The Local Oscillator

The Newsletter of Crawford Broadcasting Company Corporate Engineering

OCTOBER 2020 • VOLUME 30 • ISSUE 10 • W.C. ALEXANDER, CPBE, AMD, DRB EDITOR

Microwave Links

About a year ago, in an effort to deal with a batch of orphaned Part 101 microwave links in several markets, we purchased new Cambium equipment. The big question was whether we could use our existing antennas with the Cambium radios. The answer was anything but clear.

We were able to obtain adaptors that converted both Andrew and Radio Waves antennas for the Cambiums. We believed that our Trango-branded 3- and 4-foot antennas were either Andrew or Andrew knockoffs. At one point in the late summer of 2019, I checked and found that the adaptor would indeed fit the antennas we had on the roof at our Denver facility.

Yes, the "new" antenna for the KLZ 11 GHz link says "Eventide" on it. No, it's not an Eventide antenna, but Amanda had some cool Eventide stickers that came with the new delay units, so rather than leaving the radome bare…

Several months later, when we had the radios on hand, we sent Derek Jackson up with Amanda to do the installation. The adaptor fit just fine… but the waveguide from the feedhorn would not fit the Cambium radios. And unfortunately, the feedhorn in the Trango-branded dish antennas were integral and could not be swapped out. So… we would have to get new antennas, ones that fit. What a pain!

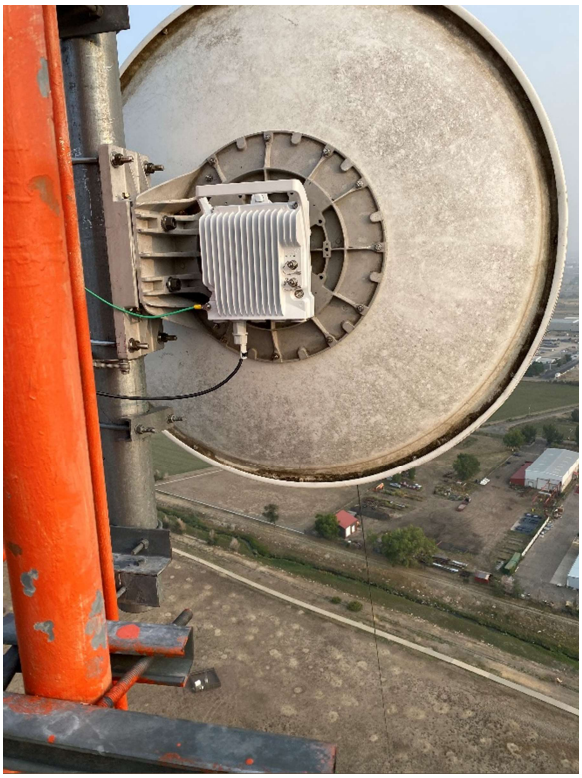
And then along came COVID-19. Everything was put on hold. It was only in July that we again started looking at this. Our friends at 3dB Networks came out and did a site survey at the studio and the three transmitter sites where the older Trango radios were in use. 3dB had some used but serviceable antennas that would work, so we scheduled the work for mid-September. Our shortest path, KLZ, would be first. Should be easy, right? Existing paths, existing antenna mounts and all that...

Amanda will tell you more about this project in her column, but…

Keith was in the middle of a move, and Amanda has yet to acquire the ability to be in two places at once, so it fell to me to work the studio end while Amanda would go with the other crew out to KLZ. But before starting, I wanted to see the radios on the backs of the antennas so I could be certain that the adaptors would work with the used antennas. And it's a good thing I did, because while the Commscope antenna worked fine on the Andrew dish, we did not have the proper adaptor for the Radio Waves dish. Back to the drawing board.

The 3dB folks sourced the proper adaptor for the RW dish and got two of them overnighted to us – two because we would also need one for the KLTT link the following week, assuming the KLZ link work went okay.

The next morning, we met on the loading dock at our studio building, and the adaptors arrived before 8:00 AM. We put it on the 4-foot RW dish, and the radio fit perfectly. So off Amanda went with one crew and up I went to the roof with the other crew.



One of the new Cambium PTP820S 11 GHz radios installed on the back of a pre-owned antenna on the KLZ west tower.

It was a very, very long day, but by twilight that evening, we had the antennas changed out, the new radios in and radiating, and the path aligned. The link was passing data at the rate we expected, so we were about to call it a success. And then, as soon as the climber was off the west tower at KLZ, we switched back to the DA mode, and as soon as we did, the link died. As in dead. As in can't even ping the radio on the tower. And no signal received at the other end.

It didn't take long to figure out that the 2 kW of 560 kHz RF in that west tower was somehow killing the radio. The question was, what could we do about it. We scheduled our friend and engineer-climber Derek Jackson to go up the tower to look things over.

I was thinking that the 56-volt MOVs in the Ethernet surge suppressor installed in line with the network cable up on the tower were firing as a result of the RF riding on top of the 48-volt DC PoE. That seemed like as good a guess as any, but Derek quickly figured out that the issue was the Cambium power supply/PoE injector. It was shutting down when we would put any amount of AM RF on that tower. My working theory is that there is a current detector in that power supply/injector, and the RF was fooling the comparator into "thinking" the radio was drawing too much current, causing the supply to crowbar. Derek observed the power supply coming on and producing full voltage, then shutting down, then powering up, then shutting down, ad nauseam. The crowbar would clear when the voltage went to zero and the supply would come back on… until it crowbarred again. As soon as we would switch to the ND mode on the other tower, the power supply would stay on and the radio would reboot.

So… we pulled out the Cambium supply/PoE injector and Derek hauled up an Omrin DIN-rail 48-volt supply and installed that, powering the radio directly. That worked. With RF on the tower, we had good throughput with no further issues.

In the process of installing the KLZ and KLTT Cambium equipment, we had a couple of occasions when parts were needed at the top of a tower and it would be a long climb down and back up. It occurred to me that we might be able to deliver the needed parts with our drone, so I rigged a 12-foot piece of nylon strap and up it went. At KLZ, I rigged a slip-knot through a Ziplock bag with the parts inside. That worked great.

The tower worker reaches out and takes hold of the cable clamp that Jordon flew up to him with our drone.

At KLTT, at the suggestion of my son-in-law Jordon, who is a professional drone pilot, I rigged the strap with a couple of medium binder clips, attaching one to the drone's landing gear and the other to the part that was needed up on the tower. Since he was standing there, I asked Jordon to fly the part up the tower, and he did. It was windier than it had been when I flew the parts up the KLZ tower, but

he got it done, putting them right into the climber's hands.

We're going to have to do some experimenting to see what kind of payload weight our drone will safely carry. We also need to see how close we can get to the tower structure – can we get close enough for the climber to reach out and grab the end of the line? In both the KLZ and KLTT cases, we simply had the climber go up a short distance to the top of the tower to retrieve the items, but what would we do if the work were farther down a tower? All questions to be answered through experimentation.

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

Hello to all from Western New York!

The Oxford English Dictionary defines passion as a strong and barely controllable emotion, enthusiasm or fondness towards someone or something that provides you great joy or anger.

Through the years, I have met perhaps hundreds of broadcast engineers and made friends with many of them, conversing either through social media or telephone from time to time. I recently reached out to one such individual whom I had met some 30 or so years ago at a Kentucky Broadcasters Association award banquet in Louisville, Ky.

Stan and I hit it off instantly, and remained in contact at least monthly, until the pandemic hit in mid-March. I called Stan recently to see how things were going for him and to catch up with how things were going in his world. I was truly surprised to hear that he had quit broadcast engineering and was working as a marketing consultant for a major Fortune 500 company. When I asked what happened with his engineering career, he stated that the group that owned the stations he worked for had purchased several more stations in an adjacent market, therefore increasing his workload considerably.

Knowing his abilities, I was certain that he was more than capable of handling the additional workload, and after several minutes of hearing all that was wrong (in his mind) with his situation, it occurred to me that he had simply lost his passion towards broadcast engineering. All of the things that he found joy in doing were now pure drudgery to him, and he felt no personal satisfaction in doing what he coveted most for so many years.

I truly felt sorry for Stan, and his former employer, for I know what he accomplished over the years could not be replicated by anyone else. His former employer is still searching for a suitable replacement in a dwindling pool of reliable and competent applicants.

Even after 50 years since I first started in the broadcast business, I still look forward to coming to work and solving problems, figuring out better ways of doing things, and learning new techniques and technology changes. I am so thankful that I have the opportunity to do daily what brings me joy and challenges, and I pray that I never lose that passion that has driven me for most of my life.

Each year, the week after Labor Day, Nora and I pack up and head to Eastern Pennsylvania for a week of relaxation in Gettysburg. This year is the first time in 28 years that we have not made the trek to our favorite destination, largely due to the COVID-19 situation. We knew that many of the restaurants we loved to frequent were going to be closed, or open for take-out dining only, and closures or limited occupancy of attractions we would likely just make this year's trip un-exciting. As a result, this year's vacation was spent right here in Buffalo, where I made substantial progress in projects around the house.

In years past, each time I took vacation time, something failed in the WDCX-FM transmitter, and this year was no exception! Checking the operating parameters daily via the AUI, on Thursday the 17th of September, I noticed that the transmitter's status had changed from green to yellow, indicating a problem

or component failure. After checking the controller readings, I discovered that the +12v (SBC) switching supply had failed. As this did not affect transmitter output in any way, I ordered the replacement supply for delivery the next week.

On Monday the 28th, I went to install the supply, and tried to bring up the auxiliary transmitter to keep us on the air while the supply was switched out, but that transmitter would not come up and make power. I saw nearly maxed-out plate voltage and no plate current, and no drive on the IPA. The exciter looked fine, so I removed the BNC connection from the IPA to the input of the final and replaced it with a direct connection from the exciter and hit plate on. The transmitter came to life with low output power, so I knew the final tube and circuitry were OK.

A closer inspection of the IPA revealed that both RF modules had failed. I had a spare module, so I installed the one good module, put the aux on the air, and continued on with the replacement of the switching supply in the Nautel NV40 transmitter. When time permits, I'll troubleshoot and repair the failed IPA amplifier module in the auxiliary.

Another transmitter issue that recently developed occurred at our sister FM station in Rochester, NY, WLGZ Legends 102.7. The afternoon announcer phoned me on the afternoon of Friday the 18th and reported that the transmitter readings were "all over the place."

We have experienced similar occurrences in the past, which turned out to be associated with the directional coupler at the output of the harmonic filter. Thinking this was the same situation as in years past, I didn't make the trip over to Rochester to rectify the problem until Tuesday the 22nd.

When I arrived at the transmitter site, I removed each diode from the coupler and checked the tab inside the coupler for proper connection to the diode slug and found both to be within tolerance. I next checked the transmitter's tuning and found that the loading control would not find a peak, indicating that there was some type of major impedance change in either the antenna or feedline.

As we were approaching very high VSWR, I reduced output power to about 50% and decided to borrow an analyzer from my friend Bill Stachowiak to try and determine what was going on.

Bill and I returned the following evening and hooked his analyzer up to the feedline, but were unable to get any type of meaningful indications due to the high RF field from the other FMs located on the tower; they were swamping the front-end of the analyzer.

The next morning, I contacted Patriot Tower in Chili, NY to inspect the panel antenna and feedline for any damage, and they reserved Tuesday the 29th for the inspection. Early Monday morning on the 28th, Patriot e-mailed us with a cancellation for the next day's work and re-scheduled for the week of October 5th. Until then, we will continue to operate at half power, which surprisingly, no difference in coverage area has been noted, especially to the west towards Buffalo, where we have a null to protect WTSS at 102.5 I'll report on our findings in next month's column.

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

Get on the Ground!

It is easy to think that adequate grounding is achieved when some thing or system is installed and take for granted that it's either done correctly or that it's still doing its job as intended. In my former life as an FM-only CE, I really didn't pay them too much attention. Of course, I'd install grounding straps and cables, but beyond that, grounds were just there. Joining Crawford, I now have three AM DAs to look after, so I've begun to see the ground system as something that regularly needs inspection, evaluation, and repair. I've identified and fixed several grounding issues this summer:

On our 50 kW 10-tower array, tower #2 had a strap ripped in two but partially buried. As Cris Alexander says, "…(it's) very important at those power levels, where a few tenths of an ohm can result in a lot of lost watts and warm earthworms." Silver soldering an extension piece took about an hour and some digging but guarantees that the tower will work as intended.

On our two-tower 1 kW DA, a problem ground at the ¼ wavelength point of the shared-use tower had been causing problems for years and had us operating under an STA for months. I could write an entire article on just this problem, which required several climbs to definitively find and solve. Also at this site I found torn ground straps, several bad connections at grounding rods, and even a ground braid that was only just taped to an N connector.

A loose ground can also be "hot." RF energy can be significant on an open ground conductor, so use caution working with a broken ground or if you lift one during a repair. I use welding gloves around energized towers.

Net "work"

Unfortunately, the network in Detroit has been an evolution built with poor attention to detail. No documentation, no maps, no structured cabling – it's bush-league at its best. Each problem is face-palm after face-palm and workarounds are a-plenty. I've found loops, uplinks that just don't work, cables that cannot be traced and plenty of low-grade gear. Why anyone would use a $10 network switch in a business is beyond me. I love that the few cables that are labeled say things like telco 21… but only on one end. What...??

One of my favorite things is SNMP. Now that the ARCPlus Touch supports it through an optional license (AutoPilot SMNP is free), you can use it to connect many things to your remote control system that you'd never have connected in the past. Gates Air, Nautel, Inovonics, Eaton (UPS systems), WorldCast, and Wheatstone are just a handful of examples of companies that allow interaction with their products via SNMP.

I have recently started using SNMP to add metering and control to our Nautel NX and NV transmitters. I love that it takes away the non-linearity of analog metering samples. What also makes it great is that virtually any data point in the transmitter can be looked at and monitored by ARCPlus, which can then send alerts or take actions for you.

Where the wired remote control is limited in scope, SNMP can give you hundreds of datapoints to pick from and virtually wire to your system. Keep in mind that Nautel requires you to use two MIBs, one master and one specific to the agent device. In some cases, you'll need to setup a user account for the SNMP manager on the agent device when SNMP v3 connections are desired.

Industry friend and tech guru Tony Peterle explains SNMP in an excellent article: https://www.radioworld.com/tech-and-gear/the-snmp-protocol-and-its-integration-as-a-broadcast-monitoring-tool, published in *Radio World*.

Two-Tower DA

Our 1340 kHz station uses a two-tower DA for its daytime pattern using a three-legged self-supporting tower of about 410 feet in height as the southern radiator and reference tower. This tower is also used by Entercom for its superpower class B FM

(190 kW ERP!) WOMC with its attendant aux and lighting components, dictating careful grounding and isolation. The tower has been notorious for shifting base impedance, and since February has not operated reliably and mostly not at all, necessitating an STA for us to run ND from the northern tower only.

There's been no shortage of effort applied to finding the problem, but remember that CBC-Detroit had no CE for a long period of time. Having been hired after the issue's appearance and having no history with this tower, I struggled to learn how the tower was designed to work and where to apply resources to find the problem.

I'd been told that crews had been on the tower and found nothing wrong. A contract engineering firm flew the tower with a drone and found nothing. I hired a consultant – an old salt who has a lifetime of AM DA experience – and he and I watched as the reactance at the ATU output flipped from good to bad, from inductive to capacitive with no indication why.

Other inspections I made turned up major issues in the phasor, intermittents, corrosion, tuning controls that were frozen or nearly impossible to

An example of the kinds of things I found at the site.

move, contactors with bad finger stock and shorting bars. The strangest was that the rollers on a few of the ribbon coils would not slide on their shafts easily and had been forced, causing them to spread open and making them intermittent. These being in series with our affected tower, I imagined fixing this would straighten things out. No matter if it did or it didn't, they had to be fixed. Amazingly, it seemed to work, and the tower functioned, but after about three days it was failing again. I even wrote a macro in ARCPlus that would detect the fault and switch us to ND-2 when it would act up.

I took apart every ground I could reach. Some were nasty. One was a braid just taped to an N connector; others were loose, and of the straps was partially torn. We re-did the feed line from the ATU

The leg of the WOMC tower where the FM transmission line was bonded to the tower at the 1/4-wave point. This badly-corroded connection cost us months of operation at reduced power.

and even dug up the strap from the ATU over to the tower. We covered the leaky roof of the old lighting shack with a tarp and took OIB measurements with the lighting conductors disconnected. None of this helped.

Finally, a third crew, this time going all the way past the FM, were on their way down after reporting on the radio that everything was looking "great." Suddenly, they fanned out on the horizontals and moved over to the FM transmission line's grounding point at the ¼-wave point. Poking at the tape, he noticed an arc and burnt his finger slightly. Opening it up revealed a mass of rust and a worm clamp that was totally fried.

As many of you know, on an unskirted FM tower used for AM, it is absolutely mandatory that every transmission line be insulated from the portion below the ¼-wave point and then "grounded" to the tower at the ¼-wave point. This ensures that the impedance seen at the tower base is an open circuit in parallel with the self-impedance of the insulated tower. A poor ground, or in our case an open one, changed the towers characteristics drastically, negating its ability to be anything more than a support structure for the FM.

I'm thrilled to say that finally works and is stable once again.

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

As usual, I'll start with a Weather Whine™, but I can make it brief. Neither Sally nor Beta really did much in Birmingham and northward. Best I could tell, aside from brief outages, none of our stations went off air for any length of time. The generator at the 120 Summit studios ran for a bit, but neither Red Mountain (WDJC-FM) nor Cullman (WXJC-FM) had much trouble. Thank the Lord!

After the storms passed through, the weather here became quite pleasant, with highs in the upper 70s and low 80s. While it has begun warming back up as I write this, it's still not as bad it was over the heart of summer. It's crazy, isn't it? Keith Peterson has been complaining repeatedly about how hot it has been in Denver, and posts on Facebook have reported hot weather elsewhere.

Speaking of Facebook: Paul B. Walker, Jr, runs a Facebook group called I Take Pictures of Transmitter Sites. Paul is also a talented guy with a great air voice and enjoys scanning the dial to see what he can pick up (that old "DX-ing" thing). He sent me an email a few weeks ago about receiving WXJC-FM, 101.1, in Laramie, Wyoming(!!!). He included a sound clip and yep, it was us.

I know we've had some meteor showers in recent weeks, but still. The other day I was working at 101.1 in Cullman, then drove back toward Birmingham. Like you folks, I know what all of my stations should sound like in each location that I frequent. 92.5 in Pumpkin Center, AL, is a little Class A that has to fight the hilly terrain, but I still normally receive it once I'm about 10 miles south of Cullman. I couldn't hear it in the usual spots and sent Todd and Jack a text. I was almost ready to dispatch Jack to the transmitter site when it suddenly came in – scratchy, noisy, but definitely there.

Also like you folks, I keep a listen on the competition for comparison. Some stations that I could normally receive at my home near Warrior, AL, were buried in white noise – almost like they were being jammed. But one that punched through is a 100W translator that's paired with an AM in Birmingham. 30 miles away, in a dip in their directional pattern, I was picking them up well enough to get clean RDS on the Ford's radio. Maybe it was just weird skip or atmospherics. I'm just saying ... (heh).

Data Links

We're in the process of replacing some of our older Trango links with Cambium units. So far, we've been pretty impressed with them. Todd supervised the installation of the new Cambium link between the 120 Summit studios and the WDJC-FM site on Red Mountain; we were down for about 45 minutes and then it came right back up. Todd is in the process of installing the license to increase the throughput as you read this.

1260 (WYDE) has given us a bit of trouble, probably due to the storms. The link on the tower failed and stopped working. We replaced it and it worked fine ... until we turned the transmitter back on. Obviously, we'd rather broadcast something, so we decided to investigate. In the interim, we fed 1260 and WXJC's translator (which is mounted on WYDE's tower) from WDJC-FM's HD3 and HD2, respectively.

Todd (re)droned the tower and discovered that the grounding lug on the radio had been left disconnected. We had the tower crew come back and attach it; this improved things – we were able to get in over the network, but not reliably. Audio delivery still suffered from severe glitches and dropouts, so I decided to go on a grounding and shielding spree. Working on a Saturday, with no pressure from elsewhere, I constructed a frame from PVC that I'd purchased at Lowes (see Figure 1).

If you've never used this, you've missed a treat. These are PVC "boards," located in the lumber department. Home Depot carries them as well. The ones at our Lowes have a (very fakey-looking) grain finish on one side; the other is smooth. It's paintable, but I decided to leave it white. It's reasonably strong, very easy to work with and cuts quickly with almost any decent saw. I used wood screws to hold it

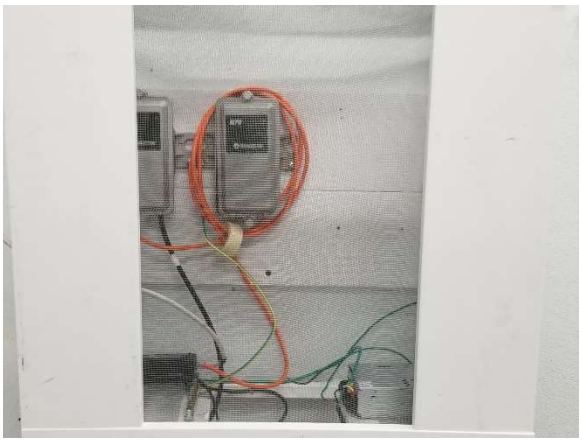


Figure 1 - Not the best picture I've ever taken, but you get the idea.

together, countersunk so that I could fill the holes with white painter's caulk. I simply let the drill push them into the PVC by about 1/4" or so.

The screen is aluminum mesh, attached to the station's master ground lug. Mounting the equipment onto the screens probably provides a good ground, but I attached separate ground wires anyway. Figure 1 shows the work in progress. For now, we're on one of Cambium's "laptop" type injectors, and the data link is up and running nicely. The old wall-mounted Cambium power injector apparently sacrificed itself during one of the storms. Everything is inside that shielded cage, and I've double-grounded the shields on the data lines running up the tower.

Fail2Ban – Update

I mentioned this last time, but I forgot to mention the reason why I installed this on our public servers. Amanda Hopp contacted me a while back; she had noticed that a bunch of failed login attempts had been made on one of our corporate FTP servers. Fortunately, we use the very secure VS-FTP software, but a quick check of some of our other servers showed that we were experiencing general attacks across the board. Whenever possible, we change the default port numbers; for example, we never use port 22 for Secure Shell (SSH), or 5900 for VNC. But apparently, the hackers are wise to that now.

Have a look at Figure 2. I've circled some numbers that should concern anyone who maintains a server, whether you work for us or for some other company. Over 125,000 attempts to hack into our mail server! This is so important, I'm going to put it in bold print. If you expose a server to the public Internet:

- Just having a port-blocking firewall isn't enough, and
- Changing port numbers may keep away the bored kids, but it won't stop serious hacking attempts.

Figure 2 - At total of 200,000 failed attempts on these two servers!

Fail2Ban watches the system logs for repeated attempts from the same IP address. This is usually a sign that someone is trying to "brute force" their way into our servers by guessing passwords. The professional Bad Guys use software specifically designed to automate this; it will try the most commonly-used passwords, and/or exploit and search for other vulnerabilities. By only giving them three tries, we have dramatically cut down on these attacks.

I snipped the long IP address list in Figure 3, but I had checked a bunch of them with a command-line "whois" search. Most are in China; other attacks were coming from Eastern Europe, Brazil, and the Middle East. These attacks are worse than annoying. Someone, somewhere, is serious about taking over our servers. If you maintain a server where you're at, you'd better check your logs regularly. If you're not sure where your log files are, Google it for that specific server – for example, "where is the VNC log file?"

Linux: The hosts.allow File

If you can, you should also limit the IP addresses that are allowed to connect. This isn't always possible; a public FTP server (our company runs more than one) is a good example. Fail2Ban is better for that, because users will come and go, and there's no way to be sure what their IP address will be from one connection to the next.

You can also do this with a good firewall (we like ClearOS; we use PFSense as well). Look for (or Google, or post a request in that firewall's online

support forums) a way to limit the IP addresses that are permitted to access a given service.

As our public-facing servers all run some flavor of Linux or BSD, there's another, quicker way to do it. For limited access, such as Secure Shell ("SSH"), I use the file "/etc/hosts.allow" to specify only a small group of authorized IP addresses for that service. Anyone else who attempts to connect will get a "connection refused" error. The basic format of each line in the file goes something like, "[service name] : [ip or host name] : [action]." Using SSH as an example:

sshd : localhost : allow
sshd : 192.168.1 : allow
sshd : [123.234.123.234] : allow
sshd : [12.12.13.14] : allow
sshd : ALL : deny

The first line permits the machine to connect to itself. Sounds silly, but you always include this (especially under POSIX operating systems!). The second line allows anyone on the local network to connect to SSH (change the IP range to match your setup). You can easily trim this to only a few machines, but keep in mind that if you're using DHCP, addresses could change. The third and fourth lines allow only these specified addresses from the outside world to connect. Finally, the last line says, "deny access to everything else." Figure 3 shows the result after a couple of days with the hosts.allow file set up: nothing currently banned.

The Geeks With Neckbeards warn that this isn't foolproof (what is?). IP addresses can be spoofed – simply put, the attacker can pretend to be someone else. But it's definitely another tool that should be used. Just be careful not to lock yourself out; you'll have to physically log into the machine with a monitor and keyboard to fix it ...

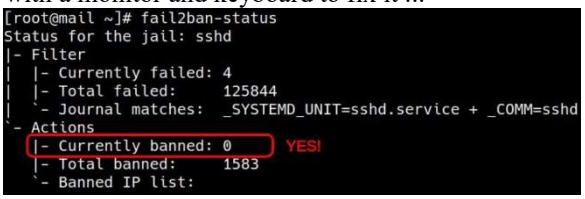


Figure 3 - Only permitting specified IP addresses eliminated the attacks.

Mail Server Happiness

... and speaking of the mail server: SPAM continues to be a problem. We're hammered with it, your ISP sees a flood of it, everyone is trying to deal with it. Unfortunately, this puts pressure on legitimate email providers to adopt the Latest And Greatest Things, often with no warning. Case in point this time: ensuring that your mail server uses Sender Policy Framework and DomainKey Identified Mail ("SPF" and "DKIM" respectively).

In fairness, these aren't actually new. I've known about these for a while and had planned to set it up for our mail server when we had time. Time ran out, though, when some email providers decided to start blocking email that didn't have these records. I won't bore you with the extremely geeky details. It took a good bit of work to get this straightened out, mostly because of bad information and advice. Basically, you have to add these as text ("TXT") records to your Domain Name System ("DNS") entries. (And what we really need is a few more acronyms.)

Our domain registry is with GoDaddy. They have a nice Website, but their support isn't the best. If you call, you will be on hold for quite a while, after which, you will get someone who (at best) speaks broken English. Better results can usually be had with their Chat system: you log in, give your credentials, then wait for a support tech to come on and swap text with you. The problem in this case was, I was getting conflicting information. One tech flatly dismissed me with, "We don't support DKIM."

Actually, their DNS servers can handle SPF and DKIM records just fine. And I've dumped on their support, but I do appreciate one tidbit of information that was passed on to me during one particular chat: GoDaddy will add the primary domain name to whatever you put in the "host" box of a DNS record. You don't enter "mail.crawfordbroadcasting.com," you just enter "mail." GoDaddy adds the rest for you. So, with an SPF record, the host name is just going to be the selector. You don't add "domain.com" (or whatever) to that. Just enter the selector.

If that means nothing to you, that's fine. I'm just glad that we figured it out. I had to manually type (well, OK, cut and paste) the needed, geeky-looking strings into these TXT records. When it started working, I did what Todd, Jack and I usually do after a wrestling match like this: I backed away slowly and quietly and let it hum!

Until next time, keep praying for this nation!

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

Wheatnet Conversion/Studio Rebuild

Over the past few months and the subsequent articles in *The Local Oscillator*, I have been reporting on the big project of the year for us in the Crawford Broadcasting Chicago cluster, the conversion of the four control rooms to the Wheatnet AOIP "blade" system.

Additionally, we are replacing the old studio cabinetry. So, the rooms are essentially getting a makeover. At the time of this writing we are in the finishing touches on the fourth and final room.

While the rooms are nearly finished, we will still need to do a lot of cleanup in the rack room where the Wheatstone TDM router system will be decommissioned and the mess of cables and punch blocks removed. While the tangled mess will be a challenge, the blessing of getting that mess out of there will be a relief.

Still the project that was greatly anticipated and so much work will be missed once it is done. I was talking with the engineers as we were working in the final room. All of us acknowledged that the project was hard work but a lot of fun just the same. We're a bit sad to see it coming to a close.

Of course, these projects are never really done. The needs of the station's change along with personnel, so the beauty of the Wheatnet system is that has great flexibility and can be reconfigured rather easily to the needs of the format or individual programs.

So far, the staff has been very pleased with the new rooms. There have been some minor complaints about the sound of mics as we are going from using the Wheatstone M2 mic processors to the Wheatnet M4 mic blades. I do think it will just be a matter of finding the right adjustments to match the sound the staff was used to with the M2 processors.

Other than that, there has been very little in the way of problems or issues. We are very pleased with the sound and flexibility of the new control surfaces and the Wheatnet Blade system. We are equally enthused by the look of the new furniture.

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

It has been another interesting month. The fires here in California have been intense to say the least. On a number of mornings I have woken up to observe ash falling from the sky. On a couple of days, I could not even find the sun in the sky. One day I spent about five minutes outdoors, came inside and had to change my shirt because I reeked of smoke. If COVID was supposed to keep us at home, the smoke kept us indoors. It was a real "Shelter-in Place" situation, but they couldn't use that term since the authorities had already used it inappropriately ad nauseam for the COVID crisis.

The COVID situation continues to get more ridiculous as the days, weeks, and months go on. My wife and I celebrated our 42nd anniversary by driving to another county for dinner. While our county is on lockdown, an adjacent county, in the mountains, is running pretty much wide open… just like the good old days (them mountain people don't take real kindly to having the government folk tell them how to run their lives).

This week is a turning point for some of the churches. They have tried to follow the mandates, but after having been essentially closed for six months, and with the governor's new color-coded set of restrictions placed on counties, they have had enough. With restrictions on churches reaching the ludicrous level, they are beginning to revolt and are opening the doors.

At the station, things have been happening, too. One night we went off-air due to our Nexgen audio server having a bad hair day (night). It was all locked up and would not respond to anything, so it got a pull-the-power restart. It was not happy, and it let us know about it by taking 30 minutes to boot up. We finally restored it to operation.

We called RCS on a subsequent day for a check on it. The verdict came down as a corrupted operating system (yikes!). The machine was seven years old (that is like 14 in dog years). Cris immediately ordered us a new machine.

I must stop and say there that I really appreciate the no-nonsense approach to getting a new machine online rather than mess at all with the old one.

When the new computer arrived, I set to work to get the Wheatnet driver installed. This is where things did not go so well. A number of acronyms come to mind, but while accurately descriptive of the situation, they would not be appropriate to print herein. I spent many (many) hours trying to get the driver to work but with no success. When Monday rolled around, the phone calls and emails began.

The main problem seemed to stem from a Windows patch that needed to be removed. I received a lot of help from Stephen Poole and Todd Dixon. Thanks, guys. Your hours of work are appreciated! Finally, the machine seemed stable, but only from a restart, not from a power-cycle or shutdown. That seemed to be consistent and stable, and I can live with that. The machine is on a full-time UPS, so it should never have an unintended shutdown.

We finally put the new machine on the air. It should have taken a few hours to get it ready, but instead it turned out to be a couple of weeks. Fortunately, our old machine kept on playing. This machine is the ON-AIR/DRR/DBServer, so it would be quite the calamity if it were to auger in. Little did I known that I was not quite done.

With the new machine chugging away just fine, I went home. A few minutes after I fell asleep, my off-air alarm woke me up. I had visions of the new machine dead in the water. It tuned out that we never tested the DRR function. The DRR was all set up fine, but no audio was getting into the machine. The answer was simple, it was just a matter of going into the sound settings and turning on the "microphone."

September has had some other fun stuff at the station, but I will hold those for next month's edition.

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

In past columns, I have often taking a theme from a rock-n-roll (top 40) song of the time. But then I guess I date myself.

This month had so much happening that I had difficulty selecting a set of topics to discuss that could be limited to available space plus a few extra added paragraphs granted by our newsletter editor.

Arthur Brown debuts the theme for this column with his signature song, *Fire*. The significance will become clear in a moment.

Roll back a few weeks to the Labor Day holiday. The waning hours of the holiday brought winds peaking overnight Monday. Early on, Mt. Scott lost commercial power with the station continuing to operate on backup generator.

Fire - cross fade to new scene.

Last August, I described violent rioting here in the Portland area. An experience in alternate journalism is the best way to describe the national media coverage of Portland. Mostly peaceful. Well if the reporting is from where the riot isn't, then of course it's peaceful.

Here in Portland, that media video must have been of the city of Portland in the State of Jefferson. In my Portland, as the night goes on, peaceful demonstrators withdraw as rioters carry on.

About the recent developments on the riot front… (it will all tie together, I promise). Our mayor hasn't been aggressive; actually, passive might be a better word. To be honest, periodic riots and violent protests have been an ongoing experience in Portland over the last 20 years.

Most recently, an ongoing nightly sage at the federal courthouse, north police precinct, east precinct, county headquarters, and other buildings has gained national visibility.

Criticism from President Trump was countered by our governor's offer to bring in the Oregon State Police (OSP) to protect the federal courthouse, allowing the Federal Protective Services (FPS) to withdraw.

Although substituting OSP officers for FPS officers failed to deescalate the nightly mayhem, the Multnomah County DA announced that arrested rioters would not be charged. Not unreasonably, in a hail of flaming objects and the need to protect officers, the OSP said they were outta here.

Fire - cross fade to new scene.

At Mt. Scott, KKPZ is operating with generator power. The station transferred to generator power with no lost airtime. Resetting a few items like clocks were required, and the cable internet was down for several days. Power management and monitoring station operation were the watchwords after Monday. Monday evening and Tuesday morning saw the expansion of several existing and new fires south and east of Portland in Multnomah and Clackamas Counties.

Fire - cross fade to new scene.

President Trump offered to deputize OSP officers and Governor Brown accepted the offer. The OSP dispatched officers to Portland, supporting Portland Police, particularly at the Portland federal courthouse. Portland Mayor Wheeler ordered that tear gas and other riot control techniques would not be used. OSP was outta here. Requests by Portland's mayor for assistance from the Clackamas and Washington County Sheriffs was answered by, "Uh – no thanks."

Fire - cross fade to new scene.

Fires in Clackamas and Multnomah Counties were growing. After two days, cable internet returned after a power loss issue was resolved. Other wireless internet services in the Mt. Scott area were also up and down for several days. Many areas in Multnomah and Clackamas Counties became yellow zones (prepare to evacuate) and red zones; Mt. Scott and the Sunnyside areas remained green.

At Mt. Scott, we have keep the field around the building and towers in grass and clear of brush. Our facility is very fire defensible.

As the fires grew, the yellow zones became RED, get out NOW zones. A fellow Portland broadcast engineer, Michael Everhart, also a volunteer firefighter, was active fighting fires in

Mollala to the east and south of KKPZ. Almost as challenging as the fires, smoke became a major disaster component.

Like many engineers, I started my career working behind the transmitter as a small station engineer. In those days in those days, engineers were often called from behind the transmitter to serve behind the microphone. As a brat engineer, I was attracted to top 30 rock-n-roll stations.

Many of those stations had Gates "Yard" consoles. Behind the mic, I noticed that most popular position for the pots was at full VU meter pegged. You could hear the meter banging into the stop as the jock was talking. I'm not sure why, but it did seem to go with top 40 radio.

At Mt. Scott, most of the emergency issues were resolved. The fuel tank was topped off and the station began to return to normal. Smoke already bad grew worse with the pollution level topping out at above the maximum of 500. The Smoke-O-Meter was even worse.

Fire - cross fade to new scene.

Smoke drove the rioters, – sorry, protesters – off the streets.

Clackamas County and Portland finally receive smoke relief as winds changed and rain arrived in the area.

Rioters and bricks, stones, industrial lasers, gasoline, and firework mortars and flaming objects returned.

The last weekend in September, Governor Brown stepped in and took command of the Portland Police Department for the weekend.

I don't know about you, but I am so done with 2020. Were only 505 years from Zager and Evans' *In The Year 2525*. Oh goodie.

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

Microwave Replacement

And I don't mean for food. September began the project of replacing the three Trango links in Denver that date back to 2010. Of course, these things never seem to go without issue. When the tower crew arrived to work on the first link, we wanted to make sure the adapters we had fit. Better to deal with it on the ground, make sure it all works, than 400 feet up in the air on the side of a tower.

This is where the first issue happened. The studio end was fine, but we found we did not have the correct adapter for the 4-foot dish that was to go on the KLZ tower. We got things ordered and shipped over night and shortly after the new adapters arrived, we got it installed and were ready to begin the first link, KLZ.

To say it was a long day would be an understatement. I understand safety and wanting to do things right, but the tower climber moved much slower than I would like to see. I think part of it is the tower he had to climb is not all that friendly for climbers, and it is nearly 500 feet tall. From the time we arrived on site, it took him over two hours just to get on the tower.

Once at the top, the work seemed to take forever. The crew got everything aimed and ready to go, and he was off the tower close to dark. Once clear of the tower, we put full power back on and immediately the link died. We fought with this for a bit before realizing the issue was RFI.

Rather than make him climb in the dark we waited. We called Derek of Today Works to come out. He is an experienced climber and someone who

can troubleshoot for us. After trying several things, he noticed that when RF was on, the power supply to the radio would quit working.

We had him climb again to replace that power supply with a much better one. So far, so good as we have not had any further issues with RFI.

Based on what we learned, we converted the old Trango 48-volt power supplies to be able to be used with the new Cambium radios. We still have one link to finish up, but the two we have done seem to be working well. We did have one issue the other day where the audio on KLTT was garbled. It sounded horrible. There were tons of dropped packets on the radio. A reboot of both ends fixed the issue. We will monitor these links closely to be sure this is not going to become an issue. I am praying it was just a one and done issue.

Transmitter Internet

Last year we had internet service installed at KLDC, KLZ and KLVZ. We were able to then install Barix units for backup audio. This has been a blessing. When we lose the main link, which does not happen too often, the Omnia.9 does its job and switches over to the Barix analog feed.

One thing I did notice was that the port forwarding we set up within the CenturyLink modems was not consistent. I, of course, always found this out at an inopportune time. I would have to go into the modem and Barix unit and switch the port being used. We finally went to Micro Center and purchased some NetGear wireless routers. We were able to get the PPPoE login info for each account and the setup of these units was easy. I have had them in place for several weeks now and so far, so good.

With all this, I wanted to find a way to get internet at the KLTT site. It was the one site we still use ISDN at, the one site that does not have Xfinity or CenturyLink. I googled broadband internet in Brighton, CO and found Rise Broadband. It is my understanding that we use them in other markets. With secondary internet service now at this site, I went ahead and installed the wireless router and have begun the process of getting things set up for the Barix. We still have some work to do to get this going, but pretty soon, all four stations will have automatic backup audio, which will be a huge help in the future.

Future KLTT Projects

Some Saturday in October, my dad and I will get to spend a few hours at the KLTT site rearranging the equipment rack. 25 years of equipment and cabling has taken its toll. It is a complete nightmare trying to do any work in the rack. The equipment is also in an order that just doesn't work for us.

Our plan is to take the station down, remove the equipment and rearrange it so it makes sense… so the remote control isn't down near the floor and the UPS isn't mid-rack. I have a drawing of where everything will go to help make some things easier for us.

We will then redo the cabling, or should I say re-route the cabling in a way that makes sense. I plan on making it as neat as possible. We all know trying to keep a bunch of cabling cleaned up is exceedingly difficult.

One thing I did do, to help with this project, is install two high density power strips. The rack had some outlets on one side, and it was full up. These two new high-density power strips will allow us to use the rack properly and have even the power looking neat. The power strips are 100% UPS power, by the way, so everything in the rack will be protected from brown-outs and momentary outages.

While waiting on the tower crew to finish up with the antenna replacement, I found myself trying to get things looking good at the site. This year, the birds have made a mess of everything. The front door, back door, the concrete, the gates all have bird poop all over. It is disgusting. I found a 20-V Worx brand power cleaner (https://www.worx.com) . You can fill a bucket with water and put the hose that is attached to the wand in and go to town. It isn't perfect, but it did get our back gate cleaned up where you can open it without having to put your hand in poop.

I need to find a bigger water container we can use for this, since it does use quite a bit of water. I hope to be able to use it to not only begin cleaning up the bird poop but also in the future when we need to do maintenance on our AC units and do other cleaning around the sites.

Fires

It seems the West Coast is on fire. Fires in California, Oregon, and Colorado that I know of are bringing in a ton of smoke. I ask for prayers for one particular fire in Colorado, the Cameron Peak Fire. My husband's family has a cabin they have been going to for over 30 years up in northern Colorado. It is where my husband proposed to me and it holds many memories for the entire family. The Cameron Peak Fire is just across the two-lane highway from Red Feather, where this cabin is. Fire crews are doing everything they can to help save this small

town, but we aren't sure if they can save the cabin. With temperatures beginning to warm up, the wind will no doubt pick up again and start driving this fire close and closer. The fire has burned over 124,000 acres, making it the third largest in state history. We pray the fire crews remain safe, that they can get the upper hand on this fire and are able to protect the various homes and other places that are being affected. We also pray that the cabin is spared and that no damage from the fire or from the freezing nights will occur as the cabin was not able to be winterized before the mandatory evacuations occurred.

Upcoming

We still have one final microwave link to finish up. This one should be the easiest one as it is the shortest tower and a smaller antenna – but it's the longest path. Both other installs went late into the evening, and it would be great if somehow, this one didn't take nearly as long as the other two.

I also need to make a trip to Wyoming with my dad to do some field intensity measurements for the possible KLDC move over to the KLZ site. We have had to put it off for over a month and need to get moving on it as any type of move of a station takes time, and we don't want to run out. But there are fires in that area, too, so we'll have to wait on that.

It is time to start getting some other maintenance items done, cutting trees down, replacing HID lights, site cleanup and so much more. I look forward to making time to get this work done and getting long overdue projects done to help better our sites.

The most exciting thing for us is our Wheatstone upgrade project. The order has been placed. It will be a bit bittersweet as in 2005, when we installed the G6 consoles in the control rooms, it was my first big project in engineering. It was a fun time. Now I get to remove that old equipment and install the new stuff. I look forward to getting rid of all the old cabling. It will clean up the racks so much. I love this new technology where all you need is some CAT6 to make this stuff work. I now wait for word when everything will be shipped. Until then, I get to plan out how we will do everything. Moving from the bridge system over to this new system will be time consuming as we will need to carefully plan on where to put everything (which blades to use for what).

That about covers it for this edition. I pray you all stay safe and well.

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

Corporate Engineering
2821 S. Parker Road • Suite 1205
Aurora, CO 80014