. The actual sounds were emitting from the metal hangers in the closet. Grabbing them, it all stopped! I expected to feel resistance but there was none. No ghosts!



I ran next door, "Santi, open up." He came to the door fully dressed. I said, "are you are up this early?" He replied, "yes, I get up at 3:00 a.m. every morning, make a few code contacts to Europe, and then go to work baking bread before the bakery opens; I do this routine every morning." Well that explained it. I asked him where his antenna was. It was a dipole on top of the roof right above us, and he was running a full kilowatt. "Let me show you the Ghosts of Christmas past," I said. Sitting down at his transmitter, I began sending a series of dots and dashes, while Santi went over to the apartment next door, standing in the closet. Sure enough, the metal hangers played their Christmas song. That explained it. The haunted mystery is over. It was all just simple physics.

There was enough radio power from the dipole to induce RF current into the nested metal hanger loops, setting up a magnetic field. With the transmitter key down, the hangers would slightly pull together making tingling chime sounds between the code on/off transmissions by touching together. It was amazing to watch. A simple principle of physics in action. The moral of the story was to throw away the metal hangers and use plastic in the future, in all of those closets. es, Tis the season, and this was a true story that actually happened in a small market town a number of years ago. It's hard to believe ... a true Christmas Ghost story.

Roger Paskvan is a Professor of Mass Communications at Bemidji State University, Bemidji, MN. You may contact him at: rpaskvan@bemidjistate.edu

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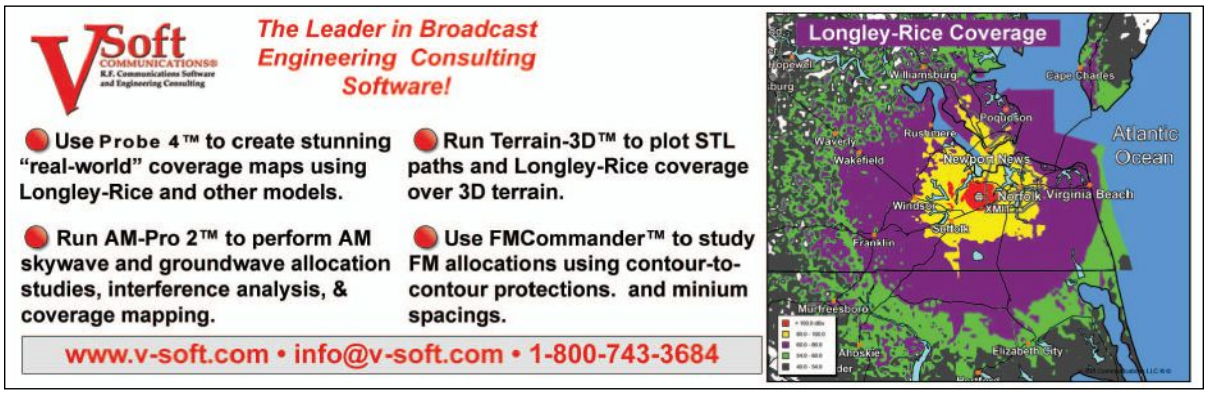

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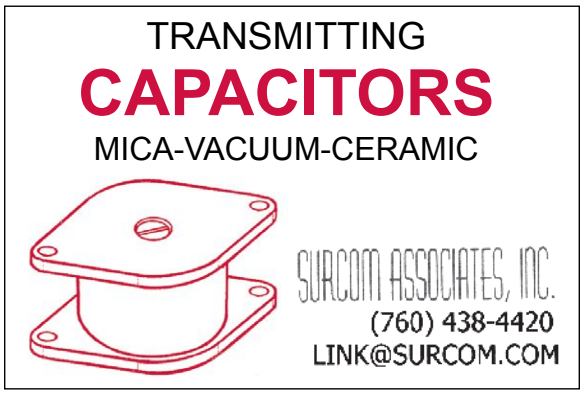

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NAB 2015 Spring Convention - Las Vegas, Nevada
Show: April 11-16, 2015
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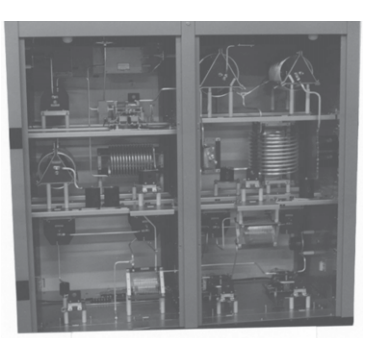

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