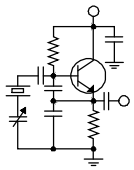
The Local Oscillator



The Newsletter of Crawford Broadcasting Company Corporate Engineering

MARCH 2017 • VOLUME 27 • ISSUE 3 • W.C. ALEXANDER, CPBE, AMD, DRB EDITOR

A New Policy

Over the last few years, a new trend has emerged with respect to factory repairs and parts from some broadcast equipment manufacturers. These manufacturers are requiring a credit card or other form of prepayment before parts or repaired items are shipped.

The issue, I am told, is that they often get stiffed on repair and parts orders. I imagine that is true. They don't have the same issue on new equipment orders because they either sell the item through a dealer (who always pays the manufacturer) or requires some form of prepayment if selling direct.

All that is to say that I get it – deadbeat customers have forced these manufacturers to use the only leverage they have to insure that they get paid, in advance, for repairs and parts.

The thing I take issue with is that not all customers are created equal. Some manufacturers have been doing business with some customers for many years, decades even, without ever having a problem getting paid for a part or a repair. That counts for something, and the right thing for a manufacturer to do in such cases is make an exception for its exceptional customers. That is exactly what a number of manufacturers have done. They require prepayment from most everyone, but for their creditworthy customers who always pay and pay on time, they offer traditional net-30 terms. That keeps the customer happy and it costs the manufacturer nothing.

Some manufacturers, however, are rigid in this prepayment policy and they don't care what the history or creditworthiness of the customer is.

We ran into this with a certain codec manufacturer last month, one with whom we have done a lot of business as evidenced by the blocks of blue in our equipment racks. We sent a frozen unit back for repair and got an email notice that while the unit was repaired and ready to ship, prepayment would be required. I contacted the gentleman with whom we have dealt at that company and asked if he would simply bill us for the $150 repair. He was apologetic but said that the company, which I might note is based outside the US, has a rigid policy and his hands are tied. No prepayment, no return.

Our good friends at Proaudio.com came to the rescue and stepped in, providing the manufacturer with a purchase order, and our codec was shipped back. Proaudio.com will bill us and we will, of course, immediately pay that invoice. I am grateful to Proaudio.com for taking care of this. Great customer service has always been a priority for those folks, and if you've ever wondered why we have a 30+ year relationship with them, now you know at least one of the reasons.

I could have pulled out my credit card and dealt with this expense directly, submitting the receipt for reimbursement, but I shouldn't have to do that. The manufacturer should take care of its long-term, creditworthy customer by extending reasonable payment terms (and reasonable does not mean pre-payment with a credit card).

Soé we have implemented a new policy within our company. We will not purchase equipment manufactured by a company that will not extend reasonable payment terms on repairs and parts. This is a global policy and does not reflect on any particular manufacturer. It's just business.

My hope is that these companies will get the message: Take care of your good customers or lose them. Simple as that.

Satellite Change

It shouldn't be news to any of us that we have until June 30 of this year to move our C-band satellite antennas to AMC 18. AMC 8 is being retired and the audio services on that bird are being relocated

to AMC 18, which is located at 105 degrees West. XDS users will need to be on transponder 17 on the new bird.

I plan to make the move in Denver this month, and when done, I will advise our people in the various markets what we ran into in the move.

Westwood One tells us that it has programmed a ñfallback carrierò into a table in each XDS or Wegener receiverôs memory. This allows each receiver to find the correct new carrier on AMC-18. Weôll see how well this works.

AM Translator Siting

At its February open meeting, the FCC passed an item of proposed rulemaking that we had pushed for as part of the FCCôs AM Revitalization initiative.

The rule for AM translator siting has long been that the translator 60 dBu contour must be completely encompassed within a 25-mile radius from the AM stationôs transmitter site or the AM stationôs 2 mV/m contour. That 25-mile limitation was a real problem for some stations, especially those which have a large coverage area and/or are located some distance from the population center(s) they serve.

The new rule still contains the same two metrics, but it provides for encompassment of the translatorôs 60 dBu contour within the *greater* of the two.

That means that stations like KCBC, for example, can now put translators in the Bay Area, which is a whole lot more than 25 miles from the KCBC site but is served by a 2 mV or greater signal level from the station. Running down the list, the new rule will allow for remote translator siting from half a dozen other stations in our company.

For the most part, to take advantage of the new rule, we will have to purchase translators in place rather than moving existing translators. Our existing translators are pretty much locked into place by other allocation considerations.

Still, I expect that as opportunities present themselves, we will take advantage of them and add to our growing number of FM signals.

Getting Better

I have received many emails and phone calls in response to last monthôs *Local Oscillator* column wherein I talked about my health difficulties of late. The good news is that I am continuing to get better every day. I am back in the office full-time and have been for some time now, and my voice has fully returned (so I can yell at people when necessary).

I still have some ways to go before I can say this episode is fully in the rearview mirror, but by the end of this month I should be about there. I hope.

Thank you all so much for your prayers and well wishes!

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

Hello to all from Western New York! The month of February was a ñPò month in the Western New York CBC stations: problems, projects, planning and perseverance rounded out one of the busiest months I have had in quite some time. Beginning February 1st, we started several projects, all running simultaneously, which created havoc in our normal way of operating the stations.

To start things off, I began installation of a new VOIP phone system with the assistance of Convergence Solutions. This project got off to a rocky start, as we did not have all the gear in hand needed to get this installation underway. Not only did I not have all the necessary equipment on hand, I had no documentation to go by to get the installation started with a firm understanding of what I needed to do, it all seemed to trickle in a bit at a time.

With telephone assistance from Steve Solton at Convergence, we were able to get the system installed and running in a few days. Every time I planned on working on this installation, something

else would pop up that needed my immediate attention, so it took longer than we had planned, but it got done nevertheless. We still have some programming issues to deal with, but for the most part, we have a new phone system without the ties to Verizon!

Along with the phone system, we arranged with one of our advertising partners to have the entire station painted, along with some minor drywall work, which included removal of 70s era carpet from several walls. The painting portion of this project wasnôt too bad, but the dust and debris from the drywall work got into every nook and cranny imaginable! We are still cleaning up dust weeks after completion of the construction work.

Running concurrently with the painting project, new carpet was installed throughout the station, with the exception of the current control room, which will be done some point this month when we tear it out for remodeling. You can imagine all our office furniture stacked in hallways, lobbies and wherever floor space could be found, while the new carpet went in, all the while we were attempting to conduct business as usual.

Also beginning February 1st was our studio project! We are switching locations of the current control room with the talk studio so more room would be available for guests during daily live shows. Tom Dozier of Hollywood Interiors is contracted to perform the construction changes in the two studios. The current talk studio, soon to be the control room, did not need a lot of construction work done, mostly carpet removal from the walls and removal of the glue that secured the carpet to the wall. One wall that separates the two rooms had to be torn out and re-drywalled due to the amount of glue used to secure the carpet. As the glue was being removed, we noticed that the wall was grossly uneven, so replacement was imminent.

This also allowed me to install a 24×24 pull-box with 2ò PVC conduits that will provide wiring raceways to the racks and punch-block wall in the engineering closet. By utilizing PVC conduits, we forgo the need to install plenum wire for any wire runs in the free air space above the drop ceilings, saving us money in wire costs.

The new control room is nearing completion. The only items needing to be done are the lighting and trim installation. On Monday the 20th, Brian Francis of Hi-Tech Laminates delivered and installed the furniture I designed for the control room. A check with Jay Tyler of Wheatstone Corporation revealed that we should expect some of the new Wheatstone control surfaces and blades to start coming in sometime the first week of this month.

That just about completes the projects portion of this monthôs report. Now onto the problemsé

I wonôt bore you with all the minor stuff that went on this past month, but there were numerous incidents that occurred while I was attending to all of the project details, which kept me on my toes!

One of the bigger issues I had to deal with was the failure of a couple of NexGen workstations, one in Buffalo and the other in Rochester. The issue here was in the fact that the new Dell T-3620 computers were not as deep as their predecessors, and there was an issue with getting the Audio Science sound card to fit. After looking the case over, I determined that the cage that held the hard drive, located at the back of the motherboard, directly behind the PCI slot, could be removed and the hard drive re-located, which would just give me enough room to install the sound card. I had to drill out the rivets that secured the cage to the case, being very careful not to get drill shavings in and around the motherboard. It seems as processors get faster and more powerful, the cases are getting smaller, making it difficult to re-use current sound/video cards that were designed for much bigger spaces.

Another BIG issue I had to deal with this past month was the failure of our fiber-optic STL in Rochester. It wasnôt the Interplex STL-Plus that failed, it was the fiber-optic line from the studio to the transmitter. Early on the afternoon of the 14th, I received a call that both stationsô audio was down, so I instructed Earl Schillinger to call Frontier Communications to report the issue. It wasnôt 30 minutes later that the audio came back up, but it had sporadic cut outs and soon it cut out completely. Meanwhile, the station called me back and reported that the NexGen network was dropping workstations randomly, then re-connecting. At this point, I knew it was going to be a long night!

I had a cheap Linksys router spare in Buffalo, and before I set out to Rochester, I decided to run out to the WDCX-FM transmitter and pull the newer Cisco managed router from that network, just in case. Good thing I did, as I installed the Linksys router and it soon began doing the same thing as the Netgear switch was doing, dropping network connections at random. I installed the managed switch, re-mapped all of the workstations and audio servers and all was well again.

Now, back to the T-1 issue.. After hours of troubleshooting, Frontier Communications technicians were at a loss as to why our circuit was

down. They reported that their lines were fine, the problem had to be in our equipment! (I knew at this point that this was NOT going to go well). I pulled the studio unit and took it to the transmitter site, and using a network cross-over cable, connected the two units together. With the cross-over simulating a T-1 circuit, both frames were happy with no faults indicated. I reported this to the technicians, who were skeptical, but went back out and started troubleshooting the circuit, junction to junction. They kept performing loop-back tests within the circuit and reporting all is well. Meanwhile, I discovered that if I pulled the data card from the Interplex frame, the audio would come up (with occasional drop-outs).

By that time, I had been up for 28 hours, and still had to drive back to Buffalo. We resumed troubleshooting after I had several hours of sleep. In the meanwhile, while driving back to Buffalo, it occurred to me that they had not performed a ñhead-to-headò test of the line. After making this request, the techs returned to the transmitter and studio sites and ran a full duplex test, reporting that it was fine in both directions! There was no way that this circuit could have tested good. Either the techs didnôt know what they were doing or just didnôt care. I performed my own loop-back test from both directions and found framing errors in both directions!

On Thursday night, I requested they send out their best technician to work with me on this issue, and together we found a bad optic card in the optic transfer case located at the transmitter site. That took care of the issue in one direction, but the path coming back to the studio still had issues.

The technician kept telling me that the circuit being tested kept coming back as a B8ZS circuit, not AMI as we were provisioned for. This was finally traced down to a junction point on Plymouth Avenue, where one fiber optic line connected to another line. The card in that circuit kept reverting back to B8ZS, even though it was programmed for AMI.

After discussing this, we agreed that the best solution to the problem was to reconfigure our equipment for B8ZS and ESF framing. Frontier actually built us a new circuit, and after changing the programming in the Interplex, our STL came back up and sounding fine!

One issue though, our data was not being passed from the studio to the transmitter! This affected the PAD data for Legends 102.7 and also internet for the AMB-OS satellite receiver. I spoke with Matt Kemp at Gates One and he sent me a loaner (data) card and backplane card for the Interplex frame. On Monday the 27th, I returned to Rochester to rectify the final issue with the STL.

While all of the above has been going on, I have been working (sporadically) on the planning for the studio renovations. Cris has provided me with the wiring designations our other Wheatnet-equipped stations have used with their Wheatnet systems, so in order to keep consistency between stations, we will incorporate the same wiring schemes in our installation. As this platform is new to me, there is a slight learning curve in getting a full understanding of how all this needs to tie together: Wheatstone ï NexGen ï ancillary equipment. No doubt, from time to time during the installation, I will be calling other engineers in our company to ask questions or get clarification on wiring/programming procedures.

Perseverance has kept me going these past few weeks. I canôt recall the last time I worked a 90 hour plus week, and quite frankly, I hope it is a long time before I have to do that again! 20 years ago, not so much a problem, but as I get older, I find that I do not recover from lost sleep as easily as before. Determination kept me going, as I absolutely HATE lost air time, and I despise problems that I cannot remedy in a reasonable amount of time. The only positive outcome I derived from the T-1 issue is that I now better understand how this circuit works. That could come in handy next time we have a T-1 failure.

Oh, and another thingé through it all, I never stressed out at all this coming at once. I simply took each moment, and dealt with it to the best of my ability. That is not a character trait I could have boasted about five years ago! I used to get stressed out very easily when confronting multiple problems or issues. It took me a long time to just step back, analyze each situation, and chip away at them till their gone!

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
Brian Kerkan, CBTE, CBNT
Chief Engineer, CBC–Detroit

Greetings from Motown! With 2017 well underway, there are many new projects that we will be working on here in Detroit. There are also a number of new faces here in the office, and an effort to expand what we are doing with social media. We now have two people that are dedicated to social media development.

It is amazing how much the radio business has changed. Who would have ever thought that we would be producing and shooting video, and doing live streaming from the radio studios. The studio design requirements now must take into account lighting and camera placement. It is also important to ensure that music is kept off of these live streams due to licensing issues. In our testing, I created a separate mix for the Facebook live feed to prevent this.

We will be doing some audio upgrades to WEXL this month, which will include new audio processing and monitoring. Fortunately, the T-1 circuits have been stable now that I have a full audio backup system in place.

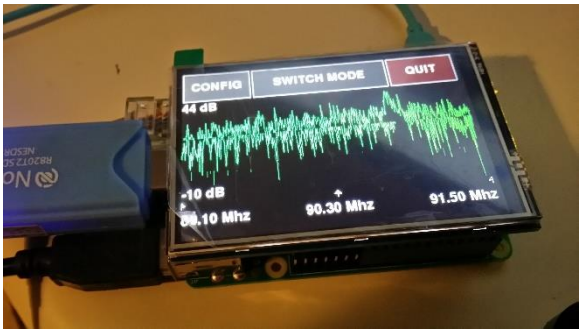
I took a vacation in February and went to the Hamcation event in Florida. It was nice to enjoy a family vacation and have some hamfest fun, combining it in one trip. I was able to go on the first day of the fest, and picked up a nice dual 3-500z amp from Amp Supply. There is nothing like the glow of the 3-500s the make the hamshack warm. It brings me back to my first days in radio in the early late 70s. I remember signing on a 1 kW daytimer, and it started by turning on the RCA BTA1 filaments. Those 4-400 tubes would light up the room with their soft orange glow. Even though the tubes in the new amp generate some heat, I like the way it looks.

I ended up rebuilding the high voltage power supply, and gave the amp an overall cleaning. Now the amp is great.

It is not surprising that many broadcast engineers are Amateur Radio operators. Some would wonder why we would choose to continue doing the work we do every day when we get home. Ham Radio becomes another technical creative outlet which allows us to try new things, like digital modes on the HF bands or antenna design.

It is impressive how many people are experimenting with the Raspberry Pi these days. I came across an article showing a spectrum analyzer running on a Raspberry Pi. The program is called Freq Show. It uses a low-cost SDR dongle as a

There's nothing like the warm glow of a pair of 3-500Zs!



The Raspberry Pi Freq Show

receiver. It demonstrates the capability of these devices. I was able to load the software and gave it a try. It is far from a laboratory-calibrated device, but could be used to check and locate signals. Since the SDR dongle will operate within an LNBs 950MHz-1450MHz L-band frequencies, it can be used to peak a satellite dish.

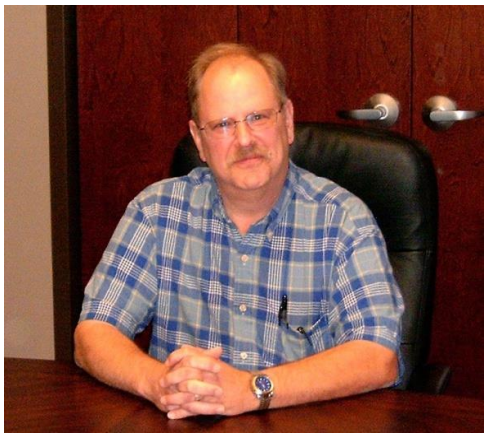
There are all kinds of I/O devices that can be added to the PI to make it function as a codec, remote control, terminal server, even as an audio processor. There are several people using Stereotool software as a main processor. By using an add-on driver or sound card such as the Wolfson, the Pi can output composite direct to an exciter.

I will be installing an Inovonics Justin 808 this month. The 808 will keep the diversity timing from drifting by receiving the HD signal off the air and making real time corrections [see the article in the February Radio World Engineering Extra ï Ed.]. It provides a nice front panel indication of the HD alignment. HD time alignment drifts over time. With this device in place, we should not have to worry about providing a quality time-aligned signal any more.

I am looking forward to the warmer weather thatôs coming. It will be nice to get out to the transmitter sites and do some cleanup work. Some ATU visits and field work is on the list of things to do.

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

Ah, sunny Alabama, where we have more trouble with air conditioning than most folks elsewhere might believe. The combination of pea-soup humidity and high temperatures (we hit 80 degrees the other day ï in February!) makes for stressed-out, overworked AC units.



All of our transmitter sites have had new AC units installed (if only by putting in a new building) at least once. We have also replaced compressors several times, including the four at our studios and offices, about six years ago. Recently, one of the 2nd floor units died. (Again. Re-died?) We received a recommendation to replace those older jobs with the latest, high-efficiency units. This would also allow us to switch from the older, more expensive R22 to R407c.

These are 17-year-old Tranes. Thatôs always a tough call, because the quotes for replacement units were about $40,000-50,000 each. Thatôs a capital expense, to put it mildly. Just replacing the compressors, with an eye to getting a least a few more years of service, was considerably less expensive. But still a lot of money!

The folks who found the failed compressor and made the initial recommendation gave us a bid of over $20,000. We obtained a second bid and it was thousands of dollars less. Then we received a third and it was lower still. We had worked with all three companies in the past and thought that we could trust them, so we went with Number Three.

Well, we still have no AC at the studios. As I write this, the new compressors are in, 50 lbs of R407c is in place, but the compressors wonôt stay on. It appears that the lowest bidder used the original Trane compressors, which will not (despite written assurances) work with R407c without replacing the oil and several valves. The second-highest bid was for new Tecumseh scroll compressors that were 407-ready.

Iôm not sure which way weôre going to go on this one. I foresee a few more days of stuffy studios and offices while we get this sorted out. As Cris likes to say, itôs always something.

Raspberry Pi

Iôve got a pretty good background in embedded control and ñmicroò programming, so naturally, this intrigues me. Todd has been playing with the Raspberry Pi for a couple of years now, and knows how to use them. These tiny little microcontrollers are nothing short of amazing, and

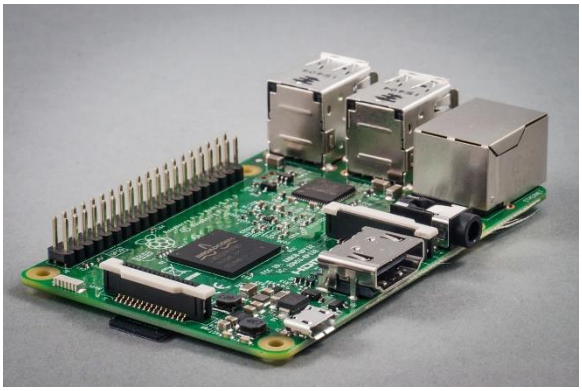


Figure 1 - Four USB ports, HDMI, quad-core processor, 40 GPIO pins and an Ethernet port. $39.

RWEE ran an article recently about using them in broadcast applications.

Our link to 101.1 is still down (more on that in a moment) this is actually a three hop: from the studios to the WDJC-FM site, from WDJC-FM on Red Mountain in Birmingham to an old ATT Long Lines tower near Warrior on Mt. High. From there it hops to WYDE-FM in Cullman. The first and last hops work just fine. Itôs the one in the middle, the Birmingham-to-Mt. High part, that doesnôt want to work. BUT é our tenant on Mt. High has good, solid high-speed Internet access. Hmmm ...

You can get complete operating systems for things like the Raspberry and the Arduino. Todd installed a lightweight version of Debian Linux (called ñDiet Pìò get it? Heh) in one of his Raspberries and placed it at Mt. High. Coming in via our tenantôs public Internet address, we can at least control the transmitter with SSH tunneling. Iôm working on a way to get the tower lights to ping back through that gateway so that we can cancel the NOTAM.

The only obvious question is how reliable they are. Theyôre cheap ï you can hook up with all the Raspberry you could want for well under $100. But will they last? Before I dump a critical station link on one of these, I need to know that for sure. But our experience thus far with the equally-cheap Ubiquiti Nanobridge links has shown me that sometimes, cheap does work.

Todd gets a big tip of the hat and an ñattaboyò for that one. Cooler than cool, and it (at least partially) solved an annoying problem for us.

WYDE-FM's Link

This saga continues. As mentioned above, from WDJC-FM, itôs a two-hop link, the first of which (from Birmingham to Mt. High) is down. Weôve had two different tower crews look at it. Weôve replaced Dragonwave radios, weôve reprogrammed, weôve eyeballed with compasses and the 2nd tower crew even put one of those fancy-dancy, GPS-based alignment tools on the dishes. Everything checks out é but still no link.

Weôve run across this before and it can be frustrating. You just have to plod through all of the possibilities, starting with the most likely and painstakingly working to the least. If youôre breaking in a new tower crew thatôs not familiar with your link, you have to be a dictator. You have to beat into their heads that (especially on a 27-mile path) tiny, tiny little adjustments to the azimuth will find the sweet spot. When we hired Microwave Specialists to do the initial alignment a couple of years ago, they told us that with this particular link, they were moving the adjustment screws no more than 1/10th of a turn to reach the peak. It was that critical.

27 miles is well within the capability of a 6 GHz Dragonwave system with 8-foot dishes. More to the point, the system has worked well for a long time, with nary a glitch or hiccup since we finally got it aligned a few years ago. We wondered if something might have popped up in the path, but that seems unlikely; a quick-and-dirty elevation check on Google Earth shows that it would have to be hundreds of meters high to even touch our signal.

Figure 2 - The crew even looked inside the 8' 'kettle drum' dishes. Everything looked OK.

A brief history of our time spent on this one: the system failed during some especially serious storms on January 22. We discovered on Monday the 23rd that the UPS unit at the Mt. High site had overloaded and shut down. This has happened before, so no worries; we rebooted the UPS and figured the link would come right back up. It didnôt.

We did a preliminary check of the alignment via Mark One Eyeball, compass, Google Earth and landmarks; best we could tell, everything looked good. We had a crew come in and replace the Dragonwave Horizon Compact radios with our ready standby units, but still no link. Better yet, we couldnôt even get into the Red Mountain side of the link. We benched the original units, tested them and confirmed that they were in fact working fine, so we called the crew back to install them. Still no link. After the crew left, I saw that we had an RSL of about -75db; unplugging one unit made that drop to -90db on both ends, so we assumed at that point that the radios were working and some signal was getting through; the antennas still werenôt aligned properly.

Jack Bonds then made a very intriguing discovery while poring through the radio logs, line-by-line, for that link. The Red Mountain Dragonwave reported that at some point during the attempted realignment process, it had very briefly hit a peak signal of -50db. Aha, and hello! This tells us that the alignment is indeed the problem.

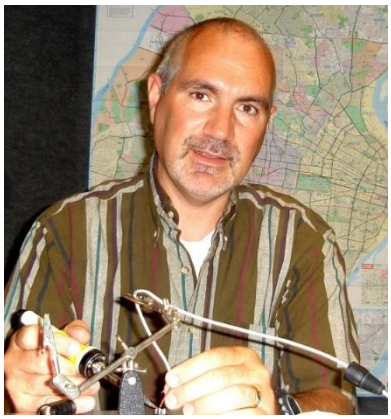
This makes sense, too. We had not only experienced a lot of lightning in the storms over that weekend in January, there had been ridiculously-gusty winds as well. Iôm convinced now that one of the dishes has been honked out alignment. The half-power beamwidth on those 8-foot dishes is only 1.5 degrees, which means that a few degrees off axis could cause a drastic drop in signal.

This particular crew has insisted that they were familiar with tight microwave links (whence their ownership of that $12,000 3Z GPS alignment thingie). But Cris has made some valuable suggestions about how to meter as they align, and see above re: being a dictator. I shall doff my tricorn hat and gitterdone. Weôre scheduled to try again in a few days. Weôre praying that the link comes back up. I hope to report success in the next issue.

Until next time, keep praying for this nation!

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

February has been a challenge for us in regards to the Ethernet microwave radio links from our Hammond studios to our Lansing transmitter site. This is a very important link for us in that it actually affects three transmitter sites. From the Lansing site we have a 5.8 GHz link to our Beecher site for data and digital audio. Additionally, we have a T1 line linking the Lansing site to our Kirkland (Rockford) site a hundred miles away. The T1 is part of a pair that runs to Kirkland, with one side running from Hammond (studio) to Kirkland and the other from Lansing to Kirkland. So, the link from Hammond to Lansing is very important to our operations.



Thatôs why we have two systems, a licensed 18 GHz link and an unlicensed 5.8 GHz link for backup purposes. Early in the month, after a lightning storm came through, the 18 GHz Trango Apex system went down. I found I could reach the radio on the Hammond side but not the one on the Lansing tower. I rebooted a couple of times. I did find the power over Ethernet (POE) injector may have had some issues, so I brought the POE from the Hammond side to verify the radio was dead.

At this time, we knew we had to replace both radios since the Trango Apex radios were no longer being serviced by the manufacturer. This is when we moved to the Trango Apex Lynx radios. During the time that we were waiting for a tower crew to install the Apex Lynx radios, we were using the 5.8 GHz backup system without too many issues. I did notice that we were receiving some errors on the system during the evening. They werenôt excessive, but it was happening every evening. I chalked it up to people being at home during the evening, with WiFi activity increasing due to services like Netflix and such.

Once the tower crew arrived and installed the new Trango Lynx radios, we immediately began

using that as the main link again. This worked well, but in less than 48 hours, we had jittered audio on the air. We use the WorldCast Horizon Nexgen audio codecs for our main STL through the Ethernet links. I rebooted the Lynx at the studio, and to my surprise, it didn't come back on. Even though we had an "ON" light on the power supply, the POE showed "radio off." It turned out the power supply was bad.

Fortunately, we had a spare power supply on hand, and we got the radio going again. However, the jittered audio was still an issue. When looking at the performance page on the Horizon codec, we were seeing packets dropped at a rate of about one per second. We then went back to the 5.8 GHz backup system and this worked great… until we got into the evening.

We started receiving emails from the Horizon codecs about IP errors. These came about every two to three minutes. This was obviously affecting the on-air sound to a certain extent, so we had to abandon the Horizon codecs and use the old 950 STL backups.

With the problems going on with the 5.8 GHz system, we had a flood of emails in our inboxes. We probably had around 250 emails overnight. That's when I noticed that the emails stopped early in the morning about sunrise. When checking the Horizon codecs' error pages, we hardly had a dropped packet during the day. However, once evening came around, we once again had the emails steadily coming in and then at sunrise they would stop.

This was a bit of a head scratcher. Why would the link be fine during the day and then at night be hardly useable? At this time, I created an email discussion thread with the Crawford Broadcasting engineers. There were some different ideas, mostly centering on RF interference. The consensus being that some kind of light was coming on at night and then going off in the morning, perhaps having a spurious emission that was causing RF interference with the link.

Now with this site being in a combined industrial/residential area and being on top of one the busiest interstates in the area, finding the light that might be causing this interference would be next to impossible. I was trying to wrap my mind around a strategy that would work to isolate the problem light. That's when I thought, well there was a light system that came on at night that would be under my control, and that was our own tower lights. We have both a day and night mode in the dual medium-intensity white (strobe) day and red night tower light system. The day mode was obviously not the issue, but perhaps the night mode was.

I really doubted that the tower lights could be causing interference, but it was worth a try. While the link was running fine during the day, we turned the tower lights into night mode. Sure enough, with the tower lights in night mode, the dropped packets started happening. When we went back to day mode the dropped packets stopped.

I still didn't believe the tower lights would put out RF that would interfere at 5.8 GHz, but that's what appeared to be happening. I investigated further and got to thinking maybe it wasn't an RF issue. I knew we had moved some cables around when we mounted the power supply and POE for the new Trango system. Maybe the issue wasn't RF but an inductive problem. The Ethernet cables for the 5.8 GHz system were lying across the control box for the tower lighting. I re-ran the cables so that there was some gap from the box. I also added some clip-on ferrite rings to the cables.

When the tower lights went to the night mode, the problem seemed to be resolved. I had far few errors that night. However, when the next evening came the errors once again returned and in fact after a few more days we were getting a steady amount of errors also during the day. I then had to conclude that the radio was probably weakening since there was a slow decline in performance that started weeks before and continued to get worse. The next step will be to replace the radio. But I do believe we figured out the mystery of the nighttime errors.

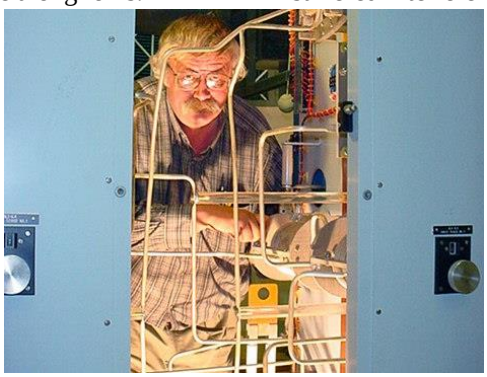
As for the 18 GHz Trango radios, we are still working to clear out the errors on that system as well. We have checked and corrected everything we could on the ground, and Trango support has logged into the radios and stated there is nothing wrong with the link. One theory that we now have with this system is that we are not getting proper voltage to the system. Both radios show an under voltage coming through the CAT5 cables. We have ordered better

power supplies and hope that will resolve the issues we have with this system.

At the time of this writing, we still have to use our 950 backup until we get resolution on at least one of these systems.

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

In February nothing happened, move along folks. Oh, OK so that doesnôt work. In February something different happened, move along folks. Ohé OK, OK so that doesnôt work either. OK, third try. In February the same thing happened. Well I know thatôs boring, I guess all you folks have moved along now.



And yes, winter didnôt stop at the end of January. We wanted winter to stop, we hoped it would. With a short pause in the worst storms, we were able to make the annual occupied bandwidth NSRC measurements. That was a real experience as I set up the tripod and loop antenna. Recording data for an extended period, the tripod blew over in the wind. Bang, the measurements were invalidated. After several attempts, I went to creating ñplan B.ò

The next day, I was back with tripod in hand with suspended cinderblock weight. Yet again recording data for an extended period, the tripod blew over in the wind. A much louder bang and the measurements were invalidated. Once again, even more, this is getting boring, and itôs time for ñplan C.ò

Day three I was back with loop in hand and cinderblocks for weight. Placing the loop on the ground with a pile of cinderblocks to anchor it, it finally stays in place. Whew! Finally.

I made the initial +/- 75 kHz close-in measurements very close to the station. The collected data was clear and unambiguous. Previous yearsô measurements that were made farther away suffered interference from other local AM stations.

Step two is locating any other spurious signals. Another AM station operating on 1640 is collocated at the KKPZ antenna site. The potential first- and second-order intermodulation products were calculated, resulting in five frequencies that required measurements.

These were measured with FIM 41 field intensity meter. The initial measurements resulted in products that were at or near the FCC limits referenced to the stations unmodulated carrier strength. A possible clue to the cause was that the FIM pointed at the station when measuring the reference carrier level. Measurements of the intermodulation products pointed at an off-premises location.

To verify, I moved further away from the station in the general direction of the off-premises location. As expected, the measured reference carrier level was lower. The intermodulation product measurements however were higher, clearly demonstrating that the source was purely local, off premises, and external to the KKPZ facilities.

To avoid the need for correcting an artificial local problem, I found another location that is in the main KKPZ lobe, clear of wires and towers, and farther away from the off-premises location. These measurements were within limits and consistent with historic measurements.

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

Moment Method Recertification

In the midst of dealing with my dadôs health issues, I forgot that the KLVZ night facility was due up for its recertification. Once I remembered it, I put it off as long as possible in hopes my dad would be well enough to go out with me. He had taught me how to do the measurements back when we first started with this, which was what, 2011? Since then, I have been the one running to the towers removing the transformers. So needless to say, I could not remember how to run the analyzer.

Thankfully we now have the PowerAIM 120, which is an amazing piece of equipment. It made the whole process super easy. The best part is that I was able to send the files to my dad before leaving the site to have him double-check everything. I had Keith help me out with running to the towers and doing the field strength measurements. It was good to get him back to helping out with this kind of stuff.

Training

I often think about if something were to happen to me, can someone else do my work? While I didnôt show Keith everything, I was able to show him some other stuff and know that he knows what to do. Iôve been trying to let him take the reins on more and more things. Sometimes itôs just because I donôt want to go to a site, but itôs also so he can learn. Iôve had to have him go out to check on equipment issues, tower lights and some other things. He lives closest to three of the sites, so he is usually able to get out there first anyway. I help him out as I can, and if we canôt resolve the problem with him out there, I will usually go out. More often than not, though, he is able to determine the problem and fix it.

It is important to train people on what to do. If I am ever out sick for an extended period of time or for whatever reason, it would be helpful if Keith knew what to do to keep the trains on the tracks. I recommend that for anyone. If there is someone you can start teaching what you do and how to do it, then do it. Donôt wait until itôs too late.

KLVZ AM-IBOC Exciter

We finally got the AM-IBOC exciter back for KLVZ. Of course I had another hard lesson to learn. Document your settings! I thought I had this done already, but apparently I skipped KLVZ and KLDC. My dad was actually able to go out to the site for this one, which was great. It was his first time out in the field since his surgeries and hospitalization.

We were able to use our Anritsu spectrum analyzer to get things where they needed to be. Once we did, I quickly wrote down all the settings of the AM-IBOC exciter and saved them to my computer. I also took screen shots of the Omnia settings and saved them as well. I want to have as much backup as possible in case we ever have another equipment failure that results in loss of memory. So, lesson two learned.

KLTT Diversity Delay

A couple times now we have had issues with the diversity delay on KLTT drifting. Last time, a simple reboot fixed the issue. This time, I did a reboot and nothing. I could not get the unit to respond at all. I went as far as moving the delay to some extremes and no change in the delay. I finally decided to head to the site so I could pull the plug and let the unit sit for a bit.

The second I got there, I realized my third lesson. Double check IP addresses! I was messing with the diversity delay on the ND-50 aux transmitter, not the NX-50 main! That was a huge DUH moment for me. I cannot believe I didnôt realize that. It explains so much. I still needed to reboot another piece of equipment at the site to get all the lights green again, so it wasnôt a totally wasted trip.

That about covers things for this edition so until next timeé thatôs 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/94.7 MHz, 50 kW-D/4.3 kW-N, DA-2
KKPZ • Portland, OR
1330 kHz/97.5 MHz, 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/91.1 MHz, 50 kW-D/1.4 kW-N, DA-2
KLVZ • Denver, CO
810 kHz/94.3 MHz, 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
970 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/96.9 MHz, 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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