The Local Oscillator

The Newsletter of Crawford Broadcasting Company Corporate Engineering

JUNE 2023 • VOLUME 33 • ISSUE 6 • W.C. ALEXANDER, CPBE, AMD, DRB EDITOR

A Frustrating Spring

The past five months have been challenging, to say the least. We have dealt with antenna issues at two of our FM sites, a broken 80-year-old base insulator at an AM site and have had major projects underway in several markets. Resources have been spread thin. It seemed at times that we were stuck in a rut across the board, but at long last we have made some real progress.

In Detroit, the new ERI SHP-4AE and transmission line are installed, tuned and on the air. Mike Kernen will have more about this in his column later in this issue. Generally speaking, this project went well. The frustrations came with tower crew scheduling and, to some degree, a disagreement with the tower contractor about how to handle the transition from the 3-inch Heliflex® line to the rigid input of the antenna tuning section while making a jog across the top plate of the tower. All that was eventually resolved and the installation was completed.

We'll call this project done, but we will likely revisit some of the transmission line supports in the near future. The tabs on the tower were spaced for rigid line, and while we did double up on the hoisting grips to add vertical support, at some point we should probably figure out how to add some intermediate hangers to at least the upper half of the tower.

Birmingham has been the biggest challenge. The new antenna was installed back in April, but we have been unable to use it because the reflected power, which starts out very low, will climb to several hundred watts after a few minutes of operation with power. Something is heating up. Todd Dixon has more on this later in this issue, but last month we had a tower crew in a couple of times, breaking open the line at the antenna input and shorting it so that we could shoot it with a TDR, and then cracking open each of the joints in the antenna to make sure there were no split bullets. The line looks clean on the TDR, and while there were a couple of minor installation issues with the antenna, there was no smoking gun.

Our next step will be to run the system at power and fly the whole tower with a FLIR camera-equipped drone to see if we can spot anything heating up.

In Buffalo, at long last we got most of the Part 101 microwave system installed and working, but there are still some issues and things to complete. Right now, the system is carrying traffic from the studio to the Boston (NY) FM site with excellent connectivity and bandwidth. The path from Boston to the Hamburg AM site is complete and aligned, but we have a power issue on the tower at Hamburg.

The tower lights at that old site are centrally controlled by a photocell on the transmitter building and a power contactor inside that switches AC power to the towers on and off at sunset and sunrise. We found that the power to the towers is daisy-chained, with towers 1, 2 and 3 on one feed and towers 4 and 5 on another. To keep constant power on tower #2, we will have to bypass the photocell-controlled contactor in the building and put light controllers on towers 1, 2 and 3. Once that is done, we will have the final leg of the microwave system up and carrying traffic.

There is some kind of strange issue with the 23 GHz path from the studio roof to the SUNY relay tower half a mile away. We should be seeing RSSIs of -31 dBm in each direction, but instead we're seeing -55 dBm. The path is clear, and the radios are both operating at the licensed power output. As an experiment, I had Brian swap the polarity of the radio on the roof to see if perhaps the issue is cross-polarization (that would certainly account for 20 dB of the disparity) but changing from V to H has no real

effect. I don't know what to think about that. We'll continue to investigate, but even at -55 dBm the short link is operating at capacity.

The replacement base insulator for tower #5 at the Hamburg AM site has been completed and shipped; we expect it to arrive any day. Once we have it, we'll notify the folks at Northstar Broadcast and they will schedule the replacement work. We'll have to provide a crane to do the lift. In all likelihood, this will all take place late this month or early next month. Thank God that the remnants of the old insulator have held up these months while we awaited manufacture of the new insulator.

And then there was the tower light system change project at KBRT. With the four towers about ready for their third paint job in eleven years, we filed for and were granted a change from red lights/paint to dual medium-intensity white/red strobes last December. The materials arrived and the installation work took place in early May, with everything new from top to bottom. But there were problems with the installation. The crew left and then returned several weeks later to find and correct some wiring problems.

The lights are all working fine now, but there were issues with some of the alarm modules and fiber-optic alarm couplers. New alarm modules have been sent from the manufacturer, and Mike Duffy should have those installed and working shortly. The fiber-optic couplers are a different story, and I shipped some replacement transmitter and receiver modules so that Mike can get those working. So for the moment we have all lights working but are under a NOTAM on two of the towers that we can't monitor because of the alarm/fiber issues.

So… it has been a frustrating spring for sure, but we've gotten some of our projects across the finish line, and others are getting close.

AM Update

By now it's old news that Ford has changed its corporate mind about removal of the AM band from the entertainment systems in its 2024 model year passenger vehicles, thanks to political pressure that stemmed from the grassroots efforts of radio stations, including all of ours. The commitment by Ford, however, extends only to the 2024 model year, and the automaker's statement included some troubling language that indicated it is looking into alternatives for the conveyance of emergency information (presumably other than AM).

What that means is that we still need the AM bill in Congress, and we can't take our foot off the gas with our on-air announcements and live reads. We need listeners to continue to pound their representatives and senators with emails and calls in support of the bill.

While all this started as an RFI issue in electric vehicles, I have a strong suspicion that what's really behind it is a subscription model for all onboard entertainment. If free, over-the-air AM *and FM* radio is eliminated from vehicles, car owners will have to either pay the automaker a monthly fee for streaming services or do without, and doing without is not an option for the majority of people. Was ditching AM a trial balloon? Maybe. It was certainly a shot across the bow of our industry, and we're very much aware of the threat now and playing strong defense.

We'll continue to watch this issue and to push lawmakers to keep free, over-the-air broadcast radio in vehicle entertainment systems.

Containers

Over a year ago, I started hearing about containers and containerized software applications in broadcast infrastructure. I will shamelessly admit that I was totally put off by that concept. In the ensuring months, I attended a number of webinars, both from the SBE and manufacturers, and learned a little about how it all works. Shane Tovin did a special presentation to our local Denver SBE chapter, demonstrating a container platform and how to set up virtual machines within containers on a server.

With the new Buffalo studios, I knew we were headed into uncharted territory with the on-air phone system. The old system was past its EOL and living on borrowed time. New system options from Telos were all virtual. Thankfully, InRush Broadcast Services were experts at this sort of thing (Shaun Dolan and Mike Dorris were the presenters in one of the aforementioned webinars), and they got things all set up and running in Buffalo. Shaun then gave Amanda and me some instruction on the system.

Shortly after, the opportunity arose to put together a containerized system myself, this one for KBRT where a 15-year-old Telos on-air phone system has reached EOL. I ordered a Dell blade server with an Ubuntu 20.04 operating system, and I ordered the required licenses from Telos. It took several tries to get everything working, but I eventually did. Our good friend Steve Solton of Convergence Solutions "loaned" us a SIP with a couple of lines that we could use for testing. That part all worked fine.

That's when I started learning about AES67, and lesson one is that AES67 is all 48 kHz. I knew that, or think I did, but apparently I forgot. When I

got all the multicast addressing right in the Telos VXs system to get it talking to Wheatnet, it was immediately evident that there was a sample rate incompatibility. We would have to change our 44.1 kHz system (set to that sample rate back in the AES/CD days) to 48 kHz, and we would need to install a PTP grandmaster clock to keep everything synched up. That was a learning experience, but we got it done and soon had our test-bed server and Telos VXs system working and sounding great. IP addresses were then changed to protect the innocent (okay, they were changed to fit the KBRT addressing scheme), the server, clock and VSet6s were packed up and shipped to California.

This month I will have to change the sample rate of the KBRT system to 48 kHz, not a difficult think but there are a number of moving parts, and we'll get the new VXs system installed and running out there, the first of many such installations across our company, I'm sure.

Thanks to our friends at InRush for educating me. I'm still a little put off by this new way of doing things, but now I know how to do it and can do it on my own. I'll be showing our engineers what I've learned as we go forward.

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

Hello to all from Western New York! Spring in Western New York left as quickly as it came. We went from freezing temperatures to 85+ degrees almost overnight, and the warm temperatures have set the grass to growing! Both our AM tower sites are due for mowing already, almost a month ahead of normal. We are fortunate though, as we have not had much in the way of rain for several weeks. As much snow as we had this past winter (186.9 inches!), I don't think our water table is in any danger of going dry with the lack of rain. If the spring temperatures are any indication, looks like we may be in for a long, hot and dry summer.

The last full week of May, Transwave Communications finally installed the last receive dish of our Cambium Part 101 microwave system. Of course, it did not go without incident. We had planned to install the Cambium dish at the top of Tower #2 at our Hamburg (WDCZ) transmitter site. The tower, a 245' Truscon self-supporting 3-legged tower, was built on site in 1941. The base is approximately 13 feet from leg to leg and tapers the entire length of the tower. At the top, where we planned on mounting the dish, it was so narrow that the tower would sway at least a foot in either direction when the wind blew. There is no way that this 6 GHz link would remain stable in these conditions, so we performed a path study and found that the dish could be mounted at the 135-foot level and expected receive levels could be met.

We do not have WDCZ up on the Cambium link yet, as we have to get full-time power to the radios and ancillary equipment at the base of the tower. As I mentioned earlier, this site was built in 1941, and the power to each tower is in series, with the lighting controller located at the building, meaning that power is only available when the photocell kicks it on. Towers 1, 2 and 3 are powered on one circuit; towers 4 and 5 are fed from another. Our plan is to remove the three towers from the current configuration, bypassing the building photocell, and sending power full time to these three towers only. I will be installing a photocell on each tower, along with a new solid-state flasher and relay. This way, the Austin transformers will be energized full time and we will be able to provide power from the tower-side of the transformers.

Another anomaly we are working on is the path from our studios to the SUNY tower. The 23 GHz signal is 24 dB off expected numbers. The signal level is -55 but should be -31dBm. The path is relatively short, less than a half-mile, with little

obstruction. I changed the polarity on the roof dish from vertical to horizontal, with no change in signal level. We should expect at least a 20 dB change with one side at horizontal polarization, so this one is a mystery.

Cris and Cambium are looking at the photos I provided to see if a clue emerges as to why the signal is low. One bright note, however: we have enough signal to complete our link to the WDCX-FM site in Boston. We are showing 329 MBPS outbound and 238 MBPS back. We have been up on the link for about two weeks at this writing with no problems noted. I am eager to find out the cause of the low signal on the first hop of our link. I'm certain that a resolution is forthcoming.

You may recall that back in March, we were going to install the 6 GHz dish on tower #5 at Hamburg, but this got derailed when I discovered that one of the base insulators on the tower had cracked and busted open. I have been monitoring this situation weekly, looking for any change (deterioration) in the base insulator. On Friday the 27th, I received a call from Alvin Varghese of Austin Insulators that our new base insulator is completed and shipping out. Once we take receipt of the insulator, we will then make plans with Farley Rigging to lift the tower using a crane, to replace the failed insulator. I'll make sure to take lots of pictures for this one!

In other news, we recently lost one of the switching supplies for RF module #6 in our Nautel NV-40 transmitter. I placed a call to Ryan Swinamer at Nautel to order a replacement supply, only to find that the UG-69 supplies are no longer available. Nautel is offering an adapter kit that replaces the UG-69 supply, but at a cost more than double the original supply cost. The adapter kit, a NAS-70, is $1010.00 each, plus shipping; the UG-69 power supplies were priced at $495.00.

Once I receive the new adapter kit, we will seriously look at this to see if we can reverse engineer this supply and find a suitable replacement at an affordable cost. At one time, we were repairing these supplies in house, but that was costly due to the time it took and the price of components. These days, finding suitable replacement parts is an effort in itself, as availability of electronic components is a hit-or-miss proposition. I'll let you know what I find in a later report.

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, and happy engineering!

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

May was a busy month and I even managed to squeeze in a week at Walt Disney World! “The happiest place on earth” didn’t disappoint. We spent time at the parks as most people do, but my mind is constantly abuzz with thoughts about how everything there works. The curiosity of linear magnetic propulsion and synchronized computer animation. The Mickey & Minnie's Runaway Railway ride in Disney’s Hollywood Studios is one of several new trackless rides which showcase extremely accurate vehicle positioning and control. The ride’s vehicles’ choreography is amazing; they drive themselves, spin, reverse, and even dance in unison, on a flat trackless featureless floor all the while being sync’d to music and visual effects. At the Star Wars: Rise of the Resistance ride these same style trackless cars are moved between floors, simulate motion and gravity as you ride in your ‘escape pod’, and even move outside ride’s building. Disney manages to keep all of their experiences online without you ever seeing a single maintenance technician. I marvel at the parks’ unmatched attention to every theme’s details – even while you’re waiting for a ride. As an engineer, I always look for signs of others at the top of their crafts. This stuff is truly amazing! I wonder if the “Disney Imagineers” surprise themselves?

Main Antenna Line Burnout Final Report

The WMUZ-FM new main antenna project has drawn to a close and I’m happy to say that it’s

been successful! Eric Wandel, PE from Wavepoint Research, Inc. along with our tower crew tuned the system about 100 kHz to the high side of our carrier to allow moderate icing to bring us down through the VSWR dip. Heavy icing may still require power reduction, but without heaters and/or radomes, we needed to leave a bit more wiggle room for light icing.

Incidentally, neither of these options were chosen because radomes add significantly to wind-load, which if added would have required a new structural analysis study and possible tower reinforcement, and electric deicers would require a new electrical conduit and its attendant expense.

Sweep of the new WMUZ-FM ERI antenna after field tuning.

Fortunately, the antenna as delivered, operated with only a 1.07:1 VSWR, and with a bit of tuning we were able to keep both sides of the carrier (HD included) under -30 dB, giving us a nominal 1.05:1 VSWR. Very impressive performance!

Before running the new system for any length of time, we wanted to pull a vacuum on it. Vacuum will cause the boiling point of water to drop so significantly that any liquid moisture in the lines or antenna will vaporize and be pumped to the manifold. For example, water boils at 72 degrees at a pressure of 29.12 Hg (inches of Mercury). I borrowed the vacuum pump I'd purchased while at my former employer and connected it to the line at the gas barrier. If you've never done this, you'll need to acquire the ACME to NPT adaptors from Grainger so that you can adapt the refrigeration style ACME fittings present on the pump to something you can use on your transmission line pressurization system.

A few words of caution about vacuum: Make certain that any system you put under vacuum is designed to withstand the resultant external pressure. A perfect vacuum at sea-level is -14.7PSIA or -29.92 Hg relative to atmosphere. This means that any vessel being drawn to a vacuum is required to withstand an external pressure of nearly 14.7 pounds per square inch, lest it collapse under the weight of the surrounding atmosphere. In case you think this isn't significant, watch as this tanker trucks is pumped out without its vents open: https://youtu.be/0N17tEW_WEU?t=112. You definitely don't want to do this to your antenna or line, or even suck in an O-ring or a gasket!

Once we achieved an adequate vacuum on our antenna system, we closed the valve at the gas barrier, switched the hose over to our nitrogen (N2) tank, reopened the valve allowing the line to fill with N2 until we achieved 5.5 PSIG. After this, our dehydrator's dry air was connected and is maintained at this pressure.

Single Board Computer

I recall a story told to me by a former supervisor of a particular transmitter remote control system with a vexing propensity to fail. And, if this unit's failure wasn't bad enough, in a seemingly symbolic adolescent parental revolt, it would turn off the transmitter just prior to shutting itself off!

Having had to jump in his car and drive to the transmitter site one too many times he finally condemned the unit and installed a replacement. The recalcitrant remote control system was ultimately taken to a farm and repeatedly shot with high powered rifles! It returned to the radio station where it served as a stark warning to other electronics who may themselves be planning their own acts of rebellion.

Why am I telling you this? Well, it's a fun story of reprisal and target practice, but I was reminded of it while I was thinking about how much we lean on our remote controls. For the most part the remote control systems we use are very stable and have more than one way to communicate with the engineering staff, either by computer or mobile app, or in the absence of internet, they can be used via touch-tone voice interfaces. These days, transmitters themselves have web-enabled user interfaces, too, and these sometimes are the only way to interact with them beyond simple basic control, metering, and status. I use SNMP for more advanced control and monitoring but that's a whole other article.

After 20+ years of service, the single board computer on our Nautel NV40 started to exhibit significant signs that it was ready for retirement. Unlike the old remote-control system in my story, it didn't shut off the transmitter, but it would balk at any attempts to log into it, more-less saying, "Buzz-off!" Maybe after ten attempts it would give in and load the AUI (what Nautel calls their GUI). I hate

being ignored, and after having my fill of its rude behavior, I replaced it.

Nautel offers a kit for upgrading the single board computer that includes new brackets, the SBC itself, all cables, and an SSD hard drive. Those familiar with the NV40 and many other Nautel transmitters know that they used Compact Flash media for their storage that could at times be intermittent, not to mention difficult to find if a replacement is needed!

The current AUI is completely Adobe Flash based, and we all know that Flash has been flushed. Installing the new SBC restores a reliable AUI and gives us a pathway to upgrade our transmitter to Nautel's new HTML5 user interface, which is becoming available to a broad range of Nautel products. I attended a webinar with Nautel's Jeff Welton, who demonstrated the interface and showed us lots of exciting new features we can look forward to. It looks fantastic and will no doubt begin to ship on most of Nautel's transmitters in the near future. I'm told the new HTML5 operating system is mobile phone friendly, too! I'll write a review about it once it's available for the NV40 and I have some experience with it.

Studio Generator Project

Regular readers may recall our saga with our studio building/FM site's emergency generator. For those who aren't, suffice it to say, it has a natural gas 6-cylinder engine with a burnt exhaust valve on cylinder 1 and is far too expensive to repair. Last fall, we pronounced it dead and ordered a replacement 125 kW Generac, which has taken until now to be manufactured and shipped to us. It's finally here (at least at the crane depot's dock) and we are readying the site for its installation.

The installation isn't too complex, requiring only that one unused satellite uplink dish be removed along with its foundation. The new spot is in a direct line with the old generator but somewhat closer to the building, allowing us to intercept the old unit's gas and electric piping and turn it up from underground at the new generator's pad location. Once the new pad is poured and cured, we can set and connect the new generator, remove the old one and return the rental unit and its fuel tank that we've had onsite all winter.

News from the South
by
Todd Dixon, CBRE
Chief Engineer, CBC–Alabama

WDJC-FM Main Antenna Update

Once again, the saga continues at my cabin at the base of our Red Mountain tower site. The Thursday and Friday before the Memorial Day weekend was the first time that we had had back-to-back rain-free days since the end of April. They had come one week prior to this visit and had pulled apart our transmission line from the tuning section of the antenna, but as soon as they got up there, a classic Alabama rain shower forced them to scurry back down the tower and no real work was done. This time was going to be different, as we had single digit percent chances of rain.

At this point in the journey, about the only thing we had left to conclude was that we had a split bullet somewhere in the actual installation of the antenna. When Jeff Taylor from ERI came to do our antenna tuning, he told me that they actually mount the full antenna horizontally at their facility about 10 feet off the ground so that they can test it before they ship it to the customer. When the antenna arrived, the antenna bays and the bay blocks were already joined, so the only parts that were put together and hoisted up during the installation were the upper and lower bullets and the inter-bay sections attached to the antenna bays.

After a quick shorting at the end of line so we could run another TDR scan of the line, the tower crew began to physically take apart each bay starting at the bottom and move each section down three inches, which was enough to expose each bullet and to see if we indeed had a split bullet. It turns out that besides a couple of minor things that the crew corrected, no split bullets were found, and the installation was done correctly. On top of that, they checked three field connections in the line at the top and found no real issues there, either.

While they were doing all of that, I opened and checked our connectors from the base of our tower and into the switch in the building and no issues were seen there. Nonetheless, we continue to have reflected power that is not what we expect from a new antenna installation and certainly way more than what we had even with the old antenna in place.

Our next step is that Cris is going to send me a FLIR module that I can connect to my iPhone. While we are feeding high power into the main antenna, we'll mount my iPhone with said FLIR module attached to our DJI Phantom 4 drone and video the line and antenna to see where we have a hot spot. At this point, it is about the only thing we can do that will tell us where the problem really lies. I'm sure I'll have a more complete update in the coming months.

Radio Engineers gets to see it all…

While I was monitoring the tower crew at our site at Red Mountain, my trusty assistant Jack sent me the following picture in a text.

Figure 1 -- a little "burglar" living in the ceiling of our studio building.

A raccoon had taken up residence above our heads in the ceiling and was doing the scratching and pawing that only those woodland creatures can. He quickly got in touch with a "critter gitter" that came and set a trap in the ceiling. Of course, in true southern fashion, the bait in the trap was (...really…) a Moon Pie. We didn't ask whether there was any science involved in the selection or whether that is what was sitting in the seat of his truck from his last convenience store run. It didn't matter.

By Friday night, we got a picture sent to us of the raccoon in safely in his trap and out of our ceiling crawl space. Of course, as I write this, there is evidence that we aren't quite done with this saga yet either. Our WDJC morning host reported hearing more scratching and movement in the ceiling earlier today. After we get this initial trapping and removal done, we'll have another crew come out and determine where they are actually entering the building from and correct that situation.

Figure 2 -- The critter safely in a trap.

Lucky Dogs, all of you

Almost all of you are in larger metro markets than Birmingham. In fact, I think Birmingham may be the smallest market the company has interest in.

One thing we don't have in Birmingham is a Micro Center store. The closest one to us is in Atlanta, Georgia. So it happened that my wife and I had planned a stay in Atlanta for several days, and among other shopping for her at IKEA and The Container Store, we stopped at the Micro Center store in that area.

All I can say is that it really took me a minute to take in the scene that I found myself in. We purchased a couple of items that will help her

with her YouTube Channel (KimDixonCreative), and I also purchased an older refurbished HP machine with 32 GB of RAM so that I could begin to create a homelab.

Homelabs are basically setting up micro services for your home that are web based. You can either choose for them to be available to you from across the web or just locally on your home LAN. From time to time, I'll be sharing some of building blocks that are necessary in order to make all of this work in your own home (or maybe even at work with an old file server that isn't being used). Needless to say, I know Micro Center has an online presence, but I would likely go broke if I had the opportunity to just walk into one any time I felt the need — so count the blessings that being in your market affords you.

We'll visit again next time, and until then, may your work and efforts be blessed.

Tales From Cousin IT
by
Stephen Poole, CBRE, AMD
CBC Corporate IT Specialist

AM Thoughts

Thinking about the battle to keep AM in automobiles in recent weeks, one of things that comes to mind was how after the huge tornado "super event" that hit us in late April 2011, it was very difficult to use my smartphone for some time after. Entire areas were without power, cell towers (when they worked at all) were at greatly reduced power to save their batteries, the Internet was out and that left... radio.

Those who say that mobile data services can replace radio are dreaming. In the event of a large natural disaster, when radio will be most needed, it's not hard to say that radio in cars could save lives. How do I know this? From our own experience:

1. Those with badly damaged homes sat in their cars to get the news (!). No way to know how many, but I'd be surprised if it wasn't multiple thousands.

2. Our stations simulcast and helped coordinate a disaster response over the air, live. People who could get to a phone called and, for example, asked for medications (in particular, insulin for diabetics). They needed ice to keep things cool. Water to drink. Little things, but in some cases, literally life-sustaining. I was very, very proud (almost sinfully so!) to be proud of that effort.

Something to ponder. Look, I love FM. Glad to work with it. But in a big disaster, AM has several huge advantages. Just to name one, you can literally string a wire between trees and stay on the air. (Ask me how I know.)

Legally Speaking

Breaking the laws of physics is the number one cause of death amongst stupid people. Gravity doesn't forgive; electrons can be cruel, and momentum is a stone-cold killer. For example, you might be surprised at the number of people who have been killed while trying to take a selfie on their smart phone.

In the West (Europe and North America), many victims were attempting to achieve photographic immortality while standing at the edge of a cliff or on a balcony. Immortality: achieved, selfie: not so much. (Or put another way, score: gravity 1, hapless adventurer 0.) In India, on the other hand, a lot of people have been killed trying to snap a selfie atop an electric train. One touch of the wires and "poof." A Darwin Award seems like poor compensation in any event.

What does this have to do with Information Technology? I'm glad you asked! Sure, a really creative person might find a way to harm themselves with a laptop computer, but that's uncommon. Even the most hapless are usually left with nothing worse than a bricked device and/or lots of smoke. Unfortunately, in the process, some of these folks also take down others with them. I shall 'splain.

Attackers

I've mentioned in the past that all of our critical servers are now protected by Fail2Ban – a neat little program that blocks an IP address after a few failed login attempts. I have ours set to three tries: three strikes and you're out. When I go into one of our servers and run a status check, I'm often horrified at the number of blocked attempts. In the

past, many of these IP numbers came from obvious sources: China, North Korea, Russia – you know, the usual, lovable actors.

Lately, though, I've been seeing a lot of IP addresses from the United States. I haven't really tried to break this down or calculate the actual statistics yet, but they're definitely on the rise. IP addresses are usually assigned to large entities (sort of like Godzilla, but better looking) (hopefully) as a block of IP numbers. As I've mentioned in previous issues, these are essentially a subnet on the public Internet. Two well-known subnets are 8.8.4.0/24 and 8.8.8.0/24, assigned to Google. You may have used Google's DNS servers at 8.8.8.8 and 8.8.4.4, which are part of these blocks.

Here's the point: Recently, I've seen groups of similar IP addresses from subnet-blocks (see Figure 1, which is from our Barracuda Spam Firewall, but illustrates the point). What this tells me is that someone has managed to gain access at a very high level in that organization and is using a sequence of IP addresses to crack into our servers. This is one reason why I limit our Fail2Ban setups to three tries. Yes, using multiple IP addresses means they get more than three tries, but as long as we use good passwords, it's unlikely that we'll be cracked.

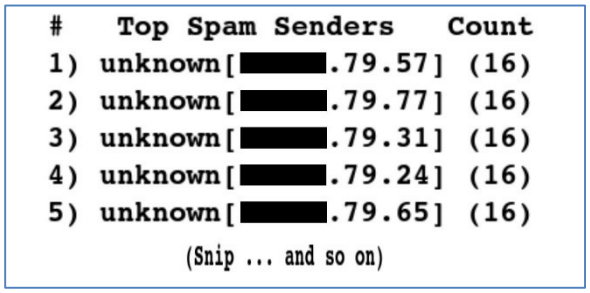

Figure 1 - I blacked out part of the IP address, but they're all from the same subnet.

Securing The Unsecurable (With a Nod to Hirohito)

Unlikely ... but not impossible. The most common things that permit Bad Guys to Do Bad Things is, in this general order: (1) hishing/smishing, (2) unpatched software, (3) bad configuration, (4) stolen passwords and (5), 3rd party vendors and suppliers. The first, second and third are pretty obvious. (1) don't click a link in an email, (2) make sure you do your updates and (3), configure your software to be secure (ex., change the default passwords).

(4) and (5) intrigue me. Yes, it's possible that someone could crack your passwords (especially if you choose something obvious), but the most common pathway(s) recently have been the last two: stolen credentials and 3rd party vendors. Think about it: many of the companies from which you buy things have your info on file. If they're hacked, then for all practical purposes, you have been hacked as well.

In the case of a block of IP addresses being used, like I said, someone high up in an organization has obviously been cracked (or is a bad actor himself!... incidentally, I say "himself" because the vast majority of hackers, virus writers and crackers are male. Someone call Gloria Allred).

Another possibility is that the person who was hacked made the common mistake of using the same password on multiple accounts. That's a horrible idea and ... *cough* ... one that I am personally guilty of. A couple of the forums that I used to visit were hacked and the Bad Guys were able to recover my password. It was one that I used a lot at the time. I've since then changed my Modus Operandi to be a bit less predictable.

The longer that a too-frequently-used password is exposed, the greater the odds that some Bad Guy will recover it from an old site that you may not even use anymore. Ergo, I'm in the process of changing some of our more sensitive passwords, but obviously, this is something that will take planning and thought (and notifying a bunch of people).

Passwords

Another thing that worries me is old, inactive accounts that might contain one of these overused passwords. Cris and I have been pondering this one, too. Ways to mitigate all of the above include two-factor authentication (2FA) and using secure keys instead of typed passwords. The problems are that we have to use a 3rd-party service for the 2FA via text (what if the 2FA guy is hacked? Plus, do you really want to give Google more access?) and with secure keys, we have to provide one for each person who needs to login, then instruct that person in its use. The advantage to the latter is that we can simply delete the key on the server if someone leaves the company.

I'll repeat my sure-fire method for generating a password. Craft a nice sentence: "I like toast with jelly! But: only 5 days a week." Take the punctuation and the first character of each word: "Iltwj!B:o5daw." Very difficult to crack (figure 2).

What about password managers? That's up to you. Many browsers now will store these passwords for frequently-accessed sites. The problem

is, many of these browsers do so "in the cloud." If the cloud server is hacked – and don't say it can't happen, LastPass was hacked twice in one year! – the bad guy has access to your banking, business and personal information." Ponder that.

Figure 2 - Tested at passwordmonster.com; 2 billion years ought to do it.

Windows: Not for Creators

I hope I don't make anyone angry with that assertion, but I calls 'em like I sees 'em. I've shown you some pictures of my studio setup. I'm fairly proud of it, and thank God for letting me have such nice equipment. But my experience with Windows 10 and 11 has been anything but smooth. Leaving aside all of the advertising and garbage that Microsoft wants to cram on there nowadays, it does the following, at seeming random:

1. It will decide that my Mackie mixer no longer exists. I'll have to power-off, power-on to get the mixer back. Additional difficulty: Mackie provides their own ASIO driver, which seems to have problems as well.

2. My DAW software may or may not see my keyboard, a nice Yamaha that provides MIDI-over-USB. Sometimes it works, sometimes it doesn't. I have to frequently reboot the keyboard, too.

3. I have other audio interfaces. One is a Native Instruments® unit that sounds fantastic, but isn't exactly intuitive. I find myself mashing buttons kind of at (desperate) random sometimes to hear what I need. The oldest is an Alesis (remember them?) 8-channel USB mixer that sounds good, but is a space heater. I'm actually afraid to leave it on overnight.

4. Many Windows programs, for whatever reason, want to completely take over an interface when you start them up. I have two DAWs: Cubase by Steinberg and Samplitude ProX 7 by Magix. I also have a separate MIDI editor that I've used for years; it's like old shoes – it fits me and it's comfortable. These different systems will argue with one another about who gets access to what.

This may remind you of some of the issues that we've had with Windows running our systems at our studios. Todd covered this one when we first upgraded to our new Wheatnet AoIP systems: sometimes, for no apparent reason, Windows would decide to scramble the assigned order of the "pots" in our NexGen system. Hilarity would ensue as the board operator would move the wrong faders.

The net result in my case is that in the past month, I have managed to record less than 15 minutes of actual music. This isn't complete parts of songs, either; it's the drums, bass and (when I can finally get my DAW to see my Boss interface) guitar. Maybe. Sometimes. I also have fun getting Samplitude to see my nice Sennheiser studio microphone, so no vocals yet.

At any rate, this world is not our home, but we have to make the best of it as long as we're here. Until next time, keep praying for this nation!

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

The Calm Before the Storm

As broadcast engineers, we always know that even in the calm times between large projects, storms can erupt at any moment especially at the time of year when actual real storms, not metaphorical, can cause damage to equipment and make things difficult.

But as I write this, we are literally days away from having two large projects coincide.

One, we are getting a new 150 kW generator for our Burnham transmitter site. Then once the new unit is installed, the older generator will be taken to our Lansing transmitter to upgrade the capacity of our standby power generation there. We have wanted to do this since we put a Nautel GV20 transmitter to be used as an offsite auxiliary transmitter for WPWX and running at a TPO of 18 kW. The 30 kW generator already at the Lansing site obviously wasn't going to handle that load, so we wired the electrical input to the transmitter on a breaker panel that would not see the generator. If we really want this site to be fully functional as aux site, it needs to have a generator capable of handling the full load.

So, as complicated as this project sounds, it got even more complicated when we found out that the changeover of generators at the Burnham site was not as plug-and-play as we were originally led to believe. Furthering the complication, this site is not logistically friendly to large (for that matter small) vehicles. With rough railroad crossings and poorly kept roads leading to the site, it makes for a challenge to get things like cranes into the site.

As stated earlier, this is just days away, but adding to the commotion is the fact that we also have a transmitter swap happening within the same time frame. Again, logistics pose a challenge, but there will also be challenges with internal logistics inside the transmitter building, as it is very tightly spaced. We may use a lot of elbow grease and be tempted to use actual grease to move out the old and bring in the new.

If that weren't enough, we have some tower projects taking place at the Lansing site during all of this as we are under time constraints with tower light repairs needed.

At least we won't be bored.

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

Mowing

May has been a rather slow month, at least in terms of me getting things done that I wanted to get done. Spring rains hit and they didn't let up for several days, dumping as much as over an inch at my house in about an hour's time. With the saturation of the soil and the almost daily afternoon/evening rain showers, it has caused the growth at the transmitter sites to blow up, but it also has prevented me from being able to get to the sites to mow.

I was able to get to KLZ on the 30th and mow a bit. I used the Kubota tractor to mow around the building, barn, towers and guy anchors. I made a good path to each one and did several passes around each. I would love to mow the entire site and get it all completely cut down, but I don't think that will be possible. After I mowed with the tractor, I got the string trimmer and began trimming around the building and moved on to one of the KLVZ night towers (which share the same site with KLZ). I found the string could not cut through some of the weeds. One weed was about five feet tall and three inches thick. The Ryobi 40V trimmer has a "blade" attachment, so I guess my next trip out I will have to figure it out. Or use the chain saw.

I was able to get 1-½ tower bases trimmed. The battery most likely wasn't fully charged and so it died quickly. I think I will look into getting an extra one. Thankfully only about three of the six tower bases s at the site are in need of mowing/trimming. I did a glance at each one before I left to make sure no growth was going to cause issues. I should be good for a while longer.

Spring will be interesting to say the least. Unfortunately, Seth Peterson hasn't been able to do any work for me due to his own health and the health of his dad. Because of that, I have to do all the work myself in between real engineering tasks. It has already proven to be a lot to do. I may see about finding someone local who can help out for a reasonable price (one price I got recently was $100 an acre – NOT reasonable!). I will work more on KLZ as I can, then move on to the other two sites that I am responsible for.

Moths, moths and more moths!

Miller moth season is here and they are here with a vengeance. I don't recall a time where they have been as bad as they currently are. I can walk out back and see them in our bushes. I open any door and one or more will come flying into the house.

While they entertain my cats for a little bit, they irritate me. They leave their "mark" on everything they touch, and trying to catch them is not easy.

Whenever I go into a transmitter site during daylight hours, I leave the light off but leave the door open for several minutes to allow them to escape (they go to the light).

On a recent trip to the KLVZ site, I found inside the building that there were very few moths and flies. With the old AC units, we would get tons and tons and tons of flies and have a nice collection of moths as well. With the new units, it seems that they aren't able to get in as easily. Only time will tell if that was just a fluke or if replacing those AC units really did make a difference.

Oddly enough, despite the abundance of moths, the KLTT air conditioner condensate drain has not gotten plugged up. I should make a trip out soon to check it again. Typically, when it gets plugged, the pan will overflow and it will drain into the building's back room. Thankfully, where it drains, it doesn't hurt anything, but I'd rather not have standing water anywhere in my transmitter building.

Security Camera Woes

During our days-long rain, I noticed that the security cameras at KLVZ quit responding. After going to the site to investigate, I found one ethernet camera cable had a burned-up connector. Water most likely got into it from outside and ran down the inside of the cable and when it made contact with the PoE

voltage, electrolysis set in and it literally ate the contact fingers. The NVR had a nice, charred port and was unresponsive.

I ordered a new NVR, and once it arrived, I replaced it and then redid the connectors on the cable. I used some electrical tape to seal up where I think the water got into the jacket and also created a good drip loop just in case. Thankfully all the cameras all came up with the new NVR.

Coming Up

My hope is that I will be able to get caught up with all the mowing this month. It will require some long days, but I think I can get it done. I also need to do some cleanup at the sites, cleaning ATU's and inside the buildings. Thankfully KLTT is still in pretty good shape from the good cleaning I gave it late last year. KLZ and KLVZ both need a good cleaning, though. I'm not planning much for June as mowing will take up the majority of it. Maybe I'll get a nice tan from it all.

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
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 • Cordova-Birmingham, AL
92.5 MHz, 2.2 kW/167m AAT
WXJC • Birmingham, AL
850 kHz/96.9 MHz, 50 kW-D/1 kW-N, DA-2
WXJC-FM • Cullman - Birmingham, AL
101.1 MHz, 100 kW/410m AAT

Crawford

Corporate Engineering

2821 S. Parker Road • Suite 1205

Aurora, CO 80014