The Local Oscillator

The Newsletter of Crawford Broadcasting Company Corporate Engineering

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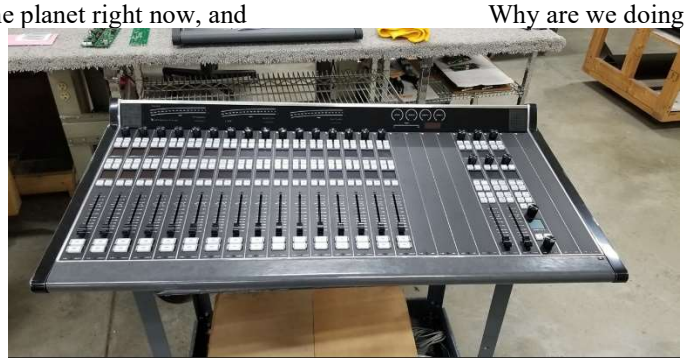
At long last, here we are at the end of what has to be the most difficult year in the lifetimes of most people who are on the planet right now, and none of us are sorry to see it go, myself included. I harbor no illusions, however, that the start of 2021 will usher in anything better. We all hope and pray for a better year coming up, but the start of the year will undoubtedly be more of the same. If you are one of those who think this will all be over with the coming of the New Year, I'm sorry to burst your bubble.



One of the Denver LXE surfaces ready to pack up and ship at Wheatstone's factory in NC

All that said, we have weathered this difficult year well as a company. God is good, and to Him goes all the glory for getting us through these challenging times. I'm pleased to say that we're all still here. In fact, with Mike Kernen coming aboard in Detroit last spring, we are plus one in the engineering ranks, fully staffed and busy as we've ever been.

We completed some big projects in this pandemic year. The biggest of these was the complete studio renovation and conversion to Wheatnet-IP in Chicago. Of course, I haven't travelled to Chicago to see it for myself, but the photos I have seen depict a gorgeous, state-of-the-art facility that will undoubtedly serve us well for many years to come.

At press time, we are in the middle of a similar project in Denver, replacing the 16-year-old TDM system with Wheatstone AOIP equipment, including additional blades and LXE consoles. Birmingham will be right behind Denver, and Detroit will be right behind Birmingham.

Why are we doing this, especially now, in the middle of a pandemic? There are several reasons.

First, these were scheduled replacements, although other than Chicago, they weren't scheduled until next year. But we were running into parts availability issues for the old consoles, and even though Wheatstone has been great in finding workarounds, the clock was ticking… really loud.

The other big reason is that we want our core facilities to be well equipped for the uncertain future, fully configurable and reconfigurable. Last spring (and maybe again soon), we had to run several of our markets remotely, with no one in the studios at all. This was a piece of cake at KBRT in the Los Angeles market, where we fully converted to Wheatnet-IP in 2019. Operating the station remotely, and even reconfiguring the infrastructure to accommodate certain exigencies, was no issue at all. We didn't miss a beat, even with live programming. Doing those shows remotely was easy with the new infrastructure. We are now equipped to that level and beyond in Chicago, and we soon will be in Denver, Birmingham and Detroit.

Beyond those reasons, a third is that the future is in IP infrastructure. Analog and AES are things of the past. While AES and derivatives AES67 and AES92 are still in play, their use is becoming more and more limited. I have spent untold hours in

planning the architecture of these new systems, and it amazes me how few signals there are in those domains. There are still a few analog signals, mostly having to do with EAS and PPM (monitor sources) and some satellite feeds. We still use AES to get into and out of some of our codecs and EAS encoders, but that's about it. Most of our sources are Wheatnet-native, including Nexgen, and that certainly simplifies things – and it really cuts down on the wiring.

Looking ahead, I can see employing AOIP in our transmitter site audio transports (outbound and return) at some point. Codecs have long been a bottleneck (and pain in the neck) in those applications. Some are better than others. How great would it be to be able to route directly to a processor input without going through a codec? And how great would it be to be able to route a mod monitor or satellite receiver output from the transmitter site to any destination back at the studio?

The reality is that we could make that leap even now in many locations, relegating codecs to backup links. For many of our AM stations, however, we're constrained by the half-duplex 802.11 links between the microwave radios on top of towers to the transmitter building. I'm told, however, that our friends at Wheatstone have a solution for even that, and we plan to test-drive it early next year.

All this new technology is wonderful. I am thrilled to be part of the transition. I've seen a lot of change in my 44 years in this business, and I must characterize this leap as one of the most useful. But as wonderful as the technology is, it's still the engineers that make it work.

As we enter the holiday season, I find myself thankful every day for our engineers. What a great group of people! I'm thankful for the leadership of our market engineering managers and chief engineers, and I'm grateful for our technical people at every level. During this time of pandemic challenges, it's you as much as anyone that have kept our company going. My thanks to each of you for your hard work, dedication and loyalty!

An Array Within an Array Within an Array

Way back in 2004, the station that is now KLVZ was then KLDC on 800 kHz, the frequency it was on when we bought it back in 1994 as KLTT. 800 was a real stinker of a frequency, especially at night with 150 kW border blaster XEROK ("Z-Rock" – yes, the famous one that Wolfman Jack once called home) just across the Rio Grande at Ciudad Juarez bombarding half the US with its huge signal. That

The second shipment of goodies for Denver ready to go

kept our little 800 kHz station as a daytimer, and domestic protections limited the power to 1 kW.

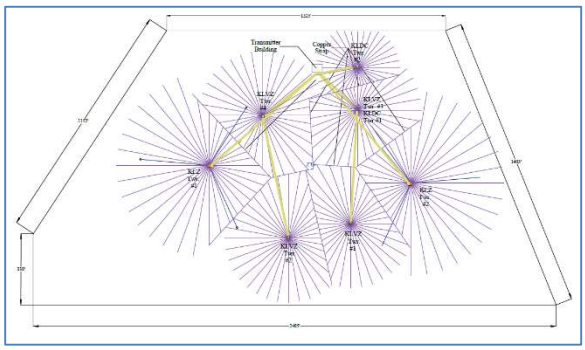
Sometime that year, I got the idea (and I'll give the Holy Spirit credit for planting the idea) that we might move KLDC to an adjacent channel and get some improvement. I looked up and down and settled on 810 kHz as the best bet. We could do up to 10 kW day if we wanted to make the investment, and there was the possibility for some meaningful protected nighttime service.

The station was licensed to Brighton, Colorado, then a farm community north-northeast of metro Denver, and the tower site was on the east bank of the South Platte River north of that little town. The three-tower directional antenna put the main lobe right over Brighton and down into Denver and Colorado Springs, and I found that the tower line would work just fine on the adjacent 810 kHz frequency.

At night, we had a big protection to the west (KGO in San Francisco), and that tower line would absolutely not work for that broad western null. I also knew that night power would be limited to something under 500 watts, so we would want the site to be as close to metro Denver as we could get it. It occurred to me (again, the Holy Spirit whispering in my ear no doubt) that the KLZ site just north of downtown Denver had 50 acres with two towers 900 feet apart and nothing else. Could that work?

So I began working on an array design and came up with a four-tower trapezoid array that would protect KGO and all the other co- and adjacent-channel stations, and that array would fit nicely in the no-man's-land between the two KLZ towers. An array within an array!

In 2005, we did the frequency change, built out the concentric array and proofed it right up. Once that was going, we did the frequency change on the daytime site and tuned/proofed that array as well. The station has been doing a great job ever since. That 430-watt nighttime facility does a great job with all



The layout of the KLZ-KLVZ-KLDC site -- the tower and ground radials at the top center are the new ones for KLDC.

but the western suburbs, and the 2.2 kW daytime signal reaches even to Colorado Springs and beyond. We never did build out the 10 kW daytime facility, although we had a CP to do so.

A few years later, we swapped frequencies and callsigns with KLVZ, which was on 1220 kHz, so the 810 kHz station became KLVZ and 1220 became KLDC. Hold onto that bit of info.

Fast forward to 2020. We had the prior year gotten the word that the landlord at the 1220 tower site was planning to raze the old building there, take down the 390-foot guyed tower and put up a new free-standing tower and prefab building for the two AM tenants while constructing a new building for its radio network. But then the pandemic happened among other things, and we got official notice that our lease will not be renewed when it expires at the end of 2022. The landlord plans to raze the hilltop and, I presume, sell to a developer. Can't say as I blame them. It's a great view from up there.

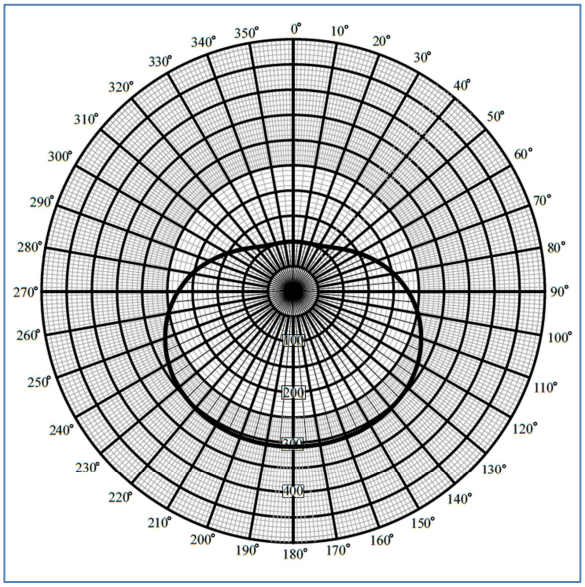
So that leaves us with right at two years to figure out what to do with KLDC, and we don't have a lot of options. Not surprisingly, I started thinking about the KLZ/KLVZ-N site again. Could I make one of the existing 810 tower pairs work for 1220, or could we make it work with a non-directional antenna from that site, almost ten miles north of the existing site on Ruby Hill? The answer to both questions was no, but that wasn't a deal killer. I would just have to find another way.

And so it was that I started looking at the available real estate to see where we could perhaps put up a seventh tower at the site to pair with one of the existing 810 towers. Right behind the transmitter building was the perfect location – there was nothing back there but dirt, and lots of it, plenty of room for a 200-foot tower and a full ground system on 1220 kHz.

The daytime allocation picture was not awful. In fact, it consisted only of adjacent-frequency protections, two of which were grandfathered with overlaps created by an FCC rule change in 1990 or thereabouts.

I enlisted Amanda as a driver and we launched out into the hinterland making conductivity measurements north and south. We had measured conductivity data on file with the FCC from the 1962 KLZ directional proof and the 2005 KLVZ-N proof, and those showed higher-than-M3 conductivity, often by a factor of two.

Higher conductivity means less attenuation and the signal goes farther for the same amount of power than it would with lower conductivity, and that's a good thing from an efficiency perspective, but I was looking for attenuation way out toward those north and south overlapped protections so we could get more power in those directions. That, however, wasn't to be. The conductivities we measured from the KLZ site were all the same as in those earlier proofs, and the FCC requires us to use whatever measured data exists.



The proposed two-tower KLDC directional pattern will protect an adjacency to the north while maximizing signal into Denver to the south.

The final design, which uses a two-tower north-south array with a shallow null to the north toward the adjacent-channel protection in Laramie, Wyoming, will permit 500 watts day, which is lower than the 660 watts on the tall tower on Ruby Hill. That would seem to be bad news, a step backward, but it's not.

Amanda and I got back in the truck and made an abbreviated set of measurements from the Ruby Hill site and found that the conductivity was half or less of what's shown on the FCC map (M3). That's not too surprising, since that once mostly rural site is now surrounded for miles and miles by concrete, asphalt and steel, which explains why the signal has long been lackluster from that site.

The good news is that with the high conductivity at the KLZ site, the 1220 signal will go a lot further with 500 watts than it did with 660 watts and a more efficient radiator from the Ruby Hill site. So not a step backwards after all!

We filed the FCC application for the move in mid-November, and I'm working my way through the county bureaucracy to get the conditional use permit modified for the additional tower. Yes, we have two years to get this done, but if past experience is any teacher, we'll need most of that time. We'll have to add 1220 kHz detuning to both KLZ towers and all four of the KLVZ-N towers (the shared tower will have to be detuned for ND-night operation), and two sets of filters/traps will have to be added at each of the towers. The design will take some care since bandwidth will be important for current hybrid and future all-digital operation. Our friends at Kintronic Laboratories are helping with this.

So if we didn't have enough to do with all the Wheatstone studio projects, we have an AM quasi-triplex project in the works, too! An array within an array within an array! Talk about efficient use of a site! And the best part – no more rent forever!

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

Hello to all from Western New York! Winter is definitely knocking on the door! We had a small preview of what is yet to come several weeks ago, and I realized that I have not yet fully prepared our transmitter sites for the winter season.

November started out wet, cold and cloudy, which makes it difficult to trek out to all the towers and do what is necessary to prepare for the long winter months. At the end of the first week of November, the Lord blessed us with unseasonably warm temperatures, and for almost four days running, high temperatures lingered at or near 75 degrees! In November, in Buffalo, this is considered truly a blessing, and it provided me the opportunity to get all my weatherization duties done!

All five tuning network enclosures at the WDCZ transmitter site received a thorough cleaning, vacuuming, and a complete inspection of all components in the network. All cracked/missing vent plugs were replaced, and new light bulbs were installed in each enclosure along with moth balls to deter any unwanted creatures.

Before the unusual mild weather began to change back to normal, I was also able to run the monitor points for the array to ensure that the points were within operating limits. All six points were within specs. The only other item that needs to be done is the yearly occupied bandwidth measurements (actually for both WDCZ and WDCX AM), and I will get those done sometime in December.

In last month's report, I wrote about the issues we were experiencing with the WLGZ-FM feed line in Rochester. Someone had confused our 2-1/4" line with an identical run that was to be removed for another station. Some 60 feet or so of the butterfly hangers which secure the line to the tower were cut, and when whomever realized their mistake, they began removing the correct line but failed to fix the damage they had done to ours. Fast forward in time, and wind and gravity began to cause our line to deteriorate to the point that it was damaged beyond repair.

On November 11, Patriot Tower removed the damaged feed line and replaced it with new 1-5/8" air dielectric line. As our antenna input power is a little under 10 kW, Cris determined that we could

I think I see the problem...

save a considerable amount of dollars by downsizing the size of the coax. This work went very well, but when I attempted to bring up the transmitters into the new line, I heard a definite burnout occur (BZZZZZT!!), and the 1-5/8" hardline inside the building was extremely hot to touch, not to mention the enormous amount of reflected power on both the Continental analog transmitter and BE digital transmitter.

I shut everything down, and to get us back on the air expeditiously, I re-plumbed the main analog transmitter directly into the main antenna, and the BE digital into the axillary antenna. This gave me time to investigate just where the burnout occurred. I started with the reject load, to ensure that it was providing a 50-ohm load to the HD injector.

Measuring with my DVM, I was seeing resistance from 38 to 126 ohms, definitely not a good sign! After thinking about it, I realized that my meter was in all probability being swamped with RF from all the collocated FMs. I had another true-RMS meter with me that was better shielded from high RF fields, and it measured a steady 48.6 ohms directly at the input port of the Altronic load.

Once I was sure the reject load was good, I began to disassemble all of the 1-5/8" rigid line from the injector and thoroughly inspect each piece. Each run to the transmitters was fine, as was the line into the reject load, but the inner line from the output of the injector to the antenna input was burned right at a bullet. It did not appear to have been previously damaged (split), as there was no indication of arcing on the outside of the inner feedline, only on one blade of the bullet. I replaced the damaged line and bullet a few days later and everything came back to life with textbook readings on both transmitters. I can only assume that a high resistive connection between the bullet and line caused it to burn out.

On November 19, I had our generator contractor, R.B. U'Ren come out to inspect and winterize our standby generators at the WDCX-FM and WDCZ transmitter sites. Service tech Bill found very little in the way of problems, with the exception of the battery in our 150 kW Generac generator at WDCZ – it would only hold a 17% charge, so he highly recommended replacement. I was able to find the commercial battery at NAPA auto parts, and Bill had it up and running in short order.

With Buffalo winters and winds, you can never know when commercial power will go down, and these generators have saved us countless times over the years from being off the air because of downed power lines.

That about wraps up another month here in the great northeast, and until we meet again here in the pages of *The Local Oscillator*, stay safe, social distance, and happy engineering!

The Motown Update
by
Mike Kernen
Chief Engineer, CBC–Detroit

If not for the people breaking things there'd still be enough broken things to fix. That statement is a constant of our profession.

The hay farmer is supposed to keep the tower enclosures at the WRDT site free from growth... but he doesn't. Frankly, I don't want him letting his helpers inside the base fences; they shouldn't be working near hot towers, even with just a few hundred watts being radiated from each tower.

This year, nature gave us giant mess of shrubs and trees such that you couldn't even walk inside the base fence areas, so I hired Tower MRL to clean them up. They filled a 40-yard dumpster with brush (!!) but not before whacking a transmission line with their trimmer. The cable was one Andrew (CommScope) hasn't manufactured in so long they had no record of it ever existing.

Splicing the cut transmission line

This gaffe could have been a costly disaster, requiring an entirely new run to the tower. Luckily, a thorough search of the site turned up one new connector I was able to verify would fit by using a dial caliper. The other connector I collected from a scrap. Fortunately, too, about five inches of the cable was sticking out of the (for some reason half-destroyed) PVC pipe leading into the ground – a pipe neatly tucked into a 12-inch void between the tuning house and the tower fence.

After yanking open the half-buried fence fabric with my truck, I was able to lie on the ground and solder connectors in place to reconnect the cable. Then I applied copious amounts of rubberized coax sealer and fixed a few nicks in the other cables.

The real fun was stretching the fence fabric back to the post for which fencing contractors use a special jack. We had a ratchet strap. Not recommended. One errant weed whacker = two solid day's work.

Flooding equals wood rot. The WCHB transmitter building is a two-car garage. It really is. A zillion years ago, WEXL (as it was then) was sold and 'tossed' out of its former owner's studio/transmitter building and into their garage.

WCHB 1340 is a class C station, with a 1 kW two-tower DA in a residential neighborhood. The landlord's repaving of their parking lot resulted in its grade being erroneously tilted in the direction of the garage so that every significant rainfall water runoff headed toward the garage. Sometimes there'd be as much as an inch of water on our floor! This repeated flooding resulted in the sill plate boards on one side rotting away so much so that they couldn't even be seen! The west wall and gable were just hanging in the air. The structure was in danger of collapse.

Repaired framing at the WCHB site.

Not wanting to bulldoze the existing lot to correct the grade, we were left with little choice but

to create a drainage system. Our landlord trenched the area near the garage that received the deluge of water and installed a French drain system. This drain leads the water to the low property rear of the garage. Works like magic!

Next came the garage reconstruction. The carpenters removed all the original shiplap siding and reintroduced support to the west wall by sistering new studs well above the originals' rot and nailing them to a new sill plate. New James Hardie siding was installed, and the rodent superhighway (garage door) was taken out. Also during the project, we pulled out an old phasor, racks, desks, and lots of total crap. Now, it's time for paint…

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

And... another year has zoomed past. I know that everyone has been complaining about 2020 and it has indeed been one of those years. From COVID to several tropical storms here in Alabama, to the election (which still hasn't been settled as I write this, in spite of what you might have read elsewhere), it has been a doozy.

But through it all, remember that God is in control. He is never surprised. He's never incapable of meeting our needs. Just draw closer to Him and let him "han'lit" (as we say in the South).

Figure 1 - No loosening that top guy wire.

Back to Tarrant

In a previous issue, I related that we had lost a guy wire on tower #5 at the 850 AM (WXJC) site in Tarrant, Alabama. That problem was caused by high winds pushing a rotten tree onto the guy wires, snatching the tower to one side and breaking one of the opposite guys. In mid-November, I was at the site and happened to notice that tower #5 seemed to be leaning again. My old eyes aren't the best, but I looked more closely ... and sure enough, that same guy wire had popped loose.

We immediately called the tower crew to come back and make things right. We were already on their schedule because we had work to do on the tower #5 sample loop, but they moved us up to the Monday following my discovery. That meant that we had to sweat the tower leaning over the weekend, from Friday until the crew could get there.

Cris suggested loosening the guys opposite the missing one. That Pirod is one evermore tough tower, and without the other guys pulling it in one direction, it would almost certainly be OK until the crew could get there. But it was not to be (Figure 1); at some time in the past, while tensioning the guys, someone had moved the turnbuckle to its limit. Yay and happy day. More sweat.

Figure 2 - Oops, the wire wasn't 'looped' through the ball.

At any rate, we investigated and found a broken insulator (Figure 2). It was obvious that the guy wire hadn't been "looped" through it. You should always put a "johnny ball" like this under compression. That way, should the insulator fail, the looped guy maintains tension on the tower. (More on this in a moment.)

The bad news wasn't quite complete: while Todd was using the drone to carefully inspect the

Figure 3 - He was a'arcin' and sparkin'!

damage, a gust of wind tossed it into a guy wire. Off came one of the propellers, and down went the drone. It's currently at the repair shop getting some TLC.

At any rate, the crew came that Monday and quickly repaired the guy with a couple of insulators that I had on hand. I had called Kintronic Laboratories and was a little surprised when they said they didn't have them in stock. As it turns out, they had some in warehoused storage, so I told them to send me five of them. If anyone else in the company needs an insulator ASAP, give me a ping.

One other bit of excitement came after the repair was completed and we switched back to the day pattern at full power. The transmitter kept shutting back with a VSWR complaint. I told Todd just to leave it in night mode and headed to the site. It was already dark, but with my headlights, I spotted a junction box for the tower lights that had been knocked loose. It was lying on a copper ground strap at the tower base. Figure 3 (taken after I remounted it) shows what a little RF can do to a little box.

Figure 4: For Your Tower Crew

If you have an AM antenna with insulated guys, email this image to your crew before they show up. Nowadays, the average tower crew mostly does cellular work. They just aren't familiar with the "tower is the actual antenna" approach used at AM frequencies. They'll paint the base insulators. They'll forget and leave stuff leaning against the tower as they yell, "OK, bring it up and try it!"

Figure 4 was taken by Todd with our drone. It's at the tower itself, so there's a bracket on one side instead of a "preformed" guy. But it'll clearly illustrate the principle discussed above: the insulator needs to be under compression, and the guys/brackets need to be "looped." That way, if the insulator should fail, you at least have something in place to help keep the tower straight and happy.

The Burk Bites ... But Then Recovers

I've said this before: I think 850 AM just gets lonely and wants attention from time to time. While we were working on the tower and the sample loop, the Burk stopped raising power in the morning. Everything was still scheduled as it should have been, and I couldn't find an obvious reason. A lot of investigation and poking revealed that the "lower" functions were fine, but none of the "raise" relays would pull in. This was both Odd and Weird (capitalized out of reverence).

Figure 4 - The correct way to do a guy insulator.

Like most new equipment, Burk doesn't supply detailed service information. This is another one of those cases where you're supposed to box it up and send it back to the factory if it needs fixin'. But I grew up programming and building embedded and control systems, and I wondered if maybe one of the relay drivers – the one common to all "raise" functions – had died.

But then I remembered that it was basically a small computer network. I rebooted the Burk ARC Plus; no change. I rebooted the relay unit; no change. Then, after several reboot cycles, the thing just magically started working again. Don't ask me to explain it, because I can't.

Vacation

Sandy and I will be taking some vacation over Christmas. Todd, Jack and I have a gentlemen's agreement that if I'm out of town over one holiday, they get the other. I was on call over Thanksgiving, but the burden will be on their shoulders in late December. We want to go back to the Carolinas and see our folks.

But there are still things to do. I'll be glad when this COVID thing finally settles out (and thank you, President Trump, for pushing the creation of a vaccine in record time!). It's been a real headache, what with some businesses running limited hours, and some closed entirely. Finding somewhere to use the bathroom can be a chore. Lowes and Home Depot are open, though, and you can tell: they're packed

with people. I'll go in there for a box of screws or a set of gloves and it can take an hour!

WireGuard

If you've ever tried to create a VPN from scratch, it's not for the faint of heart. OpenVPN is free software and works great, but wow, it's hard to set up. You will need a propeller hat and lots of patience.

You know that the entire engineering team here in Birmingham loves gadgets and software. I lean toward stuff that needs a soldering iron and custom-written software; Jack loves to build (and is good at building) the cabinets and panels. Todd is an absolute master at finding stuff online that works out of the box. This software, WireGuard, is something else. I installed it on my Samsung Galaxy from the Google Play store. Todd then emailed me a QR code that I pulled into my Android phone ... and very soon, I was on our office network. Nothing else to do!

The top part of Figure 5 is my Android's Web browser, showing our office IP address while I'm at home. The bottom shows how simple setup is. You click a "+" mark at the bottom of the connection screen, then select one of these options. You can ask WireGuard at the studio to create a configuration file or a scan-able QR code. Either can be sent to your co-workers to quickly set up a VPN.

Super nice, and well done, Todd! But I'll let him tell you about it. Until next time, keep praying for this nation and have a blessed Christmas!

WireGuard VPN
Todd Dixon, CBRE

I've been working with a VPN solution called WireGuard that I'd like to tell you more about. I've built it out on some Raspberry Pi 3+ boards. WireGuard's strength is in its simplicity.

It sets up a peer-to-peer relationship between two computers. Each peer presents its public keys and then the private key exchanges are handled transparently. WireGuard contains only 4,000 lines of code compared to others which have between 80,000 to 110,000 lines, has been incorporated directly into the Linux kernel and runs in layer 3, which is the hardware layer in network topology. Because of this, it lends itself to more speedy connections and less resource usage. Other systems, such as OpenVPN, run as applications on top of the hardware layer and take up more resources per connection.

WireGuard's encryption is state of the art and trusted by a number of big-name VPN providers, including NordVPN. Lastly, one of the really nice

Figure 5 - Using a secure WireGuard VPN.

features is that the connection is portable – meaning that a user only needs one profile to connect to the remote machine from your home and then you can walk out the door and be on your cellular data and maintain the connection. It's also readily available on all platforms from Windows, Mac, Linux, IOS and Android.

The setup is pretty simple on the Raspberry Pi. It's an automated script that allows you to set up and run everything. I won't lie and tell you that having some command line experience in Linux isn't helpful, but if you can follow directions, it is as easy of a setup as you'll come across.

The real power (besides those listed above) is that using WireGuard would allow us to shut most of the port forwarding we have set up in our ClearOS boxes except for the UDP port that is opened for WireGuard itself. Therefore, it drastically reduces our exposure to malicious internet activity from outsiders. Since your VPN connection allows you to be on your local network, you can then connect to all your machines via VNC or web on their local network addresses.

Multiple profiles can be set up in WireGuard so that a number of users can be simultaneously on the network and connecting to their local computers or other hardware. I'm looking forward to implementing it in Birmingham, then doing a lot of testing to see if it can be used in other markets as well. If you would like to give it a try for yourself, let me know and I'll set up a profile for you and a QR code so that you can setup your profile on your device.

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

Emergency Audio Players

Chicago is very much a competitive PPM market. While it is hard to be perfect, seconds of off airtime are costly, minutes of off-air time are just not acceptable. If you're not on the air with PPM encoded audio, you are losing ratings.

Handling emergency audio situations has evolved considerably since I first came to manage the engineering department here six years ago. I remember early there seemed to be no plan. When something out of the ordinary occurred, like the automation system stopped playout the operators seemed to have no plan what to do.

When this type emergency occurred, if it was a time when engineers were on duty, they would leave the room to try and find an engineer without putting anything on the air first. Many times, when I walked into a control room, the staff would be throwing their hands in the air, saying something like, "I didn't do anything!" to which, my reply would be, "You're right, you didn't do anything!"

In other words, why were you not getting any audio on the air before seeking or calling an engineer? To me the priorities of every operator should be, number one, making sure no objectionable material gets on the air. We don't want a $325,000 fine! Number two, keeping the meters moving! It's a competitive PPM market, and the minutes waiting to find an engineer to fix the issue are just not acceptable. The duty of every operator is to make sure we have audio on the air, then call engineering to get things fixed and back to normal audio.

About the only plan that seemed to exist among the operators was to perhaps find a CD to put on the air. Often, they didn't know where the emergency CD was located, or they didn't even know such a thing even existed. Basically, there was no plan and very little training for such events. The plan seemed to be call engineering and throw up your hands to make sure everyone knows it wasn't your fault.

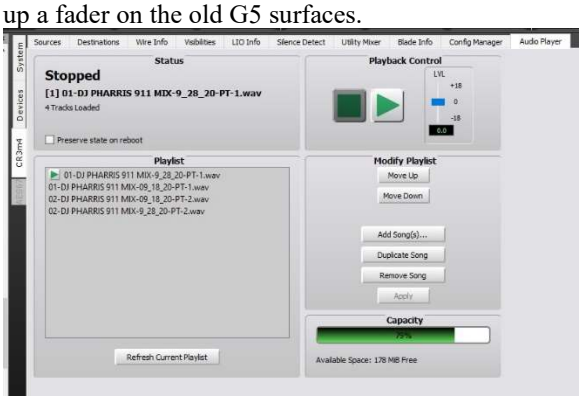
A few years back, we purchased USB thumb drive players to place at the transmitter sites for emergency audio. Using silence detection and macro programming in the Burk ARC Plus Touch remote control units, we designed a system that will play audio from the USB stick when both STL paths are silent for two minutes. Then, when normal audio is restored for a solid two minutes, it will revert back to it.

This is great for dire emergency situations like the STL equipment being down or the studio generator not coming on during a power outage. However, for events like audio problems in the studio, when we have operators on hand, two minutes is an eternity!

So we wanted to give the operators a way to do the same thing we had at the transmitter site, but this time in the studio. To achieve this, we added USB thumb drive players in the studio. We again put emergency audio on thumb drives and these were attached to the players by chains so they wouldn't be lost. While this was a better plan than CDs that would get lost in the studio, we still found operators not remembering in an emergency where to locate the drives, getting the fader on the board changed to the player, and then getting it on the air. By the time this all took place, the two minutes were up, and the transmitter site player was already on the air.

The emergency channels are on the far right on the LXE surfaces.

I knew that the Wheatnet-IP blades offered internal audio players, but we were still in a mixed infrastructure with the control rooms still having G5 Wheatstone control surfaces connected to the legacy TDM system. We also had some Wheatnet-IP blade infrastructure with interconnections to the TDM system. Still, it was going to be an issue for the operators to use the internal players if they had to dial up a fader on the old G5 surfaces.



The audio player screen in the Wheatnet Navigator app.

We went through our studio rebuild this past year and now have an entirely Wheatnet-IP infrastructure. With that, we are now using the LXE control surfaces, which also took us from 16 faders to 20 faders. This allowed me to have a dedicated fader just for an emergency audio source.

We purchased four licenses, one for each station, and activated the Audio Player tab on each of the M4 microphone processing blades in the control rooms. We then assigned them to the very last fader on each of the LXE control surfaces.

Now here's the catch, we wanted to make things as easy as possible, to have an emergency audio source that the operators could get on the air with one button. This means we had to make it difficult for the operators to change the fader to any other audio source. One cool thing about the LXE control surfaces is that they are very programmable. Just about every button on the surface can be customized to the need.

Well, the first thing I did after assigning the emergency audio player to fader 20 was to defeat the source select knob to remove the ability to change to the source at all on that channel. I also programmed the soft key to only select the emergency audio player. I then took the program bus select button on the channel and made it into a tally-only button, showing that the fader is in program. Hitting the button does nothing to turn the fader program on or off. I instead used the second soft key button to be the program assign button on the fader. The idea is that this fader is always in program and can't be easily taken out of program without special knowledge. We still have conscientious operators that turn the program bus assignment off on what they deem unnecessary faders at the beginning of their shift, a practice that you usually only find with our very experienced operators but is not desired in this instance.

I, of course, enabled all the necessary steps so the player is remote started. The end result is that the operators have an emergency audio source that only takes two steps, turn up the fader and push the "on" button. In my mind, this should mean that anything more than ten seconds of silence is unacceptable. If the main audio source stops playing, that first instinct should be to immediately press that "on" button and then call engineering.

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

At the beginning of November, I was thinking that this was going to be a month of recovery. The election would be over and the politicians would get a small measure of sanity. Generally, Covid had become less of an issue.

I had finished evaluations of a budget belt tightened by Covid. Careful evaluation this year found that much of the typical capital investment category was well under control at the station. Addressing budget items over time is like eating an elephant, one bite at a time. Not having an outstanding budget panic feels good. That is a position I like to be in.

Until this spring, I had been taking advantage of a wellness program that is sponsored though a local health program. Its part exercise, part lifestyle and part a dietary program. Covid shut the program down, but things were looking up with the possibility that the program would be reopening soon.

I am doing my own cooking from scratch with many fresh vegetables and whole foods. Being able to share with family would have been good, just the same we did have a nice time.

At KKPZ, we had a chance to catch up on the backlog of live recordings, and with the holiday later in the month, I had the illusion of a small measure of calm.

Illusion is the operative word. Guess that's what I get for doing my own thinking. By the second week of November, Oregon's governor announced more and more draconian shutdowns with inconsistent requirements. I vaguely remember that we have done this before. Yet again, even more, further still. I think Ronald Regan would have said "There they go again."

Some time ago, I mentioned that our alarm system monitoring provider had changed without notice. I had thought that was all under control after several false alarms and false starts to correcting the problem. I had hoped that finally that was under control. Again, I guess that's what I get for doing my own thinking.

Friday after a solo Thanksgiving with my wife, I went to the station to check that all was well. Upon entering, the keypad hung as I entered my access code. The monitoring center did call as we required, and I was able to clear the alarm at the monitoring center. Or so I thought. The pad was still frozen and remained in alarm. I was finally able to clear the alarm after cycling the entry door open and closed again. I planned to follow up on the frozen keypad later.

About 15 minutes later, the doorbell rang and I was talking to a young man in uniform who was carrying a gun. After some demonstration that I was a proper person to be at the station, I learned the alarm company had turned in a silent panic alarm. Of course, we don't have panic alarm service, so the mystery deepens

I guess my earlier phrase still applies. Yet again, even more, further still.

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

More Measurements

November has been another busy month. We spent a couple days driving all over the place making conductivity measurements for the KLDC move. The measurements were not what we hoped for, but we got the info we needed.

It is always interesting doing measurements like this, because while we know a lot of Colorado, when you start going down these remote county roads, it is easy to get lost. We knew what direction we needed to go; the issue we had was finding the roads we needed. We'd start going down one road only to have it dead end a mile or so later and not getting us far enough away from the last measurement point. It took some time, but we got it done.

KLTT Tower Work

We were finally able to get a tower crew out to KLTT to fix the FM antenna. Since the original installation, we have had it move off azimuth on occasion during real high winds. We've had it go into the guy wire, which could have caused severe damage. When that happened, the crew came out and tightened things down, but it did not hold.

Another strong-wind day this year again pushed it out of alignment. We were able to get Derek Jackson out to fix it temporarily. He doesn't have a setup to rig the tower to be able to support an antenna while he disconnects things and replaces other things, so we knew this was not a permanent fix.

Once the original crew that installed the antenna had a free day, they came out and added a stiff-arm. Nearly a month later and a few days of high winds and it is still holding.

Preparation

We received all our Wheatstone equipment in late November. The first delivery was no problem. They loaded it on a truck with a lift gate. That made delivery easy. The driver unloaded it, put it in our loading dock area, and we were able to transfer it to our own dolly and take it upstairs.

The second delivery, which consisted of the LXE surfaces, steel cover plates and the blades to go along with the consoles was a different story. My dad was out of town, so I was on my own. It was Wednesday before Thanksgiving, meaning not many people in the office. This time, FedEx Freight did not load it on a truck with a lift gate. I am incredibly grateful for that driver, as he unloaded the shipment off the skid inside the truck and helped me get everything to our dolly.

By the time we got it all unloaded from the truck, Charlie Grimes, long-time KLZ ops manager, had arrived. I was able to get him to come downstairs with me with another dolly, and we loaded up everything and brought it upstairs. It was a tough job, but we got it done.

A stack of Wheatnet-IP blades all configured and ready to install.

By the time you read this, we should have one control room done and working on the next room, KLDC, removing the old equipment and getting the new equipment installed.

I look forward to this project but also dread it. We have a short amount of time to get all this

done. I do have plans to take vacation the week after Christmas, and only time will tell if I will be working instead.

Our plan is to do one room a week. We will begin with the KLVZ studio because it is the least used. From there we will move on to KLDC, then KLTT, and finally, the week of Christmas if all has gone smoothly, KLZ. I don't think it will take a full week to do each room. This will just allow us some time between the rooms. Get one done, learn the new equipment, train people, field questions, then get any other work that may have been put off, aside from this project, then come the next Monday begin the next room.

Coming Up

If you guessed installing new Wheatstone equipment as what's coming up, you're correct! I don't expect much else to be going on during the month of December. Keith should be able to help out with any issues at the transmitter sites that might come up. I'll use the days in between the studio install to catch up on anything around the office.

I pray you all have a safe and wonderful Christmas season. See you next month!

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, 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/95.3 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/94.1 MHz, 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/107.1 MHz, 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

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