The Local Oscillator

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Night Cometh

And just like that, summer is over and fall is here, and with it comes the pressures to wrap up our outdoor projects and prepare for the coming winter.

When I lived in Dallas, there was a big church across the street from the high-rise residential building on which we had our STL relay, and that church had a big spire with a clock that would chime the hour. I remember that the clock face, in addition to the Roman numerals marking the hours, had a two-line prophecy: *Night Cometh*, a reference to Jesus' words in John chapter 9. I often think of that clock face, but in my mind's eye, it says, "*Winter Cometh.*"

If you, like me, watch some of those Alaska shows on Discovery, you know how even in the middle of summer, the residents are scrambling to get ready for winter, which will soon arrive. That's the way it is in the broadcast engineering business, at least in northern latitudes (people in Alabama actually look forward to winter!).

And so it is that we have our last opportunities to wrap up warm-weather projects before the snow flies, and we have quite a few still pending.

One such project – actually the same project in three different markets – is one I mentioned previously in these pages, the replacement of our legacy Trango microwave equipment with new Cambium equipment. We didn't jump on this sooner because we were trying to determine if the Cambium radios could be adapted to our existing Trango-branded and Radio Waves antennas. We got the answer to that last month when Keith Bergstrom of 3dB Networks came by and brought a Commscope adaptor kit.

We pulled the KLZ Trango radio off the back of the dish on the roof of the Denver studio/office building (because that was the one we could reach without climbing the rooftop mast) and checked the adaptor for fit. It did, and that means that we won't have to replace a bunch of antennas or realign the paths on those links. It also confirmed what we suspected, that the Trango-branded antennas are actually Andrew (Commscope) or knockoffs thereof (and I suspect the latter because they were made in China).

So what now? I have started PCNs (FCC-required Part 101 frequency coordinations) for each of the links for which we will be replacing the equipment. Why, when we're not changing frequencies or bandwidths, do we have to re-run the frequency coordinations? Because the FCC said so. We will be changing modulation/compression types, and while it's highly unlikely that any new interference would result, we must nonetheless give spectrum neighbors an opportunity to look at the new parameters and either object or not.

These new links use Cambium PTP820S radios, and we will use adaptive modulation that will range from 2048QAM all the way down to QPSK, which will provide 260 mbps down to 42 mbps on a 30 MHz channel and from 72 mbps down to 12 mbps on a 10 MHz channel. Contrast this with the flat 46 mbps that we have now on all these links. The way adaptive modulation works is that as path conditions deteriorate (due to fading, interference or both), the modulation changes to a less aggressive type until the link finds good, stable throughput. This allows the link to stay up and error free, albeit with lower throughput, when conditions are less than optimum.

One other advantage of the Cambium equipment is that it uses in-band management, unlike the legacy Trango radios which have a separate management port. That means that we will no longer require a switch at the top of the tower as we have now on many of these links. We can simply cross-connect the Ubiquiti radio to the Cambium radio and

call it a day. It's possible that those radios support MDI-X and we could use a straight-through cable, something we will have to determine on the bench when we get our hands on a radio.

The PCN process takes 30 days once the coordinator sends the notifications out. When complete, I will file the necessary FCC applications and we can immediately begin swapping equipment (Part 101 applications provide for a presumptive grant). That should allow us to get this project done before *winter cometh*, but if not, we'll push whatever doesn't get done to next spring.

Detroit Blues

In the 1920s and 1930s, blues performers from the south made their way north to work in auto and other industrial plants. Jobs were scarce in the south, so the people went where there was work. In the process, they brought their blues with them, and over time, a whole new genre, *Detroit Blues*, was born. I mention this little bit of history because I have been singing the *Detroit Blues* of late.

You might recall that our chief engineer of the past few years resigned back in June, leaving Michigan for warmer climes (Florida). We immediately began a search for a replacement, and we had a highly-credentialed and qualified individual apply. This individual began work in late July, but he could never quite find his rhythm. Issues were piling up faster than he could successfully address them, and late last month, he took his leave, which left us without a chief engineer in that critically-important market.

Thankfully, we are not without resources in the region. Chicago is less than four hours from Detroit (3:45 is the door-to-door block time shown by Mapquest), and we have a very capable engineering crew there. In August, Chicago engineering manager Rick Sewell made a trip over and spent several days dealing with issues and trying to give our newly-hired CE a leg up. After that individual left, we sent in Chicago chief engineer Brian Bonds along with some new equipment and a prioritized task list.

One of the issues that has been pending since late July is the failure of the 11 GHz microwave link from the studio to the 50 kW WMUZ(AM) tower site. The Trango Apex Lynx radio on the studio tower "bricked." We pulled the spare radio, which was purchased at the same time as the main radio and should have been brand-new-in-the-box, and put it on the bench only to find several issues. One was that both the spare -48-volt switching supplies were dead and we had no way to bench-power the spare radio. The other was that the spare was anything but new-in-the-box – it was beat up and had paint chipped off in several locations, an indication that it had likely been up the tower. When we got a power supply repaired and fired it up on the bench to check configuration, we found that it, too, was bricked – we could not communicate with it at all.

Thankfully, the new Trango Networks, which bought the patents from the old Trango Systems, still produces and services that last generation of Trango radios, so we sent the spare in and got it repaired – it required a complete board swap (it was evidently lightning damaged).

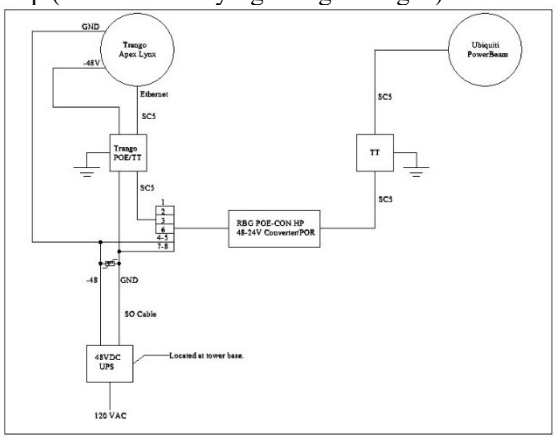


Figure 1 -- On-Tower DC and Ethernet Wiring.

We got the repaired radio back and had our local tower crew install it on the tower only to find that we could not communicate with it from the ground. We use a pair of Ubiquiti PowerBeam 5.7 GHz radios to send Ethernet up the tower, which air-gaps the Ethernet connection and gets us around the 328-foot limit. We could communicate with the PowerBeam radios at the base and on the tower, but we could not see anything beyond the PowerBeam radio on the tower. The tower crew used a cable tester to check the crossover between the radios and it reportedly checked okay. That pointed to an Ethernet port issue with the on-tower PowerBeam radio. Thankfully we had several spares. Unfortunately, we lost our tower crew before they could swap out the suspect PowerBeam.

So… job #1 for Brian Bonds was to get that radio swapped out and the link to WMUZ(AM) back up (the station has been running on a historically unreliable T1 circuit since July). To get that done, we brought in a technical tower crew from Illinois, Radicom. Like Microwave Specialists in California, the Radicom crew is not staffed with iron workers but rather technicians who climb. They understand microwave links, they understand AC and DC

circuits and can even put on a shielded CAT5 connector while hanging off the side of a tower.

This is a somewhat unique configuration. We use a 48-volt DC UPS in a NEMA-3 cabinet at the tower base to provide power to the equipment on the tower via SO cable. Up on the tower, we feed -48 VDC directly to the Trango radio through the Trango surge suppressor. The PowerBeam is fed in a very creative way through a CAT5 splitter and a 48-to-24-volt converter/POE. See Figure 1. The brown/white and blue/white pairs are used only for POE (no data), so our former CE simply broke those pairs out and fed them from the 48 VDC coming up the tower. This arrangement has worked fine for a couple of years now. But it really confused the non-technical local tower crew and our erstwhile CE.

The Radicom tower crew had no issues getting the link back up and running. There were some wiring issues on the tower. Evidently the local tower crew didn't pay much attention when they disconnected the failed Trango radio and they didn't get things back where they should be with the new one, despite being provided with the above schematic. The PowerBeam on the tower turned out to be just fine, so we didn't have to swap it out.

With that link back up, we got the whole WMUZ(AM) site back on line, and we were able to identify the IP addresses of all the IP-enabled equipment there.

Now I've got to ship that failed Trango radio that was on the tower back to Trango Networks for repair so we will once again have a ready shelf spare.

To wrap up this little story, we're going to have to continue to rely on our Chicago crew to look after Detroit until we find a suitable chief engineer. We are looking – hard. If you know of a qualified individual who might be interested, send them my way. Email resumes and references to *techjobs@crawfordbroadcasting.com*.

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

Hello to all from Western New York! The days are getting shorter, and temperatures are now starting to dip down into the 40s at night in Western New York. This all means that the window of opportunity to get our outdoor projects completed before the snow flies is quickly closing.

In Rochester, Andy of Skyline Contractors and his crew have been working diligently at getting the doghouses' foundations repaired. I met with Andy on Wednesday the 25th to get a better look of the damage that has been occurring over the years to the foundations of the cinder-block buildings. I was quite surprised at what Andy showed me, and it is only by the grace of God that we still have six standing buildings!

On two of the worst buildings, they are literally being held up by two or three blocks. The remainder of the cinder blocks have disintegrated by freezing water trapped in the walls and under the foundations. This damage was easy to see as the cinder blocks at grade were cracked and broken away in areas, but as the repair crew began to dig the earth away from the foundation, the damage was much worse below grade.

By month's end, the Skyline Contracting crew will have begun the concrete work to secure the buildings foundations. Once this has been completed, they will then begin hauling in topsoil to improve the grade around the buildings, which will help drain water away. Andy also noted that the concrete tower foundations were displaying a lot of erosion around the tower bases. He checked each one of them to see if there has been any shifting and found very minimal variances in the vertical plumb of the concrete bases. While they are creating positive grade away from the buildings, they will also fill in around the tower bases to help control erosion there.

In Buffalo, several months ago we had our

telephone service lines changed at the WDCZ transmitter site from copper pair to fiber optic. The phone/internet services at this site were failing at a rate of once per month last year, so it was no problem in getting Verizon to agree to upgrade our service delivery there. Services seemed to be stable, up until the second week of September, when we had five failures of service within a span of a week. Usually, a hard reboot of the FIOS terminal located inside the building would restore service, but in two instances, a repair crew had to be dispatched to get the services back on line. On Tuesday the 24th, it went down again, and this time, Verizon opted to replace the entire terminal, noting a bad optic card and power supply. Hopefully this will put to rest these issues with our phone and internet services at this site.

Aside from the day-to-day issues we all experience in broadcast engineering, there is not a lot more to report on this month. Soon I will be beginning winterizing procedures at all our transmitter sites in hopes that there will not be any major catastrophic failures, especially at the AM transmitter sites, where the snow tends to pile up in feet, not inches. Nothing worse that trudging through waist-deep snow to get to a tuning house that has a faulty RF switch or tower lighting flasher that suddenly quit working.

Not a whole lot left of the bottom course of blocks at this tuning house.

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

Not too many weeks ago, we had tons of rain and lots of flooding. Our transmitter sites had weeds growing on weeds, and it was too wet to have them mowed. Last time, I covered the severe storms that had done some damage at a couple of our sites. The business where we have our hair cut (such hair as I have now, anyways) was badly damaged by either a small tornado or strong straight-line winds (see Figure 1). The entire roof will need to be replaced and there's a lot of interior work to be done as well. Our friend was in the building cutting a customer's hair when it happened, but thank the Lord, no one was hurt.

Now, as we start October, we're in a drought and wildfires are becoming a problem. What a difference a month or two makes! Just the other day, I passed a pretty bad wildfire right off I-65 near my home. (I think Alabama – the state itself – suffers from bipolar disorder, and I suspect that it is incurable.) But September was relatively quiet. We repaired the sample system at 850 AM in Tarrant, so all the antenna monitor readings are nice and normal now. Cris and I are working on a slew of numbers so that we can give that entire array a 20-year tune-up. Yes, it has been 20 years since we built it!

We are still planning to repair the strobes at the 101 FM (WXJC-FM) site in Cullman. We are pricing an LED replacement system, but we may need to wait another year or two for the price to come down. These LED systems are already FAA-compliant, with the high intensity day mode rated at 270,000 candelas(!), but to my stingy mind, they're still kind of expensive. We'll see.

In no particular order …

Troubleshooting a Directional Array

Entire books have been written about this. Even in this day and age of microcontrollers and smart phones, a directional AM is still a very complicated engine. Lots of interactions, lots of

Figure 1 - Strong winds destroyed this beauty salon near Warrior, AL, where Sandy and I live.

things to go wrong. When you lose your antenna monitor, even if only briefly, you already know what to do: you confirm that you are in parameters by other means, including some field strength measurements.

I've never had a situation where the array was damaged at the same time as the antenna monitor failed, thank the Lord, but it's easy to see how this might happen. A really bad round of lightning strikes could kill an ATU and the sample system. Each array is different, but I've given a lot of thought to how I'd handle that if the worst happened to WXJC(AM) (850 kHz).

Cris is big on having a complete set of static impedance measurements. With the advent of inexpensive network analyzers, that just makes more sense than ever. You take it down one evening, then measure the impedances at every J-plug in the phasor. If you keep a record of these numbers, in the event that anything heads west, you'll usually see the biggest change at or near the point of failure, or at least in that circuit branch. Makes sense.

But as an intellectual exercise, I wanted to know how to arrange the phases and ratios with a different reference tower. The failure this time was the reference tower in the day pattern; how could I make sure we were legit and legal? It's actually pretty simple: I have the phasing/ratio "budget" for our entire system, both day and night patterns, and it was fairly easy to change the reference tower (and thus, the phase "origin" for the entire array – Figure 2) in my spreadsheet to determine what I'd see on the antenna monitor with the *second* highest-ratio tower as the reference. To ensure that the actual reference tower was in tolerance, I simply used the inline ammeters and did some good old-fashioned division. Just like we used to do in the good old days!

As experienced engineers get older and retire, there are fewer and fewer of us who understand and can troubleshoot these AM directional arrays. Method of Moments modeling has been a blessing, but even with that, if you own a station, you're going to want a guy or gal who knows what all those capacitors and tapped coils actually do. Mental exercises like this one keep my mind agile.

	A	B	C	D	E	F
13						
14	TOWER	PHASING	BUDGET	WORK	SHEET	NEW - 2017
15		Tower 1	Tower 3	Tower 4	Tower 5	
16	PD	-13	-14.2	-16.9	0	(Based on new
17	Phasor	-80.2	78	93.2	0	measurements
18	Subtotal	-93.2	63.8	76.3	0	in June 2017)
19	Line	-105.8	-98.1	-193.8	-162.7	
20	Subtotal	161	-34.3	-117.5	-162.7	
21	ATU	-80.2	-102	-86.8	101.4	
22	Subtotal	80.8	-136.3	155.7	-61.3	
23	Origin	61.3	61.3	61.3	61.3	
24	To Tower	142.1	-75	-143	0	
25						
26	Items in	gray	are calculated			
27						

Figure 2 - The phasing 'budget' for the WXJC AM day pattern.

A Real Life Test

I've written in the past about the generator monitors, using a combination of Arduino and Raspberry Pi controllers, that we've put in place at WDJC-FM and WXJC-FM. The latter had a chance to shine in early September. Cullman EMC, our utility provider, notified me that they needed to do critical maintenance from about 9 PM to no later than 3 AM the next morning. In the past, this would have required me to be on site to make sure all was well.

In fact, the utility did kill the power at precisely 9 PM almost on the dot, and my monitor immediately notified me. After the programmed 10-minute timeout, it smoothly lowered power to ease the fuel burn on the generator (this was late night, after all). When the power came back on, my monitor smoothly increased power back to normal and all was well.

It's amazing what these little controllers can do now. I see a revolution coming for the traditional vendors of broadcast remote control equipment. Figure 3 shows a typical notification (this is a simple startup test). The email comes to my phone, and my phone is programmed to make a unique, loud sound whenever I receive a notice from that email address. Win-win.

I know it sounds insane, but honestly, given the choice between writing a Python script for one of these little controllers, or trying to slog through the incomprehensible logic used on our Relio remote

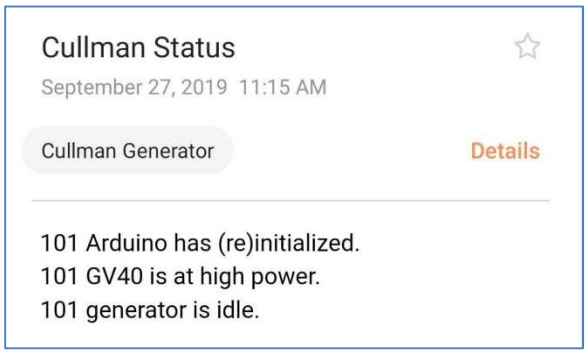


Figure 3 - A test email from the 101 transmitter site.

controls, the Arduino and Pi will win every time. You are limited only by your imagination. The next step at 101.1, as I get time, is to put an Arduino *and* a Pi in place to actually report various parameters.

SNMP

I had promised last time that we'd have a write up on SNMP, but Stuff Happened. Naturally, we wanted to make sure that it was reliable, but we were clued in on site control via the Simple Network Management Protocol by a fellow who used to rent space on WDJC's tower. He says that they monitor all their little translators over the Internet that way now.

Wheatstone's latest equipment (i.e., the Blades) already support SNMP out of the box, and other vendors are following with firmware updates. Todd – our resident free/open software guru – is the one playing with this, and I'll have him report on it when we're confident that we have something good to say.

Personal Odds and Ends

The first is sad news: as I was writing this article, I received news that a young lady died in an accident this morning. This young lady was the best friend of Jack's better half, so keep him and his girlfriend in your prayers, as well as the family of the girl who died. Terrible news.

Sandy has been seeing doctors for the longest time, as most of you know. I wrote a blog post on my personal Website about the Healthcare Hydra; I think I need to add to it. One of the things that has always struck me is this: why is it that the huge healthcare complexes, the ones that exist to treat very sick people, expect you to park a mile away and walk forever to get inside? I've never understood that one.

This may deserve its own headline in the future, but for now, it's just a rumor. Anyway, the Worldwide Community of Neck Beards™ (i.e., the Ubergeeks) are saying that the next version of Windows, number 11, will possibly be based on Linux instead of the old NT base. Again, this is just a rumor, so take it with a grain of salt. But the story is that Microsoft is having more and more trouble with regular updates to that old NT code base, and given that Linux is constantly updated by a team of programmers around the world, they might just build a Windows GUI atop Linux. How cool would that be?

No need to go into dreary detail about all the computer work that we've done in September. Todd, Jack and I have built a couple of new firewalls, have updated all our corporate servers, and we're currently looking at upgrading the "dumb" email system that we use for some of our equipment. The updates, though, were especially fun. I periodically check each of our servers (Web, email, FTP, et al) and this time, there were several *hundred* files to be installed on each one. Took quite a bit of time, too.

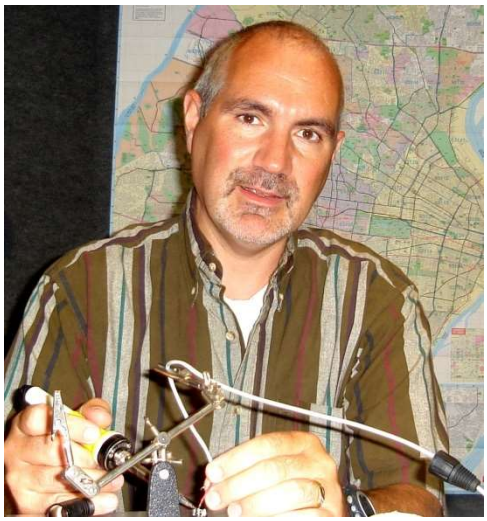
Finally, a reminder to all my favorite manufacturers. This month and last, I mentioned user interfaces, non-intuitive setup, etc. The best method I've ever found is to hand your shiny new gadget to an ordinary user and then to *just watch them*. Don't help them in any way. See if they can figure that thing out without having to call support or scratch their heads. You might be surprised. All y'all (a little Southern lingo, there) are turning out some truly outstanding stuff nowadays, but wow, you need to pay more attention to the user interface and/or documentation. Just sayin'.

Until next time, keep praying for this nation!

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

Knock on Wood

I am almost afraid to write this. I know as soon as I do, I will curse myself. We just crossed the official date for the beginning of autumn, and we have yet to have a major lightning event that affected any equipment at our four transmitter sites or the studios this year.



Of course, the fall season can still be a time for lightning, especially in October, so we aren't out of the woods just yet. In looking at the reasons why this has been a good year, the first thing that comes to mind is just dumb luck.

While I couldn't find any current information on the total thunderstorm days so far in Chicago in 2019, I did find it for the time up to early June. The average number of thunderstorm days for Chicago each year is 38. By June 5th we had already had 21 days, so given what we have seen over the last four months since then we will undoubtedly come in well above the average thunderstorm days for Chicago.

The dumb luck factor can still apply because you can have lots of storms but not have all that many lightning strikes near your sites. Without examination of all the charts over the last couple of years, I have no doubt that we had at least the usual amount of strong thunderstorm cells near our tower sites.

The other factor is that not every lightning bolt is created equal. That is certainly where the luck factor can come into the equation. The typical lightning bolt will probably be under 20,000 amps. While that sounds scary, there are really extreme bolts that can be hundreds of thousands of amps, what Cris calls "grand mal" strikes.

If one of those grand mal strikes hits your tower, all bets are off because you're most likely going to have equipment damage no matter how much protection you employ into your site. Then again, these extreme bolts are rare, and the luck factor definitely come into play here.

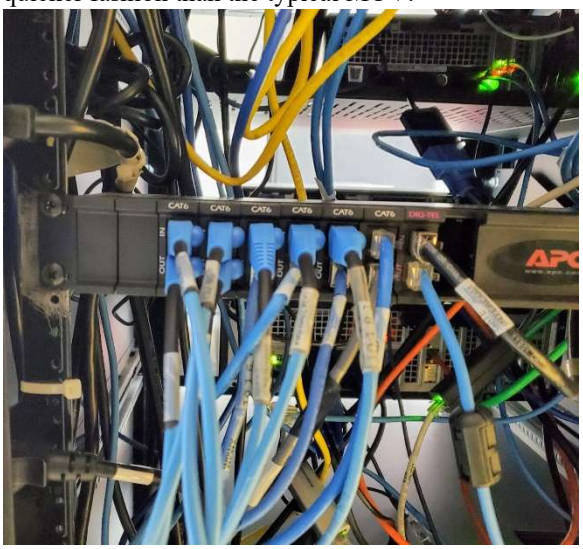
The typical lightning bolt is probably where we live most of the time. This is the expected and we need to employ as much lightning protection as possible to make sure the typical doesn't affect our operations.

In 2016, we took a bad lightning strike to our STL tower at the studio. In the same week, we took damage at two of our transmitter sites as well. It was a very rough week. From that point on, I was determined to get the typical strikes at our sites tamed.

We first examined all our grounding systems. At our studio STL tower, we found one of the ground connections loose. While the tower was still grounded with other connections, the particular connection that was loose was the one that connected the tower to the station ground. Not good. This was probably a big reason we had so much damage in the rack room. We, of course, immediately fixed this issue.

We also began adding in surge protection by purchasing the rack-mounted APC surge protectors. The base unit is two rack units and you can order modules for Ethernet, coax and phone lines. We purchased several units to spread through our rack and electrical rooms. Not every cable is put on these modules, but we picked out key cabling to hopefully catch a surge before it spreads out to other equipment, cables such as the ISP entry cable, the initial cables from the modem/router, phone lines and other entry points from the outside world. We also run CAT5 cable through these for other key equipment like Nexgen file servers.

In addition to the individual surge protectors, we added overall surge protectors to the buildings at all five sites. These are units that not only provide plenty of MOV protection but also have SASD protection as well, which respond in a much quicker fashion than the typical MOV.



Individual surge protectors are strategically employed on key entries.

We also found that some of our ground wiring from the studios to the station ground in the rack room was often not even connected to anything. We set about fixing that and took it a step further with making sure all the rack rails in the rooms were well grounded. Additionally, we added wires to the individual equipment from the ground cables to their chassis bolts.

On our towers, we often had issues with lightning and static "doing in" our 18 GHz and 5.8 GHz microwave radios. Having grown tired of calling tower crews every few months to fix problems with these radios, we began switching the network cabling to these radios from the shielded CAT5 outside cable to direct-burial CAT6 cable. Instead of a foil shield and a drain wire running with the other pairs, this cable is copper clad on the entire inside of the cable jacket. This cabling is bonded to the tower in several spots. We haven't replaced every outside cable with the copper clad CAT6 cable, but we seem to have done enough of them to make a big difference. The cable is not cheap, but then again, neither are tower crews.

Whole-site SASD surge protectors are employed at each site.

Additionally, we began putting ferrite on everything. If I have a question on whether a cable needs ferrite, I don't have a question; it gets ferrite. Lightning is like water in that it follows the path of least resistance. You want to address lightning from two sides of the equation, make sure that your ground path is near zero and then build up the resistance on the side of the equipment as high as possible. The best way I know to do this is add ferrite.

We still are looking at ways to improve our odds of surviving a lightning strike. In the near future, we will be adding quarter-wave stubs at three of our four transmitter sites. This should provide a lot more protection to the main transmitters at these sites as it will be a final path to ground for a lightning strike to move from the center conductor of the antenna coax to ground. There are probably other steps we can take, but I feel that over the last three years we have made great strides improving our vulnerabilities to these catastrophic events.

Valley News
By
Steve Minshall
Chief Engineer, KCBC -- Modesto

As I reported a few months back, we have installed a new Burk ARCPlus Touch remote control system here at KCBC. I continue to be delighted with the new remote control system. However, one new issue has popped up.

Since the time that we switched over to the new system, we have had a few antenna pattern changes that did not happen. KCBC operates with separate antenna patterns and power levels for day and night. The pattern changes are accomplished with a macro based on calendar dates and times. On a few occasions, the pattern change did not occur. Sometimes it misses a switch to day pattern and sometimes it misses a switch to night pattern. This happens about once every two or three weeks.

With the infrequency of the problem, it is difficult to troubleshoot. Manually changing patterns either via the remote control or the antenna controller always works. Like the old saying goes, "You can't fix it if it's not broken." The problem is that it is almost not broken!

While the proper, and desirable, thing to do is to repair the problem, the next best thing would be to provide means to ensure pattern changes happen more reliably despite the occasional problem. My first step towards that was to close two relays instead of just one for each pattern change. Normally I use channel 7 relays for pattern changes. I added channel 6 relays to the pattern change macro so that both relays 6 and 7 close for the pattern change. The two relays are simply wired in parallel, if one relay has a contact that does not close, the other relay should still complete the circuit.

The next step I took was to build a macro that I call "Pattern Change Alarm." There are two of these macros, one for day and one for night. These macros are initiated by the sunrise and sunset times programmed into the remote control's calendar. The macro waits 10 seconds to see if the pattern has changed correctly. and if so, it cancels the alarm. If the pattern did not change, it will wait another 10 seconds and then give another command. The cycle continues for four attempts at changing the pattern, alternating between relay six and relay seven. If the pattern does not change, it sends an alarm via phone, email, and text.

I also set up an alarm that sends me an email every time the pattern is changed. This has been useful to determine if the pattern change occurred from the pattern change macro, or the pattern change alarm macro. If I see the pattern change time ends in 00 then I know the pattern change occurred from the first attempt. If I see the pattern change time ends in 10, 20, or 30 then I know that the first attempt failed and the pattern change alarm macro made the pattern change. Since the time that I implemented these changes, there has only been one instance of the pattern change alarm macro intervening.

This is all well and good and almost ensures that the pattern will change as scheduled. However, it does not help me to determine where the occasional problem lies. It could be in the remote control system (especially since the problem seemed to start with the installation of the new system), or it could be in the antenna controller.

To further aid in understanding the problem, I took another step. I installed a resistor network that samples the voltages across the pattern change relays. It sums day and night and is routed to a meter input on the remote control. The system is programmed to send an alarm via email when this meter input goes positive.

Twice a day I get emails from the remote control system. It tells me the exact time the command was sent to the antenna controller and it tells me the exact time that the pattern actually changed. This way I should be able to tell if the remote control is not sending a closure, or the antenna controller is not responding to a closure. This works great. Every morning and every evening I get the email. When I check my email, I can glance at

those and see if everything is normal or if there has been a problem. So far, we have not missed on the first attempt at a pattern change since I implemented the pattern command alarm, but I am sure it will happen eventually and then I will be able to divide and hopefully conquer the problem.

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

Computers. Love them or hate them, computers have become a central part of today's broadcast infrastructure. A fact made clear this month as KKPZ finished (finished? nothing is ever finished…) the transition to new Nexgen computers. As Cris mentioned early on, this isn't the first upgrade to Win10, it is the first upgrade of the entire Nexgen system at one time.

The project did not start well. Failures of hardware, misaddressed shipments and other problems were not a good indicator of success. Windows 10 is another negative indicator as well. For those of us old enough to recall the real funnies in the newspapers please note here that I did not include the %###$&^% associated with the phrase Win 10. Yes, I can hear the question now: What is a newspaper?? It was a large sheet of cheap paper upon which actual news was occasionally printed in cheap black ink. The day-old version was often used to line the bottoms of bird cages. But I digress.

I have to say, I had a good team to work with on the project. Roger and Jennifer moved program recording sessions twice in order to allow access to the Nexgen system. Both worked hard to update logs and programs several days ahead so we could work on the system.

The other vital component to the project was RCS support and Field Technical Services (FTS). I was able to pull the sound card from one of the original computers, which allowed installing the card in one of the new machines. Once that was done, FTS was able to copy the database and make preliminary install of the Win 10 compatible Nexgen software.

On "T-Day" (transition day), we had done the preparation work that would hopefully allow a seamless transition to the new system. We began by isolating the control room system and enabling emergency control room (ECR) mode to allow the station to remain on the air.

After a last-minute database update, the old audio server (ASERV) was powered down. It's worth noting that this was the fourth or fifth time the computer had been powered down in its *lifetime*. Bringing up the new ASERV and control room systems was the minimum necessary to turn off ECR and get back on a normal footing.

Thanks to the teamwork of staff and the efforts of FTS, the transition went without incident.

We are now in that last ten percent part of the job that takes ninety percent of the work. Fixing all the "small stuff". Things like a hesitation when playing the B Bar. Many of these problems are related to Windows, which automatically selects settings which conflict with user applications.

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

Detroit

Truth be told, September was a busy month, but also a slow month. Denver has behaved and I am thankful for that. I spent the majority of my time last month helping deal with some Detroit issues.

We found most of the machines in the market are still running Windows XP, including the machine used for Wheatstone (XPoint and Navigator). With the recent purchase of TeamViewer and the need for support from Denver and other markets, we wanted to get TeamViewer installed on those machines. The Wheatnet computer, as it turned out, had SP2 installed, and that prevented us from installing even an older version of TeamViewer. So we purchased a new computer and had it sent to Denver where I set it up. I got everything ready to go so all that needed to be done was plug it in and turn it on in Detroit.

There have been several other issues in Detroit that I have helped with. It is fun getting to help out another market, but irritating all at the same time. We found several computer issues and all I wanted to do was what I knew needed to be done, but those things required someone to physically be present. One of those things was to retrieve a lost password. The brand-new desktop and laptop that were purchased for engineering were set up with passwords that nobody knew, and we had a hard time gaining access using what those passwords were reported to be. Steve Cuchetti in Detroit was able to get into the laptop but not the desktop.

I found a program called Lazesoft Recover My Password online that you burn as a USB/CD image and boot the computer from. It allows you to "break into" the computer by resetting the password. I am normally not a fan of this, as I just don't trust such things, but I decided to try it on my own desktop computer and all seems well since running it and resetting my password. Due to a number of other issues, this has been put off, but I hope to hear soon if the program solves the issue and gets us into the desktop computer so we can retrieve several critical documents.

Production Computers

The one big thing I did in Denver last month was replace two production workstations. I decided to look at the 2019 budget and realized we were due to replace two of them, so we got it done. Because we no longer use physical sound cards, we were able to use Dell Precision workstations in the small form factor, which makes for a nice, small footprint in the studio.

The move to the new computers went fairly quickly and without a lot of issues. I have a process now: set up the computer, do all the updates, then begin installing various programs, followed by transferring any documents, bookmarks and settings. Then I install Nexgen (thankfully we have a spare license key to make this possible) followed by Wheatnet drivers.

I think the confusing part of these installs was remembering that the production workstations have USB Wheatnet driver keys and not the software keys. The older computers had internal USB ports, where we plugged in the key, and out of sight, out of mind – I had forgotten. Despite this, the installation was fairly painless. I installed both computers the same day in a matter of an hour or so.

Upcoming

I found that we have a beacon out on one of the towers at the KLTT site and am waiting to hear back from our climber to see when he can take care of it. I honestly do not remember the last time we had any beacon issues. I think it has been two or three years, which is a bit surprising because before that, we were having to do several climbs a year. I pray this is not the start of a new cycle of lamp failures but just a one-time fluke. I have plans to go to each site and begin cleaning the ATUs and even replacing parts of the ATU at the KLTT transmitter site. I want to get things looking good and make sure hardware is good and tight before winter gets here.

I do hope autumn shows up here soon. Despite it being fall on the calendar, the temperatures

are more like summer, complete with high fire danger. Fall temperatures make working outside at the towers much more tolerable, and we don't have to fight the bugs as much. It will allow us to be able to get a lot of work done that we've put off due to the high temps.

I think 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, 107.1 MHz, 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
WXJC-FM • Cullman - Birmingham, AL
101.1 MHz, 100 kW/410m AAT
WXJC • Birmingham, AL
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92.5 MHz, 2.2 kW/167m AAT

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