The Local Oscillator

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Low Voltage

Back in late 1995 and early 1996 when we built the KLTT transmitter site, the electrical system was a 480/208-volt ñwyeò configuration. Part of this was incidental, and part was by design. The incidental part was the 480-volt panel for the 50 kW main transmitter. We didnôt have any choice in that matter. It was the 208/120 panel where we had a choice. Because we were providing our own transformer to step down the 480 volts to either 208/120 ñwyeò or 240/120 delta, we could go either way. I opted for the former for surge/lightning protection reasons: with a ñwyeò arrangement, itôs easy to put an MOV from each leg to ground and thus clamp each leg to a value well below what might be destructive. That arrangement has served us well all these years ï we have had no surge issues from day one until now.

There were, however, some ñunintended consequencesò that began appearing not too many years out of the chute. The tower bases are fed off the 208/120 panel, and this operates the tower lights as well as the solenoids on the RF contactors. The tower lights werenôt an issue because the Austin Ring transformers coupling the AC power across the base insulators can be tapped for a wide range of voltages. I tapped the primary for 208 volts and the secondary for 115 volts at each tower, and the tower lights have worked just fine ever since.

Itôs those RF contactor solenoids that we have had trouble with over the years. When they were new and the switches operated very well mechanically, there was no issue, but eventually the bushings and moving parts began to exhibit a little friction, requiring more power from the solenoids to fully seat the contactors in the day or night positions. And if the day/night switch pulse happened to occur when the beacons flashed ñonò on more than one tower, the voltage drop at the end of those long underground AWG #4 cable runs, there simply was not enough voltage to push the contactor mechanisms through their range of motion at one or more towers. That would require either the operator or AutoPilot to switch back and forth between day and night patterns a time or two (or even more if the timing was wrong) to get the station back on the air with the correct pattern.

We tried addressing this with several different schemes through the years. Early on, we installed boost transformers right in the ATU cabinets to up the voltage to the contactor solenoids. That helped some, but we still had occasional failures that worsened over time. Later, we wired the solenoid windings in parallel (for 115-volt operation) and then used a stud-mounted rectifier and current-limiting resistor to provide something like 120 volts with a half waveform to the windings. This worked reasonably wellé for awhile. And we would still occasionally get those ñperfect stormò circumstances that would lower the voltage at the ATUs to the point where the contactors would not complete their full travel. With the rectifier/resistor in the circuit at each tower, rocking back and forth between patterns to complete the day/night switch would sometimes overheat the current-limiting resistors and burn them out, meaning that the station was off the air, hung up between modes, until someone could get out there.

Last month, I took a fresh look at the situation with the goal of providing 230 volts or more to the tower base areas in mind. We had our preferred electrical contractor come out and give us a bid on installing two new transformers between the 208/120 panel and the tower feeds, The bid was reasonable, so we moved forward. The result was 237 ï 240 volts at all four tower bases with the tower lights on.

Of course we had to re-tap the primaries of the Austin transformers so as not to over-voltage the tower lights, but that was no big deal. For the

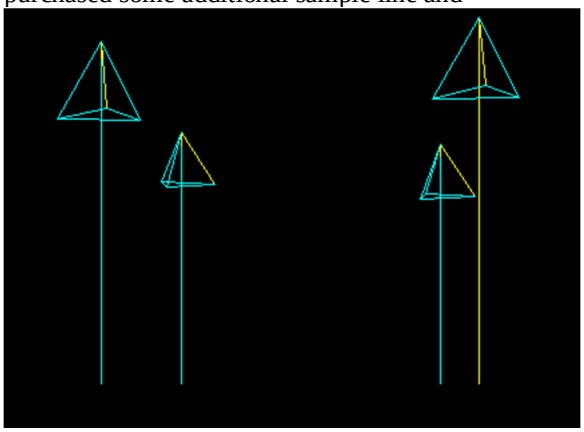
moment, we left the rectifier/resistor in the circuit for the solenoids, but eventually we will re-wire the solenoid coils in series and remove the rectifier and resistor.

For the moment, the day/night switching at the towers is working better. It has been cranky just once or twice since we boosted the voltage, and it has always worked on the second try (it used to take many back and forth tries). Amanda and Keith will, as we move on into fall, clean and lubricate the moving parts in the RF contactors, which should further reduce the amount of power required to seat them. Itôs my hope that we can achieve reliable day/night switching and be done with all the hassle and unreliability once and for all.

Another MoM Application

As we continue to convert our eligible AM directional arrays to moment-method licensing, we have focused over the past month on the four-tower 560 kHz array for WRDT. This has been a bit of a project for a number of reasons. One is that the towers are 84 degrees high with 21 degrees of top loading. The top-loading is further complicated by the wires between the ends of the top-load sections (a ñspider webò). Add to that a ten-foot STL/ICR antenna near the top of one tower, six-foot STL/ICR antennas near the top of two others and the isocouplers for these antennas across those tower bases and I found myself working on a rather complex model that was a real challenge to calibrate. I did, however, eventually get it to calibrate.

Chief Engineer Joe Huk and local consultant Russ Harbaugh did all the sample system and base impedance matrix measurements, and in the process we discovered that the tower #1 sample line was eight degrees or so longer than the other two lines. While there was nothing in my records as to the reason for this, I surmised that it was done to get the phase of tower #1, which is theoretically the same as that of the reference tower, up off of zero so that the old AM-19 analog antenna monitor could resolve it. Whatever the case, we had to get the lines all to the same electrical length within one degree, so I purchased some additional sample line and



Top-Loaded Tower Model

connectors that Joe and Russ trimmed using a network analyzer to get the length right.

With the tower and circuit models all completed, I was able to derive the new model-determined operating parameters. The surprise was that the new parameters were all within the operating tolerance of the licensed parameters, making adjusting the phasor to the new parameters a snap.

All that remains of this project at this point is the reference field strength measurements, and there are a bunch of them, because there are a lot of null pairs. Once we get those made weôre ready to file.

Next?

The Motown Update

By
Joseph M. Huk, Jr.,
P.E., CPBE, CBNT
Chief Engineer, CBC–Detroit

July has been a mixed bag in Detroit. We experienced many issues with our air-conditioning in our main studio and transmitter facilities. In addition, we are planning for a series of personnel and studio moves.

First, we were experiencing issues at the WEXL transmitter site. The air conditioning at the site was not working. I called our local HVAC service company of choice and let them take a good look at the unit. When I had them out during the winter, I explained that at the end of the fall I had no cooling. The service man indicated that my issue may be a leak in the ñA coil.ò Now, upon further inspection, it turned out that it was just a surface dent and no leak was present. He put in a couple of pounds of Freon and we were cool as a cucumber.

The interesting thing was that I had an issue about a week earlier with the Nautel Exporter Plus at the site. The unitôs microprocessor was locking up. The display on the front of the device was frozen. Just before the HVAC unit was fixed, I took the Exporter Plus to the office and plugged it in and ran it for several days. At that point, having experienced no lockups for several days, I called Nautel and they explained that earlier units had a thermal issue. I was told to examine the fan and the cooling vents to make sure they were not plugged. I did take the cover off and blew out the dust. However, things were generally clean. Mind you, in the WMUZ studio facility, the ambient temperature is a very comfortable 73 degrees. So, it dawned on me that it was possibly too hot in the WEXL transmitter room and that is why it locked up.

Since then, with the A/C at the site working again, the unit has been reinstalled and has been working very well. Of course, the transmitter room is now not 90 degrees, but a comfortable 72. In an email, Cris explained that Amanda at our Denver facilities experienced the same issue.

In the studio facility, the rooftop HVAC unit that cools the rack room had condensation dripping from the plenum. Unfortunately, it was a real surprise since it was happing right next to our baby, the Nautel NV-40 WMUZ main transmitter. Since I was not able to get the HVAC folks over to the station until the next day, I placed two trash pails under the plenum. When I came back into the office the next morning, I found the pails nearly full! Mind you, these pails hold many gallons of water. I realized that the plenum placement or layout was well thought out since it never crossed over or near the top of the NV-40. I was very grateful for the thought that was put into the layout of our facility prior to my arrival at Crawford. With this observation in mind, I will think very differently in the future if I need to plan such an installation.

Last, we have some corporate mandated personnel moves which will entail the moving of a production studio and the addition of some equipment in other studios to make them for versatile for voiceovers, general production and transcription. Since the projectôs tasks keep changing, I have been using Microsoft Project to track the timing, responsible party, and tasks that need to be accomplish to bring the project to fruition. I am hoping this will help everyone understand the complexity as well as keep everyone on the same page. Next month, I will let you know how things are coming along with the move.

Until next time, be safe, and if all goes well, we will be reporting to you from the pages of *The Local* Oscillator next month. Best regards.

News From The South

By
Stephen Poole, CBRE, CBNT, AMD
Chief Engineer, CBC–Alabama

Wow, itôs already August. Time flies when youôre having fun.

They're Baaaack ...

Copper thieves, that is. Iôm sure youôve heard and seen some of the stories in the news. We had our wakeup call this morning (Friday, July 29) as I write this, in fact. We were called to the 850 AM site in Tarrant, Alabama when the remote control stopped responding. Jimmy went first; when he arrived the doors on the old transmitter building (which is only used for storage now) were standing open and some old equipment was scattered on the ground. Someone had broken in.

The good news is that the only thing missing was part of an old Jampro Penetrator antenna, a two bay radiator that we removed from the WXJC-FM transmitter site in Pumpkin Center when we bought the station several years ago. The annoying thing is that the thieves/vandals cut the phone line first thing, so we had no idea that they were there. No alarm. (I donôt think they did this by design; I think it was a couple of kids looking for some quick beer money. I think they cut that wire looking for copper and were disappointed when they saw that it was a multipair phone cable instead of a thick coax filled with copper. The fact that they killed the alarm dial-out to ADS was just a lucky break for them.)

The really annoying thing is that they cut the phone line about one foot from the building, so we had to buy a water-tight junction box to do the splice. But I consider that a small price to pay compared to what they could have done. With per-pound prices for copper creeping back up into the $4-$5 range, it has become very attractive to crooks again. Well, this was our wakeup call. Hopefully, you wonôt need one, but if you do get one, I hope it will be no more serious than ours was. Better check your security!

Spam, Blacklists and Other Joy

If youôve heard Dave Ramsey, you know that he loves to rant about the lack of intelligence in most large financial institutions. His rant also applies to the large Internet Service Providers (ISPs), especially when it comes to dealing with spam. They remind me of the old joke from some guys who were experimenting with artificial intelligence: They asked a computer how to take care of the fleas on a dog. ñThrow it in a fire,ò the computer replied. ñFire kills fleas.ò

Look, spam (unwanted email) is a huge problem; I wonôt deny that. It has to chafe the ISPs that a majority of their bandwidth nowadays just goes to transporting ads for ñV.i.A.GRaò and other essentials. But stopping it is extremely difficult; the spammers use all sorts of tricks to get around any sane type of filtering.

The operative term is, ñsane.ò Naturally, being Large ISPs with no intelligence, they move into the realm of the insane to address the problem. Years ago, you could simply obtain a static IP address on the Internet and pretty much do whatever you wanted with it. You could easily register a domain name and set up your own Web or mail server. Admittedly, this makes it easy for Bad Guys to do the same thing, and it makes it easy for spammers to write viruses that take over your computer and then send the spam through your Internet connection. But the ISPôs response is analogous to chucking poor Rover into the flames. Simply put, they overreact.

For one thing, theyôve made it very difficult to set up your own small mail server now (and ñsmall,ò from their point of view, includes ours, even though we have about 350 users). If the reverse DNS lookup on your IP address doesnôt agree with the forward lookup, many ISPs are likely to brand you a spammer and block your email right on the spot.

In other words, if they look up ñmail.crawfordbroadcasting.com,ò it will return our

IP address (216.180.115.25). If they then do a reverse lookup on that IP address, they want to see ñmail.crawfordbroadcasting.com.ò If they donôt, they just assume that itôs a spammer and block the IP address. Not all ISPs do this, but some of the really big ones are notorious for it. The problem is, the default on a reverse lookup is to just return who ñownsò that IP address block on the Internet.

You might think that this is automatic, but itôs not. Most of the allocated IP addresses are ñownedò by the person or group to whom theyôre assigned. For example, our Web server, ñwww.crawfordbroadcasting.com,ò is at IP address 173.8.230.33. But a reverse lookup on that IP address returns ñcomcastbusiness.netò as the actual owner of the IP. If we were to put an email server on that IP address, many ISPs would block that email.

This might make sense if IP addresses werenôt so easy to spoof, and if there werenôt so many small mail servers (like ours) that might be on ñleasedò IP addresses ï i.e., addresses that are assigned to us, but which we donôt actually ñown.ò (As Iôve covered elsewhere, to make the reverse DNS work, the ISP who actually ñownsò the IP address must be your DNS authority and must agree to return your domain name on a reverse lookup).

But it gets worse. Nowadays, if a large ISP even thinks that someone on your IP address is sending spam, theyôre likely to blacklist you. What this means is that all it takes is for one employee to get hit with a ñspambotò virus and your entire domain is hosed. This is what happened in mid-July, when we started having a lot of email returned to us with ñInvalid Domainò errors. After further investigation, I determined that we had been blacklisted. Joy ï even though our Barracuda Spam Filter caught (and stopped) it in less than two hours.

Removing yourself from a blacklist is a pain in the neck; youôre completely at the mercy of the people maintaining that particular list (are there over ONE HUNDRED of these lists now; no telling which one any given ISP might use when deciding whose mail to block!). All you can do is ask ï politely, hat in hand ï and hope that theyôll do it. Eventually. It can take a couple of weeks for the various copies of the blacklist around the world to finally note that, yes, in fact, you arenôt a bad person and can send email again.

What can we do to protect ourselves? All of the usual things: donôt click anything you donôt understand, use a good antivirus program, and stay off of public wireless access points. Yes, that latter one is a pain in the neck, but folks, the fact is, most of these are completely insecure. (Hereôs a tip: unless they give you a big, long, cryptic-looking password, that network can almost certainly be cracked. And hereôs another tip: especially in larger cities, where there are gangs of kids running around cracking these things for fun, it probably *has* been cracked. Donôt assume that just because itôs a nice Starbucks or a large airport that the wireless hasnôt been compromised. You can thank me later.)

The IPV6 Transition

Youôve probably heard mumblings and groanings about the inevitable move to something called ñIPV6.ò What is it?

Currently, most of us use IP addresses that correspond to version 4, called ñIPV4ò). Each IP address has a total of 32 bits, usually written as four ñoctetsò between 0-255; using our example from above, ñ173.8.230.33.ò The problem is, with 32 bits, you can only have about 4 billion different IP addresses, and the pool of available numbers has been used. Obviously, we need larger IP numbers.

When the phone companies are faced with a similar problem, they simply add more digits to the front of your phone number. In our old insurance agency back in NC, we still had some ancient stationery that listed our number as ñ890.ò As the little town of Raeford grew and expanded, it then became ñ6-7890,ò then ñ456-7890ò and finally, they added the area code: ñ123-456-7890.ò (Not an actual phone number, obviously, but you get the idea.)

The problem with IP addresses is that their managed by geeks, and geeks want geeky solutions. Therefore, they came up with a completely new scheme using 128 bit IP addresses, written in Hexadecimal, giving us a potential total of about 340 *undecillion* (thatôs 10 to the 38th power) unique IP addresses.

Hey, thatôs nice. But it makes the transition considerably more difficult. The phone companyôs approach would have worked fine (just add a ñcountryò or ñregionò code in front of the IPV4 address). The good news is that IPV6 works essentially the same as IPV4 addresses, with a few obvious drawbacks for the end user. The biggest one, of course, is that IPV6 addresses are much larger, meaning that theyôre much more difficult to remember. ñ173.8.230.33ò is easier than ñ2002:0:0:0:0:0:ad08:e6210ò (which number I obtained from an online IPV4-to-IPV6 translator; Iôll take on faith that itôs accurate).

The good news is, at the Internet level, DNS will still work. At some point in the future, when you enter ñwww.crawfordbroadcasting.comò in your browser, instead of DNS returning ñ173.8.230.33,ò it

will return the much larger IPV6 jawbreaker. Your browser will take care of making the connection and pulling up our Website. On the server end, really, all youôll need is an IPV6-capable router; you can still use IPV4 addresses inside the building, including the old familiar ñ192.168.1.1-typeò numbers that weôve all come to both love and hate.

But honestly; why did they have to make this so complicated? Look for more on this in the future as I learn more about it (as Iôm being forced to!).

Until next time!

Catalina Tales

By
Bill Agresta
Chief Engineer, KBRT

July has been one busy month here at the KBRT transmitter plant on Santa Catalina Island. As I sit here writing this I am having a very hard time believing that another entire month has passed, and Iôm realizing that I have not come up for air since July 6th when this all began. Let me tell you about it.

After visiting friends and family on the mainland for Independence Day, I made a mad dash back to the island when I found out that KBRT had gone off the air and I was unable to access our auxiliary transmitter by remote control to bring the stations back on. Upon arriving at the transmitter plant I found several issues. First, in our audio rack we lost the transformer and power supply that powers the phasor controller. Then in the back room we had a frozen-up air conditioner, this because another air conditioner had died. Finally, the Nautel XL12 main transmitter was flashing ñmodulator fail.ò

I had to think fast. I opened all doors to cool the back room down, opened the frozen-up air conditioner and ran the fan to thaw it out while I opened the phasor and manually switched the RF contactor so our auxiliary transmitter was now feeding the antenna. That allowed me to bring the trusty auxiliary transmitter up on the air.

I quickly pulled out our portable air-conditioner and duct taped the exhaust through the front door of the transmitter room. This got some cooling started, and while that was going on, I went to see what was going on with the XL12.

Many of you may remember that since about 2007 we have occasionally experienced an issue with the XL12 where it seems to have a mind of its own, changing power levels and occasionally turning itself back on after we signed off for the evening. Many times when this intermittent power changing issue occurred, it would put the transmitter into ñshut-backò because it would attempt to drive the RF power beyond the capabilities of the transmitter.

I soon realized, however, that this was something much different than the issues we had dealt with (and fixed) in the past. I reset the transmitter, fired it up into the dummy load and watched it go back into modulator fail with a few minutes. After calling Nautel and reaching a rather grumpy customer service rep (who is now no longer with the company), I began to tear into the transmitter myself. I verified tight connections on the power distribution panel and the RF signal path all the way into the phasor, and I checked and rechecked the control panel, replacing the batteries and resetting.

After not finding anything obvious, I decided I was going to have to catch the transmitter in this failure mode. I fired it up and watched it run for nearly an hour before I decided to shut down our aux transmitter and return the XL12 to the air. It ran all day but failed again early the following day, this time lighting a red ñmodulator failò LED on one of the PA modules. I called Nautel again and we ran some more tests but really did not get far.

We then set up a test day with one of the Nautel technicians, and I asked for the help of our operations manager, Todd Stickler, and our local cable TV/Internet system owner, Ralph Morrow. With Todd manning the phone, Ralph on the scope and me running around with a DVM and doing all the switching and probes, we managed to get some numbers but still no ideas about what or why the

XL12 was doing. By this time I had grown pretty frustrated since we were seemingly getting nowhere. Thank God

At that point, thank God, Cris got involved and called Nautel, getting us in touch with a very knowledgeable engineer there. Though we are still working on this issue, I am feeling very confident now as we have made a couple steps already in a good and logical direction. So far we are thinking at least one of the transmitters issues have to do with some of the power supply taps being too low ï the low-voltage supplies are all just below the low end of their safe operating ranges. With our ever-changing awful island power here, this does not surprise me. The power supply names are a little misleading in this regard. For example, the lower end of the safe operating range of the ñ24-voltò power supply is 26 volts. Go figure.

We are still working out some of our air conditioner issues as I am forced to do most of that type of work here myself. We have one person on the island that does HVAC work and he is both very expensive and might not show up for months on end if you can get him at all. I did manage to get him to install a new compressor in the dead unit, but as the ñisland factorò would have it, soon after he left the condenser fan motor went out, causing the new compressor to overheat and shut down. Thank God we have back-up portable air conditioners here!

Well, onward until we get it all in the green once againé

Until next month, the Lord bless you and keep you; the Lord make his face shine upon you and be gracious to you; the Lord turn his face toward you and give you peace.

The Chicago Chronicles

By
Art Reis, CPBE, CBNT, AMD
Chief Engineer, CBC–Chicago

Those of you who follow my column in *The Local Oscillator* will likely recall that I donôt often devote whole columns to telling whatôs been going on around the old CBC-Chicago Radio Ranch. Others who write within these pages do that, and I like reading what they have to say, if only to get ideas, at least see how the other half lives, if you will. Iôm more of a óconceptualô guy, preferring to write on ideas and issues. But, as I write this, itôs the night before deadline, and while I do have a good rant piece *in my head,* thereôs no time to develop it, because frankly, this month has been going totally *nuts around here!* Weôve had projects on our projects, and a few of them are fascinating enough to make me believe, in my hubris, that youôd be interested in them, too. So, here goesé

WPWX Antenna

One of the things Iôve learned by working here is that thereôs no telling what can happen when it comes to improving our facility. Even if it isnôt in the budget at the beginning of the year, something weird just might happen by an honest act of serendipity, to make something big happen.

Case in point: Last fall I worked up a nice budget agenda, only to have most of it bounced by Corporate, because they had decided that WPWX was going to get a new transmitter. This is the ultimate ñgood news/bad newsò situation. On the one hand, most of the work Iôd done had just been swept away by the unforeseen expense. But what an expense: a new Nautel NV-40 transmitter for WPWX. You bet I was thrilled, after the initial shock wore off.

Of course, the installation of the new rig meant that we also had to take out the old Continental and put the Nautel in its place. That also meant taking our trusty BE FM-30T, now reduced in power to 9 kW, to feed the ancient Dielectric 7-bay aux antenna for an ERP of a mere 30 kW non-DA. But donôt kid yourself ï the coverage was a*wesome*. So much so that, on a trip to Rockford at the time, I could hear WPWX clear as a bell within five miles of DeKalb, home to our friendly neighborhood liberal talk station on the next channel up. And coverage into Joliet, 30 miles to the southwest, bloomed. I got scared. Cris

got concerned. Local management got giddy. The office got calls from listeners in new places. Cris got calls ï from everybody in the Chicago management team. They wanted to keep that aux transmitter signal on the air forever!

Well, we couldnôt quite do *that.* There are rules about this sort of thing, after all, so Corporate began to look seriously at not repairing, but actually replacing the stationôs 25 year young main antenna with something better. Mind you, the old main antenna is directional, with two nulls in the pattern where only one is needed, the null towards DeKalb. The ñJoliet Nullò as we call it, is superfluous. The antenna is an H&V, not circular polarized, full-wave spaced instead of half wave spaced, which is the preferred design on directional antennas anymore. And, in my opinion, the old girl puts too much signal into Lake Michigan.

ERI, Inc. was called in, they took a look at the situation and reasoned that they could improve on all of this (which is interesting because the present main antenna is also an ERI!). The new antenna is a radically different design from the present one: Half wave spacing, six bays, circularly polarized. This ought to be some antenna.

At the outset, ERI said that the delivery date wouldnôt be until November: early winter. A lot of near-term hopes got deflated on hearing that. But then, sometime later in the spring, we got word that the possible completion date had been moved up a couple of months. Then it became mid-August. Now, as I write this, at the end of July, the antenna will likely ship in ten days!

That made haste rather mandatory. The old Continental transmitter had been sold but was still in storage at our site. We lit a fire under the new owner to get it picked up, soon, real soon. Hopefully by the time you read this, that will be *fait accompli*. Weôve quickly called up two local (well, almost local) tower rigging companies to bid on the job. Both have proposals on how they want to handle the job. The old rigid coax in twenty foot sections is being replaced by a single 520 foot run of Heliax, so we have to arrange proper storage of the old line. Then weôre going to try to sell it. Whew!

By the time you read this, *maybe*, the new antenna will be up and everyone from the station will be running around in their cars doing listening tests.

WSRB STL

Some of you readers may remember from months back the interference hassles we experienced with the WSRB STL. During the late spring and early fall of each year, that particular 950 MHz STL path has been subject to a great deal of interference from across Lake Michigan (thereôs that darned lake again!) Thatôs because the receive dish at the Lansing site is pointed right through the Hammond Studio dish, as it should, right at the area of Grand Rapids, Muskegon and environs, where lots of stations use big signal analog STL boxes. At least a couple of them are on our own STL channel. Further, at least one local transmitter on a nearby frequency decided to go into business for itself and ended up putting spurs right on top of our STL channel. QAM systems donôt like that. I took screen shots of our spectrum analyzer during one of those interference periods and sent them to Cris. That started something.

The alternative became not just to change frequency, but to change *bands*. Why not? At our Denver facility, weôve been using EHF (above 3 GHz) microwave STL stuff for some time now, with little if any problems. So, the reasoning went, why not use the same solution for the same problems here, right? Well, in retrospect, yes and no; or rather, plus or minus Murphy.

When we in Chicago heard about this project, we were understandably excited, because not only would we be the first stations in the market using such an approach, but weôd be using a system which is IP based. That is something which really appeals to the pioneer spirit in me. And, with two IT mavens on staff, this would keep them intimately involved and loving it.

In due course, the system arrived. Not only did we have the instruction manual on disk (and printed four copies, double-sided printed and edge-bound), but we had Crisô copious notes on his experience with installation as well. To say that those notes were a great help, especially in avoiding the pitfalls, was an understatement. Armed with all that, we began setting up the test bench, wiring the system like the real world but in miniature, setting up IP addresses and stuff. For instance, early on, we decided that even though we were going to give the system the same IP address structure as the rest of our single-platform system, we would not attach the two platforms. Why should we? With AES audio being the inputs and outputs of the STL, we didnôt see the need ï we still donôt. I must add one thing: Part of the legal requirements for the system was an intermediary unlicensed microwave hop. We used a pair of Ubiquiti NanoBridge M5s for that. Those little guys are such a joy to work with (and cheap to boot!) that weôre looking to use them for other STL apps as well, such as Internet access where presently we have none. Sweet.

At this point, enter Murphy. To start, we

turned the system on and gave it a three-day burn-in before starting work. Burn-in, indeed. One of the power supplies for the on-tower head end units burned *up*. We called the factory. They said, ñsend the bad unit back.ò We did, and waited a week for their tech support department to determine that the problem was indeed the supply and not us. Only *then* did they send out a replacement. We resumed setup. It took a few days because this was a learning experience as well. And that doesnôt count the wiring of the special, shielded connectors to the very heavily-encased, UV-resistant CAT-5 cables. That was a humbling experience, because, by design, I swear that failure is not an option, itôs mandatory. A dozen connectors gave their lives because some aspect of their installation wasnôt perfect. We were being meticulous. We wanted to be *sure* that the project was complete and perfect when it was finally deployed, and sadly, that took more time than we thought it would.

Deployment day came finally. Re-enter Murphy. The tower crew arrived at the site, uh, less than prepared. They said theyôd only come out to do re-lamping, but if so, why send three guys? In a few hours, while they replaced a dead lighting strobe, some of the things they needed were sent. The completed units went up, followed by the two CAT-5 outdoor type cables at each site. And then Murphy struck... again. On the Denver STL systems, the mounting hardware was galvanized. Here, it was stainless steel and ï you guessed it! ï the stuff seized right up, not once but twice. The project was delayed yet another day while that was fixed. I was getting perturbed. So was Cris. It didnôt help that the tower crew tried to mount the antennas and radios directly to both towers rather than using a standoff pipe for each, as they had said they would from the outset. We screamed about that, and that got the proper parts out and finally, the physical install was done properly.

Finally, we turned the system on for dish aim, and communication was established ï one way. This STL is designed as a two-way system, and while the TSL path was spot on, we could get no signal to the transmitter site unit. The manufacturerôs tech support folks were called. (Given this entire situation, their number is now in my speed dial. Not a good sign.) We and they troubleshot the situation, and they determined that one of the on-tower radios had a dead receiver. Great. So now, the project is again on hold while we await an RMA to send the unit back for repair. I wonôt tell you how Cris and I feel about all this. Cris gave them an earful. I did the same to the tower company.

Donôt you hate it when you do your part of the project right, and everyone else doesnôt? It ends up causing un-needed confrontation.

You want *how much* to do this job?

At CBC, most of our sites have emergency power generators. That means five of them here in Chicago. Our newest gen is about seven years old, one is ten, two are 14 years old and one is 21. Thatôs a lot of time for these things to be hanging around, and for that reason, twice-a-year maintenance checks are mandatory. For years, weôve had this done by the folks who sold us the gens, all the same manufacturer, who will remain nameless for reason which will become painfully obvious in a moment. Their latest round of inspections revealed a nasty surprise: our studio site generator has a middling radiator leak.

This is no small issue. This 80 kW mini-monster is one of the 14-year-olds, and so maybe itôs time for this sort of thing to happen, but the shock of that nasty surprise was quickly eclipsed when the estimate for the repairs came out to $6000!!!! I blew a gasket (which wasnôt under warranty), Cris blew one, and we decided, ñNo way! Weôre going to do it óour wayô.ò So we shopped the job around. Our own Warren McFerren wanted to do the job himself, and made no secret of it until we told him that being an employee who is saddled with a warranty for the company he works for was something he really didnôt want.

Down Calumet Avenue from the studios is a really good, reasonably-priced auto repair place. We in engineering, well, most of us, have our own cars serviced there. We called up the owner, he came out and looked it over, noted how buried the radiator was in the engine, and said, ñYes, we can do this. The radiator can be saved. However, the genôs going to have to be down for three days: one to disassemble the engine enough to remove the radiator, one day to fix it in at the best radiator shop in the area, and one to completely re-assemble and test the unit.ò

But, *there's* a gamble. For a lot less than $6000, we can have our emergency power source down for three days while the needed repairs are made. The $6000 repair shop wanted to put in a brand new radiator, and do it in one day. But the new radiator would be half the cost. Labor and mileage to and from would take the other half. In our shoes, what would you do? We opted for the local shop and the three day waiting period. Weôre putting NIPSCO, our electric utility in Hammond, on the prayer list to keep us going during the outage. And, weôre picking our dates carefully, with an eye on the three day

weather forecasts.

Iôll tell you how all these projects came out next month.

Finally...

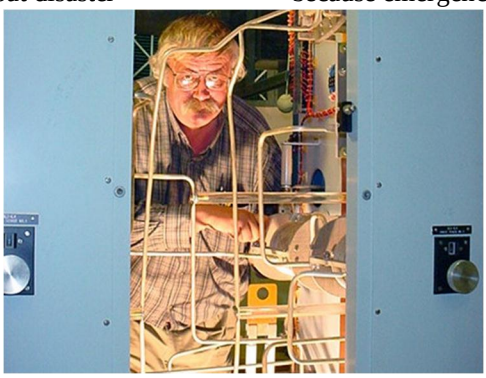
This came to me from the associate pastor of the church I attend, St. Edwardôs and Christ, Joliet: Did you know that the word ñBibleò is an anagram? Yup. Bible: Basic Instructions Before Leaving Earth.ò There now you know. Blessings!

Until next time...

The Portland Report

By
John White, CBRE
Chief Engineer, CBC–Portland

As Cris commented back in June, events during this last year have prompted many broadcasters to think differently about disaster events, particularly in terms of taking a wider view of disaster preparation. Reading Stephen Pooleôs description of the early hours during and after the Alabama Tornado swarms, I was struck by how much the travel difficulties looked like problems I would expect here after a great Cascadia subduction zone earthquake.



I would add to Stephenôs description of the challenges he faced an observation from WWL in the aftermath of Katrina. WWL experienced difficulty obtaining generator fuel to remain on the air as a first responder.

A key solution to travel problems, facility access, fueling, and resource issues is planning *prior* to an emergency. Clearly, large-area disasters such as Gulf Coast hurricanes, subduction zone earthquakes, large-scale flooding or tornado swarms have both similarities and differences. Simply put, a disaster plan consists of decisions that can be made prior to the disaster. The plan then becomes the foundation upon which a response can focus on the choices that must be made to deal with unique problems that appear when a disaster actually happens.

As broadcasters, we all recognize our responsibility as first responders to our listeners. Our own internal disaster planning tends to focus on how we would keep our stations operating as a public information resource. Itôs easy to lose sight of the responsibility to be part of the wider disaster planing process. I have two specific examples.

Several years ago, Tualatin Valley Fire & Rescue sponsored a workshop to identify critical infrastructures in the Portland metro area. Many broadcasters felt the workshop was a waste of time because emergency services planners should already know roads, bridges, power, broadcast stations, and telephone were critical infrastructure. The goal of the workshop, however, was to identify which parts of the broadcast sector are critical ï transmitters, power, accessé those critical items that are needed to keep broadcasting operational. The goal of the workshop was to provide detailed information to metro area emergency planners.

Emergency planning in the Portland metro area is based in large part on an astonishing statistic: The bulk of the earthquake rescues happen in the first three days and are performed by friends, families and neighbors.

In recognition of that, Portland area responders have established programs based on the ñNeighborhood Emergency Teamò concept. Our local responders, typically fire departments, provide emergency training to ordinary people. Focus is typically on basic rescue techniques, such as how to recognize structures that can safely be entered. The result is an organized public cadre, which can respond to people in need.

These neighborhood teams communicate with emergency management and fire stations via ham radio using simplex and identified ham repeaters. These facilities are identified in the emergency plans and receive priority for fueling, access, and emergency repair during any emergency.

To my knowledge, few broadcasters have made a similar effort to develop local broadcast disaster plans with local emergency management.

As an aside, itôs worth noting that space

provided to ham radio repeaters is fully tax deductible at the usual commercial market radio space rent, particularly for those that are 501(c)(3) or designated as an emergency disaster resource. That is a natural fit for many broadcast facilities. The point is that with pre-planning, the fueling problems WWL experienced during Katrina might well have been avoided and WWL may have remained on the air.

More recently, we at CBC have been discussing several different thoughts on generators and emergency operation in general. I took some time to break down the generator discussion into several categories.

Gen Fuel ï two fuel types seem to be common: LP / natural gas and conventional diesel. LP and diesel have ongoing refueling needs while natural gas supposedly does not have that problem. That was the thinking behind choosing natural gas for emergency power at the Portland Stonehenge FM transmitter farm.

The recent winter outages in Texas have caused me to question the natural gas choice. Like the rest of the country, the Southwest has been pushed into eliminating conventional power generation in favor of wind. Since wind is a fair-weather power source, itôs considered at best an incidental power source. When wind is off line, it needs to backed up with natural gas turbines.

The Texas outage demonstrated one flaw of the green wind ideas, which have been eliminating conventional power generation. The outage began with a cold snap that pushed power demand above capacity. The wind was off line due to the icing, which necessitated rolling black outs. Everyone thought that wasnôt such a big problem because there is plenty of natural gas available for the backup generation.

Then came the ñcatch 22ò: Without electric power, the natural gas pipeline pumps went off line. That caused pipeline pressures to fall, starving out the turbine power backup plants. As natural gas turbine plants failed, the power outages grew.

Fuel alternatives ï I first ran across an exciting concept for emergency generators some fifteen years ago. Making the rounds in the emergency services community was an ad hoc multi-fuel solution for backup diesel generator fuel. That solution involved placing a natural gas or LP jet at the air intake of the generator engine. With the engine running on diesel, the NG / LP fuel was slowly increased. That caused the engine to over speed (more fuel) causing the governor to reduce the diesel fuel rate. The engine happily runs with the combination of fuels, although some diesel is required for proper ignition.

This concept is now being implemented with what are called bi-fuel generators. Dual fuel generator are an either / or fuel configuration. Bi-fuel is a mix of fuels. Diesel plus a gaseous fuel. As one vender described the concept:

> ñThe ideal solution to healthcare facility power backup needs is found in the bi-fuel genset. Operating on a mixture of 75% natural gas and 25% diesel, the bi-fuel genset can run up to four times longer than it could on 100% diesel. In the unlikely event of a disruption of natural gas supply, the unit reverts to run on a mixture of 100% diesel.ò

Extended oil drain ï my first introduction to oil change and diesel run time was a set of diesel irrigation water pumps that were installed in 1936 due to the lack of electric power at the location. After my dad moved the family back to the farm following WWII, we happened to be chatting with the water master and pump tender in the late 1950s. His news was that that the pumps would be converted to electric pumps in a few years. The part that stuck in my mind as a young lad was when the pump tender commented that the engines had gone a million miles.

That all makes sense as the engines were operating in the optimum environment. The engines ran continuously for five months with a constant engine speed and no start / stop cycling. Those engines were run on a two-week oil change schedule, which works out to roughly 300 hours, consistent with the 100 to 500 generator oil change schedule.

The latest news again comes from radio. One late-night radio show here in the Portland area is the Truckersô Radio Network. There I learned that diesel lubricants are no longer changed on a miles or hours schedule. Typically modern practice is oil change based on chemical analysis of the oil. Eaton, a manufacturer of diesel drive equipment, now supports extended drain, (1,000 plus hours) when the newer synthetic lubricants are used. Eaton, like other manufacturers, provides specifications for lubricants that qualify for extended drain applications.

Use of these extended idle and run time lubricants will provide a solution to planning for a long duration disaster. Use of the more expensive synthetic lubricants may well be a cost savings due to the extended idle times and reduced oil change costs.

Rocky Mountain Ramblings
The Denver Report
by
Amanda Alexander, CBT
Chief Engineer, CBC - Denver

AP 2010 and ARC-16

We have finally given up hope on AutoPilot 2010. In the last issue of *The Local Oscillator* I mentioned some of the issues we had been having with the program. We received a new, dedicated AP computer shortly after the last issue came out and I immediately set it up. I installed AP2010 and got everything transferred over from the old, resource-challenged machine. The problem was, it didnôt work! The issues followed the program and did not remain behind in the old PC as we had hoped. I even created some new flow charts (AP2010ôs version of scripts) to make sure the issue wasnôt with the original flowcharts I had created. These were very simple charts, doing nothing more complex than switching patterns and powers, but they simply wouldnôt work reliably. We finally gave up on AP2010 and went back to the working AP3 and its trusty VB scripts.

In the process of all this another issue arose. At a Rockies game several weeks ago, I needed to monitor KLTT as the day/night switching was not working properly. I had little data coverage on my iPhone at the game, presumably because there were 40,000 other folks there all using their 3G phones, so no VNC. The only option left was to dial up the ARC-16 at the KLTT site. When I got the tone I keyed in the passcode but instead of getting the normal voice prompts, I kept getting a message, ñHello, please enter number dummy.ò What the heck does this mean? I tried entering the passcode again and some other stuff but and nothing worked. The ñ99ò command to hang up didnôt even work. I thought it was the ARC-16 that was messed up.

I decided to try calling one of the sites from a landline. It worked. There is something with the iPhone touch tones that the ARC-16 cannot read. We tried it with my dadôs iPhone and with another local engineer friends, all with the same results, although that engineer friendôs own ARC-16s responds to his iPhoneôs touch tones just fine. It must be something peculiar to the version of ESI card that we are using in our ARC-16s.

We are contemplating a move to the new ARCPlus units. Burk is in the process of making them compatible with our current IP8 units, which would make installation a snap and reduce the cost for us.

Transformers… The Dark Side of the Transmitter Site

As part of our ongoing troubleshooting with the day/night switch at the KLTT site, we finally decided to get some transformers installed to boost the voltage feeding the towers. The voltage drop was so great by the time it got all the way out to tower 2 that there wasnôt enough *umph* to make the switch. The new transformers have given us enough voltage (237-240 volts under full load at all the towers), but we still occasionally arenôt switching properly.

The next step is to lubricate the moving parts of the RF contactors and rewire the solenoids for 240 volts, eliminating the rectifier/resistor that we now use to drop the solenoid voltage down to 115. The problem with all of this is the site has to be off (no RF), with no electricity at the tower bases. So we have a weekend schedule set up so we can go out and do a bunch of this work. This includes repairing the Austin transformers on all four towers. We already had to do a temporary repair of a hole in the protective coating with duct tape (it fixes *everything!*). It will be an all-hands-on-deck day with Keith, my dad and myself all working. I am hoping by the end of that day the day/night switching will be working reliably.

Site Maintenance

One thing I am finding out quickly: when a site behaves itself, that is when it goes crazy. The KLVZ daytime site, which we completely rebuilt in 2009, has been a great transmitter site over the last

two years. I have not had any problems this year at the site. Because of that, I have not done too many checkups on the site.

I went out there the other day to check on things and noticed very quickly I need to make more trips. We have two hornet nests above the building door. We also have a spider that has literally formed a web over the front of the building. The door is now covered with gnats and mosquitoes that have gotten caught in the web. The areas we have had to block off to keep the horses out now have weeds growing five feet tall. It is quite an amazing thing.

Healthline

For years, we have had dropouts on our Healthline satellite feed from GABNET. We thought it was the old Starguide receivers, and when we finally replaced them with the new XDS units, I thought the problem was resolved. It wasnôt until recently I was told the dropouts were still happening and were in fact much worse. I began digging into this problem. Citadel Media hadnôt heard complaints. I switched the feed to our backup XDS but got the same dropouts.

Finally, I was able to get Citadel Media to record the program off the downlink on their end. The next day I was told that they, too, heard the dropouts. I am waiting for a resolution to this problem, but itôs always nice to know it is not mine to deal with anymore.

Evaporative Cooler

As I write this, we are busy getting bids from various contractors to replace the evaporative cooler at KLZ. In Coloradoôs thin, dry air, evaporative cooling works very well and provides a cheap and effective way of cooling a building.

The existing unit, which is probably ten years old, has been a challenge the last few years to keep working. We went stopped by the site on the 25th and found the transmitter building to be very hot. The cooler was evidently nit working. After looking at the unit on the roof, I found the belt was loose. I went ahead and replaced it with a new spare we kept on hand, but to get the new belt on I needed to loosen the motor bracket. I got the right tool and some WD-40 and got the rusty bolt loosened, installed the new belt and adjusted the motor bracket so it was tight. I went to tighten the securing bolt and immediately it snapped off. I didnôt use much pressure, either. It, like the rest of the old cooler, had simply rusted through.

We are hoping to be having the new unit, which is a high-tech polymer-based unit that has no metal parts, installed while you are reading this.

That about covers it for this edition, so until next timeé Thatôs all folks!!!

Digital Diary
by
Larry Foltran
Corporate Website & Information Technology Coordinator

The Google Juggernaut Cometh

It appears that the tech world is all abuzz about the arrival of Google+, the first true volley across Facebookôs bow. But should it come as any surprise that the first shots in this battle have come from Mountain View? In recent years, Google has made numerous attempts to put their multi-colored logo on everything we see each and every day? From the acquisitions of YouTube and Picasa to the launch of Gmail, this juggernaut simply keeps rolling. Just wait until the day comes when youôll be ordering a McGoogle with fries.

But in all seriousness, Google has experienced its share of failed attempts at securing a foothold in the social networking realm. Its latest offering draws upon lessons learned from Orkut and Google Wave as well as public frustration over Facebookôs privacy settings. Iôve read a flood of tech sheets relating to Google+, some of which are praising it and others expecting it to die an agonizing death. Despite the fact that Iôm still waiting on my official invite for Google+ (still

waiting for my Will and Kate invite too), I recently had the opportunity to take a friendôs account out for a quick test drive. In addition to the myriad of articles Iôve read outlining the pros and cons of Google+, my sample of the system provided me with a good overview of what is offered.

Following the approach employed when launching Gmail back in 2004, Google has released Google+ as an invitation-only beta offering. This means that Google has the ability to control the initial pool of users, perhaps even distributing the invitations by specific demographic. Users of the system are also allowed to invite other friends to join them, which is obviously what social networking is all about. In most cases, these invitations have been blocked based on Googleôs established member cap which, from what I understand, is being increased on a regular basis. So even if you receive a friend invitation, the Google cyber bouncer may still not let you in the door. Considering the premise that demand for association with a group increases based on exclusivity, Google has created fervor among social networking junkies. Tell someone they canôt come in and theyôll want to be there even more. In my opinion, this could ultimately hurt this project especially if they drag it out as long as they did during their Gmail launch. If membership is still limited by the time the novelty wears off, it may be difficult to move users from Facebook. As with most things, time will tell. The one major benefit of limited initial membership is that it gives Google the ability to slowly throttle up the system and address bugs in a relatively controlled and smaller user environment.

One of my favorite features of Google+ thus far is their Circles system. It allows you to organize your friends within specific groups that are relevant to you. Whether it is family, friends, colleagues, or your Saturday evening square dancing club, you can simply drag your contacts over and Corral them into the desired Circle. Although Facebook does have its Groups feature, Circles appears to be much more a part of the entire Google+ system than simply a feature or option. Aside from the organizational aspects of it, the Circles system allows you to view only status posts, referred to as Streams in Google+, from the specific Circle you choose or even post to only that Circle.

Another great feature is Hangout, which allows you to video conference with several of your Google+ contacts at once similar to Skype. Unfortunately, I wasnôt able to really sample this feature as much as Iôd like to due to the limited number of mutual contacts. Keep in mind, I was using a friendôs account. I can see Hangout being a good option for staying in touch with family members spread around the world or business collaboration separated by hundreds of miles.

The major aspect thatôs being touted as Google+ôs feather in the hat is its mobile platform. Where Facebookôs mobile system has been plagued with issues or severe limitations, mobile users are praising Google+. In fact, there are already some rumors that it will be a factory installed feature on iPhones. Linked with a Picasa account and you can quickly share and store photos while on the go.

Unfortunately, thatôs about all that really impressed me about Google+. Granted, it is still very early in the game and the type of connections, applications, and information that has turned Facebook into an addiction among many hasnôt yet migrated to Google+. In my opinion, it will take much more from Google than what is currently available to woo the firmly rooted Facebook users and essentially make them start building their connections and profiles from scratch. Perhaps some users will be attracted by the outlook of rebuilding connections as they did when joining Facebook. I think the majority may simply stay put or end up using both systemsé as if there are enough hours in the day for that.

In the Google-authored press releases and demos Iôve seen, they have consistently pushed their view of the productôs advantage in terms of privacy. Many Facebook users have voiced their frustrations over their systemôs privacy features despite Facebookôs apparent ongoing efforts at improving them. In the short time that Google+ has been running, there have already been reports of some minor flaws and holes in their privacy system. My thought is if you voluntarily put information about yourself on the Internet, there is always the potential of that information getting out. I utilize Facebookôs privacy system and customize the settings as much as possible, but I still have a realistic understanding that my information is on the World Wide Web and potentially available for anyone to see. If you donôt want anyone to see it or read it, donôt put it on the Interneté period.

The ultimate question is whether Mr. Zuckerbergôs monstrosity is bulletproof or will it go the way of MySpace as users go to the next big thing? Many experts believe Facebook has the advantage in this battle simply because of its enormous user base. Provided they donôt do anything to alienate their faithful customers (ahemé Netflix), they should be safe. On the other hand, Google seems to prove time and time again that it has the ability to successfully infiltrate different product platforms.

Diversity seems to be the key in so many businesses these days and, thus far, Facebook has been a one trick pony. Can we expect to see Facebook attempt to join the Internet browser battle or the war for your computerôs OS? Time will tell.

Once the smoke clears, or should I say if the smoke ever clears, the ultimate winners will be the users. These companies are competing for the eyes and attention of the masses, which these days can be quite fickle. Competition tends to push developers to create new and exciting features rather than allowing them to rest on their laurels. Take the internet browser wars as an example of how direct competition has inspired Microsoft to add some great new features to Internet Explorer. Ohé waité never mind.

é until next month!

KBRT • Avalon - Los Angeles, CA
740 kHz, 10 kW-D, DA
KCBC • Manteca - San Francisco, CA
770 kHz, 50 kW-D/1 kW-N, DA-1
KJSL • St. Louis, MO
630 kHz, 5 kW-U, DA-2
KKPZ • Portland, OR
1330 kHz, 5 kW-U, DA-1
KLZ • Denver, CO
560 kHz, 5 kW-U, DA-1
KLDC • Brighton - Denver, CO
1220 kHz, 660 W-D/11 W-N, ND
KLTT • Commerce City - Denver, CO
670 kHz, 50 kW-D/1.4 kW-N, DA-2
KLVZ • Denver, CO
810 kHz, 2.2 kW-D/430 W-N, DA-2
KSTL • St. Louis, MO
690 kHz, 1 kW-D/18 W-N, ND
WDCX • Rochester, NY
990 kHz, 5 kW-D/2.5 kW-N, DA-2
WDCX • Buffalo, NY
99.5 MHz, 110 kW/195m AAT
WDJC-FM • Birmingham, AL
93.7 MHz, 100 kW/307m AAT
WEXL • Royal Oak - Detroit, MI
1340 kHz, 1 kW-U, DA-D
WLGZ-FM • Webster - Rochester, NY
102.7 MHz, 6 kW/100m AAT
WRDT • Monroe - Detroit, MI
560 kHz, 500 W-D/14 W-N, DA-D
WMUZ • Detroit, MI
103.5 MHz, 50 kW/150m AAT
WPWX • Hammond - Chicago, IL
92.3 MHz, 50 kW/150m AAT
WSRB • Lansing - Chicago, IL
106.3 MHz, 4.1 kW/120m AAT
WYRB • Genoa - Rockford, IL
106.3 MHz, 3.8 kW/126m AAT
WYCA • Crete - Chicago, IL
102.3 MHz, 1.05 kW/150m AAT
WYDE • Birmingham, AL
1260 kHz, 5 kW-D/41W-N, ND
WYDE-FM • Cullman - Birmingham, AL
101.1 MHz, 100 kW/410m AAT
WXJC • Birmingham, AL
850 kHz, 50 kW-D/1 kW-N, DA-2
WXJC-FM • Cordova-Birmingham, AL
92.5 MHz, 2.2 kW/167m AAT

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