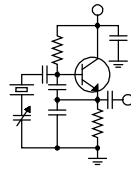


The Local Oscillator



The Newsletter of Crawford Broadcasting Company Corporate Engineering

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NAB 2024

Another NAB spring convention is in the books. I've lost count as to how many NAB conventions I have attended over the years, but this was my first in quite a few years (2016 was the last time if I recall correctly). I had several years of health issues, and then COVID, and then I was trying to avoid getting COVID (again!). This year, the time seemed right, and it was. It was an exhausting trip, but worthwhile, and nobody in my entourage got COVID, thank God! In fact, I haven't as of this writing heard about anyone getting it at the convention, a sharp contrast from the last few years.

We attended several sessions and spent a few hours on the exhibit floor meeting with manufacturers, engineers and vendors. All that was time well spent, and we checked off everything on our list of things to do. In addition to that, we had a number of other meetings, and it was great to renew old friendships. It's always amazing to me how small a universe our business really is, and that is apparent at the NAB spring show.

So what did we see at the show that was of interest? We got a good look at RCS Zetta and were able to ask a bunch of questions. We will, over the next few years, be transitioning from Nexgen to Zetta, so it was important for us to really see it work. I plan to do some more in-depth exploration of that platform in the coming months using some materials that RCS provided.

We spent some time with the Nautel folks, asking a lot of questions about the VX-series of low-power FM transmitters. Right before leaving for the show, we took delivery of our first VX transmitter, and our early experience with it raised a number of questions that we were able to explore with some of Nautel's engineers. We also requested certain features and modifications.

Over at the Inovonics booth, we spent a productive hour with Ben Barber and one of his engineers, discussing the new FM and AM monitors as well as other products. Those folks are the best. They've come a long way from their humble beginnings making solid-state electronics for Ampex reel-to-reel tape decks! Their name is entirely appropriate for the innovative products that they manufacture.

After a session on dashboard displays and metadata, we met with the folks at Broadcast Electronics and discussed TRE+. We even met the Australian engineer that wrote the code. More on this later.

Burk showed us some of their new products, including their Arcadia NOC system and Climate Guard TOC monitor. Exciting stuff.

Over in the Central Hall, we spent some time with Frank Foti and our other friends at Telos. It's always great to see them, and they always have some new, innovative and interesting products to show us.

Also in the Central Hall, we met with Jacob and the other folks at Tieline. The new Bridge-IT was the hot new item that we were interested in. Just when you thought a product couldn't get any better...

We met with vendors, including RF Specialties and BSW, discussing pricing models and new procedures.

And we spent some time at the SBE booth talking with Megan, Chriss, Jim and Cathy about various SBE activities. We regularly interact with those folks throughout the year in our functions as Certification Committee member and local certification chairman, and Amanda as chapter chairman, but it's always good to see them in the flesh.

At the end of our two-day stay, we were exhausted but excited at all we had seen and learned.

We should be just about recovered by the time next spring's convention comes around!

Dashboard Displays

A couple of months ago, I wrote in these pages about metadata. Our friends at Radio World picked that column up and ran it. Since then, I've done some thinking about metadata, and the conference session further stimulated some thought.

One of the things I got from an interaction with the NAB's David Layer last fall was that car radio manufacturers (and automakers) handle metadata differently, particularly with RDS. There are two fields of interest: RT (Radio Text), and PS (Program Service). According to various RDS equipment manufacturers, RT should contain title/artist metadata and PS should be a string describing the radio station. Oh, that it were so!

I recently helped Amanda install a new Nautel VX150 FM transmitter at our Denver Lookout Mountain site. We had hoped to utilize the internal RDS generator so that we could keep the outboard Inovonics RDS generator on the aux transmitter, but we found that the internal Nautel generator does not have a function that will populate both the RT and PS fields with the same string. We ran it for a couple of days with just RT populated, and lo and behold, just like David Layer said, a lot of radios, including the Pioneers in my work car and Amanda's car, stopped displaying title and artist! As I noted in that earlier column, missing or inaccurate metadata is at best a listener irritation and at worst, a tune-out factor. That could not stand.

The short-term fix was to use the outboard Inovonics generator with the new transmitter. The Inovonics generator has a DPSTEXT= function that populates both fields with the same string. Nautel needs that same function, and I have submitted a request both with support and engineering. Hopefully it won't take long to get the change made.

That little exercise was an eye opener for me. It brought home what I already knew. And I will restate it here: all our stations should be populating both RT and PS with title/artist metadata. If you're not doing that, you're going to irritate or run off listeners.

While we're on the subject of dashboard data displays, we have purchased TRE+ licenses for our Chicago/Rockford market stations as well as WDCX-FM in Buffalo, and we hope to get it up and running in the coming days. Right now we are awaiting development of an ingest for Nexgen. We were initially told at the product demos that we could

use the RCS Zetta ingest, but when we tried it in Chicago, it didn't work. The formatting is different in Nexgen. BE has developed an Nexgen ingest, but it's still not quite working.

Mod Monitors

In two of our markets over the past months, we were part of a beta test program for a new AM modulation monitor from Inovonics. The monitor is the 526, and it's a Jim dandy.



The folks at Inovonics asked a lot of questions during the development phase, and I was very pleased to see the features and functions that we had asked for in the beta unit. One (or two, really) of those functions were dual high-level RF inputs for main and aux transmitters. Monitor input switching has always been a chore. The 526 not only has two inputs but they are remotely selectable by GPI, so it's fairly easy to make the monitor follow the transmitter that's on the air.

We warned the engineers at Inovonics that there may be situations out there where tube-type transmitters are still in use and the RF pickup mechanism may be... unsophisticated. A hefty voltage could possibly be applied to the inputs of the monitor, so some protection should be in place. They listened and it is.

There is a great GUI as well as a very readable local screen on the unit. Metering includes RSSI, positive and negative carrier modulation, demodulated audio level, loudness and MDCL. There is also a spectrum plot that will show any significant issues with emissions. Bandwidth is selectable, as is average or peak detection. And there's even an oscilloscope display of the IF or demod audio.

The monitor will email you with alarms. It will stream demodulated audio to you over the internet so you can remotely give a listen, and if you live in the AOIP world, you can feed the output to your system via AES67. What more could you ask for?

We've got 526 monitors ordered for the AM sites in Birmingham, Buffalo/Rochester, Detroit, Costa Mesa and Oakdale and KLTT in Denver.

Last month, we purchased 551 HD Radio mod monitors for our FM markets. This, too, is an amazing device. We'll get one of our FM chiefs to tell you all about it sometime.

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

Hello to all from Western New York! Radio is ever evolving. Some changes are good, some not so good.

When I started in radio in the summer of 1968, the disc jockey basically programmed the music, was responsible for show prep, and entertained the listeners.

It was work back then. You had to time out your hours, practically to the second, to catch live news feeds from ABC Radio News and the Kentucky network.

Commercial times were logged at the exact time they played, transmitter readings were taken hourly, all while taking calls from the listening audience.

I came on site near the end of the “Golden Age” of radio, as changes were forthcoming, and what big changes they were! Sometime in the mid-1980s, station owners believed they could save tons of money by automating radio playlists and doing away with disc jockeys altogether.

This was not new technology for the times, as automation on our FM station was in full swing in the 1970s playing beautiful music while the AM was totally live. The AM was the moneymaker back in those days, as FM had not caught on in mainstream listening.

By 1985, radio automation had caught on nationwide, putting many radio hosts/entertainers on the streets looking for other work. In our station, we purchased and I installed a Sono-Mag automation system, which consisted of a “brain” (controller), four Revox PR-99 reel-to-reels, and three Sono-Mag carousels, two of which played commercials and the third local liners and PSAs. There was also a stationary cart machine that played hourly station IDs.

The production room was a “source” on the controller, which could be programmed in, in the event that live broadcasting was required (breaking local news, weather information etc.).

Listeners didn’t exactly warm up to

automation, and eventually advertisers caught on that the community had turned away from radio as their primary source of entertainment. Sales of 8-track and cassette players boomed as they took the place of radio.

Fast forward several years (I recall it was around 1988), we made the switch back to live radio, as did many other stations in the region. Profitability of stations slowly rose, and the station began to pool those profits into much needed equipment. Suddenly, radio was fun again, spontaneous and the listeners noticed and returned.

I bring all this nostalgia up as today’s radio buzzword is AI – Artificial Intelligence. Although I am sure that AI has its place, I don’t believe that it should be utilized in the broadcast world, radio or television. There are stations currently airing cloned AI voices, although there is a lot of tweaking that needs to be done, such as pronunciation of local names/places.

AI can in seconds, write a 60-second spot, and produce that spot in a matter of minutes, taking the job away from a writer/producer. Can AI produce that spot as well as a human counterpart? Perhaps so, but there still has to be a human element involved.

AI simply takes the place of creativity. How excited would you be looking at a painting created by a computer, or hearing poetry generated by an algorithm?

AI is a multi-billion-dollar business. There are tons of tools readily available today as apps that can take your photo and morph it into realistic avatars. Students can produce essays written by bots in a matter of seconds. Areas that AI could greatly benefit us are in the medical field, both diagnostic and billing, along with military applications and research. I am optimistic about the future of AI, but am reserved to what extent it will be applied to our everyday lives.

In the month of April, we experienced a lot of issues with our ISP, Spectrum. We were having sporadic drops in audio delivery to our AM station in



Rochester, which is delivered over public internet via Tieline Bridge-IT codecs, and with our internet streams. I performed a speed check on our static IP and found it to be 82 MBPS, considerably lower than the 300 MBPS we are paying for.

I called Spectrum technical support and they remotely connected to our modem and stated that the service had the proper provisioning and found no issues. Less than an hour later, I again performed a speed test and found we were operating at 344 MBPS.

In the meantime, I had requested an on-site visit by a technician to try and determine why our speeds were so low. He arrived and quickly substantiated my findings, stating that we in all probability had not been upgraded when speeds were increased.

Things were working well until Friday morning, the 19th. We again were experiencing dropouts of audio to WDCX(AM) in Rochester, along with our three internet streams. I performed a hard reboot of the cable modem, and internet service went out completely!

After calling Spectrum technical support again, they discovered that our signal level dropped considerably around midnight Thursday night.

I again requested a service call, and within

hours, the technician arrived. He found that the signal level into our suite was extremely low, low enough that the modem could not sync up with the router. In tracing the coax out that feeds our TOC, he found that someone had cut and spliced the run that comes from the demark on the backside of the building, along the roof to the 2-inch conduit that runs from the roof to the TOC. The splice was full of water, therefore causing attenuation of our signal. We replaced the entire run with new coax that is designed to work in wet areas. I am uncertain as to who could have cut/spliced our internet coax, but I will keep a close eye on it to prevent this from happening again.

In Rochester, we are having similar ISP issues (again Spectrum) with dropouts, lasting from several seconds to sometime hours. I am currently looking to switch to another ISP, but the choices are slim, and most are not currently available in the vicinity of the WLGZ transmitter site. Green-Light and Frontier Communications have plans to provide internet services to that part of town but have yet to announce when that will take place. As Don Jr. states, "It's hurry up and wait!"

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

The Non-Event of the Year

The eclipse didn't reach totality here in southeast lower Michigan, but that didn't stop everyone from staring at the sun.

The paper blackout glasses someone handed me worked beautifully, and I what I thought would be a ho-hum event turned into something that inspired me. It inspired me to go back inside.

See, I was certain that the sun, moon, and earth would line up in space and the moon would briefly (partially) block the sun. I was also sure that it wasn't the end of days, or some other nefarious event.

Just as Halley's Comet, Y2K, and the end of the 'Great Cycle' of the Mayan calendar came and went without fanfare, so too did the eclipse. I'll be 79 when the next one comes around. I saved my glasses.



DSL = Dead Subscriber Line

Any casual observer might think that it's one of my favorite pastimes to sit in a noisy equipment room on an uncomfortable (read: broken) office chair with AT&T support technicians.

We have used DSL at our nighttime site for WRDT for some amount of time far in excess of my tenure with Crawford. Upon my arrival, several Crawford transmitter sites employed DSL.

DSL has some unique advantages, one being that it is delivered via copper pairs that are already present in most buildings. It can be added to wiring already in use for the location's POTS (plain old telephone service), and it delivered adequate if not exceptional network speed for a transmitter site.

DSL has been in the process of being phased out as much faster technologies have become available. However, in places where it's installed and working, there was no impetus to remove it. As time went on, the modems would fail, and we invariably replaced it with satellite internet provided by ViaSat, which was very handy in areas where cable service is unavailable and or too expensive to have brought into the site.

ViaSat works fine, but it does have significant latency. Sir Arthur C. Clarke proliferated the idea of geosynchronous orbit or geostationary Earth orbit whereby a satellite placed above the equator, at an altitude of 22,236 miles would remain effectively stationary relative to a point on earth's surface. At this altitude, a satellite would require one sidereal day to orbit the Earth – the exact same amount of time as is required for a point on Earth's surface. If all that sounds complicated, it is, and it's expensive, too. Plus, one of ViaSat's four ka-band satellites must handle every single data bit for every subscriber. Considering this, ViaSat's service is a bit pricy. Latency is an issue, too. Consider that even a simple ping originating from a ViaSat subscriber location must make a massive 88,944-mile trip before returning to the host.

Enter the tinfoil hat contingent's foremost nemesis, 5G. Once I dreamt of owning a 9600 baud modem, but now, AT&T can deliver 5G to a subscriber for ~\$60/mo. 5G delivers ample broadband speed such that entire neighborhoods can have their wireless broadband requirements serviced by one cell tower. And these customers have voracious appetites for data.

Where has all this taken us? Well, we are in the process of installing our first 5G "powered" STL (studio transmitter link). After it became evident that AT&T wasn't going to get our DSL working again, I decided to see what alternatives were available at this transmitter site. Unfortunately, there was nothing comparable in price to DSL, or even close, except for 5G cellular internet.

AT&T offers this in a new product called InternetAir. 5G internet shares the cellular 5G network with everything from smartphones to the "internet of things," or IoT. Fortunately, the 5G network is a distributed system composed of multiple devices and pathways none of which share a common point and therefore the subsequently limited throughput like that of a single spacecraft.

The InternetAir planners thought about their commercial customer base, too, and offer a static IP

address at no additional cost. Next month I'll let you know how it works.

Wheatnet

Dependability is a dangerous thing. What? How? Well, sometimes things work so well that you seldom have to interact with them. You forget their subtle ins and outs. The Wheatnet WNIP PC audio driver is such a thing. As Cris Alexander likes to say, "It works like a hose," and, well, most of the time it does. Little need be done other than to install it on a host PC, and to paraphrase Cris, the audio flows like a hose.

I'm often reminded of such subtleties and that the devil is in the details when I least expect it. Recently, one of our writer producers complained about clicks, pops, and gaps in the audio on her computer. She could zoom in on the waveform with Adobe Audition and we could see a gap. After much effort, including the replacement of her computer, we discovered not one cause but two.

This computer had been working for a solid two years prior. What was different is that our user had become a fan of a particular web page that apparently had a memory leak. Specifically, if she left the tab for this page open long enough, the memory usage of just that tab would continue to grow until the computer was forced to start using virtual memory for foreground tasks.

I noticed the high memory usage at the first report of this problem but instructing her to shut down Chrome or close tabs in order to record a simple audio track seemed unwarranted. It took checking back on this problem several times until I was able to spot the ballooning size of this one webpage which this time had crept up to nearly 4GB!

The second issue was created by my configuring a different computer for her. I had not applied some of the changes indicated by Wheatstone to ensure proper operation of the WNIP driver. It's likely that many of the times I've used the WNIP driver, no changes to its environment needed to be made. This time was different. Something in this PC wasn't quite what the driver needed to work properly.

Wheatstone is aware of this possibility and provides a document that covers settings to optimize the performance of the network interface card. They also provide a patch file that makes some changes to the TCP/IP stack. Applying the patch and adjusting some of the advanced settings for the NIC worked. I also instructed her to close the tab with the offending website while recording.

Mystery Box

In a couple of days, by the time you read this, I'm expecting a big heavy box from Canada

with two doors and a touch screen monitor on its front. Can you guess what it is? Full report next time.

News from the South

by

Todd Dixon, CBRE
Chief Engineer, CBC–Alabama

Enter the Tieline Gateway

In Birmingham, we have seven signals (including translators) and several HD channels. Our STL rack was loaded with two Tieline Bridge-IT XTRAs, five Worldcast IP codecs, and our backup Moseley 900 MHz unit feeding our various sites.

I have always had a love/hate relationship with our STL setup. The Bridge-IT XTRAs were rock solid in their performance. I can only recall one or two times that we ever had an audio problem that wasn't somehow network related. The only drawback to them, in my opinion, was that they lacked the one thing that the Worldcast IP codec ecosystem did have – a Network Management Software (NMS) tool. The value of being able to see every codec we had in an end-to-end picture, to me was worth the random probability that one of the Worldcast codecs were going to simply lose their firmware and need to be completely built back up from scratch.

This past month, we got two Tieline Gateway 8 codecs for which we had budgeted for 2024. Jack Bonds and I went about the process of getting the two 1-RU boxes integrated into our WheatNet system, and slowly began to replace each of the seven codecs that we had in our STL rack.

We started with a Bridge-IT XTRA that we use for remote broadcasts. It wasn't used as much for our local remotes anymore as we had made the switch to using Cleanfeed and some Presonus USB interfaces, but we do get over 14 hours of NightVisions programming from our Detroit market each week from their Tieline Genie Distribution codec.

Mike Kernan worked with us by feeding us audio during the testing and we were able to get their stream locked into our Gateway as it had been coming to us previously. We have two separate ISPs coming into our studio, so one thing that Mike had



been doing from the start was sending the NightVisions programming to us with two streams – one to each static IP we had given him. This allowed us to take advantage of one of Tieline's killer features – SmartStream-PLUS. If one of the ISPs dropped for any reason, the other stream would continue feeding our codec through the alternate ISP.

Given that history, Jack and I made that part of our default install on our Gateway in the places where we have our point-to-point microwave links in place and also have backup internet service. In that way, we have multiple streams getting fed to our sites over two network paths and increase our overall redundancy.

Over the course of the following week, we visited every place that we had a WorldCast codec and replaced it with a Bridge-IT XTRA and got it connected to our Gateway back at the studio. Any Bridge-IT XTRA we had at the studios got placed out at a site.

In the end, the Gateway 8 is feeding 11 streams (including SmartStream-PLUS streams) out to our five tower sites and it's a beautiful thing to behold. The second Gateway 8 is a fully-redundant backup to the primary.

Of course, as I mentioned earlier, I'm a big fan of being able to see our entire STL connection picture in one place, and the Tieline Gateway goes a long way toward alleviating that concern. The program manager allows us to see every stream we are sending in one central location, and that is really enough for me.

One thing that I see doing in the future with the Gateway 8 is adding the ability to monitor all of those streams via SNMP. As Cris said to me, with SmartStream-PLUS, there is a real possibility that you might not know that one of the streams had gone down without some kind of network monitoring.

The Gateway's ability to send out streams is

only limited by the actual bandwidth you have, so another thing I have been thinking about setting up is a Raspberry Pi media box that will allow me to send three additional signals to it so that I can log in and hear our streams if necessary.

If it hasn't come across in the timbre of this writing, I love the Tieline Gateway and all of its

features. I guess the only thing that really disappoints me is that now our STL rack looks completely barren, but I wouldn't be human I didn't find some way to be unhappy about something!

We'll visit again next month, and until then, may God bless the work of your hands.

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

Our broadcast engineers know how to get things done. We're called "engineers" and not simply "repairmen" or "technicians" because we often have to custom-craft one-of-a-kind solutions to unique problems. But the cockles of my normally jaded heart were warmed by evidence that some folks here in Alabama are just as serious about "gitterdone" as we are.

Figure 1 comes from the convenience store just north of my neighborhood. It's a relatively new building and it's pretty nice. The design is well-thought out, and the owner obviously planned from the beginning to put his bagged ice freezer on the east end of the building. Unfortunately for him, the company that supplied said freezer didn't provide an excess of cord. So ... gitterdone! You could pluck a note on that wire, and the plug is a bit crooked in the socket (see the inset), but hey; the ice



stays nice and cold.

By the way, the black goo that you see in that picture is one of Alabama's finest features: we have green and black mold that grows here wherever and whenever it can. When you've had as much rain as we have lately, it's hard to control, too. Buildings in downtown Birmingham are spotted with the stuff. My own truck has patches of green mold on it. I attack it regularly with Tilex and, if it's really bad, pure chlorine bleach, but it's still hard to get rid of.

Acronyms

Our government and the tech crowd love acronyms. When my late wife worked for Social Security (SSA), she had pages full of abbreviations that she had to learn and use. COLA (Cost of Living Adjustment), PIA (Primary Insurance Amount), DRCs (Delayed Retirement Credits), and so on. SSA.gov (itself an acronym) actually has a webpage that they've entitled – I'm not kidding – "Social Security Terms in Plain Language." Google it and knock yourself out.

The military is probably the worst, and the golden gribble goes to the Defense Advanced Research Projects Agency, or DARPA. If that SSA page doesn't satisfy and you're truly bored, look up DARPA online and start browsing through all of their projects, each of which has an acronym.

My current favorite is DARPA's RACER: Robotic Autonomy in Complex Environments with Resiliency (Figure 2). Their latest ditty is an AI-controlled tanklet with glowing green eyes. Repeat, *the eyes glow*. Because sending a tracked terminator to blow me to dust bunnies isn't scary enough.

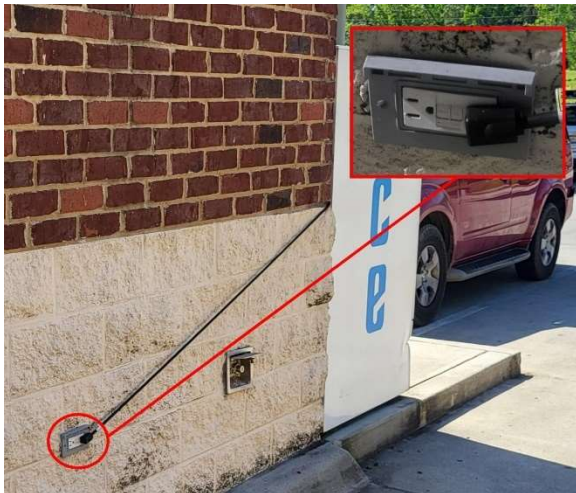


Figure 1 - Gitter'done -- Alabama style.



Figure 2 - The eyes GLOW!

The tech community is certainly guilty of this as well. Wikipedia has a page filled with computer acronyms and abbreviations, from say, AMOLED (Active-Matrix Organic Light-Emitting Diode) to ZMA (Zone Multicast Address).

What finalizes the hilarity is that the same acronym/abbreviation might be used by several different organizations to mean different things! AAM: the Academy of Ancient Music, or Active Appearance Model (a computer thing), or the Alliance for Audited Media ... you get the idea.

OK. LMOWSETH (Let's Move On, We've Spent Enough Time Here). I should mention, though, that my spell-checker had a field day with all of these acronyms ...

Distributed Denial of Service (DDoS)

Unless you live under a flat stone (and some here in Alabama do; they like it), you've probably seen all sorts of cyberattacks in the news. Some of these only affect large organizations and the Web itself, such as Denial of Service hacks. These are relatively simple in concept and are mostly intended to annoy rather than cause damage.

A script kiddie with a decent computer can easily overwhelm someone's website by flooding it with requests. These limited attacks are often done by some protest group, for example, attacking a supermarket chain because they hate mayonnaise. (OK, I made that one up. But you get the idea.)

More sophisticated are the so-called Distributed Denial of Service attacks, or "DDoS." These use a bunch of scattered, compromised computers to target the victim. Since the requests are coming from a bunch of different IP addresses, it's very hard to filter with a firewall, too. (Ask me how I know). To kill it quickly, you might have to actually block a whole range of addresses. The obvious problem is that you're "walling" innocent people as well, if their address happens to fall into that block of IPs.

Figure 3 shows a simplified example. I am

NOT casting any aspersions on Amazon; they do an extremely good job of protecting their systems, and they respond very quickly to any and all attempts to hack or compromise their systems. I could have as easily chosen anyone with a large block of assigned IP addresses: Comcast, Microsoft, Google, whomever. I picked AWS (another acronym!) at random.

I looked up this block, chosen at random, using the "whois" tool in Linux. This IP range is from 205.251.192.0 to 205.251.255.255 ... or 205.251.192.0/18 in CIDR form. That's a lot of IP addresses; it's not hard to imagine that your website or cloud service might be in there somewhere. If we used brute force to quash that entire block, innocent people would be hurt. Sigh.

A "Bad Actor" working on behalf of a foreign government might even have the resources to attack from thousands of different locations -- even different countries -- at seeming random. This increases the difficulty in stopping it by an order of magnitude. The victim's online services go down until steps can be taken to stop the attacks, which can take quite some time (from many hours to days).

```
NetRange:      205.251.192.0 - 205.251.255.255
CIDR:          205.251.192.0/18
NetName:       AMAZON-05
NetHandle:     NET-205-251-192-0-1
Parent:        NET205 (NET-205-0-0-0)
NetType:       Direct Allocation
OriginAS:      AS16509, AS39111, AS7224, AS14618
Organization:  Amazon.com, Inc. (AMAZON-4)
```

Figure 3 - A typical large block of assigned IP addresses.

Thankfully, our core business product is radio. As long as our transmitter sites can keep sending out radio waves, we're good. But it's also true that digital and online technologies have become important as well. Knowing that your fabulous "cloud" service might be taken down during a DDoS or SPAM-scatter attack (or worse) is just something that we have to PLAN for. Backups, employee education, firewalls, good anti-virus, are all essential.

Ransomware

Do I need to define this? Most people know by now, but just in case: this is a form of malware that infects your computer(s), encrypts everything, and demands a ransom payment to get your data back. The latest twist is that the Bad Guys also download a bunch of data and threaten to expose it if you don't nip along smartly with that payment.

In early April of this year, the City of Birmingham reported "computer issues." It has since been confirmed by employees that it was a true-blue

ransomware attack. Everyone from the police to firemen have said that they've had to submit their time sheets on paper to get paid. Other services have been down as well.

A year earlier, in April 2023, the Jefferson County Board of Education (JCBOE) was hit by ransomware. The reporting on this said that they had to basically rebuild their entire computer systems, and when school started in August 2023, there were still problems for returning students.

If you're just scanning this article, read this, if nothing else. I'll put it in bold print:

The most common way that ransomware gets into a system is by someone clicking a link or downloading an infected attachment in a "phishing" email.

Make sure all of your folks know not to do this. If you get an email from "YourBank.com" don't click the link! If you get an invoice (this has been really popular lately) claiming that your card has been charged with some large sum, *don't click the link*. Go directly to your financial institution's or vendor's website yourself.

There are other ways that malware can get in: exposing an unencrypted VNC (Virtual Network Computing) or RDP (Remote Desktop Protocol) (yes, more acronyms!) to the internet with weak

passwords; visiting dodgy websites; or not keeping your antivirus/antimalware stuff up to date. It's a pain in the neck, but the alternative is losing all your data – or in the case of our facilities, literally being off air because our systems have been compromised.

Finally – I really am trying to keep this short – here's how a typical ransomware event proceeds.

- Someone clicks a link, or downloads an attachment, that installs malware.
- That computer scans the network for other targets.
- Each time it finds a fresh target, it installs itself.
- All of the data is encrypted and/or stolen. This is usually done last, to delay detection.

The fact that the Bad Guys will try to infect everything they can reach implies that there are other steps that you should take. Never, ever expose insecure services (such as RDP) to everything inside the network. A firewall should be in place on each machine, with needed services carefully pinholed. Anti-malware is a must nowadays, too.

But that's enough for this time. Everyone have a blessed May and keep praying for this nation!

The Chicago Chronicles

by

**Rick Sewell, CSRE, CBNT, AMD
Engineering Manager, CBC–Chicago**

NV5 Transmitter Repair

Earlier this year we had an alarm from the main transmitter at our Kirkland (Rockford) transmitter site that one of the low voltage power supplies was below threshold. This was on the NV5 Nautel transmitter that has dual supplies for all of its low voltage supplies, so the transmitter remained on the air through the back up supply.

That's one if the reasons why we love Nautel transmitters so much, the redundancy they build into their transmitters keeps your station on the air. This is especially true for servicing this site, which is over 100 miles away from our studios.

After determining the supply was the issue and not the metering by swapping the main and the back supply, we ordered

another supply, relying on the backup in the meantime. The original supply model was no longer available, but they had a substitute from the same manufacturer. In this instance, the supply is used for the +5V, +15 and –15V, DC voltages.

I was fairly confident that I would drive the 100 miles, replace the power supply and be finished with the issue. However, to my surprise, after putting in the new supply, the voltages supplied by the new supply were varying wildly up and down. The transmitter was on the air but still using the backup supply.

We called Nautel and let them know we must have received the rare bad replacement part. They sent us another one. This time I was a little

worried about it not being just one bad supply but



perhaps the newer model was the issue. I put it on the bench and supplied 120 volts AC, and sure enough, this one was varying output voltages as well.

We wondered then if Nautel had just received a bad lot of these newer supplies, so we ordered the same model from another supplier. Once again, when I put the third supply on the bench, I got the same results. So, there was some kind of problem with this particular model.

I was curious as to how this could get this far, and it would be an end user like me that discovered the issue? Since this supply was rated from 90 to 240 volts AC input, my guess was that it was having an issue with the lower input voltage range. I put it back on the bench with a 208 volt AC input, and sure enough, the supply remained rock steady with all the output voltages where they should be.

This still wasn't a cure for me, since we are feeding 120 to the supplies in that transmitter. I thought about finding a route to feed 208 from the voltage mains on the transmitter itself, but we would lose the protection of the UPS feeding the low voltage supplies and subsequently the controller, AUI and exciters.

Going back to the first issue, the original supply was actually only a few volts below threshold, so I guessed that the supply being 11 years old and under constant use had dried up electrolytic capacitors, and if replaced, that might bring the output voltages back to spec.

I figured out and ordered the necessary

capacitors and then dusted off the soldering station. As I thought, the output voltages were back into specifications. Once replacing the supply back into the transmitter and putting power back on the transmitter, I was immediately happy to see the supply working as it should.

However, irony was to rear its ugly heads again and the transmitter was now showing that the backup low voltage supply was now below threshold. This was annoying but at the same time I was thankful it had "held-on" the whole time I was going through the issues with the other unit.

Having anticipated this happening, albeit not as quickly as it did, I ordered twice the number of each electrolytic capacitor that was needed for the first supply. To my continued frustration with this saga, after re-capping the supply, it was not working at all.

It took me awhile, but I eventually figured out that one of the new capacitors was not working properly and I had to wait for a new order to come in. Once that was replaced for a second time, the supply was working at spec again. I put it in the transmitter, and we now had both the main and backup supply working.

I am not sure what to make of the newer model power supplies not working as they should at the lower AC input voltage. But having three of them act the same way tells me its either a design flaw or they had to switch suppliers on a critical part along the way and someone didn't fully vet that replacement. For now, it's not my problem anymore.

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

The other day, I had an interesting experience with some rack screws. There isn't much that's more mundane to a broadcast engineer than rack screws, but it did spark a number of thoughts with me.

I had some brand-new rack screws, and I was installing some gear into a brand-new rack. Much to my surprise, the screws started to seize up after a few turns of the screwdriver. This is known as galling.

Galling causes friction which causes deformation of the threads. It's a

vicious cycle because the more the deformation occurs, the more the friction increases. This can lead

to what is known as cold welding, where the threads are completely seized. Cold welding is often associated with stainless steel hardware, but it can happen with any metal.

Galling most often occurs between two similar metals. A stainless-steel bolt inserted into a stainless-steel nut is a common galling problem.

High quality stainless hardware is often coated or plated with materials to prevent



galling. Stainless steel nuts and bolts associated with transmission line hardware are usually treated in some way to prevent galling. Stainless steels are very unforgiving when it comes to galling. Once you start to feel it seize, it is usually too late.

One way to prevent galling is to use nuts and bolts of different materials. For many years we had a 1978 Corvette, and every 24 months I had to get a smog check. I had two catalytic converters for the car, one for normal driving and one for the day of the smog check. California does not like old cars, so they put very tight requirements on emissions. I found that a fresh catalytic converter was advantageous to win at that game.

I had a big problem with the eight nuts and bolts that mount the converter to the exhaust pipes seizing up. I tried anti-seize compound, regular steel hardware and stainless hardware, but nothing seemed to work.

In talking with a tower guy one day, he mentioned that they sometimes use brass nuts on stainless steel bolts to prevent seizing in the outdoor environment. Bingo! I tried that with the catalytic converter, and it worked great!

Normal anti-seize compound that you can buy in a tube or bottle will prevent hardware from seizing up during assembly, but sometimes it seems to get washed away in the outdoor environment, and seizures can occur upon disassembly.

The point of all this is that I accidentally discovered a neat anti-seize product. Lock-Ease is an aerosol spray can that is normally used for lubricating locks. As such, it does not leave any sticky residue behind. It seems to be simply powdered graphite mixed with a solvent. The solvent evaporates away, leaving well-distributed graphite powder behind.

I find Lock-Ease to be more convenient to use than the normal anti-seize products. It might not be technically as good for prevention of galling as the other products, but I've never had a problem when using it, and I have been using it a lot. I just put the bolts on a paper towel and spray the threads. It is black and is attracted to clothing, but still I find it more convenient and less messy than regular anti-seize.

My troublesome rack screws were given a quick spray of Lock-Ease after which they screwed in without any friction. As a bonus, lock ease seems to work pretty well with locks too, go figure.



**Rocky Mountain Ramblings
The Denver Report**

by
**Amanda Hopp, CBRE
Chief Engineer, CBC - Denver**

My First NAB

This year was the first year I was able to attend the NAB spring convention. I am grateful for the opportunity. It was a bit overwhelming, and even though it has been two weeks at this writing since I returned, I am still digesting everything.

I was only able to have two full days on the floor, and those two days were packed with educational sessions and meetings with various vendors. It was great meeting some of the engineers that are responsible for the operation of our equipment. We were able to discuss issues we have had and offer suggestions on what we would like to see. We have already discussed it more with them once they all returned to their home office.



It was wonderful putting faces to the people I have spoken to many times on the phone or over e-mail. I hope I can continue going each year, but only time will tell.

Tractor Maintenance

I was able to take a Saturday morning last month with my husband and get the Kubota tractor ready for the season. This meant changing the oil, oil filter, fuel filter, air filter and greasing all the various points. It took a couple of hours, but we are good to go for the season.

Dylan was also able to do the oil maintenance on our John Deere riding mower. We still need to get the weed eater and push mower ready

to go for the season, but those should not be too hard to do.

Things are greening up fast and growing.

We've had a lot of moisture as of late, which prevents us from mowing, so hopefully we can find some time here and there between storms and get some of it done.

New Transmitter!!

We received our new transmitter for 95.3 FM, a beautiful Nautel VX-150. Installing it was a chore, which had nothing to do with the design

of the transmitter.

First off, this is a site that is in the mountains of Colorado. It is about 30 minutes outside of Denver. The road to our site is a steep incline that is very shaded. We typically avoid it in the winter because there is too much snow. When we installed the new antenna for this station back in March, we nearly got stuck going up the road as did the tower crew.

When we took the new transmitter up in April, the snow was deeper and impossible to drive through, so we had to hike up the road. This meant grabbing bags and filling them with the tools we would need and hand carrying the transmitter up to the site so we could do the work. Even then, the screw stick I brought could not finish the job, so I ended up having to do everything with a regular screwdriver, which was a blast.

We had to rearrange equipment in the rack only to find that certain cables were not long enough. We called it and the next week (after the NAB trip) we went back, and although we still had to hike up, we had a plan. We made the cables we would need and got everything in the rack where we wanted it.

We did notice some anomalies having to do with the filter we have on the frequency. The transmitter does not like the skirts on the filter passband with modulation, so we do get periodic high-VSWR alarms. This is one of the things we were able to discuss with the Nautel engineer.



There was no driving up this road to our Lookout Mountain site, so we hoofed it, carrying transmitter and tools. Can it be summer now?

engineering, they were able to replicate the problem and found it worked at 24 minutes and eight seconds but not a second more.. So, for now we have it set to 20 minutes while they continue working to correct it in a future software update.

Another thing Nautel is working on is RDS. This transmitter has its own RDS encoder, which is great. However it does not allow DPSTEXT=, which on the Inovonics RDS generators populates both the Radio Text and Program Service fields. Doing that allows all radios to decode DPS or TEXT depending on what the radio uses to display title/artist metadata. Short of using some sort of middleware, there is no way to do both without that DPSTEXT command and Nautel only allows DPS or TEXT for this. They will have an update soon for us to allow the full command, and I think once it has done, we'll be off to the races. For now, we're using the Inovonics 730 external RDS generator.

A/C Woes

It is that time of year when the air conditioners will be running more. At the KLTT transmitter site, it runs year-round. Earlier in the year, the main unit would go down and the system would switch to our backup unit. This is immensely helpful

The other anomaly we found had to do with the modulation loss RF mute. We had it set to 60 minutes on our BW transmitter and duplicated that value on the new Nautel. However, as soon as we would turn the transmitter on it would immediately mute itself. After going back and forth with

to us as it means a trip to the site can wait a little bit if needed.

I recently took some time and went to the site and found the filters needed changing and a couple fell inside the unit and the economizer filters fell out of the unit. Those secure oddly, so it was no surprise. I went ahead and changed the filters inside both units and made sure the economizer filters were secured. After that, the main unit seemed to run fine until right before the NAB trip, when I noticed it had again switched to the backup.

I was able to get service contractor Wern Air out to look at it, and they found the thermostat was not working properly. It was calling for cool but the unit on the roof did not get the message. He replaced the thermostat, and it was working. We thought we were good.

The next day, I went out to set up the Wi-Fi access on the thermostat so I could keep an eye on things, but noticed it was off. The backup A/C unit was running again. We could not get the main unit to come up at all. Wern Air came back out and found the breaker on unit's low voltage power supply was tripped. He reset it and it worked for about a day. I am currently waiting for them to make another trip out to troubleshoot. Something is causing it to trip and they need to find it.

Upcoming

I have said it the last two months, but mowing will begin any day now. The first week in May we will take the water tank and pull-behind sprayer out to KLVZ and lay down some herbicide to get rid of the Canada thistle before it gets big.

We have a project coming up that includes us moving the 250-watt 94.3 FM into the transmitter building. It is currently located in a weatherproof cabinet at the tower base and just does not operate as well as we would like – temperature swings are too great with the transmitter running at 600 watts into a half-wave-spaced antenna. We believe moving it into the main transmitter building will allow it to operate properly. Plus, it would make it easier for us to work on.

It is gearing up to be a busy season here in Denver. Hopefully for you, it is not as chaotic.

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

The Local Oscillator
May 2024

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/100.7 MHz, 5 kW-U, DA-1

KLDC • Denver, CO
1220 kHz, 1 kW-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 • Brighton-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



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