The Local Oscillator

The Newsletter of Crawford Broadcasting Company Corporate Engineering

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Lightning Rods

Last month, I talked about using our new drone to inspect the KLTT towers and how we found that the lightning rods on two of the towers were loose and flopping around in their mounting holes. It didn't occur to me later to link that situation with a problem that Amanda has been having with the KLTT night pattern.

For some months, there has been some instability in the night pattern parameters, particularly the tower 4 phase. That pattern and entire site has historically been very stable, so the parameter drift (really shift as opposed to drift) was a bit of a head-scratcher. The day pattern was rock-steady, so whatever the issue, it was at tower 4 itself (which is a night-only tower) or in the night-only components in the phasing and coupling system.

Tower worker Derek Jackson tightens up the lightning rod on KLTT tower 4.

Amanda took all the reasonable steps, checking all the connections and tightening up coil clips at all four towers, starting at tower 4. That didn't help. The parameters would be fine one day and out of the blue, she would get a phase alarm for tower 4. She would make a minor tweak of the T4 phase control and bring it back in, and all would be well… for a little while. Then it would shift the other way.

It should have but didn't occur to me immediately that the tower 4 parameter shift was related to the loose lightning rod on that tower. I heard from a local consulting engineer of a similar situation that occurred on a 50 kW seven-tower directional array not far from where I live. A lightning rod's hardware vibrated loose and the rod was flopping around in the wind. In that case, the imperfect junction of the copper-clad steel rod and the galvanized steel of the tower was producing an IM product in the aircraft band. I don't know what frequency the product was on, but I suspect it was on a tower, approach or ILS frequency of Denver International Airport – the directional array is directly under the final approach path for runways 35L and 35R. In any event, the local FCC engineer DFed the product to that tower, and tightening up the hardware cured the problem.

When I heard about that, it got me thinking about issues that a loose lightning rod could cause, and that's when the light bulb came on. The parameter shift was being caused by that loose rod alternately making and breaking contact, which would effectively add and remove about five feet of electrical length, which amounts to a little over one degree. That would cause a shift in current distribution and self/driving point impedance (mostly

reactance), which would certainly account for the phase shift we were seeing.

Toward the end of last month, we sent Derek Jackson up the tower to deal with the loose rod, and it didn't take him long to tighten it up. When he was done, Amanda touched up the pattern parameters, and it has been rock-steady ever since.

You might recall that tower 2 in that array also had a loose lightning rod. Why wasn't it also contributing to the instability (and why wasn't it affecting the day pattern)? That was pretty easy to figure out. That tower has for some odd reason long had a problem with lightning, so years ago we installed a static dissipater array on the top of the tower. The lightning rod just sticks up a little bit above the static dissipater elements, so its coming and going has very little effect on the electrical length of the tower. Clearly, we still need to tighten it up (and Derek will take care of that at the first opportunity), but for now it's not causing any issues. On the other hand, the KLTT site is just west of the approach path for runways 16L and 16R (and four miles from the end of runway 16R) at Denver International, so we will make this a priority. The last thing we need is interference to airliners on the approach, especially in marginal weather conditions.

Last AM Translator Window

The end of last month, the FCC opened the last filing window for AM translators. This was the fourth overall translator window in the AM Revitalization proceeding, and the second filing window for new translators. Crawford made filings in all four windows.

In this last window, we filed for two translators – one for WDCZ in Buffalo and one for WDCX(AM) in Rochester. These were the only two AMs in the company that do not have an FM translator (or an application for one on file). If we get grants on these and the one pending in Detroit for WRDT, we will have an FM translator for every AM station. That's pretty amazing in my book.

This window will work much like the last one. We filed "short form" applications for the two translators, and the FCC will evaluate those for mutual exclusivity ("MX") with other applications. MX applications will be grouped, and a public notice will be released at some point identifying the MX groups and applications, providing a settlement window during which applicants can work together to eliminate the mutual exclusivity either by withdrawing applications or making technical changes. Those MX applications that cannot be settled or engineered out of MX status will go to auction, and the applicants will be allowed to bid on them.

Non-MX applications (singletons) will at some point be identified, and a window will be announced for filing of long-form applications. A 10-day window during which petitions to deny can be filed will open on the date that each application is notified as accepted for filing. Those applications for which no petition to deny is filed that are otherwise grantable will be granted in sequence and construction permits will be issued. Presumably the same procedure will apply to auction winners and their applications.

All this is to say that it will take six months or so for non-MX applications to be granted and longer for MX applications. We will from time to time update the status of our two applications in these pages.

Denver 95.3

Readers may recall that the first translator that we put on the air was on 95.3 MHz in Denver, which was at the time a clear frequency in the market. For a couple of years, we enjoyed a full-market, interference-free signal.

There was a construction permit on the frequency for a LPFM up in Louisville, which is near Boulder. The permittee was the City of Louisville, specifically the police department.

They actually had two LPFM CPs, one a primary and the other a secondary. The other CP was on a different frequency. I helped the city with a mod application to move from that CP site, which they did not own, to a ballfield complex monopole, which they did. Sadly, they got caught up in their own bureaucracy and the secondary CP expired before they could put it on the air.

They did, however, manage to get the 95.3 CP built and on the air before the expiration date (which was later than the other CP's expiration), so starting in September, we began getting interference here and there from the new LPFM.

The 100-watt LPFM doesn't by any means kill our Lookout Mountain sited translator signal, but it is an irritation. Places that were solid before or perhaps had barely noticeable signal fades now have a competing signal present. Stop at just the right place in a signal null and you can hear the LPFM's looped message.

Unfortunately, there isn't a lot we can do. I have studied the situation every way I can, and we're sandwiched between the LPFM to the north and a first-adjacent in Colorado Springs to the south. There's no room for any power increase.

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

Hello to all from Western New York! This time of year tends to be a little boring, as there is just not a lot that can be done outside during the winter months. Aside from plowing (or shoveling) the driveways and sidewalks to the transmitter sites, there is not much activity going on outside the studio and transmitter buildings. I am really an outside guy. I would rather be out tending to whatever issue has arisen than being stuck indoors and looking out. Of course, that would depend on the weather conditions – as I am getting older, I find that the body does not tolerate the wind and polar cold as easily as it used to. I recall back in the mid-1990s, working outside with wind chill temperatures in the minus 40 to minus 50 range and loving every minute of it! No so today! I have found that my tolerance to the cold wind and temperatures have diminished considerably since I have jumped (or perhaps, stumbled) over that 60-year milestone a while ago. Being out in the cold air today seems to hurt more now than it used to, and like everything else as you get older, you tend to do things in moderation, or spurts, observing reasonable limits. I guess that way, you tend to live to see another day.

One outdoor item that I am waiting on weather conditions to improve before I get started on is rebuilding the reject load at our Rochester FM station. The Altronic load is located outside the building, and it's a bit too large to bring inside to work on it. Not long after it was installed, around 2006 if I recall correctly, I had to replace all of the resistors in the load, as it had drifted well out of its 50-ohm range. I performed the work outside, with temperatures in the 20s and in a fairly brisk wind. It took several hours to complete the rebuild. With temps recently ranging in the sub-zero to mid-20s range, I have considered it justifiable to wait until the weather improves, at least into the upper 30s or better. Both the main FM and HD signals are on the air, albeit using separate antennas, so the urgency to get the load rebuilt can be delayed until more suitable conditions present themselves.

At our Rochester FM facility, DJR not long ago leased out the HD-2 channel. We have not utilized HD-2 since our Rochester AM went on the air in HD, so the BE IDI-20 importer was basically idle for several years. When I attempted to reinstall the importer, I found that there were numerous software issues that kept it from booting and running the IBiquity software. In order to get the signal up and running, I pulled the spare importer out of Buffalo and used it to get the multicast on the air, sending WLGZ's importer into BE for repair.

BE had to perform a complete software reinstallation, along with replacing the riser cage and adding much needed memory to the motherboard. I received the repaired unit back after nearly a month at the service facility, and was waiting for an opportune time to reinstall it when the WDCX loaner unit crashed. I was not able to get the importer to come back up and stay on. It appears that the power supply has issues, along with the hard drive. I got the repaired importer installed, programmed and working, and will be sending the WDCX spare IDI-20 back to BE for evaluation and repair.

Our Buffalo facilities have been running smoothly of late. Last month, Brian Kerkan and I performed the software upgrade in our Omnia.11 audio processor. There is a second upgrade for AES-192 that needs to be made, but that requires the processor be pulled from service and sent into Telos Omnia for the upgrade. I received a demo unit and installed it using the same settings Brian had used when he initially set it up, boxed up our processor and sent it on its way. I am looking for the updated unit to be returned to us the first week or so of February with the upgrade completed.

We will be soon installing a new Omnia.9 to our AM air chain here in Buffalo, replacing an Orban opti-blob that came with the sale of the station. I can't wait to see how much improvement the Omnia will make in our AM air sound!

A reminder to those who must perform yearly occupied bandwidth measurements, if you normally do them in January and haven't done them yet, you are running out of time. The FCC requires that the measurements be made within 14 months of the previous measurements. I will have to wait on the WDCX(AM) measurements in Rochester until our IBOC exciter is returned from the Nautel service department. It was sent in a while ago with corrupt engine software, and according to Scott MacLeod, service technician at Nautel Limited, the flash RAM needs to be replaced, and we opted to reprogram the engine card rather than replace it, which would have increased the repair cost nearly $3,000. I will be performing the WDCZ occupied bandwidth measurements this week, along with the monitor point measurements to insure that we are in compliance with the stations licensed operating parameters.

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

Happy 2018 from all of us here in Motown! There have been some pretty bone-chilling, single-digit temperatures in January.

We worked out a better power supply solution for the Trango Apex Lynx microwave radio on the tower at 1200 WMUZ(AM) once we experienced two failures. The manufacturer supply could not keep up with the 32 amps of RF on the tower. I researched and found a better supply, and put together a two-pole EMC powerline filter to resolve the issue. Since the change was made, we have not had any additional issues. We will be installing a carrier-grade 48-volt UPS system to supply uninterrupted power to the radios to further improve operation.

We installed a new Telos HX phone system in the WCHB control room and talk studio, and installed the XScreen software for call screening. The installation went well, and the quality of the calls improved.

Fiber was installed to our building last month, and we are in the process of planning the cutover of the PRIs for our phone system and our network services. We should be running on the fiber in mid-February.

We have been taking some time during this cold weather to clean up our racks and wiring that has accumulated over the years. I have also been helping Steve Cuchetti in our engineering department to study and prepare for his Amateur Radio license. He should be taking his test soon. I find that Amateur Radio is a great way to explore many areas such as RF, antenna design, and electronics. It is rewarding helping others get into the field.

I recently had an opportunity to do some pretty detailed surface-mount PCB repair that helped me realize the value of a hot-air rework soldering station. For all these years, I have used a traditional soldering iron to do most repairs. Replacing caps, diodes, or even replacing small ICs was possible with an iron, but once you use a hot-air gun with the proper nozzle, it is easy to see how much better doing repairs can be.

Over the holidays, my son gave me a high-end plasma TV that needed repair. This set originally retailed for around $3,000. It was a top of the line TV five years ago, and still sells for over $1000 dollars today. I got it home and put it on the bench. I was curious as to what was causing the error, and after some research I found that many people had this same issue, and it's not hard to understand why.

After looking at the plasma sustain board that drives the panel, I found several MOSFET transistors that had shorted. The board was designed

to use the PCB as the heat sink. I ordered new MOSFETS, and decided to pick up a solder rework station on eBay. I was able to get it for under $100. When it arrived, I unboxed it and found that it was equipped with various nozzles for general work as well as square nozzles for IC rework.

It was time to put this new tool to work. You can select independent temperatures for the iron and hot air. Using this tool made removal of the MOSFETS a breeze. I decided to also change the driver chips and transistors while I was doing the repair. Once hot air was applied to each part and the solder began to flow, it was very easy to remove each component. Even the small parts were removed with ease. The board looked great once it was cleaned and prepared for the new components.

I ordered solder paste that had a syringe applicator that made it very easy to use. When the parts arrived, I was able to apply the solder paste to the board and reflow each component. Once I replaced all the damaged components, I assembled everything and placed it in test.

What I found right away was that the surface temperature of the MOSFETs was way too hot. It didn't take long to determine the original cause of the problem. The MOSFETS went over the critical temperature and shorted. This reminded me of when I first started here at Crawford. The Nautel NV40 was going through RF modules and power supplies. Once I got the HVAC systems working properly and the room temperature down, the transmitter runs and hasn't experienced a failure since.

So I ordered some heat sinks for each MOSFET on the sustain board of the TV. It really made a difference once I ran the test again. I was able to put everything back together and now have a wonderful, 3D-capable TV with excellent contrast ratio.

This whole experience makes me realize that you can't assume that products are engineered to last. I can think of a few transmitters that experienced power supply issues similar to this. Keeping the room where our equipment is located cool will help it continue to run and reduce component failure.

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

Well, it was cold last month. We even had a dusting of snow, which is unusual enough to shut Alabama completely down. One of our A/C units lost a fan, but as cold as it was, the transmitter never even noticed.

People who live in hot areas sometimes dream about moving to where it's cooler, and vice-versa. Well, after experiencing Nawthern-style chill for the better part of a month, I've decided that I shall let others have it. I'll take my Southern summers, even if it means that the A/C works overtime and it's so humid that the windows fog up.

Real Engineering

When I was growing up, car batteries would at least give you some warning before they died. You knew it was time to do the replacement when the car would growl and hardly turn over before starting. I'm not sure what has changed, but nowadays, your car or truck might literally start just fine one day, and the very next, not even turn over. When my car was in the shop last year, the battery literally died on the shop floor. They had to replace it before they could complete the diagnostics.

Likewise with big diesel engines, such as the ones in our generators. We test ours regularly. The one at the WDJC-FM site on Red Mountain had just done its usual test run a week before with no problem, so I figured it was OK. In fact, it wasn't. Alabama Power cut the electricity to the transmitter site to do some scheduled maintenance, and the generator wouldn't crank. Given that WDJC-FM's tower hosts all of the STLs for our other stations, this was a very not-good thing.

Oh, and of course, this would happen on a morning that Todd was headed to the 850 site in Tarrant, and I was headed to Cullman. Better yet, Alabama Power had led us to believe that the scheduled outage would be at the studios, so we had

Figure 1 - Real engineering: the battery from Todd's van in WDJC's generator.

concentrated on that. Todd had even replaced the batteries in one of our older UPS units. We thought we were ready.

Todd beat me to the WDJC-FM site and tried to jump-start the generator; no luck. In desperation, he pulled the battery from his Chrysler van and hooked it up directly. I had almost arrived by that time, and I got a very welcome text from Todd: "Back on." It was a beautiful thing. Todd and Jack replaced the battery that day, and we're going to replace the one at the 101.1 site in Cullman as well. Cris ordered us to just set it up on a regular schedule, and we're doing that.

But kudos to Todd for some Real Engineering™.

Coming Up

Lots of odds and ends. We've made it a priority to get all of our budgeted items out of the way as soon as possible in 2018. We have all sorts of goodies coming in, including new Wheatstone Blade mic processors, a new set of TieLine STL codecs, and some new servers.

The big one is a new transmitter for 92.5, WXJC-FM, in the huge metropolis of Pumpkin Center, AL. We gave away the old Energy-Onix box that was in there; it had never run at all from the time that we bought and then rebuilt the station. It was just gathering dust and ugly-ing up our nice transmitter building, so it was hauled off. The current Nautel FM5 has been earning its keep and doing the job for years and years, but we do want a backup transmitter. The new Nautel will become the main, of course; the old FM5 will be retired to auxiliary service.

Meltdown and Spectre

This one is a doozy. The details are still scarce as I write this, and it doesn't help that the tech media can't seem to get their stories straight. Some say that both vulnerabilities affect all Intel and AMD processors; others say that they only affect Intel. But in fact, these are two separate vulnerabilities. The first is called Spectre and affects AMD, Intel and ARM. The second is called Meltdown, and primarily affects only Intel and ARM products.

Keeping this simple, all of the latest processors use a number of tricks to speed execution. We've reached the point that simply increasing the clock speed gives diminishing returns, primarily because it takes time to read and write memory. In fact, the processor can outrun even the fastest dynamic RAM (DRAM).

One common enhancement is to use caching: the processor has a modest amount of very fast RAM built into it that is constantly filled from the slower dynamic RAM (DRAM) in the computer. Another is to do simultaneous/out-of-order execution of several instructions at a time.

These big speed-ups, though, require prediction: the processor has to correctly guess what the software will do next so that it can begin loading the cache and setting things up for what will happen in the future. Every computer program constantly makes decisions and branches from one location in memory to another. If you can predict what's coming next, you can speed execution dramatically ... but sometimes, the prediction is wrong. When that happens, the processor has to cancel the operation, reload the cache, and etc. and so on. Do this too often, and things slow down noticeably.

This is where it gets really, really geeky (and believe me, I'm oversimplifying it). These particular vulnerabilities can be exploited by a really sharp programmer. The kernel (i.e., the core of the operating system itself) is supposed to be in "privileged" or "protected" memory; only the kernel should be able to see it or read it. If an ordinary user program tries to touch that memory, read or write, you get an exception. Theoretically, when this

happens, the CPU is supposed to dump the result and start fresh (and you'll see a Blue Screen of Death or some other warning box). But in fact, some of that off-limits memory will still be in the processor's fast cache.

These are real vulnerabilities. Proof-of-concept code has already been written to exploit them. Even something as simple as a JavaScript running in the background of an otherwise innocent-looking Web page could use these hacks to access protected memory, including passwords and banking information. That's severely not good.

There are no good workarounds for this. I've followed the efforts of the Linux Kernel programmers, but I'm sure that equivalent cursing and grousing is coming from Microsoft, Apple, and anyone else who writes code for these vulnerable processors. Benchmarks have shown that there's a 5-40% performance penalty for the workarounds.

Perversely, the biggest performance hit comes with "big server" stuff, such as databases (like the ones on our Web and email servers). These applications tend to work the cache, predictive execution, and all of those other tricks heavily, because they're predictable, repetitive tasks.

What does this mean for us? All we can do is keep our systems updated, apply patches (and we have), and then hope for the best. Personally, I wonder if some really slick solutions aren't right around the corner – for example, maybe the operating system could exclusively use one processor or one core? I don't know enough about the current architecture to insist on that, but there are a lot of people, who are much smarter than I am, working on this. We'll see what happens.

Finally: A Stranglehold on Physics

Figure 2 is included for your amusement. This is from a large medical center (visible in the background) south of Birmingham. Note the lightning rods along the retaining wall in the parking lot. The ground wire that goes through the concrete pillar is just a bonus: one wonders what the odds are that lightning will ignore that nice, tall building in the background and go for these little rods. Better yet, one wonders which salesman talked them into spending the money on this. We should hire him or her.

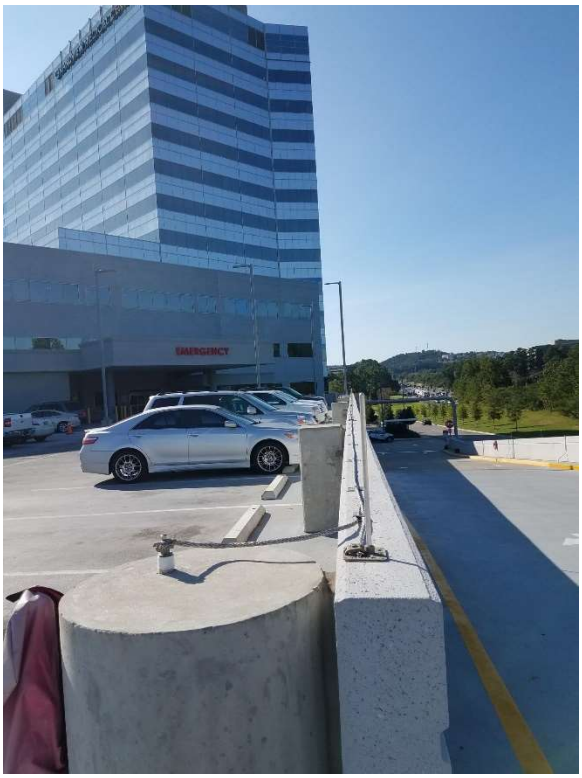
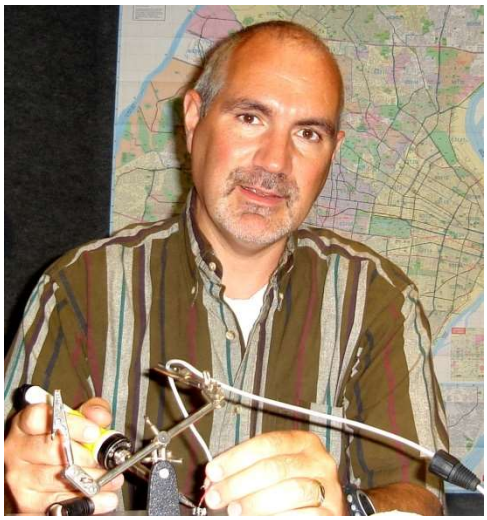


Figure 2 - Lightning rods on the retaining wall. Note that tall building behind it.

Until next time, keep praying for this nation, and as always, I thank you for praying for my wife, Sandy. We've begun the long and arduous process of filing for disability; it's in God's hands now.

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

I'll preface this with an admission: I am not a fan of Windows 10. I'll go further than that and say that I wish I could still use Windows XP on all of our computers, which I thought might have been the best system software Microsoft ever produced. That being said, I don't really have much in the way of bad things to say about Windows 7. I've gotten used to it, and over the last few years, it has proven to be reliable.



Some of my prejudice against Windows 10 goes back a couple of years when I had a perfectly working laptop that had Windows 7 on it and I decided to take Microsoft up on their offer to upgrade to Window 10 for free. I suddenly (or not so suddenly) found myself watching web pages take three minutes or more to load. I tried upgrading the RAM on the laptop and that made very little difference. I deeply regretted the upgrade of the system software and swore to never use Windows 10.

We even had a few of our office computers get upgraded to Windows 10 during Windows updates and that caused a lot of problems for some of our staff. I was tipped off by Stephen and Todd that there was an app for PCs that keeps computers from being automatically upgraded to Windows 10. The engineering staff here locally went to every critical computer and installed that app.

So, fast forward to the beginning of the year. We had decided to replace theNexgen ASERV computer for WPWX with a new computer. This is our top billing station in the cluster, so it has to work right all the time. There's no margin for error. When we got the new computer, we found it had Windows 10 for its system software and soon found out that we couldn't take it backwards to Windows 7.

My apprehension about this replacement was on full bore. Still, I decided to move forward and try to leave my prejudice behind. With our ASERV setup, there are three main systems that have to be installed on the computer. The first is the NexGen software, which is what we use for automation. The second would be the WNIP audio driver. We don't have sound cards; instead we use an AOIP-based scheme with the Wheatnet Blade system. Thirdly, we have Sea Level relay cards installed for optos and closures.

When building a new ASERV computer for replacement, we can typically receive it on one day and have it ready for replacement the next day. That includes going through all the Windows updates, settings and software installation. During the actual swap-out, we usually have it done in less than 45 minutes. There is some time required to move the Sea Level card from the old computer to the new one.

With the Windows 10 computer, we did find some challenge in making each software component work properly. This stretched over several days of being in contact with the various support departments of the three stated software systems mentioned above.

Once we got the NexGen software properly working with Windows 10, it was on to the Wheatnet (WNIP) audio driver. We got stuck on this one for a bit. This happened during the east coast blizzard, so we didn't have support available from Wheatstone except for emergencies. Amanda Hopp from the Crawford Denver cluster decided to jump in and see if she could make a WNIP driver work on one of her Windows 10 computers. She was able to make it work by setting the compatibility mode of the .exe to run in Windows 7 mode.

We, however, didn't have the same success she did by making this adjustment. We still didn't have audio produced by the driver. We finally decided to call NexGen support to see if they had any clients using NexGen on Windows 10 with the Wheatnet Driver. They told us they did and took a

look at our problem.

After looking at the settings of the machine, they didn't find anything that wasn't set up correctly. They did find that by restarting the WNIP driver in the Windows Services module, the audio would start working. This, however, wouldn't survive a reboot. What was happening was that the computer was loading the WNIP driver before the network card for the Wheatnet IP Network was up and running. So the driver was not actually loading correctly since it wasn't in touch with the network. The fix for that was to go back to the Windows Services screen and set the driver to not load "automatically," but to load automatically with a delayed start.

That fixed the problem with the WNIP driver, and I don't know if could say this was a Windows 10 issue or just something that was particular to that machine. I understand that Wheatstone is updating their latest driver to put some delay on how quickly the driver loads to allow for this issue. Needless to say, we rebooted the computer several times to make sure the driver loaded correctly every time, and it did.

With everything that had to be done to make a Windows 10 computer work with NexGen and the Wheatnet driver, I wanted make sure it was stable. We decided to have it run as a simulated ASERV. We got that going, and I figured if it would run as an ASERV for three days over the weekend without stopping, we were ready to go. When we got back from the weekend, it was still running and appeared to have no problems.

We still had one more system that we had to tackle on this computer, and that was the Sea Level relay/opto card. We contacted the support department at Sea Level to ask about the card in relation to Windows 10. They didn't seem to know for sure how the card would work with Windows 10, but they did recommend a particular driver for Windows 10.

We didn't have any way to test this ahead of time since we didn't have a spare Sea Level card lying around. So, it would have to wait until we did the actual swap and put the card in the machine to see if the driver would work.

When we did the swap, we ran into numerous issues. The first occurred when we attempted to change the blade number on the WNIP driver to the blade number of the computer it was replacing. We got an error message from the Wheatnet system that indicated that there was already a Wheatnet blade with that blade ID number, and it wouldn't let us put the computer at the proper blade ID number.

In the meantime, the NexGen software had come up and started to run the station log. But since it had no sound device properly loaded, it immediately played through about seven hours of the log. We also couldn't get the Sea Level card to work properly with the installed driver that was recommended by their support department.

To get that working, we actually removed the recommended driver and allowed Windows to search for the driver. It downloaded the correct driver and the Sea Level card worked.

We had NexGen support on the case, and they made some changes to the settings again. Some of these caused us to have further complications. I also found that we had somehow lost our settings for the ASERV to interact with the Wheatnet blade associated with that ASERV, which meant we couldn't work our source changes on the blade's Utility Mixer. This apparently had been accidentally erased by one of our local engineers a couple of weeks before. I went to correct this erasure, but put the wrong IP address in the settings, and this caused further problems when we reloaded the NexGen software.

So, what should have been less than one hour to swap the computers turned into hours and a snowballing effect of issues. We eventually got through them all and put the new ASERV into service. I still didn't have a good feeling about the situation, but we were up and running.

Two days later, when I got to the studio, they told me that all the audio running on the station was being cut off. With the spots on air missing the last half second of audio. I got in touch with NexGen support and when they got deep in to the reports, they found the time was being adjusted on the computer about every ten seconds or so. This was causing the player to jump early on segues between audio elements, thus cutting off audio.

After a thorough examination of the time settings inside NexGen, their support tech was confident we were set up correctly. He felt that it was a hardware problem, possibly a bad battery on the motherboard. It would seem weird that the battery was bad on a brand new computer, but we decided to take it down and reseat the battery just in case.

After doing that, the computer would not boot up to run Windows. We now had a dead hard drive. Now I can't say for sure what the problem was ultimately. With my bias against Windows 10, I certainly think there were some contributing factors there. I know that we had some human errors involved and finally hardware as well. I did know that I wasn't going to have this computer in the role of our most important ASERV. We punted and went

back to the older computer. At the time of this writing we have now put a new computer in place again. This time it is a Windows 7 operating system. We rebuilt the Windows 10 computer and are putting it into a less critical role in a program director's office.

My guess is that we will eventually have to put Windows 10 computers into our automation system. I know I might be a bit prejudiced by a couple of bad experiences, but I can certainly wait until it's an absolutely "have to" situation.

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

In the "Olden Days," in the movies and top-40 songs, a glimpse of stocking was something shocking. That refrain from "Ol' Blue Eyes" leads into this month's column.

In olden days, a British naval officer thought importing Scotch Broom was an excellent idea. It turns out that it wasn't. Scotch Broom was intentionally planted in Vancouver, BC, Canada. The broom has moved slowly south as an invasive species and noxious weed.

The growth of noxious plants like Scotch Broom and blackberries can only be removed by mechanical suppression. This winter has been mild, usually a harbinger of explosive spring growth. Some pundits claim that a person can see the weeds grow.

Over the years, we have cut back the growth over a portion of the area encompassing the towers

Scotch broom covers the hillside above the KKPZ center tower.

and ground system. We have tried sprays of various kinds with minimal results. Mechanical suppression works, and we hope that over the coming years, we can encourage grass to grow. The pioneers that turned the great grass of the plains to fertile farms were called "sodbusters" for good reason. The effort to clear grass is back-braking labor.

As some of you know, I have been active with local broadcast emergency planning. Several weeks ago, we scheduled a meeting to talk with a local county emergency manager. We want to get a feel for public safety communications needs once the initial warning is past and the task becomes recovery. In those few short weeks, events to the west have overtaken public attention as Hawaii State emergency management issued a false "take cover" ICBM warning.

For those of us who think that problem is "over there," we should expect to have another thing coming. A local engineer who is retired from the FCC commented, "With my background with the USAF-SAC alert and warning system, both the alert and the correction were fascinating screwups".

In the wake of the warning and much-delayed cancellation, warning point managers will be under pressure to eliminate mistakes and insure they never happen again. The impact that local warning point managers can expect is currently unknown. I have heard several suggestions that the warning system, including EAS, be required to seek Federal approval of each warning event. Yeah, when the tornado lands, routing the warning through DC is going to work really great.

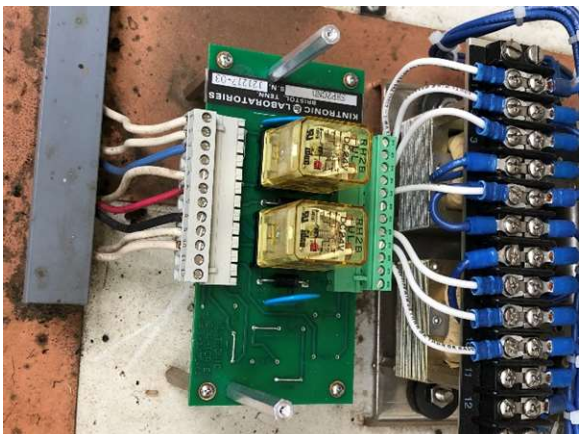
Blue Eyes, take us out of here. In olden days, a glimpse of stocking was something shocking. Now heaven knows, anything goes.

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

Tower Work

We've had to do a bit of work at the towers at KLTT. One of the biggest things was replacing all the slave relay boards in the ATUs. After trying for months to find the issue behind the pattern switching problems at KLTT and at long last figuring out it was an intermittent Phoenix connector at tower 2, we finally decided to replace the slave relay boards, including both halves of that connector, at each tower.

We started with towers 1 and 2, as that is where we had been seeing the problem the most. These new boards needed a little bit of reworking, as the contactor side of the replacements had a Phoenix connector where the old ones had screw terminals. This wasn't a big deal. We decided to pre-wire those RFC Phoenix connectors on the bench back at the studio. Then once at the site, we cut each wire to length and crimped a spade lug on to attach the other end to the screw terminal on the contactor. The finished product looks really good, too, as I was able to clean up some while the work was being done.



New slave relay board installed in an ATU at KLTT.

We also found, during one of the inspections using Phantom 4 drone, that the lightning rod at the top of one of the towers at KLTT was loose. Actually, two were loose, but only one was of immediate concern, as it was affecting the night pattern. We hired Derek Jackson to come out and climb that tower. Thankfully the rod was not missing any hardware. It took some elbow grease, but Derek was able to break the nuts loose and get things tightened up and secured.

We had him back out a couple of weeks later to deal with the other rod, only to find that the lower nut was cross-threaded and the top nut was seized. He had to cut the rod off and we will have him back out sometime when it warms up to replace it altogether.

ARC Plus Batteries

So far, the remote control time issues seem to be resolved after I reset the batteries and pulled the jumper, a step I missed previously. I did have a unit reboot itself again, which was a bit irritating as I got flooded with text message alarms when it came up with the nighttime alarms unmuted. If it happens again, I'm going to have to contact Burk and see what we need to do to resolve the issue. I cannot have units randomly rebooting. It is most likely a symptom of an issue that will only get worse with time.

Firmware Updates

I like to try and keep some of my equipment up to date with the latest software/firmware versions. I am pretty good about checking Burk Technology's website periodically to see if my various

equipment/programs have updates. Other things, such as our Tieline equipment, Sage, Worldcast Horizons, Inovonics monitors, and even transmitters all get updates from time to time. I have no doubt that some people are hesitant to install updates because if there is a bug, it could be a bad thing, and if everything is otherwise working, why mess with it? Maybe I put too much trust in companies and just do the updates when I notice them.

As noted above, I am always good about keeping our Burk stuff updated. I have AutoLoad Plus, AutoPilot 2010, ARC Plus and the Plus-X Dual IP-8 adapters. I have kept AutoLoad, AutoPilot and the ARC Plus units up to date. The Plus-X Dual IP-8 adapters seem to get forgotten, most likely because I have no need to log into the units, ever beyond initial setup.

And so it was that I noticed these adaptors were way behind in firmware and I would have to update twice, once to get to 1.0.10, and then again to get to 1.0.11. I have never had any issues with firmware updates before with Burk so I just did it. The update finished on all four of my units, and I went about my day.

I went home, and at 5:00 PM, I got a text that KLTT was not in night mode. My heart sank, because I thought this was that other (reboot) issue showing itself again, but what I found was that I had no control over any of my sites. I could see status, but could not issue any commands. I worked for 30 minutes to no avail before finally decided to go to the sites. My dad was kind enough to go with me so I wouldn't have to go alone in the dark.

We went to KLTT first because at that time of day, it was the easiest to get to. It was stuck in the day mode, but I had logged directly into the transmitter and dropped the power way, way down to keep from interfering with other stations. Upon arrival, we immediately noticed the "link" light on the Plus-X device flashing from green to red, something it does when in maintenance mode, but because we hadn't put it in maintenance mode, assumed it was showing us there was an error, which was why we could not issue commands.

We worked and worked. Deleted the device from AutoLoad, added it back in, and nothing. Finally, I decide to push that maintenance button, and the light went steady green! What!!??!?!? Had I done that to start with, we could've been out of there quickly.

Evidently, when the firmware was loaded, once the adaptor rebooted, it came up in "maintenance mode," and because Burk does not have a way to show me it was in maintenance mode on the ARC Plus web page or in AutoPilot, I ended up spending way too much time chasing my own tail.

Had this been in the Tech Bulletin or even if I could've seen on the webpage/AutoPilot that we were in maintenance mode, it would have saved us a lot of time. It taught me one big thing: when doing firmware updates, treat them all as you would a critical update to something like NexGen. For Burk, since it usually won't take you off the air, schedule it for a time that if you find issues, you have time to go deal with them. If you have many sites like we do, focus on the least critical one. Do the updates there, test things to make sure they work, and only then move on to the other sites. Had I thought to do this, I wouldn't have had to go out at night to my sites to deal with the issue.

Firmware updates are important, much like those dreaded Windows updates, even Java, Adobe, and so many more. Those updates are there for a reason. Security vulnerabilities are found and improvements are made. Keeping equipment and programs up to date help make sure your stuff is operating as well as it can be. Always read the release notes and any other documentation that may come with the update, as it may hold important details that you need to know before continuing. I am bad at reading these, and it's come back to bite me a time or two.

It's always important to first BACK UP whatever it is you are doing. I know some things you cannot back up, but do have any important info (such as configuration parameters) stored somewhere, whether it's a file you can save from the thing being updated, or create your own document. I have documentation with pictures and values for our Omnias, NX-50 transmitter, Exporters, AM-IBOC exciters and more. I don't want to trust that things will come back up with everything there. Plus, if a piece of equipment fails, there's a good chance you will have to reprogram it up. Even if that document

you created is out of date, it's a good starting point to help you get things right.

Backups

Speaking of backups, how many of us actually back things up on a regular basis? Do you have backups of your backups? I have two computers for work, a laptop that I can carry home and to the sites, and then my desktop, which allows me to do my daily work and gives me a way into the network when I am away. So, I keep all the documents from my desktop on my laptop. I backup this way about once a month. Most of the important stuff doesn't change much, if at all, but I do like having recent things I've done saved. This makes it easier if I need to go to a site or do something from home.

From there, I have a 1TB hard drive I keep onto which I can backup my desktop and my laptop (I do have some personal photos and music I like to keep as well). I have another 1TB hard drive I keep at home in my fire safe. I backup our personal computer at home and my laptop, which should have all of my desktop stuff on it. I haven't needed to go back to any of these to do things due to a crash, but the option is there. I like to prepare for worst case scenario. The hard drive in the fire safe should be safe always, so it will be good for a catastrophic failure, a fire or flood at the office that may destroy what I have there.

We have several computers around engineering with critical stuff on them. NexGen can be a PITA to backup. I can easily backup all the files, so we at least have them. The problem is, you can't really back NexGen itself (the database) up. I would need to make sure no one is making any changes anywhere or risk corruption. So, the files backup is the way we go. We also do not have a backup server as some other markets may have. While this situation is not ideal, because I am able to back things up about once every month or two, it gives us a starting place to start rebuilding.

Wheatstone has a lot of important files. With our older bridge (TDM) system, I am able to backup each room. I am also able to backup X-Point and Navigator. From there, I copy it to a Dropbox account I have set up on that computer. This allows me to grab that backup from the computer itself or the Dropbox account from any computer. Keeping X-Point up to date is critical. I cannot tell you how many times I've made a change and not saved the file. Then something happens, even something like me rebooting the computer, and people start screaming that this or that isn't working. It takes me a bit to realize it was my own fault. Had I saved the configuration and backed it up, I would not have had the issue.

I would recommend backing up everything you can think of. Windows 7 and later has this great thing called a Snipping Tool. For equipment you can log into, use that program to take and save a screen shot of the pages. Save any configuration files you can and the rest, take a notepad out and start writing, then take the time to put it in a Word document. Save everything in a way that you know what it is. No use in having a backup if you aren't sure what file to use.

Depending on how often you change things I would say once a month to two months between backups is about right. Things like transmitters, processors, exporters and HD equipment won't need to be done each month because once you get them set up, they should be done. But remember, if you do change anything, make a note of it in your backup. You hope to never use a backup, but when you need it, you will need it in the worst way. Also, keep a backup at your office, and keep a second one offsite. That way if the building burns down or you have a tornado, flood or other disaster, you still have a good copy elsewhere.

Coming Up

February brings us the second month of 2018, which seems crazy. Where did January go? I will say that this year has started off much better for the Alexander/Hopp family than last year, and I am grateful for that. I hope to get the remaining three security lights installed at the KLVZ tower site. We purchased them when we did the two at the KLZ tower site and decided we should do the ones at KLVZ too since we have one that doesn't seem to want to stay on. It will be good to have nice LED security lights that have their own photocell built in.

We'll see if I do anything from the cap budget in February. I haven't decided yet. We'll see how the month starts and what needs to be dealt with first, then I will look into what we have in the budget.

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/103.3 MHz, 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/95.1 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
950 kHz, 5 kW-U, DA-1
WDJC-FM • Birmingham, AL
93.7 MHz, 100 kW/307m AAT
WCHB • 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-FM • Detroit, MI
103.5 MHz, 50 kW/150m AAT
WMUZ • Taylor - Detroit, MI
1200 kHz, 50 kW-D/15 kW-N, DA-2
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

Crawford

Corporate Engineering

2821 S. Parker Road • Suite 1205

Aurora, CO 80014