The Local Oscillator

The Newsletter of Crawford Broadcasting Company Corporate Engineering

MAY 2013 • VOLUME 23 • ISSUE 5 • W.C. ALEXANDER, CPBE, AMD, DRB EDITOR

NAB 2013

Another NAB spring convention is in the history books. This yearôs convention was worthwhile and interesting, although I did not see any quantum leaps in technology or application on display or discussed in the sessions. Still, it was worth attending, more to see friends old and new than anything else, catching up and discussing projects, technology and FCC issues.

One of my favorite stops is always the Kintronics booth, both to see what projects they brought with them and to visit with the KTL staff and all the consulting engineers that inevitably make the booth a stop on their tours. This year was no exception. I had a nice visit with Bobby Cox and Jim Moser, and while I was there got to spend some time with John Warner, Jack Sellmeyer, Ron Rackley, Ben Dawson, Steve Lockwood and several others. I found myself soaking up knowledge just standing around talking with those guys.

There was another impromptu engineering summit following one of the engineering sessions when several of the above-mentioned folks along with Ray Benedict (CBS) and a few others talked about AM improvement and what meaningful measures might realistically be implemented. I look forward to what might come out of that.

So what was new and exciting by way of products? The one thing that caught my eye was a cooperative effort between Omnia and Nautel. They call it ñOmnia Direct,ò and it provides for an all-digital composite connection between the Omnia.11 processor and Nautelôs exciters in the NV-series of transmitters. It eliminates the coaxial cable between processor and exciter, holds onto the high-frequency audio components that are rolled off as a result, and does away with the D/A ï A/D conversion in the processor and transmitter, respectively. The best part: Omnia will retrofit our existing Omnia.11 processors at no charge starting sometime this summer, and new processors starting in June or thereabouts will come already equipped. I look forward to getting this feature enabled in our NV markets (Buffalo, Detroit and Chicago).

Wheatstone showed the new L-8 compact control surface that will have application in the production rooms of our markets that have Wheatstone bridge routers. In fact, we look forward to upgrading our bridge routers in the coming year to provide for them to communicate with Wheatstone ñBladesò and otherwise bring our facilities into that world.

I really like some of the new products Tieline has come out with. That company is focusing on remote codecs, some of them unconventional, and providing ways for broadcasters to get audio back to the studio from remote places. The very morning the exhibit floor opened we placed an order for another Bridge-IT codec.

One thing that surprised me was that I could not find APT. I looked in the exhibitor directory and did not find them, so I looked for the parent, Audemat, and didnôt find them either. At long last, after roaming the exhibit floor for many hours, I came upon a familiar logo displayed high above a booth in the room next to the main Central Hall with the radio exhibits. It seems that Audemat, Ecreso, APT and maybe one or two other brands are now marketed under the name ñWorldcast Systems.ò It was there that I found the familiar Oslo and Horizon codec lines and was able to spend some time talking with the Worldcast staff about whatôs new. As an aside, we like the new Horizon Nexgen so much that we have ordered a bunch of them recently, replacing all our Denver Intraplexes with them as well as equipping Chicago and Birmingham. They sound great, work great and allow multicasting.

The good folks at Nautel rolled out the NV-

LT line, essentially a lower cost, bare-bones or ñlightò version of the NV line that does not offer digital features or a touch-screen AUI. This is a smart move on Nautelôs part. They should pick up a good bit of small and medium market business where HD Radio may not be important but station owners nonetheless want a first-class, state-of-the-art transmitter.

Nautel, by the way, had *the* commanding booth location in the radio hall, occupying the location just inside the door. You had to walk around their booth one way or the other when entering from the concourse. That must have cost a pretty penny!

The convention was several days of long days, sore feet and an aching back ï worth attending, but Iôm glad itôs over!

The Nautel XL12 aux transmitter is in place at the new site. Bill promises to clean the drywall mud off before I get there!

KBRT Update

The FCC granted the license for the new KBRT mainland facility on April 24, praise God! That ties the bow on the move, at least in terms of the FCC.

On Tuesday, April 30, we had a burnout at the new site. At about 8:30 AM, I began getting email messages from the transmitter reporting VSWR trips. I immediately logged into the site and reduced transmitter power to 5 kW, a power level it would stay on with.

A scan of the antenna parameters showed a common point impedance higher and more inductive than normal, and all the non-reference towers had about double the normal ratios. That pointed to a problem with the reference tower, #3, which is the high-power tower.

When Bill Agresta got to the site a short time later, he looked carefully at everything and found nothing out of the ordinary. Phasor, ATU, tower base and transmission line for tower #3 looked pristine. I had him switch to the ND mode, which uses tower #3 (but a different network in the ATU). That immediately showed a high VSWR, confirming my suspicions that the problem was in the tower #3 circuit somewhere, most likely the transmission line. I had Bill fire up the island site, then grabbed the OIB and ran for the airport.

I got to the site late that afternoon and double-checked everything. Then I brought up the transmitter at 200 watts unmodulated and checked the input of tower #3 with the OIB ï and found the impedance up over 100 ohms! Then I moved the bridge to the output of the ATU ï and found the self-impedance of the tower to be up around 60 ohms. I had measured it at 19 ohms in January.

With everything pristine at the tower base, I used a small pair of binoculars to look up the toweré and immediately saw something that didnôt look right at the top guy connection on the southwest leg. The

The trailer-mounted generator is ready to go at the new site. When service is needed, we can simply unplug it, roll up the cable and tow it away.

fiberglass rod insulator was black and blistered.

As I write this, the tower crew is on site to replace all three of the top insulators on tower #3 with longer rods. We may need to replace all the insulators on that one tower with insulators equipped with corona rings. More on this in next monthôs issue.

Bill has been working to get the old site on the island cleared out. As I noted last month, there is 60 yearsô worth of stuff out there to dispose of. Bill has conducted a long-running ñyard saleò and gotten rid of a lot of it that way, and he has hauled several trailer loads to the mainland for disposal or recycling. We hope to have this phase of the project wrapped up by the middle of this month.

The auxiliary transmitter (Nautel XL12) is now at the new site and in place. As of this writing, the power modules for that transmitter are still on the mainland ï for some odd reason they did not get shipped with the transmitter. The remote control wiring for that transmitter was done back in November, and the AC power wiring in in place and ready to connect. That should simplify the installation considerably.

We have a Continental 10 kW dummy load on the island that will very shortly be shipped to the mainland site. The plan is to install this inside the building as a temporary load until we can get an outdoor 50 kW load, which we will budget for next year. At least that will give us a means of off-air testing, albeit at reduced power.

The trailer-mounted generator is at the site and the electrician has completed the connections. Even the phase rotation has been confirmed. That generator, which we purchased in 2007 and used for three months after the fire on the island, is a 70 kW unit, which will not run the site at full power, so I have to make a ñload shedò connection. The transfer switch has a programmable dry contact output that our electrician has provided wiring for. We will connect this to the 10 kW power level of the NX50. When the generator fires up, it will switch the main transmitter to a 10 kW power level for the duration. We may, at some point, purchase a larger generator capable of operating the site at full power, but so far the Edison power been stable and reliable.

I also have to get the satellite downlink up and running at the new site. We will use it as a backup to the microwave link. The dish, LNB and receiver are all on their way to the mainland from the old site.

Once all that is done, we can call the new site ñdoneò and dismantle the remainder of the facility on the island. For now, the aux transmitter, a Nautel ND10, is still operational and ready to go should we need it. If the worst were to happen we could request an STA from the FCC. The ND10 has been sold and the buyer is ready to go get it as soon as we have the backups working at the new site.

Congratulations!

Congratulations to Todd Dixon, who recently passed his certification exam and now carries the title of Certified Broadcast Radio Engineer (CBRE). Well done, Todd!

Reminders

Iôm sure all our CEs are on top of these things, but by way of reminder, make certain that your occupied bandwidth measurements are up to date and in the file (AM stations must do these at least once every 14 months). Also, make certain that your quarterly tower light inspections are up to date and in the log. Those of you with MoM licenses,

The trailer-mounted generator is connected and ready to go. When service is necessary, we can simply unplug it, roll up the cables and tow it away.

keep an eye on that two-year anniversary of the license grant ï you will need to recertify the sample system before that date.

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

Hello to all from Western New York! Spring has finally arrived in the Northeast, and by Buffalo standards, the winter months were a bit milder than forecasters had expected. Snowfall in our region averages about 91.3 inches per year, this year the city only recorded an official snowfall amount of 33.0 inches! However, just to the south of the city where our WDCX-FM transmitter site is located, the snow accumulation there was 132.5 inches, and Springville, NY, just a few miles south of the transmitter site, recorded 161.2 inches of snow. While the precipitation amounts were significantly less than normal, the winds well compensated for the lack of weather. I have not seen any statistics as of yet from the NWS, but I would bet that this winter broke all records for the amount of wind and wind speeds recorded. We generally see more property damage and utility outages due to excessive wind speeds than we experience with heavy snowfall amounts.

Over the years, Buffalo has gained the reputation of being the ñsnow capital,ò which is far from truth. This all goes back to the Blizzard of ó77 when Buffalo was buried by over 12 feet of snow. What was interesting is the fact that during that blizzard, less than 6 inches of actual snow fell. The majority of the snow we received came from a frozen Lake Erie where it was picked up by the winds and re-deposited on Buffalo! As far as the ñsnow capitalò of New York State is concerned, that honor would belong to either Syracuse or Watertown, both located on the eastern shore of Lake Ontario. The 2012/13 ñsnow capitalò honors go to Parish, NY, located about 25 miles north of Syracuse. Parish received a total snowfall this year of 228 inches, or 19 feet of snow!

I am still not certain if all this talk of global warming is true or not. I do know that since weather records have been recorded, starting back in the 1800s, we have seen shifts of weather patterns that vary from region to region, and if you can go back far enough in these records, chances are you will find similar variances in weather patterns that have occurred perhaps as early as 100 years ago. Climates do change, and I find it hard to believe that greenhouse gases have depleted the ozone layer to the point where it is causing major changes in our weather patterns in such a short period of time. Believers of global warming always bring up the fact that the polar ice cap is melting. Of course it is. If it wasnôt, it would now extend past South America.

With the coming of Spring also comes many outdoor activities. Aside from the normal outdoor maintenance issues, this year I will have several other projects to do. First and foremost, I will have to replace a fence panel that was blown down during one of our winter windstorms at the WDCX(AM) tower site. The wind was so strong that it broke off the 4x4 posts right at ground level. Until the panel can be replaced, I have affixed several rows of yellow caution tape across the open side, to help deter anyone from entering the tower area. One good thing to note is that the tower where the panel is open is dead during the daytime, so any chance of someone getting hurt during daylight hours is minimal.

Another outdoor project that is upcoming is the repair of the tower footings at the WDCZ(AM) transmitter site. The former owner had started with the re-surfacing of the tower footings, but had not completed the project by the time cooler weather arrived. We have five free-standing towers at this site, and at least 12 of the footings will need to be re-surfaced with concrete. Hopefully I will be able to find a good masonry man to get this work done.

This will be a quiet year as far as cap-ex projects go. We do not have any major equipment replacement projects planned, as everything in both our studio locations and transmitter sites are in excellent shape. Hopefully, this will give me more

time to finally finish several maintenance projects I have had on my list for some time now, and kept getting pushed back for one reason or another. That about wraps up another month here in the great Northeast, and until we meet again here in the pages of *The Local Oscillator*, be well, and happy engineering!

The Motown Update

By
Joseph M. Huk, Jr.,
P.E., CPBE, CBNT
Chief Engineer, CBC–Detroit

ZIPOne Audio Processing Update

Last month, I indicated that we were working on a crosstalk issue with a Telos ZIPOne codec. As I mentioned, the issue was not with the codec after all. We found that the Shure FP-410 mixer we are using has a large amount of gain at its input stage. Somehow, station backhaul audio from the ZIPOne was making its way into the preamplifier stage of the Shure mixer. All that needed to be done was to reduce the input gain on the mixer. The mixer was set up for microphone input level and is apparently very sensitive to unwanted signals in this application. It is most likely due to proximity.

NAB 2013

At this yearôs NAB there was a very interesting collaboration that are going to benefit many broadcasters.

Nautel and Omnia

Nautelôs NV series of transmitters, through a release of new firmware, will be able to accept baseband *composite* audio by way of its AES/EBU interface. This will certainly improve audio quality in situations where the transmitterôs exciter is a distance away from the stereo generator/audio processor device. Right now, long runs of coaxial cable possess large amounts of capacitive loading which impairs frequency and impacts overshoot response. By digitizing the composite base band sending it over an AES/EBU connection, the audio quality will be preserved.

I have done some reading on the internet where some folks have been successful utilizing CAT5 to make AES/EBU connections over 1000 feet. That is something worth investigating.

The Omnia.11 audio processor requires a secondary AES/EBU output in order provide the AES/EBU digitized baseband. Omnia is going to provide the service of modifying existing units in the field and make the option standard on future units. This is really hard to beat!

TieLine/Tieline Demo

While at NAB, I had the opportunity to take a look at competing products to the ZIPOne and Zephyr codecs called the Bridge-IT. I made arrangements for a demo unit and received it a few days ago. I am particularly interested in interoperability with other codecs like Telosôs ZIPOne and evaluating the codecôs audio quality with its companion software made for the iPhone.

Shure Microphone Seminars

Also while at NAB, I attended three seminars on the use of microphones for video shoots. While I am not a videographer, I found the presentations very interesting and useful for some remote broadcast applications. The focus was on using lavalier (LAV) microphones for talent. It covered placement and proper dressing of the cabling so that mechanical noise wonôt travel down the cable to the microphone element. Last, it covered different types of polar patterns for LAV microphones. Certain polar patterns can help prevent audio feedback where public address amplified speakers are close to the talent. In some cases, these microphones are placed on inanimate objects to make a shoot where

microphone visual seclusion is important. I can't wait to try some of these techniques with our upcoming remote broadcasts.

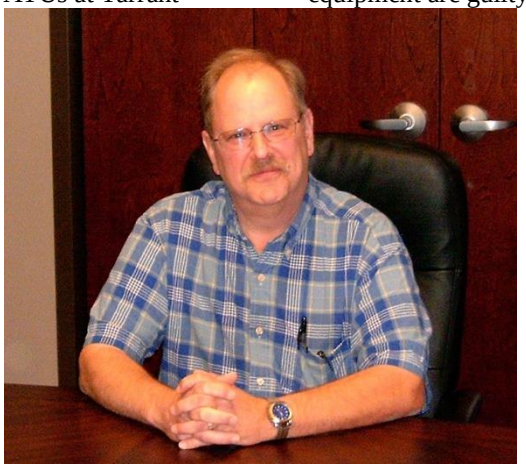
Until next time, be safe, and if all goes well, we will be reporting to you from the pages of *The Local Oscillator* next month. Best regards.

News From The South

By
Stephen Poole, CBRE, CBNT, AMD
Chief Engineer, CBC–Alabama

It's really amazing how accurate computer modeling can be nowadays.

One of the things we've had on the back burner for a while is tweaking the ATUs at Tarrant (WXJC) for a better match. They're not that far off, so it's not a crisis, but it's something we want to do, especially on the night pattern. While I was setting things up, Cris sent me an updated model for the night array. The calculated values for the DPIs were as follows (tower 1 is the reference and tower 3 is negative):



Tower 1: 215 + j119.5
Tower 2: 136 + j244.5
Tower 3: -22 + j166.6
Tower 4: 63 + j162

Using our trusty Delta OIB, the measured in-line values were:

Tower 1 - 186 + j142.8
Tower 2 - 151 + j259.25
Tower 3 - -22 + j182.75
Tower 4 - 63 + j190.4

Look at how close they are! To avoid downtime, we measured at the output J-plugs inside the ATUs. Cris's model estimates the DPI at the actual tower bases. That accounts for the somewhat higher measured "X" values. The resistances were all in the ballpark as well. To be honest, as broad as the null was on the Delta, it's possible that I could go back, take more time, and get "R" values that are closer to the projected ones.

The Bad Old Days

I've never understood engineers who pine for the "good old days." Yes, the equipment back then was much simpler, but it also failed more often. Old timers want to argue about this, but that's a statistical fact. Those who pine for the older tube equipment are guilty of Auto Mechanic's Syndrome: they drive the worst car in town, and when you ask them why, they exclaim, "It's so easy to fix when it breaks!"

So it is with the older tube equipment. A big soldering gun and a box of spare tubes would cover 90% of the failures. But you would find yourself going to that spare parts cabinet far more often.

This doesn't mean there weren't some great tube designs. Some of them were delicious-sounding (for example, the old Collins V20 1KW AM transmitter – there are some great pictures of these old warhorses at Barry Mishkind's www.oldradio.com website). Others, well, not so much (such as the Gates BC-1 series). None of the older transmitters were designed to be driven with heavily-processed audio. Best case, you were frequently replacing tubes; worst-case, they sounded like doo-doo.

But the fact is, regardless of common wisdom, the new solid-state stuff is far more reliable. The Nautel FM5 at our own WXJC-FM has been chugging along since we built the station back in 2002. The only maintenance we've done is to replace one of the cooling fans. The XL60 AM transmitter at WXJC hasn't even required that – I think Cris and I replaced a fuse when we were putting it on air, and that's about it.

When it comes to measurements and field work, the new test equipment and computer models are worth their weight in platinum. You'll hear old timers brag and boast about using a GR bridge and a generator to measure line lengths, but let me tell you: you can't beat an accurate vector network analyzer. If

you don't mind doing the math, the Agilent analyzer will give you the precise resonant frequency in a matter of seconds, no muss, no fuss and no guesswork. You can't beat it. When we recertified our system last year, we got the impedances for all five sample loops in about 10 minutes.

Our engineers seem to be forward-looking folks who enjoy new technology. But I think that's the key to staying ahead in this business. I've said this here before: if you're content to rest on your laurels and refuse to learn anything new, radio (and life in general!) will pass you by. On the other hand, I don't care how old you are, if you're excited by new technology and new ideas, you're still young at heart and will do a better job.

STL Work

We've been working for some time now to get WXJC's old 950 MHz STL upgraded to an 11 GHz Dragonwave link. We've had so many storms, it took over two months for the tower crew to find time and a clear day to get to us.

"Clear" is a relative term, too – as I'll explain in a moment. We knew that one end would go on WDJC's tower on Red Mountain, no matter what. We also knew that we'd need to remove some of the older 950 MHz dishes to lighten the load on that tower. To confirm this, Cris commissioned a structural analysis on the tower; it passed with flying colors.

The first step was removing the old unused 10-foot grid dish that was pointed at WYDE-FM in Cullman, 45 miles away. We also removed the 450 feet of 7/8-inch coax, reducing the load considerably. That was hot and hard work for the tower crew, because they had to swing and "tag" the dish and coax to avoid the other antennas on that tower.

Once they were done, they mounted the 4-foot Dragonwave antenna. Todd checked it out and everything looked fine, so we moved to the WXJC transmitter site in Tarrant. The weather was overcast, so we couldn't confirm an eyeballed, line-of-sight look at the 60-foot pole at Tarrant. The path study had shown that we should be okay (and the 950 MHz link worked from there), so we decided to proceed.

Then we ran into another problem: the existing bracket on that wooden pole at Tarrant was bent with age. It was barely supporting the 6-foot 950 MHz dish; we knew it wouldn't hold the 4-foot Dragonwave antenna steadily enough for a reliable link. We had to break from work while Southern Broadcast Services built a new mounting system and installed it on the pole.

Figure 1 - Trying the Dragonwave dish on the new mount at 850 AM in Tarrant.

We then mounted the Dragonwave dish and the heartbreak came. The weather finally cleared that evening and we couldn't *quite* see WDJC's tower on Red Mountain from the top of that pole. We've had so much rain for the past several months, and the trees adjacent to our property had grown just enough to prevent a direct line-of-sight view. The link might work decently at 950 MHz, but there was no way it would be reliable at 11 GHz.

We had hoped to reuse that pole to save money, but our contingency plan all along had been to mount the dish on tower #2 of the directional array, which is unused on the 50,000 watt day pattern. Since it will be higher and in a slightly different spot, Cris is currently redoing the PCN and FCC paperwork. We'll do what Amanda and Cris have done in Denver: we'll mount a weatherproof NEMA box up near the dish, then use a second NanoBridge link to get the data from tower #2 into the building. This will keep the CAT5 runs nice and short.

I mentioned last month that we're also planning to replace WYDE-FM's T1 line with a Dragonwave or Trango 6 GHz link. There's no way that it would work over the full 45 miles, though, so we'll have to "double-hop" it, using an old ATT Longlines tower. First, we're going to have someone climb that dish and take pictures to ensure a clear, line of sight view from both ends.

Networking

Most of us have networks that have grown on an "ad hoc" basis: as new computers have come on board, we've simply installed them on the existing network, sometimes adding a switch or two to expand things as needed. We are approaching the point here

in Birmingham where weôll need to step back and reconsider some things.

Jay Tyler with Wheatstone pointed out to us last year that while Wheatnet is quite reliable, itôs not invincible. A really congested network is going to cause problems ï ranging from crosspoints not being made to outright hangs. He concurs with our thinking, that the best idea is to isolate each associated group of hosts into a separate subnet, with access carefully controlled to everything else.

Thatôs easy to do with the newer switches; worst-case, you may have to add a firewall. As an alternative, the intelligent use of Virtual LAN (VLAN) technology will also do the trick. But the days of having the office computers, the transmitter sites, the printer and everything else all on One Big Network are gone. You have to learn to think modular.

While youôre at it, watch for one very common mistake: when connecting these subnets and VLANs, itôs very easy to create a loop. This is just what it sounds like: two separate network segments are connected via two separate paths. The symptoms can vary from a completely dysfunctional network to random, weird and inexplicable errors. If you currently have a LanLink, VPN over DSL or even a wireless network in house, you have to make very sure that there are no ñloops.ò You may need to actually take a pencil and paper and sketch your network for examination from time to time.

A loop is illustrated in figure 3. We have a backup NanoBridge system between the studios and WDJCôs transmitter site on Red Mountain. This has been replaced with a Dragonwave; weôve unplugged the NanoBridge on the studio end. We can switch to the backup in a matter of minutes, but we can avoid a loop.

There are other ways to do this, including (expensive) automated switches, but weôve chosen the easy route: we simply keep the NanoBridge unplugged on the studio end. If the Dragonwave goes down, we can very quickly move to the NanoBridge, restoring communications very quickly.

Until next time, keep praying for this nation and watch those loops!

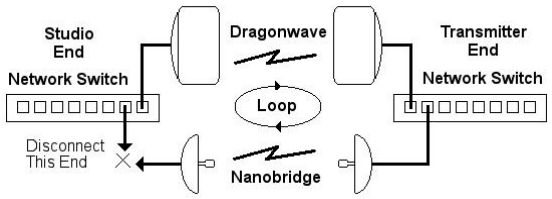


Figure 2 - A loop between the studios and WDJC's transmitter site.

The Chicago Chronicles

By
Art Reis, CPBE, CBNT, AMD
Chief Engineer, CBC–Chicago

Behind the Phone Companies' push for VoIP

The phone company has been the subject of a lot of rants within these pages from various contributors. Iôve written some of it, and as have my cohorts, much of it has been properly disparaging, and as you can guess, we believe rightfully so. Stephen Poole is the king of it. But Iôm going to give you a somewhat different angle on the phone company this time, one which I had not considered before. With it, I bring a cautionary tale about the law of unintended consequences.

Most everyone in the business knows by now that the phone companies are beating the drums to change their business model in a fundamentally major way, from copper to fiber optics. No problem there; it only makes sense from a bunch of standpoints. Copper is expensive. Copper is far more subject to accumulated deterioration from the elements. Most importantly, copper is quite susceptible to equipment damage caused by an electro-magnetic pulse, be it from lightning or, God forbid, from nuclear explosion. Fiber shares none of these disadvantages. The only negative property which both share is dig death. As we all know, thanks to the

backhoe, auger, and trencher, nothing is permanent anymore.

But, the growth of fiber has happened side by side with the growth of IT, and thatôs where things get interesting, in the Chinese sense. The phone companies now want their entire systems converted to Voice over Internet Protocol (VoIP). Verizon was the first to Petition the FCC to convert their entire network that way. The other legacy phone systems (read that, other than Vonage) have or are about to do the same. That has a lot of folks in the know cringing out here in flyover country.

Think of it: The Internet is, for all intense and purposes, the Wild West of communications. Open, free, uncensored, entrepreneurial-oriented and, for the most part, untaxed. That is key. But with all that, just as in the Wild West, VoIP also brings with it a lot of lawlessness, and on an international scale, of vulnerabilities to viruses, worms, trojans, Iran, North Korea, Russia, China, you name it. If you think that the security of the web is important now, look at what itôs going to be like when your land lines become VoIP lines. I am told (via the Internet, and on TV, which Iôm sure got its info from the Internet) that the next great frontier of cyber-vulnerability exploitation is going to be your cell phone, no matter if itôs a Droid, Android, or iPhone. Who knows what sort of devilment can will be cooked up by those cyber-monsters?

Now, in the face of all this, why, oh why, are the phone companies so willing to go there? Whatôs the motivation?

Plenty. You already know some of it. One incentive is that, with the Internet, thereôs almost no culpability by the phone company for loss of service. Hey, itôs the Internet. If it fails, if thereôs a bandwidth problem, if the service is overall lousy, itôs not the phone companyôs problem. *It's the Internet!* It also allows telcos to cut down on the manpower expense of provisioning and maintaining the system. Maddening as all that sounds, it still fails to trump two points. First, customer dissatisfaction and backlash. Second, someone is going to see this eventuality as an opportunity to exploit that market with a new company or service which circumvents that uses the old ñclosed circuitò model ï for a price. You can take it to the bank that there will be many who would be willing to pay for such reliability and security, too.

But thereôs another reason that the phone companies want out of the legacy phone business: The Federal Excise Tax. Iôll bet you that most people have forgotten about that little fly in the ointment, but the FET on phone service in this country has been around since before virtually all of us were born. Itôs simply a Federal tax on *local* phone service (not long distance). Thereôs a line for the FET on most every phone bill, and when you look at it, it doesnôt come to all that much. That FET isnôt presently collected on Internet phone service. In talking to Vonage recently, I learned that, while there is such a thing as a ñFederal Program Fee,ò it isnôt, per se, the Federal Excise Tax. As a matter of fact, that term doesnôt come up on the FCCôs web page regarding phone taxes at all. But, the phone companies want rid of it. Why? Well, not because *they* have to pay it. They simply pass the tax along to their customers as a line item on the bill, and send the FCC the check. The cost to them is in administering the tax; that is also an accounting expense on their part, and apparently, a sizable one. So, the phone companies might say that removing the Federal Excise Tax from your bill is for your benefit, it is also, to some extent, for their benefit as well.

But there are unintended consequences attached to all this. The loss of any tax to any government at any level is a loss of what they consider to be *their property*, and the federal government is going to want to replace that tax withð yupð another form of taxation. What an argument for starting taxation of the Internet! Theyôd do it in a heartbeat, if only Congress would just go along. And donôt think that Congress wonôt be pressured to pass legislation to tax the Internet. The Postal Service, for another entity, is champing at the bit for an email tax, all while dying for lack of revenue (and a huge amount of waste, but thatôs beyond the scope here). Taxing emails would be, in their mind, the perfect solution. And Congress has been and will continue to be asked to do just that.

Such taxation would cripple the Internet.

So, the first lesson here is (for you phone companies out there as well), be careful what you wish/ask/pray for ð you just might get it. The second lesson is to the rest of us: Weôd better be a lot more vigilant and prepared to storm the Congress if there is *any* bill introduced which would allow any taxation on the Internet. Itôs enough to make us all a real bunch of one-issue voters.

The states have already begun collecting sales taxes on items purchased online. Thatôs not quite the same as taxing the Internet, but thatôs where the line must be drawn, or weôll all pay more than we were ever paying before in mere telephone excise taxes.

PoE – Caveat Emptor

The Chicago area recently underwent the

same kinds of storms that Stephen Poole has been talking about in some of his weather-related articles of the past few months. One recent storm in Chicago caused quite a bit of damage to our Lansing site, taking out our Trango STL, the building alarm system, and the hard drive in our FSi-10 HD exciter. The folks who rent space from us in that building lost their phone system totallyð completely fried. In the course of ascertaining the extent of the damage, I had occasion to test the power supply systems of the two digital STLôs on the tower, a Ubiquiti Bullet-M, and our Trango STL. At some point in the process, I sent an email to Cris which said, in part, ñBTW, I donôt know if this is industry standard, but on at least the [Bullet-M STL],the DC wiring going up is + on both 4 & 5, and ï on 7 & 8.....ò Crisôresponse was, ñThere is, as far as I can tell, no standard for PoE. I have read warnings in various equipment manuals to use only that deviceôs supplied PoE because the connections are different. So be careful when dealing with this stuff.ò

Indeed.

Back in the day when CAT-5 was new, four pairs of wire seemed to be a little bit of overkill. The IEEE standard for the stuff was new, and stated that only two pairs were designated for use at the time, the orange and the green, for data. The other two, blue and brown, were labeled in that early standard as ñreserved for future use.ò At that time, I figured that a second data path would be the use. Only in the last ten years did the thought of using the other two pairs for power seem to be even feasible. Why would anyone? This is 24-gauge wire weôre talking about here. Even at the middling length of 100 meters, which is considered the practical limit for a length of the CAT-5 run, the IR losses could be considerable, and in case of a short circuit, even with fusing, the ruin of a whole length of cable is not out of the question.

With the advent of higher voltages and the accompanying lower current used by power supplies on the one end and equipment on the other, this problem seems to have solved itself. Power over the Ethernet is everywhere now, as well it needs to be. But, the area of standards remains ñbuyer-bewareò territory to the end user.

There are many possible ways in which PoE could be configured. The folks who use PoE donôt seem to have many barriers when it comes to dealing with how they do it, either. In the case of our Ubiquiti NanoBridge and Bullet-M unlicensed STLs, they choose to put the positive 24 volt side on wires 4 and 5 (blue) with the negative side on wires 7 and 8 (brown). Thatôs at least keeping the data on the pairs which allows the data to stay on the 1-2 and the 3-6 pairs. But then there are setups such as at Trango, where the wiring is as follows: B+ 48 on wires 4 and 5, and B- on wires 1 and 2. So much for ñThe Standard.ò Of course, once the wiring gets to their PoE, they figure that it isnôt going to see anything other than their RF head. However, we who have to troubleshoot and service the equipment must know whatôs what and where, and the documentation wonôt always tell where the power supply voltages are. That means that, as part of your checkout process when the equipment arrives, you should make the effort to find out where the power voltages are for yourself.

As I mentioned earlier, I made a simple little test box for myself. It consists of an RJ-47 wall mounted jack from The Shack (yes, I meant that) and a short length of straight-through CAT-5 cable. A no-brainer project.

To make it more convenient, I drilled eight holes into the case, right over the screw terminals, and just big enough to allow the tests leads of a digital VOM to enter and contact the screws. Thus I didnôt have to use one hand to hold the test leads up against the screw terminals full time (see Figure 1).

Add the CAT-5 cable and attach it to the plugged-in PoE. Start with one lead in pin one of the tester and the other into pin two. Measure voltage, if any, then move the second test lead around to each subsequent hole in the box until you get to pin eight. Measure any voltages you find. Take the first test lead to pin two, and repeat with the second test lead into pins three to eight. You know the drill. In time, youôll be able to figure things out by putting test leads in just certain holes and going from there.

Attaching the CAT-5 from the ñloadò side of the system directly into the test box allows you to measure resistance for the device at the other end. The manufacturerôs data sheet, and Ohmôs Law, will give you the minimum resistance you should expect to see. Tack on about 30 ohms per about 200 meters of CAT-5 length (up and down) and youôll have a good idea of what a shorted device looks like. On our Trango, for about 100 meters of up/down length, I measured 17 ohms. The box was a goner. The Bullet-M measured infinite resistance. Probably fried as well. The Bullet-M is being replaced.

At the very least, the first rule of dealing with POE, and the manufacturers all tell you this, is, ñNever use any PoE module or power supply other than ours.ò True, in most instances, especially if the POE includes both supply and interconnect between their equipment and the real world. And be *very* careful which picking which plug to plug into which jack in a POE. There seems to be two kinds of folks

in this world who have dealt with PoEs in their work. Those who have plugged the wrong plug into the PoE, and those who will. As common sense as it sounds, itôs still violated, and things die.

The one thing Iôve noticed about the PoE wiring *so far* is that within a pair, the same side of the voltage holds. I donôt know that anyone wires their PoE such that, say, pin four is B+ and pin 5 is B-, but if anyone has run into this, Iôd like to know. As I discovered from Cris earlier, when it comes to PoE, there is no standard. Apparently, anything goes, and where PoE is concerned, I refuse to be surprised by anything any more.

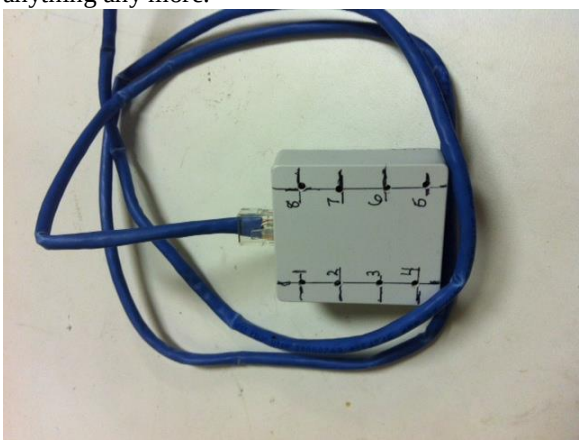


Figure 1 - PoE Test Jack

Grounding Tip

Most folks think of grounding as black magic. It isnôt, though my knowledge of the subject, which was zero for all too many years is, shall we say, evolving. There was a time, for instance, when I considered that a decent ground connection could be had by using a split bolt connection, especially where more than two wires/cables are involved. Iôm not buying that any more.

After our recent Lansing lightning hassles, I called in an electrician we deal with to check out our ground resistances. This guy has a wonderful device designed to measure ground resistances. It looks like an Amp-Clamp on steroids and costs like it, too ï in the four figures. With it, our friend learned that just about all of our grounds which were cad-welded were good. Our Lansing tower is a huge free-standing Pi-Rod, which has nearly 20 ground wires attached to its three legs. That wasnôt the problem. There were two others.

First, the coaxes for the main and aux antenna, which were installed before Crawford bought the station in 1997, had their grounding kits mounted too far up the tower and the tails werenôt cad-welded to the tower. New ground kits are coming, to be installed as close as possible and this time cad-welded to the ground rods.

The other problem was a split bolt for our STL ground connection. As tight as I had tightened that bolt last fall, it had worked its way a little loose. The electrician showed me the proper way to tighten it (see Figure 2). Hit the split bolt on the closed side with a hammer and *then* wrench it in. Do it again and again until the split bolt canôt be tightened anymore. Assuming this is a new connection with clean copper all around (and if it isnôt that way, make it so), this should improve the ground resistance greatly. Sealing

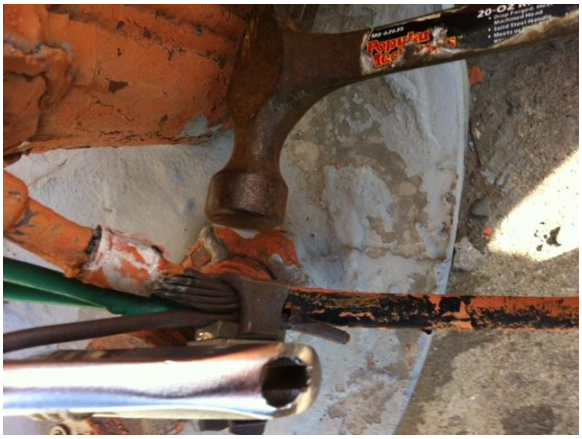


Figure 2 - The proper method of tightening a split-bolt requires a hammer.

the connection off with sealing putty and layers of a good quality wide electrical tape should seal the deal.

But Iôm still not with the connection that way. Iôm having the entire set of wires cad-welded to the tower ground stakes, STLs, incoming coaxes, the works. The connection to the AC ground will also be re-done.

If lightning zaps your stuff, keep upgrading the quality of your ground system until the lightning doesnôt zap your stuff anymore. Itôs all you can do.

The Portland Report

By
John White, CBRE
Chief Engineer, CBC–Portland

Often, a series of events seems to highlight the need for planning. Last month, I highlighted a telephone trunk line cut. A large number of households and businesses were without phone service. At the time, there was little public or media notice of the event, even though a large area was without any phone service ï and that included much of the coverage of wireless sites, which depended on T1 circuits for connectivity.

That was one event. Notice, however, I said ñseries of events.ò

Another reminder was a March 23 *Science News* article entitled, ñQuakes in Slo-Mo. That article referenced work being done on the Cascadia Subduction Zone in British Columbia, Canada. The article notes:

In the early days of GPS satellites, [Herb] Dragert had set up four benchmarks in the bedrock of Vancouver Island, British Columbia, to watch how their positions changed over time...

But instead Dragert saw one of his stations, at Albert Head on the southern part of the island, throwing a slow-motion tantrum. Every year or two it would inch westward for a few weeks, then stop, then do it again…

Twenty years later, Dragert and his colleagues know that they were seeing something new and important at Albert Head. The phenomenon, known as "slow slip," happens when two sides of a geologic fault shift the same amount as in a large quake, but over weeks to months rather than seconds.

One would be tempted to feel a moment of reliefé that is, until the next shoe drops. The article continues:

Geologists are now learning that slow slip happens in all sorts of places, from Japan to New Zealand to Costa Rica. New discoveries reveal how slow slip serves as a transition between ordinary quakes at the surface and those in deeper parts of the Earth where rocks flow like softened butter. And because periods of slow slip have heralded several large recent quakes, including ***Japan's 2011 Tohoku quake****, studying slow-motion events could hint at new and better ways to anticipate the next big one.*

The take-away for those of us in the Northwest is that Dragert and Wang show that some sections of the subduction zone slip while others remain locked, contributing to the potential for very large earthquakes. The science news article includes a chart showing:

Between August and October 2012, the Pacific Northwest experienced the longest slow slip event ever recorded. It started on Vancouver Island in Canada, and over several weeks migrated south into the Olympic Mountains and deeper into Washington state.

Another event came in the form of a new NAB local broadcaster promotion. The promo observes the key role of broadcast radio and TV as a service to local communities. The theme is ñLocal Broadcasters, Witness to History.ò

The final reminder in the series in an article in the June 2013 issue of *Analog* magazine. The science fact article was titled, ñWaves of the Future: Where Will the Next Tsunami Strike?ò by Richard Lovett.

In that article, Lovett speaks of the Hood to Coast relay race here in Oregon and uses that as a springboard to discuss Tsunamis that form following subduction zone earthquakes. The article is informative and worth reading.

In the meantime, I have to confess that as reporters of the news, we broadcasters failed during the telephone cable cut. Later, as I thought about it, the lack of coverage was a surprise in this day when even a small power outage is normally reported. When I say we, that we includes me. When I first observed the problem, it was localized to my facility. Slowly I learned it was a much wider event. In the process I didnôt think to treat the event as a news item.

In any case, Oregonians and Northwest broadcasters should all be aware of the potential for a large earthquake and make plans and preparations. What was the Boy Scout motto again? ñBe Prepared.ò

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

KLDC Canopy

We had to go back to the good old Motorola Canopy at KLDC. It seemed like every time it snowed, Iôd get a call that the station was off the air. While the NanoBridge worked fine in dry weather, it was when it snowed that we were in trouble. We were able to find two old Canopy units that were working and got them set back up and installed on the roof at the studio and the transmitter site and havenôt had any issues since.

Horizon

We have five of our new Worldcast Horizon Nexgen codecs installed. I must say, I like them a lot. We installed them at the KLDC and at KLVZ. KLDC was no problem as it uses just two Horizons, one at the studio and one at the transmitter. We have had no issues with the audio like we were having with the older Intraplex units we were using. KLVZ was also very simple to do, even with the two site locations. The one KLVZ studio unit feeds both transmitter site units. The Horizons are super easy to program up, which is a huge plus. I have enjoyed listening to the two stations with no audio glitches.

KLTT RF Contactors

We decided months ago we needed to start replacing the RF contactors inside the phasing and coupling system at the KLTT transmitter site. You may recall all the issues we had with the day/night switch from last year. While we havenôt had nearly the trouble since replacing the one troublesome microswitch, every once in a while it still doesnôt switch properly. The contactors are nearly 18 years old, original to when the site was built. They are worn and mechanically have trouble going back and forth. Having switched twice a day since 1996, thatôs more than 13,000 cycles. I donôt know about you, but Iôd probably be tired as well!

We purchased one brand new contactor and installed it in the phasor. It snaps back and forth smartly, which is quite a contrast to the slow motion buzzzzzz of the other contactors in the system. We sent the old unit to Kintronic Labs to be rebuilt, and that one is already on its way back to us. We will do this with a total of five more. We are hoping this will give us another 18 years of use before having to redo them again.

That about covers it for this month. I hope to have more to write about next month. So until next timeé thatôs all folks!!!

KBRT • Avalon - Los Angeles, CA
740 kHz, 10 kW-D, DA
KCBC • Manteca - San Francisco, CA
770 kHz, 50 kW-D/1 kW-N, DA-1
KJSL • St. Louis, MO
630 kHz, 5 kW-U, DA-2
KKPZ • Portland, OR
1330 kHz, 5 kW-U, DA-1
KLZ • Denver, CO
560 kHz, 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, 50 kW-D/1.4 kW-N, DA-2
KLVZ • Denver, CO
810 kHz, 2.2 kW-D/430 W-N, DA-2
KSTL • St. Louis, MO
690 kHz, 1 kW-D/18 W-N, ND
WDCX • Rochester, NY
990 kHz, 5 kW-D/2.5 kW-N, DA-2
WDCX • Buffalo, NY
99.5 MHz, 110 kW/195m AAT
WDCZ • Buffalo, NY
950 kHz, 5 kW-U, DA-1
WDJC-FM • Birmingham, AL
93.7 MHz, 100 kW/307m AAT
WEXL • Royal Oak - Detroit, MI
1340 kHz, 1 kW-U, DA-D
WLGZ-FM • Webster - Rochester, NY
102.7 MHz, 6 kW/100m AAT
WRDT • Monroe - Detroit, MI
560 kHz, 500 W-D/14 W-N, DA-D
WMUZ • Detroit, MI
103.5 MHz, 50 kW/150m AAT
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, 5 kW-D/41W-N, ND
WYDE-FM • Cullman - Birmingham, AL
101.1 MHz, 100 kW/410m AAT
WXJC • Birmingham, AL
850 kHz, 50 kW-D/1 kW-N, DA-2
WXJC-FM • Cordova-Birmingham, AL
92.5 MHz, 2.2 kW/167m AAT

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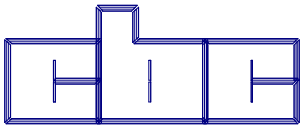

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