The Local Oscillator

The Newsletter of Crawford Broadcasting Company Corporate Engineering

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The Second Wave

The second wave of AM translator filings, in what is officially known as the ñSecond Modification Window,ò opened last week. Crawford filed five applications in this window, proposing to move five translators which we are in the process of purchasing to pair with our class B AM stations.

In Portland, we propose to move a translator from Tacoma, Washington to our site on Mt. Scott to pair with KKPZ, mounting the antenna on the detuned auxiliary tower next to our building. We proposed 250 watts H&V with a directional antenna oriented southeast.

In Modesto, we propose to move a translator from Imlay, Nevada to the KCBC site to pair with KCBC, and to mount a non-directional antenna on top of the east tower. We proposed 250 watts H&V for this one.

In Birmingham, we propose to move a translator from Donelson, Tennessee to the WYDE(AM) site to pair with WXJC(AM). This translator was proposed with 99 watts H&V and a directional antenna oriented northeast.

We filed two applications for Denver. One is to move a translator from Oak Creek, Colorado to the KLVZ site to pair with that station, mounting the antenna on the northeast tower. That application specifies 250 watts H&V non-directional. The other Denver application proposes to move a translator from Craig, Colorado to the KLTT site to pair with that station. We propose to mount the antenna on tower #4 (NE) of the KLTT array and operate with 250 watts H&V, directional southwest.

At present we are waiting to see if we got MXed on any of these filings (ñMXò = mutually exclusive, i.e. one or more applications filed for the same frequency in the same area so that both applications cannot be granted). Hopefully not.

If we get grants on all these, we will soon have an FM signal for every AM station we have except WLGZ, which is already simulcast with WDCX-FM in Buffalo.

KBRT-FM (K264CI)

Last month I noted that we were gearing up to make an antenna change and add some vertical power to KBRTôs translator. We got that done without issue on July 6.

The resulting coverage is much better than what we had before with the horizontal-only antenna. The signal was listenable ï not solid, but listenable ï throughout all of Corona except the terrain-shadowed northwest part. I could hear the signal in Norco and the south part of Riverside as well. The vertically-polarized antenna is oriented east, so it looks right between two peaks into central and south Corona.

As time goes on and the LPFM situation clarifies, I hope to up the power on this translator. We may also look for another site at some point, one that does not have terrain shadowing. The reality is that if I could site it on one of those lower peaks east of the KBRT site, we would do a whole lot better into Corona. Thatôs not going to happen, though. Thatôs all Cleveland National Forest land with no power, no phone, no pool, no pets.

Antenna Structure Registrations

In the process of doing the engineering work for the next batch of translator applications, I ran into ASR issues with a number of our towers.

The issue was incorrect coordinates on some of the directional array element towers. I planned to use tower #4 at KLTT and tower #3 at KLVZ to support the antennas for those stationsô translators. It was as I began plotting high-dBu interfering contours on Google Earth images that the problems became apparent.

A little sleuthing showed the problem at KLTT to be one of datum. The original ASRs for KLTT were filed and issued using the NAD27 datum. The existing ASR database uses NAD83. Someone at the Wireless Telecommunications Bureau (WTB) ï either FCC personnel or a contractor ï improperly converted the coordinates, and as a result the ASR database contained NAD27 coordinates for two of the towers but showed them as being NAD83 coordinates.

You would think getting something like that would be easy to fix. I filed a trouble ticket and uploaded a copy of the original ASR documents for those towers ï which clearly showed ñNAD27ò next to the coordinates ï and explained that either the datum needs to be changed to NAD27 or the coordinates need to be converted to NAD83. I have no idea why, but that didnôt work, so I had to file another trouble ticket saying the same thing. This time it worked, and the coordinates were corrected. Ditto for tower #2 at KLTT and tower #3 at KLVZ.

Itôs always important to have matching coordinates when filing applications with the Media Bureau (and WTB as well). Mismatched coordinates are guaranteed to hold your application up at best and get it dismissed at worst. Since we have only one shot at these translator apps, I couldnôt take a chance.

This ASR coordinate issue has alerted me that I probably need to look at every ASR in our company to be sure that they are correct. My guess is that since I found three of the nine registered towers in the Denver market with errors, a similar percentage may have problems elsewhere in the company.

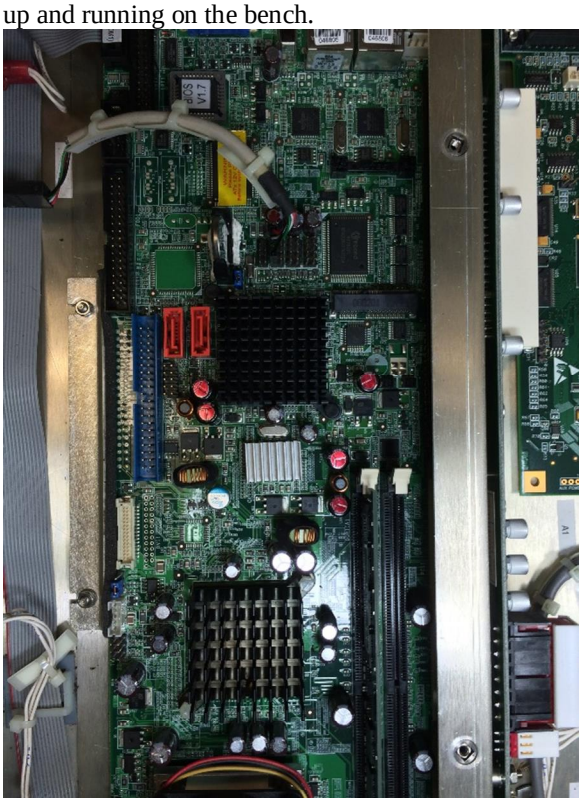
Exporter Caps

At the risk of beating a horse to death, we continue to have issues with Nautel Exporter Plus units dying. All of these are about the same age and were purchased as trade-ups when we retired the first-generation NE-IBOC units. Readers may recall that the failure symptom is that the unit powers down by itself. When it is powered back up, it either hangs in an endless ñInitializingò cycle or else shuts itself back off after a couple of minutes.

Factory repairs of these units have been costing around $1,200 ï they replace the single-board computer. We have had some success repairing them ourselves in the field without replacing the SBC. John White did an excellent write-up on the procedure he followed a few months ago successfully repairing the KKPZ Exporter Plus.

A couple of months ago, I successfully repaired one of the units from our Denver operation in the field. In mid-July, another unit died and I thought Iôd take a crack at it as well.

In this unit, only four of the five caps that I had replaced in the first unit were bulged out at the top, but I thought it wise to replace all five anyway. I did that, and in about 20 minutes the unit was back up and running on the bench.



The capacitors marked in red in this photo are the ones that should be replaced on the Nautel Exporter Plus SBC.

Some tips for field repair of these units:

First, the photo above shows the five caps that you should replace in red. Replace them all, whether or not all are showing physical signs of failure.

Next, to remove the caps, heat the pad on the underside of the board while pulling the cap sideways on the top of the board, away from the lead being heated. Alternate between the two pads, pulling in the opposite direction until the capacitor comes free. It took me just two shots to get each cap out.

With the caps out, use solder wick to clear the solder from each hole. Sometimes this works and sometimes it doesnôt. If it doesnôt work, donôt waste a lot of time continuing to try to clear the holes.

If you have a PC drill, use it to gently clear the solder from the holes. I did this on some and it

worked great. Make sure your bit is no larger than the capacitor leads (0.5 mm). You're dealing with a plated-through hole in a multi-layer board here and you don't want to remove any of the through-hole plating.

If you don't have a 0.5 mm PC drill, the easiest course is to apply some solder to the holes, then first heat the positive pad on the back side and insert the (longer) positive lead from the top. Remove the heat and rock the cap around as the solder cools so that the lead stays loose in the hole.

Next, put the (shorter) negative lead right against the center of the pad on the top of the board and heat the corresponding pad on the back of the board. As soon as the solder melts, push the lead all the way into the hole until the cap seats against the board. Re-heat both the negative and positive pads, apply solder as needed. Clip off the leads and clean off the flux. I followed this procedure on a couple of the caps with no issues whatsoever (I drilled the rest).

As I noted above, replacing all five caps took me just a few minutes. If you're handy with a soldering iron, you'll have the unit fixed and back in service faster than you could box it up and ship it to the manufacturer. And you'll save the company $1,200!

Power Supplies

Trango -48V power supplies have been dropping like… well, like exporters around the company of late. These are the laptop-style "brick" supplies that were supplied with Apex links back in 2010 and 2011.

I haven't quite figured out the failure mode yet. They still measure -45V or so under load on a DVM, but there must be significant hash on the supply because the radios they are powering either quit outright or start doing weird things.

Some lose throughput on the data path (the RF path and RSSI remain good and locked). Some quit responding altogether. Some work fine most of the time but the link goes intermittent. The most recent quit responding and displayed a flashing green ODU light on the power-over-Ethernet (PoE) injector.

The replacement supplies are a bit pricey but seem to be heftier – they are certainly bigger! In Denver, we're replacing all the supplies. Several have failed and all are about the same age, so Amanda is replacing them all.

Those of you with Apex (or even ApexPlus) links that use the brick type supplies would be well advised to swap the supplies out before they fail. Trust me! They won't fail at a convenient time!

The New York Minutes
By
Brian Cunningham, CBRE
Chief Engineer, CBC – Western New York

Hello to all from Western New York! Summer is in full force here, with endless heat and little to no rain in sight. We have broken the 90-degree mark several times this year, which is an extraordinary event in itself for our region of the country. High temperatures, humidity and no rain have kicked our air conditioners into high gear, and they are running around the clock to keep our facilities cool and comfortable.

Because it has been so dry, we are having to replace our A/C filters every month, instead of every three months. The only downside to the warm temperatures and little to no rain is that we are not having to mow as often. Our transmitter fields are extremely dry, and most of the growth has turned to straw, a concern in itself if it ever caught on fire, so keeping it cut down low to the ground is a priority, especially those sites that are close to populated areas.

Last month, I had reported on an electrical problem at the WDCX-FM transmitter site. We were blowing 200-amp slow-blow fuses every couple days or so. In order to determine the cause of the failures, I purchased a good clamp-on AC ammeter with peak hold function and measured

the amperage draw on each leg of the incoming service. All three were exceeding 200 amperes for a brief period, but one phase, the one that kept blowing the fuses, had a peak draw of 260 amps!

To try and isolate the cause of the excessive amperage draw, I measured each phase with only the transmitter and ancillary equipment operating, then added the air conditioning and exhaust fans into the mix. Next, I measured the amperage at each disconnect, and found that the A/C units were causing the excessive amperage draw.

I called in our HVAC contractor to check out our two Bard 5-ton air conditioners. They soon found the cause of the problem. One of the unitsô electrical connections into the compressor was arcing, due to high resistance connections on the 3-phase electrical mounting block. He stated that Bard used a special type of connector on the service wires, and these connectors are a known component to fail with excessive use. He replaced the wiring harness to the compressor, and cleaned the condensing coils on both units, as they had clogged up in just a matter of weeks since they were checked. Since this work was done, we have not experienced any fuse failures, and the amperage draw on the main service is below 200 amps.

On Friday afternoon, July 8th, I received a call from the Rochester board operator stating that he felt that the modulation on WDCX (AM) was lower than normal. He compared it to the other AM stations in the market and found that indeed our audio level was not as loud as they were accustomed to.

On the following Monday, I made the trip over to Rochester to investigate the cause of the low audio and found that the Omnia.5EX processor was the cause. The modulation monitor was showing 70% modulation, and that was consistent with what the Nautel AM IBOC unit was reporting. I switched the transmitter over to exciter B and began looking at the Omnia processor.

The output meter was showing -2 dBFS, and any adjustment to the output level would result in no change to the AES/EBU level. I also noticed that the headphone output was not working, so I tried a hard reboot of the unit to see if it would come back to life. After the re-boot, no change was noted, so I pulled the processor and sent it off to Telos for repairs.

While traveling back to Buffalo, I received a call that WDCZ 970ôs audio was cutting in and out every couple seconds or so. I suspected that the Moseley DSP-6000 digital encoder/decoder had failed, so I drove straight out to the WDCX-FM transmitter site to pick up our spare encoder.

Once I arrived at the WDCZ transmitter site, I noticed that the DSP-6000 decoder was showing constant faults, and at this point, was passing no audio at all. Armed with this knowledge, I then drove to the WDCX studios to pull the spare decoder. I installed the spare encoder at the studio end, and drove back to the WDCZ transmitter to install the decoder.

Once installed, I fired up the STL receiver, and still had no audio, and solid faults were showing on the digital decoder (I should note that signal and sync LEDs were lit green). Now, we have a real problem: the STL is not passing the digital signal! We do not have a backup STL transmitter/receiver for this site, and being an out-of-band radio set, there was no chance of borrowing a set of radios from another station, re-tuning and installing to work on 945.000Mhz.

On a hunch, I went back to the studios and pulled the STL transmitter and re-configured it to work with analog mono. Hoping that the portion of the audio board used for mono was not damaged, I reinstalled it and ran a mono studio feed to it. So far, everything looked good. I was seeing audio on the VU meter, so I adjusted the audio level and headed back to the WDCZ transmitter site to complete the mono path.

Within a few minutes, we were back up and running with the mono analog, and all sounded good. I made some tweaks on the Orban audio processor to adjust the modulation levels, and breathed a sigh of relief, we had dodged another bullet! At some point, I will need to pull the STL transmitter and troubleshoot the composite portion of the audio board. I suspect the problem will be a blown amp chip in the composite input section.

In order to provide backup audio on WDCZ, we have purchased a Tieline Bridge-IT in case the STL fails again. We can also incorporate it for use at the FM site should we lose our audio path there. You simply cannot have enough back-up!

Another issue I recently troubleshot was the loop readings on tower #4 in our Rochester AM array. The loop was reading approximately 15% lower on both day and night patterns. After looking over the phasor schematic, I determined that the only common factors between the two arrays were the sample line, antenna monitor, and the Delta transformer located in the doghouse.

The first test I performed was to note the readings currently indicating on the phase monitor, and switched the input with another channel to see if the problem moved. It did, so I ruled out the phase monitor. Next, I used my VOM and measured the sample line from both ends, everything there was

good also. That left only one component that would cause the incorrect reading, and that was the Delta transformer. I pulled the transformer and swapped it with the one in tower three, and found that it was reading low there too. The transformer from tower 3, now mounted in circuit on tower 4, was reading correctly! I pulled the defective transformer and sent it to Delta Electronics for repair. Hopefully they will be able to repair it and send it back soon.

Our cap-ex projects are rolling along. By the time this reaches press, we should have the new fence project at the WDCX (AM) site completed. The old wooden fences are being replaced with 6-foot chain link around all of the towers and generator pad. This site normally holds a lot of water, and the wooden fences were constantly in need of repairs. The galvanized steel fence posts and fencing should last us a good 20 years with very little maintenance needed.

The studio project at WDCX-FM is well into the planning stages. We are getting quotes on the new broadcast furniture, construction work, and electrical, and hope to be able to pull it all together within a matter of a few weeks. We have severely outgrown our talk studio, and our only option of enlarging it was to swap the current main control room with the talk studio. We donôt need all the room we now have in the control room, and we are not able to obtain any additional square footage in the suite we now occupy, so swapping the two was the most logical choice. It will be a challenge keeping everything on the air while we undergo construction, but I have a solid plan that will enable us to continue operations with little difficulty.

Our roof project for the WDCZ transmitter building is scheduled to begin sometime in late August. Our roofing contractor will be setting a definite date sometime within the next few weeks. Since we have not had any rain to speak of, they have been quite busy trying to catch up on projects they couldnôt get to back in the winter months.

I am pretty reserved in my opinions political in nature, and hardly ever speak my mind publicly about political issues, but folks, I am worried about the upcoming presidential election. The future of this country is in the balance, and the wrong choice can send us into horrible times. Pray for our nation, and pray that we make the right decisions on whom we send to be the leader of our country.

That about wraps up another month here in the Northeast. Until we meet again here in the pages of *The Local Oscillator*, be well, and happy engineering!

The Motown Update
by
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Last month I experienced an issue with my Tieline Bridge-IT Distribution Codec (ñDistoò) that we use to distribute programs like the Bob Dutko Show to our sister stations. Within the Tieline Codec we have programs or presets containing the IP addresses of the codecs to which it connects, along with audio codec parameters. In this case we have the unit set up to send streams to our Albany, NY and Portland stations simultaneously.

One afternoon, operations manager Vito Faletti indicated that Albany had lost their feed of the Dutko program and were taking the internet feed as a backup. I went to the rack room to investigate the issue and noticed that the Disto was trying repeatedly to connect without success. We first actuated a command from the Wheatstone scheduler to re-send the closure (LIO) to the Disto to re-run the program that auto-dials the IP addresses of the codecs at our other stations. Unfortunately, that had no effect.

Next, I rebooted the unit. Upon power up, it would not even try connecting to any codec. A message on the screen said I was not authorized to connect or use the unit. After discussing the issue with Cris, I called Bill at Tieline to obtain some guidance.

From the message on the front panel of the unit, it seemed that I lost the authorization to use the codec license supplied with the unit. It seemed

strange since it was purchased with all the installed audio codec algorithms straight from the manufacturer. Bill had me look at some of the menus, including the one that shows the installed codecs. We found that one to be blank. In addition, the field that shows the serial number of the unit was also blank.

At that point, he wanted me to try to load the license file from the Tieline server over the internet. Through some menu navigation, we gave that a try, but it was not able to load them. Bill indicated that he would create a license file and send it to me in an email with some directions. When I received the email and file, I tried to set up IP communications between the two units. In order to do that, I put the Disto on our other network switch with a different ISP service. Almost immediately, the Disto grabbed the license file from the Tieline corporate server and loaded it. Now I could see the serial number and codecs loaded on the display.

I put the connection back to the dedicated Comcast ISP internet service we use for the link and I tried to connect to the Albany/Portland station codecs. Unfortunately, the display would say connecting, but a completed connection was still not possible. At that point, even though the Comcast router indicated service, I rebooted it to see if the connection would return. After that, I noticed that the unit connected to Albany/Portland without an issue.

In the end, it seemed that I had two issues. One was that the license file was corrupted. The other was that it lost its internet connection. It is nice to know that the license file can be loaded two different ways (by PC or Internet). Sometimes, you have two issues that are masking each other and have to sort through them. This was one of those situations.

At our studio facility, we have a neighbor next door that has not been keeping up the edge of their property for some time. This area is closest to our KU Band dish that we use to receive Healthline and Tony Perkins programming.

At some point, the neighbor, which is actually a tower site, decided to create a berm or raised edge along the property line. Since that has occurred, the foliage has grown to a point where it is impacted the received signal strength to the XDS Pro.

I noticed that when I first started working on improving the received signal strength, I was only getting an Eb/No of 0-7. At times, I would lose the signal altogether. The feed horn or LNB assembly was filled with leaves and wasp nests. After I cleaned out the debris, I had an Eb/No of 7-8.

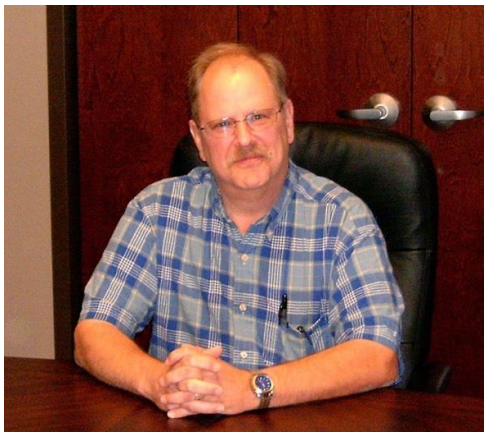
Finally, we contacted our grounds keeper, Fernando with Crown Landscaping, and had him clear the foliage in front of the dish. Now, we are receiving an Eb/No of 12-13. Historically, before the creation of the berm, we had an Eb/No of 16-17.

When you put it in perspective, you can see the contribution of each of these issues. The berm is about 3-4, the foliage is about 3-4, and the nest and debris, is about 7. Knowing this data, I believe, gives you some real world history for your installation. It provides you an understanding of the importance of grounds maintenance and the effect of surrounding obstructions. This way you can monitor your installation and take care of issues before they occur.

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.

News from the South
by
Stephen Poole, CBRE, AMD
Chief Engineer, CBC–Alabama

Wow! This has been a crazy two months. The past few weeks have been especially crazy, what with one severe storm after another. It has just been nuts. More on this in a moment, but Iôve also been dealing with my beloved wife, Sandy, who has had painful muscle spasms for a while now. The doctors have done a scan, theyôve sent her to PT, theyôve given her muscle relaxers. As I write this, we are scheduled to go see a specialist. Weôre praying for some answers and I would appreciate your prayers as well.



Now for the storms. It has been ridiculously hot and humid here. The humidity is so high, if you walk outside after being in a cooled building, your clothes actually become damp. The atmosphere has been unstable, so every other afternoon, storms have brewed up with strong winds and lightning. This has taken its toll. Just for starters, weôve had phone lines out and several tower have been under a NOTAM with light outages.

The Big Meltdown

On Friday, July 22, severe storms rolled through overnight and knocked out the power at the studios. For some reason, the generator didnôt come up. But thatôs not the good part. The best part is that Todd was on vacation, Sandy didnôt work on Friday so she didnôt get up at 5AM as she normally does, and the storms had also knocked out my phone at home.

We rarely get phone calls on that line. Like most folks nowadays, I use my Smartphone (Sandy, being even higher in tech than a mere radio engineer, does video with Facetime and Periscope). We have ATT UVerse, and the Internet was still working just fine, so it never occurred to me that the phone might be out.

But it was. And the poor folks at the studios were beside themselves trying to get up with me. Sandy woke me around 7 AM and told me that my smartphone had been going crazy. I looked at the messages and said, ñcrap.ò

I set a land speed record getting to the studios. Todd had done what he could via phone (even while on vacation!), but I knew there were still some major problems. For example, 101.1 FM had been switched to Emergency Control Room in NexGen, but was still making dead air.

Jack Bonds beat me to the studios and started giving me the bad news: there were UPS units in engineering that had overloaded and shut off. Jack played hero, too, juggling equipment around to different outlets and getting us back on air.

How could that have happened? Any time we experience something like this, we need to know the reason so that we can try to prevent a recurrence. At length, a plausible scenario began to form. As I walked through the building, I noted that some overhead lights were out, while others were varying in brightness. Some were too bright. We were getting ñphantomò voltages on some phases. These were apparently just enough to keep the generator off and to confuse the UPS units.

Alabama Power sent a tech to replace two pole fuses; we were able to get the generator to come on while he worked. Then I started receiving text messages about the mail server being down. The demark for our WAN Ethernet service is located downstairs. The generator only backs up our critical on-air functions, all upstairs. We had run an electric cord run through the ceiling, from a generator-backed outlet to the demark, but our new service provider had installed two separate pieces of equipment. Only one had been plugged into the generator-backed power. We bought a UPS and plugged everything into it, with the UPS being fed by that cord from upstairs. That got our Internet service, and thus, the mail server, back on line and running.

Eventually, everything was back to normal and we made it through the rest of Friday. But Saturday night, July 23, I received a call from the operator at the studios. He had heard a very loud ñboomò and the power was out again. This time, the UPS units did their job and the generator took over the load. We were on air, but I drove in to the studios

to see what was going on.

Once again, there were two line fuses popped on the power pole out front. I was pretty sure that it was the same pair, too, so my heart dropped. Boy, I was praying that transformer hadnôt failed. Alabama had already replaced it once, so it was certainly possible. But when the tech from Alabama Power arrived, he replaced the pole fuses again and everything seemed OK.

I pointed out to him that two of the phases on the high-voltage feed to our transformer were quite close together. He spread them apart and removed some vines from around the insulators, then popped in the new fuses. Thank you Lord! The power came back up and stayed up. No more ñbooms.ò I still think those two insulators are too close, but at least I have a bit more protection against the wind whipping the wires together.

Not a great picture, but look at the insulators on the right. This is after the tech spread them.

While I was there with nothing to do but listen to the generator hum, I updated the software on the mail server ... and when I was done, no one could fetch mail and the Barracuda was building up a large backlog of deferred messages. Yay! The mail server is down again!

This time, it turned out that the update had cleared some rather important operating system settings to the defaults. It took me a while to find and fix those, but finally, the mail server was back up. I made it to bed about 2AM Sunday morning.

Production Issues

What with all the running weôve been doing with the storms and working on STL systems (more on that in a moment, too), the folks back at the studios were becoming restive. We had one production room that wouldnôt behave; we repaired some things, but continued to get complaints about the mike ñpoppingò and sounding tinny. That last one was easy to correct: itôs an AKG side-address condenser mike ... and they were talking into the back of the thing.

The biggest problem we had was a lack of communication. The staff had been stewing for some time about these problems and I was largely unaware of them. To help address this, we have emphasized the long-standing policy of submitting non-emergency requests in writing. Todd has also installed a ticket management system that we can use internally to track repairs and make sure that nothing slips through the cracks (something that we should have done long ago, to be honest).

STL Problems

The microwave data links to 1260 and 850 had been down for a while. We called in one tower crew, and Todd knew we were in trouble as soon as they pulled up. The owner of the company, a wiry old man, had brought his stepson (or grandson? He used the terms interchangeably and we were too frightened to ask for more detail). These folks arrived in an ancient Oldsmobile land yacht, a half-rusted smoke monster with shocks so worn, it wallowed and bobbed over every bump and pothole.

We attacked 1260 first. Todd supervised the work while I remained at the studios with Jack. Todd sent me a few texts about how slow the crew was. Junior/Stepson/Grandson/Whatever tried to climb, made it about 50 feet, then chickened out and came back down. So, the old man climbed. And he climbed. And climbed. It took him forever just to reach the dish at 190 feet, and by the time he got there, he had forgotten most of what Todd had shown

him on the ground.

Todd determined that the power supply on the ground had failed, so I ran a replacement to him. When we hooked it up, we were able to confirm that the link worked (yay!) but didn't trust the lightning suppression at the top of the tower. I had brought some Transtectors with me as well. The old guy climbed down ... and climbed down ... and at length, reached the ground, huffing and wheezing and puffing like an ancient steam locomotive.

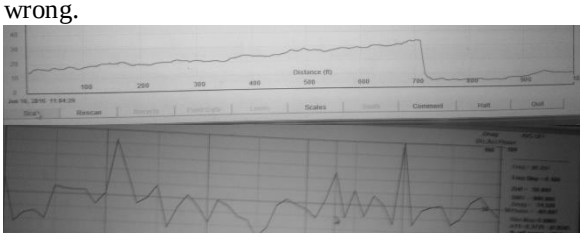
By then it was almost 5PM and there were storms moving in. The mental image of this poor old guy hanging off the tower, lightning popping all around, was enough to convince me that we needed to call it a day. We had at least proven that the link was solid and good. But wow.

We brought in another crew, one that we've used before. They were able to get 1260's link up and running by lunchtime, so Todd moved on to 850. There, we found an intermittent shielded CAT5 connection. The link came up, but by the next morning, had failed again. Todd switched to night pattern (and therefore, to low power) and it came back up. Aha! We've still got to address this one. Right now, the data link serves as our primary STL and the old 950MHz link is our backup. We're able to stay on air.

Sports!

We have leased WDJC-FM's HD3 to a local translator owner for the purpose of airing Fox Sports and NBC Sports. His translator is at 99.1, and thinks he can make a go of it.

That may be; I don't know. What I do know is that we had to do some work to get him on air and operating legally. First, the switchover date was delayed when he discovered that the person responsible for the 99.1 translator antenna had done something wrong up on the tower. As a courtesy, Todd took our network analyzer and looked at it. The TDR gave a slowly-rising mountain, measured from the ground to the top. The impedance sweep was nothing but peaks and valleys. Yep, something was wrong.



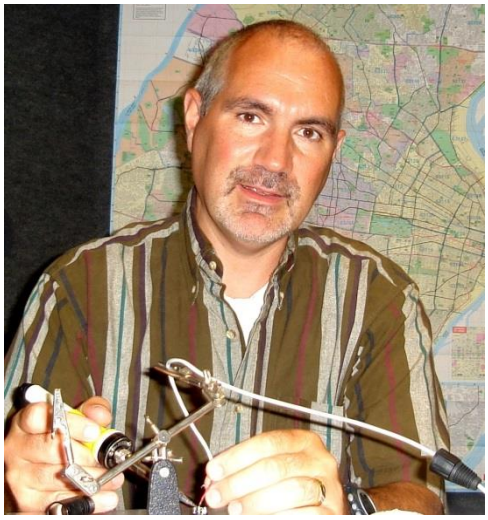
Another terrible picture. Top: TDR, bottom: Z sweep.

The guy was able to get his antenna fixed, but there was another problem: he wasn't feeding legal IDs. We had no choice but to take the HD3 off air until he corrected that. This took a day or two.

At length, we finally got him on air, sports a-talking, and life being good. He has a Sage ENDEC with the latest software installed, and everything is nice and legal. I wish him the best. We will be closely monitoring the HD3 signal to be sure it stays legal.

The Chicago Chronicles
by
Rick Sewell, CSRE, CBNT, AMD
Engineering Manager, CBC–Chicago

There's the proverbial saying, "Lightning never strikes the same place twice." I really don't think there is much scientific data to prove that, but geez, I hope it's true! A few days before the time of this writing, we had a grand mal lightning strike on our 80-foot STL tower at the studio/office location. Despite having a static dissipator and lots of grounding, the discharge tore through multiple systems, causing serious damage to many systems on the tower, throughout the rack room, studios and our offices.



I try to be a bright-side person, so as bad as the damage was, it could have been much worse. It appears we lost several of our Ethernet radios that extend our networks to the transmitter sites on that tower. Fortunately, all of our 950 MHz equipment is still functioning. This means we had a way to get our audio to the transmitter sites. If some (or all) of these were gone, we would have been dead in the water for quite a while. I was quite thankful for that.

When the lightning strike occurred, I happened to be on vacation driving through the heart of the Ozarks in Missouri. My first thought was, "Why did this have to happen while I am on vacation?" Still, it was impossible for me to sit on the sidelines, so I called my staff on hand, Brian Bonds and James Kelly, so I could lend any of my knowledge to help them get the stations back on the air, before I eventually would be exiting the interstate and would no longer have cell coverage.

The strike took two of the stations off the air due to the damage to two of the WheatNet blades. These were serving as the connection for the audio servers and eventually for the output to the STL equipment.

After two minutes, one of these stations, WPWX, began playing the backup audio player located at the transmitter site, so, it was back on the air fairly quickly with PPM-encoded audio. We had installed this player earlier this year so that when both STL audio paths were silent it would be ready to automatically put this player on the air until normal audio was restored. I wrote an article about this player in the May edition of The Local Oscillator, earlier this year.

The other station, WYCA, didn't have a backup player. We had been in the process of setting up a playlist through the Nautel VS2.5 transmitter. However, we still needed another firmware upgrade to fully realize the ability of the transmitter to do this.

While on the phone, I was able to help the engineering staff get the stations back on air with normal audio by bypassing the WheatNet blade system to put the control rooms directly on the air through their legacy Wheatstone bridge router. Once I knew all four stations were back on the air, I was able to have the peace of mind to exit the interstate and be out of cell phone coverage, because I knew my staff could get

The 80-foot Pirod free-standing STL tower at the studio. Note the static dissipaters on the top.

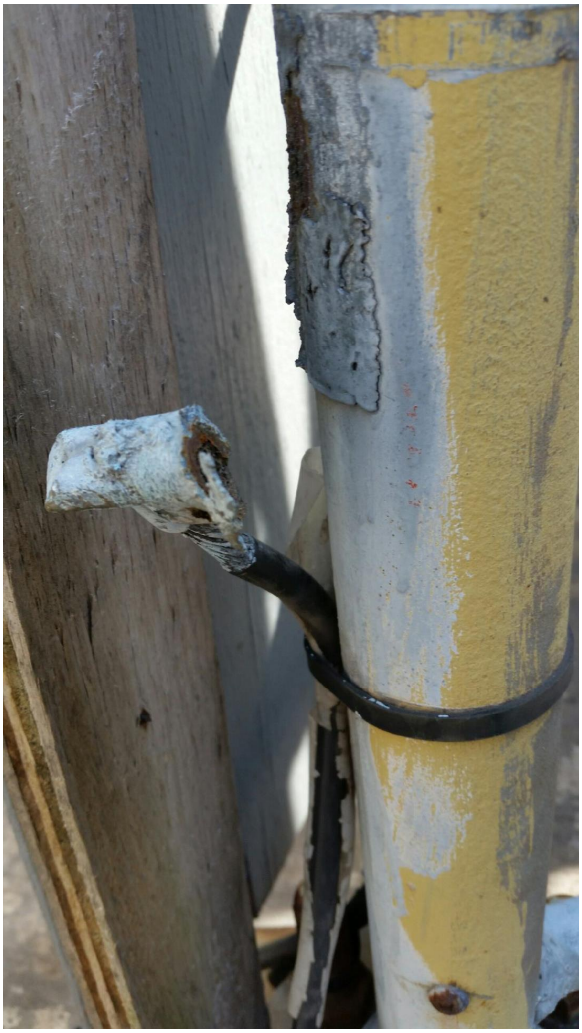
through the rest of the issues.

Brian and James did a great job of keeping the stations on air and getting the place back to as normal as possible under the circumstances. When I returned from vacation, we continued to work through the problems as quickly as we could.

The list of devices and systems affected by that lightning strike at the studio/office location are too numerous to list here. We have found that we often donôt realize something is broken until we repair the system attached to it. Beyond the problem with the Ethernet radios, our biggest issue still hampering our efforts is the internet firewall server. Excluding our traffic/sales network, all of our networks from the studios, rack room, house and transmitter sites terminated into this unit. While we are using an off-the-shelf router to substitute while we wait for a replacement, thereôs no way it could be used to get all these networks back on the Internet with all the sophisticated routing we need to fully function.

While lightning didnôt strike the same place twice, we did continue to have powerful electrical storms rip through the area for days following, and these affected two of our local tower sites. We lost Ethernet radios at our Lansing, Illinois site along with part of our remote control system. It also looks like we lost an Ethernet radio on our Burnham, Illinois tower as well.

It will probably be weeks before we can get everything back to normal. Again I have to look at the bright side and remember that as bad as it was, it could have been much worse.



After he wrote his column, Rick dug into the possible contributing causes of the lightning damage and found the above – the ground connection at the base of the tower was broken off. Someone probably hit it backing out of a parking space. We are getting a welder to come out and attach a new ground connection. -Ed.

The Portland Report
by
John White, CBRE
Chief Engineer, CBC–Portland

Last month, I discussed some of the issues facing AM stations which have towers from other services nearby. This was prompted by a request for our station to be shut down for the safety of a crew working on a tower 800 feet away. After some thought, I have concluded this is a multifaceted subject which impacts many stations and requires more discussion.

From a safety perspective, we all should have a plan for work preformed inside areas near a tower with higher RF levels. Generally, we expect that broadcast engineers and tower crews are trained in proper safety procedures. Untrained workers, such as painters and carpenters, do not have RF safety training and they require a higher level of protection. Under some circumstances, de-energizing the tower or employing very low power levels may be required.

A more complicated situation is when work is being performed on towers that are not part of the broadcast array. Our communications tower just to the south of the KKPZ building is an example. Itôs about 100 feet from tower #3 of the KKPZ array and we have found that we need to disable the detuning and reduce the 1640 kHz expanded band station that shares the tower to night power (1 kW) when work is done on the tower. This guarantees that workers wonôt receive contact burns when working on the tower.

By comparison, the RF exposure at a tower that is 800 feet distant will be expected to be well below both occupational and uncontrolled levels, provided that the detuning is disabled while work is being performed at the tower. Personal protection equipment used at the work site should be rated for the RF frequencies in use. Otherwise, false indications can result from inaccurate operation of the equipment. The tower crew should document the suitability of any PPE used and any requests based on unsuitable PPE can be rejected.

Recent changes in FCC rules, which were intended to simplify the process of dealing with adjacent tower detuning, have in some ways made the situation more complicated. Specific steps for maintaining detuning in an operational state are not dictated in the FCC rules as had been the case in the past. Specific and complicated procedures for those directional systems that were licensed based on field measurements retain those complicated procedures, which complicates the situation for some AM stations.

At this point, itôs good to ask what AM broadcasters need in order to protect the proper operation of the stations antenna system and coverage. For most of us, job #1 would be keeping the detuning equipment at detuned towers operating properly to protect our coverage. A close second is reducing the necessary cost to the stations to obtain that goal.

Maintaining detuning equipment in an operational state is more difficult that might seem to be the case. Shorted drape wires, ungrounded coax cables, broken detuning apparatus insulators, and mistuned adjustments are common. I have found problems with detuning equipment on something like 40 to 50 percent of inspections. Thatôs a record that suggests a need to pay special attention regular inspections.

The primary tool the FCC has given us is the mandatory notification of station prior to work at a detuned tower. Beyond that notification, the FCC has not specified a procedure to be followed to insure ongoing proper operation. Presumably, field measurements might not be required to demonstrate proper operation.

As a broadcast engineer, I want proper operation confirmed at the end of the work. As a tenant at a tower, I would expect that inspection prior to work starting would help insure the tenant doesnôt inherit problems left by others.

Unfortunately, there appears to be an unwillingness to follow the notification rules. Of the last six instanced of tower work at the nearby water plant tower farm, five of them did not include notification. In one case, I was contacted to provide a key to disable the detuning, and in another we were

requested to shut down. In yet others, I found out after the fact that work had been done.

The reason for the high level of noncompliance is not clear. It could be lack of awareness (no excuse), or possibly a decision to ignore the requirements. That, ultimately, is worse. In either case, I have been working in the direction of posting notification signs. At least one other tower owner has posted signs, and hopefully more will follow.

A comment about the method of moments tool is in order here. The tool allows AM stations to replace an expensive field measurement process with direct modeling of the antenna system. MoM will eliminate much of the drudge work involved with detuning. It won't, however, prevent damage from improperly operating detuning systems.

For KKPZ, which has seven detuned towers to deal with, implementing MoM is highly desirable. The KKPZ towers are self-supporting semi-uniform towers, which makes modeling complicated. To make matters even more difficult, one of our towers is skirt fed, which disqualifies it for MoM licensing.

Rocky Mountain Ramblings
The Denver Report
by
Amanda Hopp, CBRE
Chief Engineer, CBC - Denver

Mowing

We were finally able to finish up the mowing at the KLVZ and KLTT transmitter sites (65 acres between them). It appears the spraying of the weeds at KLVZ last year really did a great job. We are no longer having to deal with Canada thistle as in years past. That means no letters from the county telling us to deal with it or else.

Storing the tractor inside a tower base fence worked out very well, especially at KLTT. We had a lot to mow at KLTT (50 acres). Keith Peterson was able to go out at first light and mow for several hours before it got hot. It took him, I think, three days to get the site finished up. I must say, it looks very good. I can actually see all of the fences for the towers.

KLTT Link Status

Last month, we started having issues with the KLTT Trango 11 GHz microwave link dropping packets. This would, on occasion, make the audio sound bad. To eliminate all the rest of the network, we bypassed the switch on each end and connected the codec directly to the Ethernet radio. That didn't help at all. We noticed that the Trango radios were not showing any issues ï BER of zero and zero dropped packets were reporting on the diagnostic screen of each radio.

Next, we had Derek Jackson climb the tower at KLTT and swap out the Ethernet switch up there along with the Ubiquiti Nanobridge that links the data from the top of tower #4 back to the transmitter building ï that unit was showing low signal. He also replaced all the cables on the tower. That didn't help with the dropped packets, but it did restore the signal to -37 dBm, which is about right for a path of just a few hundred feet.

With everything at the transmitter end of the path eliminated, we decided that we wanted to go ahead and change out the Trango APEX radio at the studio with our spare APEX Plus. It would be cheaper to do it ourselves (free) than hiring someone to climb the tower. Because we don't have shielded CAT5 cable running from the engineering room to the roof (it runs in conduit), we did not have a power return for the APEX Plus radio, which uses the drain wire of the shielded CAT5 for a ground return for the power supply. Our only option was to locate the power supply on the roof, so we did that temporarily.

The "old man" swaps out a microwave radio 160 feet in the air!

We got the radio to power up, but never could get it to work ï it had the same IP address as another device on the network and we could not change it. We eventually gave up and put the original APEX radio back in place.

Cris had the idea to go into the Horizon codec and reduce the packet size to 128 bits, which represents about 4 mS of audio. This fixed the problem for now. We are still trying to find the real problem, but so far, we are having no luck. Perhaps the Trango is really going out, slow enough that it isnôt showing errors yet. Perhaps it is another piece of equipment altogether. We will find out at some point, hopefully before disaster strikes.

KLVZ Microwave

We were finally able to make time to get someone to climb the tower at KLVZ. Last month, the link to that site died altogether on us. We figured out easily that the problem was on the tower ï we could not communicate with the Trango APEX radio ï but with the issues at KLTT, we decided to hold off on figuring out this issue. We brought the spare APEX radio out to the site as well as a new power supply. We knew it would be one or the other. Thankfully, it was the latter. It made for an easy repair and a much less costly repair.

KLZ Dropping Packets

Remember that whole thing about KLTT dropping packets like crazy and the audio sounding like garbage? Yeah, KLZ started having the same problem one day. It nearly has to be unrelated as in testing for KLTT, we made KLTT a closed network. The issue was still happening as a closed network. I guess it is possible the issue at KLTT is bleeding over to KLZ, as we didnôt close off the KLZ network to test the issue. We did the same thing I mentioned above about KLTT, logged into the KLZ Horizon and changing the packet size to 128 bits. That immediately cleared up the issue with the audio, but the dropped packet counter continues to increment.

Satellite

We had a day last month when we were having some issues with a satellite program. After arriving at the KLZ transmitter site, we immediately noticed tons of wasps hovering around our dish. We found the front (dish side) of the feed horn was broken and the wasps were making themselves at home inside. We sprayed it out really good with wasp spray and left it to dry. Keith went out there later on and used a ton of electrical tape to close it off

The bucket of the Kubota tractor made a dandy work platform.

so the wasps would not get in. We ordered a new feed horn since we could not find the cover that would fit.

When the new feed horn arrived, we went out and instead of using a ladder and trying to balance it on the uneven ground, we made use of the bucket on our tractor. It provided a nice work platform and stable standing area. We got the new feed horn installed and it has been working great.

Coming Up

Our annual vacation in Lake City, Colorado in the beautiful San Juan Mountains is only a matter of days away for me. It will be a weeklong, much-needed vacation. I am always grateful for the people who fill in for me if their help is needed. Without their help, I would not be able to take time off each year. I don't foresee any issues happening, but it's good to know I have people in place that can handle the situation.

That about covers it for this edition so until next time… that's all folks!!!

KBRT • Costa Mesa - Los Angeles, CA
740 kHz/100.7 MHz, 50 kW-D/0.2 kW-N, DA-1
KNSN • San Diego, CA
1240 kHz, 550W-U
KCBC • Manteca - San Francisco, CA
770 kHz, 50 kW-D/4.3 kW-N, DA-2
KKPZ • Portland, OR
1330 kHz, 5 kW-U, DA-1
KLZ • Denver, CO
560 kHz/100.3 MHz, 5 kW-U, DA-1
KLDC • Brighton - Denver, CO
1220 kHz/95.3 MHz, 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
WDCX • Rochester, NY
990 kHz, 5 kW-D/2.5 kW-N, DA-2
WDCX-FM • Buffalo, NY
99.5 MHz, 110 kW/195m AAT
WDCZ • Buffalo, NY
950 kHz, 5 kW-U, DA-1
WDJC-FM • Birmingham, AL
93.7 MHz, 100 kW/307m AAT
WEXL • Royal Oak - Detroit, MI
1340 kHz/96.7 MHz, 1 kW-U, DA-D
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/95.3 MHz, 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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