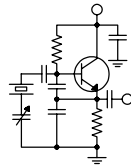


The Local Oscillator



The Newsletter of Crawford Broadcasting Company Corporate Engineering

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Reregulation

Do you remember the deregulation craze that swept America in the 1980s? It seemed as if everything that had been tightly regulated by some federal agency or other was the beneficiary of deregulation. On the surface, this seemed like a good thing. I mean, less government involvement in our lives is a good thing, right?

The problem was, deregulation had unintended consequences, “collateral damage,” in virtually every industry in which it was applied. Just look at the railroads. Look at the telcos.

Broadcasting was deregulated in those days, and for the most part it has been a good thing. That deregulation trend has continued until recently. Just think about some of the technical regulatory requirements that no longer exist: transmitter and antenna readings logged every three hours; base current ratios; annual audio proofs; monitor point readings at specified intervals; operators on duty at all times; FCC operator licensing. The list goes on and on.

On the non-technical front, we used to have to do ascertainment (gasp!) to determine what were the significant community issues. Program logs had to be kept. The main studio, public file had to be in the community of license.

For the most part, I think deregulation has been a good thing for broadcasting. It has allowed the industry a level of growth and prosperity that could not have been realized under the old rules. But it has had its unintended consequences, too. With many of the technical requirements relaxed, particularly required measurements and measurement intervals, many broadcast station transmission facilities have been allowed to fall into disrepair. This has produced elevated levels of interference, particularly on the AM band. Who can dispute that a station looking at its monitor points once a year (if that often) is far

more likely to have undetected pattern drift?

Over the past year or so, the FCC has been taking a hard look at localism. Are broadcast stations serving their communities as they are charged to do? Are they providing sufficient levels of programming that deal with local community issues? Are station personnel communicating adequately with citizens and community leaders to determine what those issues even are? Are station personnel accessible to local citizens?

After a series of meetings in venues far and wide, the FCC has released its “Report on Broadcast Localism and Notice of Proposed Rulemaking.” This is a comprehensive 98-page document that covers everything but the kitchen sink. I scanned the document (with closer study to come when I have time) and found that a lot of formerly deregulated stuff is now on the table for consideration. For example, one item under consideration is no more unattended operation. How would that change the way we operate? For some stations, it would have very little impact, but for others, it would change everything.

This return to regulation, while to some degree warranted, bears watching. I just hope that common sense will prevail over draconian knee-jerk measures. We’ll see.

What Was I Thinking?

One of my responsibilities as DOE is to constantly examine out technical facilities for possible improvements and upgrades. It’s a responsibility I take very seriously. I have a number of resources at my disposal that I use in this pursuit, including a powerful suite of engineering software that allows me to do quickly perform allocation studies. I also subscribe to a “flag service” that watches all FCC broadcast facility technical filings and actions, screened by relevance to our facilities. If

a second-adjacent channel station to one of ours files for a site change, for example, I'll know about it. It's that sort of thing that sometimes opens the door for a facility improvement or upgrade for one of our stations.

Last spring, it was another type of event entirely that triggered a second look at the daytime allocation of KLVZ (810 kHz, 2.2 kW day/0.43 kW night). Regular *Local Oscillator* readers will recall that an array of construction cranes was put up near the KLVZ daytime site, producing reradiation that filled the nulls of the pattern. After trying everything in the bag of tricks without success, our only recourse was to augment the pattern, and this required some conductivity measurements on a co-channel station in Sturgis, SD. Those measurements revealed the conductivity along the direct path to be very low indeed, and this opened the door for us to let out the back side of the pattern by a good amount.

As I was wrapping up the augmentation application, it occurred to me that perhaps we could let out the main lobe as well, to the south-southwest. We had only one station to protect in that direction, a co-channel in Santa Fe, NM, and much of the direct path between stations was through the Rampart Range of the Rockies. So I sent Ed Dulaney out with the FIM to make some measurements on KLVZ. Analysis of these measurements showed the conductivity in the mountains to be much lower than the FCC's M3 conductivity map predicted. As a result, I was able to let the pattern out and increase daytime power to 10 kW with the existing towers.

The KLVZ daytime towers are 77 electrical degrees high on 810 kHz, and while this produces a reasonable efficiency, the pattern geometry is such that the driving point Zs were fairly low – so low, in fact, that the negative tower would try to flip over to positive on the upper 15 kHz sideband frequency. That would never work for HD Radio. In fact, the whole phasing and coupling system design was a real challenge because of the pattern geometry and the bandwidth requirements, so I turned to Dr. Bobby Cox of Kintronic Laboratories for assistance. Bobby came up with a design that will work, but it's going to require some changes to the towers and it will require that we dump the power from the parasitic tower into a dummy load rather than return it to the common point.

Out at the towers, we will add 15 electrical

degrees of top-loading to each tower using the guy wires. This will require quite a bit of work, installing a temporary guy at each top wire location while taking down each of the top wires and reconfiguring it sans top insulators. The top loading improves the efficiency of the towers, giving us more bang for the watt, but it also raises the self-impedance (and consequently the driving point impedance) of each tower.

Since we'll be dumping close to 1.8 kW from the parasitic tower into a load, we'll need that much TPO headroom in the transmitter. To deal with that, we'll use a Nautel XL-12 12 kW transmitter that we will operate close to its rated power output. The FCC has only recently begun allowing AM stations to dump parasitic radiator power into a load. It will be interesting to see how this all works out and how we determine what the antenna input power should be (presumably it will be 10.53 kW less the power to the load – how we determine the CP current remains to be seen).

There are lots of other considerations. We will be adding a good bit of transmission line to the required lengths to achieve a better phase budget, and we will also have two tee-networks on the phasor input to get the load orientation we are looking for. Clearly the good old days of phasor design are gone for those who wish to operate with HD Radio! We are also considering the possibility of replacing the existing transmitter building, which is a 1983-vintage construction trailer mounted on 8-foot piers (to keep it above the flood plane).

When I filed the upgrade application with the FCC last September, knowing that it included a rather complex daytime allocation study complete with conductivity measurements and a directional antenna, I figured on a 12-month processing time minimum. Imagine my surprise when I saw that the application had been granted on January 18, four months and six days since filing. That's got to be some sort of FCC processing record!

We would like to get this project done in 2008, before the snow flies in November, but that remains to be seen. One thing I'm fairly confident of, however, is that at some point soon, I will be standing in the antenna field watching as the construction work proceeds, and as I stand there, I'll remember putting that application together. That's when I'll say to myself, "What was I thinking?"

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

Hello to all from Western New York!
Thirty- nine years ago this week, I began my career in broadcasting. I can honestly say that I have enjoyed practically every minute of it. While there have been subtle changes along the way, over the past five years, I have seen technology change dramatically.

I recall back in the mid-eighties when my stations received their first billing computer. I set the computer up in the conference room for training, and none of the staff would even touch it! I took the initiative and began exploring what the computer could do and how it operated. In no time, I was able to navigate through the numerous menus and was confident enough to teach the business manager how to operate it. I recall, as the entire staff stood there looking at this monstrosity, making the statement, “Someday, computers will run entire radio stations!” Most of them thought that I had lost it, that there was no way that a computer could run an entire radio station! Well, it happened more quickly than I had ever anticipated, and on a much larger scale.

In today’s radio plant, it is hard to not find a piece of broadcast equipment that is not connected to, programmed by, or run via computers. I am not saying this is a bad thing. The computer has enabled us to broadcast to all four corners of the earth via the Internet. But as in all technology, there is always a downside. Computers are not one hundred percent reliable, and are at times much harder to troubleshoot and repair than the equipment they replaced.

I have taken notice that the job of the radio station chief engineer has quickly evolved into IT / Networking / Programming, and if you did not keep up with changing technology, you got left behind. I could not imagine some of today’s younger generation of engineers working on a cart machine, reel-to-reel tape machine or even a tube-type console or transmitter. Keeping this type of broadcast equipment running has quickly become a lost art,

along with troubleshooting and repair down to the component level. Most all of today’s equipment is practically non-serviceable in the field, requiring a trip back to the manufacturer, or a simple board replacement. I recall many challenges through the years in troubleshooting problems with now-extinct equipment, and the satisfaction and pride I had when I found and rectified the problem. I know now how some of my predecessors felt as technology changed back in the early seventies.



WDCX – Buffalo

January turned out to be quite the problem month. Our Comstream ABR-202 satellite receiver decided several times to dump completely all its programming. This wouldn’t be a big problem, but the receiver is located at the transmitter site, some 25 miles away from the studio, so a trip out is warranted each time it dumps programming.

I had installed our new Telos 2x12 digital hybrid in December along with a newer version of the Telos Assistant Producer call screener software. First off, the computers we were using to handle the call screening developed some serious issues. These were old Compaq office computers that were recycled several years ago and had been sitting there running for at least the past three years. After loading the new software, they would freeze up, or you would get a bazillion (that’s a 1,000 million!) errors during boot-up. I decided to dumpsterize these old dinosaurs and install a couple of newer Dells that I had in reserve. Once I got these up and running, I installed the Telos hybrid, which ran for about an hour trouble-free before it started randomly rebooting itself. The hybrid made several trips back to Telos before we discovered that the root of the problem was one of the Desktop Directors was causing the hybrid to reboot. It was sent back to Telos, and of course, it did not malfunction while there. They are sending it back to

me to see if the problem re-develops.

I have had to recently replace all the battery packs in our Tripp-Lite and APC UPS units. They were all installed about the same time and they all failed within a week or so of each other. The APC replacement battery packs were \$315 each from the manufacturer, but I was able to find replacement batteries locally for a little over \$28 dollars each. It appears that the battery life in these UPS units is about two years.

Many of you in the Northeast experienced the major winter storm that blew through Buffalo and Rochester on Wednesday January 30th. This storm, while not producing an enormous amount of snow, was fueled by winds in excess of 70mph. We lost power at the WDCX transmitter site, and the standby generator kicked on immediately. But a trip out to the transmitter site was warranted because the Omnia Audio Processor locked up, which resulted in the exciters muting because of the loss of the 10 MHz reference. While on the way back to Buffalo to take care of this problem, the WLGZ transmitter site went down because of power loss, but the generator did not kick on. So after getting Buffalo back on, I had to turn around and go back to Rochester to fix the WLGZ generator. The ride back to Rochester was tedious, as the white outs from the wind-blown snow were the worst I have ever seen. It took me over 3-1/2 hours to get to the site, a trip that would normally take a little over an hour. Once I got there, I found that a rubber bypass cap on the water pump had split, causing the coolant to drain from the radiator. I replaced the defective cap and filled up the radiator, cranked up the gen and got the station back on the air.

Also during this storm, we lost our spare Ku-band dish that was on top of the WDCX studio building. The dish was mounted on a non-penetrating roof mount, held down by concrete blocks. The dish was a total loss, and I am not sure what happened to the concrete blocks that held the dish down. As soon as things quiet down, I will take a trip up to the roof to inspect for any other damage that might have occurred as a result of this storm.

WRCI / WLGZ – Rochester

On January 28, I installed the new Audioarts D-75 console in the WRCI control room. This completes the console installs for our Buffalo and Rochester control rooms. I still have one other console to install in the WRCI production room, a Tascam Digital, but this will have to wait until I get the Buffalo transmitter building completed.

Last month, we began experiencing random dropouts on our T-1 between the studio and transmitter site. A call was placed to Frontier Telephone to investigate the cause of the problem. I had Ben Martin check the Intraplex frames for any error indications, but none were found. And, of course, Frontier said that the problem was in our equipment, that they found nothing wrong with the fiber-optic line. Amazingly, the dropouts ceased after the telephone company tested the line. Go figure. I'm sure that I have not seen the last of this problem.

That about wraps up another month here in the Northeast. Until we meet again here in the pages of *The Local Oscillator*, be well, and happy engineering!

The Motown Update

By
Tom Gardull, CBRE
Chief Engineer, CBC–Detroit

Both of our Nautel IBOC digital AM exciters had a similar problem within a week of each other. The main transmitter at the WRDT day site did not come on one morning and it was because the exciter had stopped. The NE-IBOC only needed to be restarted and all has been well. WEXL's problem was at 5:00 PM on a Friday. Everything was frozen up. No keyboard, touchscreen, or output. That required a hard reboot, but it came right back on. I reseated all the cards inside of both units, but none were obviously loose. I still have no real idea why this happened to either.

I have recurring Wheatstone system problem whereby the on-air light for the FM talk studio will sometimes not come on. When that happens, the Wheatstone system is not giving the command. Most recently, the on-air light failed on Friday and came back on Monday. The interesting thing is the advice I got from Wheatstone. In the Xpoint program, which is the administrative software for the system, there is a feature under Diagnostics called System Reset. It does what Wheatstone calls a "cool reset." It might cause a momentary audio glitch but they said most people do not experience that. But this "cool reset" corrects many of these intermittent anomalies. The next time the logic gives me a problem, I will try the "cool reset."

Telos call screen manager software does not work the same for all their types of equipment. WEXL starts a new telephone-talk show in February. We got the "Assistant Producer" call screen software for their legacy products since we are using a 1x6 hybrid. The Telos software setup was easy. Networking was a problem mainly because of problems with some of the retired computers we were using for this purpose, but that was overcome. We kept experiencing a difference from how this call screen manager was working compared to our FM call screen manager, which uses a Direct Interface Module. The "Caller Data" entry field was not

popping up when a call was answered, and the answered line was not turning green on the screen. After several calls to Telos, they set up a test 1x6 hybrid in Cleveland and discovered the firmware does not support those features. That is too bad because it means an additional step by the screener

having to mouse-click on the line to bring up the popup box. It will be a nuisance. Telos has offered to try to include the "Answer" feature in future Assistant Producer software, but cautions that if the stumbling block is the 1x6 firmware, nothing can be changed in its software.

We added several 20-inch widescreen LCD

panels for the NexGen workstations in two production rooms. Prices keep falling, and our producer's eyes keep getting older. Eyestrain is a real problem for guys who sit in front of monitors all day. It was quite a difference going from our original IBM 15-inch screen up to these Acer 20-inchers. Producers say the bigger screens have helped their eyes a lot.

RCS/Prophet changed its website layout in early January, but it turns out it did not correct all the bugs. I regularly check their website for news of any patches or updates. Two days after one of my regular checks, I clicked on again and saw the new setup. I navigated to the usual items I check only to find access was password protected. I thought that to be a bit unnecessary, but it is their website. RCS even had a popup offering to get you a password if your email was already registered with them. I requested and got my password and tried again. This time I got, "Access Denied-please contact tech support." I called an RCS tech who said the changed website was about a day old and he was not too familiar with it, but he would pass along the problem to the developer. I never heard back, but next day I tried again. This time there was no login and no password needed. It was a regular website again.



News From The South

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

New Building

WDJC's new transmitter building arrived in January, and has now been set in place. Now we're just waiting on the electrical... and that has taken awhile because the inspector changed his mind and decided that we would need a separate disconnect between the generator transfer switch in the old building and the service entrance on the new.

We already have a 400A disconnect going into the switch, and you'd think that would suffice, but this fellow mumbled things about the "new code" and "momentary overloads." Ergo, we're buying a new disconnect. The electricians are wiring it as I write this. Hopefully, we'll get power to the building and begin moving equipment – a project that will bring Robert "Bubba" Payne back to the Big City to assist.

Bubba – along with Ed Dulaney and Rick Sewell, of course – provided invaluable help when we moved five stations to our new studios back in December of 2006 (in one weekend!!!). I've told Robert that this project won't be like that one. We're not up against a hard deadline, so we're not lifting a tool until the building is wired and we've passed all inspections. I still get jitters thinking about that studio move, where we were up against a brick-wall, drop-dead "must be done by" date... and yet, we were unable to even run cables until after we'd been granted a Certificate of Occupancy. (Apparently, running studio wires could have been considered de facto "occupancy," in the words of one inspector). We simply couldn't have done it without Robert, Ed and Rick.

Reradiation

I've heard the horror stories and have been peripherally involved in running these issues down,

but this is the first time I've had my very own case of reradiation to deal with. It's a doozy, too. Someone or something has begun reradiating 850 AM's signal,

causing a couple of my monitor points to creep up. Near the site (say, within a couple of kilometers), there are spots where the FIM loop antenna might as well be omni-directional. I can pirouette like Rudolph Nureyev with the thing and the needle on the meter hardly moves.

We're convinced that the problem is reradiation because we've

already run those radials, using data from the most recent proof, and can show that the ratios drop to the correct "proofed" values as we move away from the site.

They say that a conservative is just a liberal who has been mugged. Well, I've been mugged, and now I'm all over the bandwagon for electronic modeling of antenna systems, as opposed to the current 1940's-era "take a million measurements"



New WDJC-FM transmitter building being set into place

methodology. Again: I'll admit that I just didn't see this in the past. All I had to do was take my FIM around my "points" and check the signal; sometimes it would be a little higher or lower, but it was always in tolerance. With this most recent episode, though, and the need to do a partial proof on the radials in question, several things have become obvious.

First and foremost, most of the available terrain and road data is hopelessly out of date. The maps show roads that no longer exist and vice-versa. More than once, while trying to find a point from the proof, I've run against a fence with a sign that says "No Trespassing" and "Monitored by Video Surveillance." Or, the road will just end at the gate, and will be crumbling and overgrown with weeds. The road ain't there any more!

It's not a matter of being soft; I'm perfectly willing to hike through woods to take readings. The problem is, the woods are now owned by someone, and as often as not, they'll have "posted" signs and fences. You *can't* hike through them.

Second, when you're trying to find a reradiator, you can take your pick. There are four trillion cell towers out there now and another billion are apparently being built per month. Those things are everywhere! They're literally spaced at about 1,000-2,000 foot intervals in the Birmingham metro (and even closer in some areas). Can't they share? How many of these things do we really need!?

Third (and this touches on the first one about maps and data being out of date), there's a ton of new construction. When 850 was built way back when, the area north of the transmitter site in Tarrant was a wilderness. That is manifestly no longer the case. New homes, with attendant road changes (and tons of new power lines!) are popping up all over the place.

I guess my point is this: in this day and age when we have computer software that can very accurately model what a signal will do when it leaves an antenna array, why are we still doing AM directional work with technology from the "vacuum-valve" era? I went to Hallikainen's great website and re-browsed the FCC rules for AM directionals, and folks, there are still paragraphs in there that refer to taking your "data plot" and "holding it up to a light" against their plots and charts to "get the best fit." I thought we were in the digital age! It doesn't make sense.

Some Free Software Gems

Ask Todd or Jimmy: I'm a fiend for free software. Anytime I need something, I always check the download sites first – download.com for

Windows, or sourceforge.net for Linux. As often as not, someone has already written what I need and makes it available under an open-source or free software license. It's a beautiful thing.

First of all, you probably know about this one, but don't even think about starting a project like this without going to Google maps. They have relatively recent satellite images that make it a LOT easier to find an ancient measurement point on an old map. Plus, you can scan around your site from time to time to see what has changed. Be warned that they don't update those images continually; the ones for Birmingham, for example, appear to be 1-2 years old. But it's still very, very helpful. (And fun! If you want to, go to Google, click the "maps" tab and enter "Pawnee Village Road, Tarrant, AL." You'll see the WXJC site... and if you get the same image that I did, you can even zoom in on my gray Dodge Dakota pickup right outside the front door. I was obviously working the day that the image was taken!)

But I found a real gem when I was gearing up to run the partial proof on 850's directional array: it's a program for Windows called "USA Photo Maps," available from jdmcox.com. It lacks many of the more advanced features of the expensive cartographic and civil engineering packages, but for my needs, it works just fine.

I can enter lat/long coordinates of any point in the United States, go to that point, and then download the latest satellite maps, Tiger road maps, or even 7.5 second topo map data. Better yet, you can do all this on the fly: in other words, as you move into a new county or township, you download the maps then. You don't have to download (or carry a DVD filled with) maps for areas that don't interest you. You only download those that you actually need. Nice!

Like I said, there are a lot of things this program won't do. For example, I needed to create some arcs on the maps to check suspected re-radiation; this thing thinks in straight lines only. Fageddaboutit. But for me, those are minor issues; in this case, I just printed out the map and drew the curves myself.

In the Linux department, Todd has been experimenting with PC Linux OS. It's based on Mandriva (formerly Mandrake) and looks really nice. He installed it on an older machine out at Tarrant, put Wine (the Windows emulator for Linux) on it, and then loaded the USA Photo Maps software. It works flawlessly! Nice again!

That's it until next time. As soon as this rain ends, I've got more monitor points to check!!!

Gateway Adventures
By
Rick Sewell, CBRE
Chief Engineer, CBC–St. Louis

One of the cool parts about working with one of the older AM stations in the country is that you encounter a lot of history. At the KJSL transmitter site, formerly under the call sign of KXOK, it is fun to dig through some of the old files that have been stored out there. There's not a lot of memorabilia left, which is a shame. But it's cool to look at some of the original documentation for the start of the station back in the mid 1930s.

The transmitter building is itself a piece of memorabilia dating back to 1936. Not exactly an antique or landmark, but it certainly has an air of nostalgia about



resembled the original build, practicality dictated that we go with a wooden porch. The original porch was constructed with concrete, obviously poured into forms there on the site, reinforced by rebar. At this point much of the rebar was showing as a good part of the concrete had crumbled away.

In addition, we addressed an issue with the three self-supporting towers' concrete piers. The grout work along the surface where the tower leg meets the concrete pier was decaying and needed to be re-grouted. We also had the entire surface of all nine piers coated with a sealant to make them hold up better against the weather.



New KJSL transmitter site back porch

it. Given the age of the building, it certainly has to be taken care of or weather and time will do their evil work. We have had to address some of this over the last six years that I have been Chief Engineer.

At the end of 2007, we needed to tackle several problems that were decaying on the outside of the building. This included "tuck-pointing" of some loosening brickwork and replacing a back porch that really was a hazard. Although it would be nice to do a replacement of the porch with something that

Canopy Update

At the time of this writing we are in a holding pattern to complete the Canopy project that will eventually replace the KJSL T1 line. The KJSL Intraplex, a point-to-point multiplexing STL, will be



KJSL Canopy Antenna

changed from using a telco T1 line transport to an over-the-air Ethernet transport.

The Ethernet "pipe" for this multiplexer's data will start with the data channel of KSTL's Intraplex system where it will travel through the T1

to the KSTL transmitter site and then travel through the canopy system from the KSTL site to the KJSL transmitter site.

To make this work, both Intraplex systems had to be pared down to the minimum so that the data channel in the KSTL Intraplex could be expanded and the data from the KJSL Intraplex fit the within the expanded bandwidth of the KSTL data channel. This involved some reconfiguring and wiring changes, which I have completed, except for the actual multiplex cards in the KJSL Intraplex because we are currently using this system on the KJSL T1 for our studio-to-transmitter link.

Most everything is ready to go except for the installation of the four-foot dish that will be mounted at 255 feet on the KSTL tower. The main holdup is the weather. We are waiting for a break so that the tower crew will be able to get up there and complete

the installation. We did have some progress in January as we got the junction box that will service the radio on the on the tower installed along with the electrical cable to that box. We also got the matching dish and radio installed on the roof of the KJSL transmitter building.

To mount this at the highest point of the building, which allowed us to clear a light pole that was smack dab in the middle of the path back toward the KSTL tower, we used a "home brew" chimney mount. The mount was made using rigid two-inch conduit and that was held in place using Unistrut and 1/2-inch all-thread.

I would estimate that by the time this is published we will have completed the installation of the dish on the KSTL tower and most likely have switched over to this system.

Catalina Tales

By
Bill Agresta
Chief Engineer, KBRT

Greetings from Santa Catalina Island! This has been a reasonably successful month here at our transmitter plant. Projects seem to be moving along and some are actually getting completed. Things always seem to move pretty slow here, and even more so since the fire, but now they seem to be picking up pace as we have recently completed our tower re-guy project and are 95% done with the installation of our new perimeter fence. There are still a few projects on the drawing board that are hitting road blocks, but at this point they are just minor setbacks that I plan to have resolved very soon.

I have always been a neat freak at heart, but with the ongoing projects, I have never really been able to organize this place to my liking. It seems like I have gone for years just moving things to and fro while juggling to get the next project done. Now we have finally reached a point where things are finding their place and organization is becoming more and more evident.

As some of the larger projects are being completed, things are beginning to run more and

more efficiently. My workbench is still covered with tools and a few half-done projects, but each day it's

looking better and I am feeling better about it. I guess I have a better perspective on things on this bizarre little island now. That overwhelming burn-out that I faced after the fire has faded and I am actually enjoying my job once again. As I look back, it's amazing how much I have learned and grown through it all. Thanks to all who have supported me through the tough times. You are much appreciated!

Last year at this time, I was all upset about the growing bureaucracies in LA County that were finding their way here to the island and our transmitter plant. This year, it seems I have found a solution that seems to keep them at bay. The Santa Catalina Island Company has decided to hire a large crew to trim the eucalyptus tress along the road that leads to the interior of the island, including our plant. The scope of this job makes it unsafe to travel the road while the work is in progress, so at 7:30 each morning, the road closes until 1:00 each afternoon. This literally shuts down access to and from our plant



every day, making things so quiet up here it's almost kind of eerie. Add to this the fact that we have received more rain over the last month than we had in the last three years and this place is really quiet. No more insane inspectors and no more lost hikers – just a quiet and very muddy transmitter site.

With the road closed each day, I have had to do some pretty interesting juggling to keep our fence crew working and to get supplies to the plant, but I am used to unannounced obstacles here by now. Sometimes I just chuckle and say, "God is bigger than this!" and it seems there is always a way to navigate around the roadblocks if you stay focused and calm and most of all, trust God to show you the way. He has never let me down yet. Even with all the major chaos we have been through up here, the kids and I are always amazed when we look back.

Speaking of rain, the island received so much rain this last month I am surprised at how well we handled it. There were no major landslides and not even a large amount of rocks falling down on the road. After the fires, there has been a growing fear of major land and mudslides, but once again, God has His hand covering this little island and holding us together. Our driveway is pretty muddy and I need four-wheel drive just to get in and out, but with the new concrete work pads and gravel parking pad, it is not so bad. Being able to get out of the truck and into the building without tracking through ankle deep mud is a really nice thing. This is the first big rain since the gravel and concrete were installed, and I already don't know how we got by without it.

Though most things are looking pretty positive, there were a couple little *island factor* occurrences we had to deal with. The most impacting, at least emotionally, was the flooding of our living room in the residence quarters here at the transmitter site. We had some construction done on this room a

couple years ago and never quite got it completed until last month. The heartbreaker was that we got it about 90% complete and the kids and I actually had dinner at the table instead of on the floor of their bedroom for the first time in almost two years.

We went to bed Saturday night feeling pretty good that we were going to not only complete the living-room but also the workshop next door the following Monday. We got up for church Sunday morning and to our surprise, the entire place was flooded. The water was flowing from under the door of the shop and into the living-room, so I went to see where it was coming from. My son and I walked around the perimeter of the building several times but had no idea how the flowing stream of water was getting in. Finally, I decided to go back inside and dig under the workbench, and wouldn't you know it, in extreme *island factor* style, the water was percolating through a newly-formed crack in the concrete under the bench. How many of you have ever had to deal with a running spring *inside* your transmitter plant? I guess the hill behind our facility has become so saturated with the ongoing rain that the water decided this was as good a place as any to spring up from the ground. We have been discussing tapping the spring and offering "KBRT Clear Running Spring" bottled water, "bottled at the transmitting source..." LOL!

With things moving along here, there is still no shortage of work. We have many things on the drawing board and look forward to the completion of more projects this coming month as our transmitter plant continues to become more organized, efficient and reliable with each passing day.

Until next month, the Lord bless you and keep you; the Lord make his face shine upon you and be gracious to you; the Lord turn his face toward you and give you peace.

The Chicago Chronicles

By

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

How Dare They?

Instead of a couple of big essays this month, I've strung together a whole bunch of little ones, just to show you my unfocused side can predominate at times. My staff here knows that in real life, it predominates all the time, but it's time I let you all in on it. Don't know why. It's just time.

Let's start off with where Tom Gardull, our Detroit CE, left off last month. Good work, Tom. Your article about the comparative cost of T-1 circuits (vendor dependent) lit a fire under all of us and led to a memo from Cris to have us all contact our providers to see when contracts started, how long they ran, and how much we were paying a month.

Now, it isn't like I hadn't seen this concept of comparative costs before. I'd just forgotten about it, since my last experience with the cost of such things as T-1 and analog audio circuits was years old. But boy, did it bring back memories. And, per Cris, I started checking.

We have two T-1 circuits. Both go to our Kirkland site, which is way out in the boonies. One originates at our Lansing site and dates back a little over three years. The second is newer, originates at the Hammond studios, and goes out across the state line. Like the Lansing T-1, both are inter-LATA, both from AT&T to Verizon country. Because of the inter-LATA, neither could be bid by either AT&T or Verizon. We had to go to a third party. The Hammond run, which is the newer one, is administered by a local outfit, Cimco, which gives us both great service and a really good price. We love them. Unfortunately, you can't have them since their operations are confined to the Chicagoland area. The older Lansing run is administered by another firm which won't be named to protect the guilty and us from a lawsuit, but you all would know who they are if I told you. That sets the scene.

I contacted both companies after receiving Cris' memo and attempted to get the contract dates and rates. Cimco was forthcoming almost

immediately. Rate was good, too, less than \$670. Great. The other company wasn't nearly as responsive. I got the runaround from Dallas to

Cleveland on this project, but finally got someone who was able to tell us something. That "something" was that our contract was up for renewal on October 10, 2010 (10/10/10, for you numerology freaks) and that the rate was close to \$1450 monthly, more than twice the cost of the Cimco T-1.

Remember, this was for the circuit which doesn't cross the state line. Worse, the original contract apparently contains an "evergreen" clause which binds the customer to an automatic extension of the contract for three years without recourse or notice from the vendor other than a paragraph in the original contract. Needless to say, we were stuck. Or, maybe not. The vendor responded with an offer of a competitive rate (similar to Cimco's, as it turned out) if only we would switch from a T-1 to an "MPLS" solution – read that "STL via the Internet." Cris said, "NO," which agreed with my assessment.

Cris told me to get a copy of that contract. I did so or, well, I tried. No luck. The vendor went into scramble mode to look for it. Their legal department couldn't find it, under Crawford, Dontron, or our any of our call letters. So, here's what the vendor did: They sent us a new contract to sign, since they couldn't find the old one, with a monthly rate reduction to \$1100.00 – still far more than what we're paying Cimco for even better service than we're getting with our present Lansing-to-Kirkland circuit. They've got to be kidding.

So, Cris has a copy of the new contract but not the original one. That original wasn't signed at Corporate, but rather here in Chicago. Hopefully, we can find it. If not, I don't know what we're going to do. Can you enforce an original contract that doesn't exist in anyone's files?

This whole scenario is going to play out long after this issue goes to press. If there's any resolution to this issue, it will have to be reported in a



future issue of *The Local Oscillator*.

Encoding of Audio from CD for Streaming

This one kind of sneaked up on us. Actually, it sneaked up on all of us. (Whatever became of long deadlines for enactment of rules and regulations?) There has been a recently-enacted ruling by Copyright Royalty Board stating that any programming streamed on the Internet has to have all pertinent title, artist, album and marketing label sent down the stream with the audio so it can be reported along with the number of listeners to SoundExchange. The thing is, if your station is streaming, getting that information onto the stream from *all* of your program sources (especially CDs) is problematic, at least for now. This includes such programming as countdown shows from syndication services, mixes, the local reggae show, whatever. But there are solutions, both here and on the horizon. I'm only going to touch on them a little bit this month. We're just getting started on the solution trail ourselves as this is being written. Let's look at a few of them.

One of these is TRE (The Radio Experience). We have it here in Chicago, and we recommend it to anyone who doesn't have it. The thing is, I'm not sure that TRE is suited to working with streaming data as much as it is working with PAD for the broadcast side. Be that as it may, there is something about the TRE architecture which makes it of interest for what we're trying to accomplish. When TRE is set up, the user is instructed to create a folder in a virgin drive (one created for this particular purpose). One folder is created per service, be it main channel or HD-2. In our case, we use drive letter "v" for the particular drive letter. (No, the word 'virgin' had nothing to do with that choice.) The pertinent PAD data for each song is dropped in the "v" drive as the song begins. The TRE program checks that same folder several times per second for any changes in the data which lives there, which of course changes every time a new song comes out of the automation system. Here's the trick: Any new data dropped into that "v" file will be transmitted as PAD data, provided it is formatted properly. A glance at the contents of the file will show the proper format. Just open WordPad and type in the info. Then save it to the folder and watch it go on the air. Since the "v" drive is accessible to any computer which is on the same Ethernet platform as the "v" drive, adding PAD data manually become a snap, once you get the hang of it. We've already tried that here as an experiment, and it really works.

Now, if adding that data can be done

manually, what about the idea of a CD player with a data port output (either serial or Ethernet CAT-5/6) which can read the PAD plus album title/marketing label data off the CD and sending it to the appropriate "v" drive folder for transmission to the stream? If the CD won't yield up that information, why not copy the CD within "Toast" or a Microsoft counterpart, and add the information manually? There's a lot of manual operation involved here, and one of the goals of our research is to see if all this information can be gleaned and sent to the stream's data component automatically. We're in rather a race against time on this one, and we know it. In the meantime, we have to turn off the Internet stream during any such programming.

One of the things I recently discovered is that here in Chicago, a service exists which makes a record of every song played by all four of the CHR and hip hop stations in the market and tabulates a survey of the number of times each song is played on each station. Now, this kind of service has to be automated, and though the service claims that the process is proprietary, it has to be based on data which is encoded into the audio, something which may not be dissimilar from what Arbitron is doing with the PPM system. However, if this were the case, we in Broadcast Engineering would have heard about it by now. To be sure, we're looking into it, but we're also checking out other avenues as well.

Our network broadcasts are also affected. In our case, we broadcast Michael Baisden from ABC Long Forms on two of our stations, but we've had to shut off the stream of that program since we don't get PAD data from the network. Well, that's about to change. The network has just informed us that Baisden is broadcasting from a new studio with a new automation system installed, and all his music material, heretofore broadcast direct from CD, will be streamed to the affiliates within a few weeks. We're waiting with baited breath.

This is so new to us that this is about as much as I can say for now. There will be more info forthcoming in future editions of *The Local Oscillator*, to be sure. Stay tuned.

LED Tower Lights

We had installed those new LED obstruction lights on our towers late this past year, and we're planning to replace the big flashing code beacons with their LED counterparts next year. This is supposed to save us money on both electricity and tower climbers since these new LED types don't require near the maintenance of their incandescent counterparts, something like 1/5 the number of climbs

required (or more) and the saving in electricity is 90%. There is no reason to deal with the climbing issue: it is what it is. On the electrical side, however, there's this little check list I recently developed for the time when we make the big switch to solid state lights. I'd like to pass it along.

–Be sure to get new lighting alarm modules.

The old ones won't handle the small amount of demand current that the LED lamps desire or draw. The SSAC SCR9L Universal LED Lamp Alarm Relay works pretty well on both obstruction and beacon lighting circuits. Start there. We did.

–Replace that 50 AMP tower lamp breaker in the main panel with one rated at 10 Amps. In most cases, it is the smallest size breaker you can get; you won't need any more.

–Replace the output breakers for each level in the control box, if you can, with ones which are small enough to handle the normal current of an LED tower light set, be it 1 amp for a given obstruction light level, or 2 or 3 amps for a beacon level. This may not be possible, but it's better than having 20 amp breakers for a three-light obstruction level as our controller boxes presently have.

–Get the booster transformers out of the circuit and out of the box. Those things are in there to overcome the lowered voltages at the light sockets themselves, which is of course caused by the IR losses in the wires going up the tower. Without all that nasty I (as in current) being drawn by the old incandescent beacon lamps, there is no reason to fear IR losses anymore. They alone are responsible for the vast majority of the heat generated inside those unventilated boxes. Therefore, those iron core monsters will make one nice cool set of bookends for your tech library, if you don't already have a couple of NAB Engineering Handbooks on hand to perform the function.

Doing all of this will both make your system closer to code requirement and reduce your power consumption even more.

811

You heard it first here. From time to time, we broadcast engineers have all needed to dig holes for all sorts of stuff as part of our work product. Quick, how many of you can remember the number to your local utility locating or "dig" service? No fair peeking in your Rolodex or Palm Pilot! Oh, I know mine, but I'll admit I had to think about it for a few minutes, and my first guess was wrong.

Well, that old 800 number is now a thing of the past, since there is a single, new, national three digit number for getting a utility locating service to

come to your site: 811.

As of now, that number is replacing the ones for JULIE and Miss Dig in the Midwest, and whatever the service calls itself in other areas of the nation. About time this happened, too. Now there's one less excuse for not calling in and having the area of the dig inspected.

Cell Phones

Before I begin, I have a confession to make. Cris put me up to telling you this. Here's how.

I recently had reason to check in with the local cell shop to see about when my contract was up. As usual, the nice pert young sales lady told me that I was also due for a cell phone upgrade. I calmly told her that I really didn't need one. She calmly told me that the cell phone I was using was really getting rather old and that I should upgrade to something with all the latest features. I asked what features were new. That was a mistake.

As it turns out, there are a lot of new things of which a cell phone is capable. I've known about a number of them for quite some time. Distinctive ring tones, not just distinctive to your phone, but to who is calling you on your phone. I know of a couple of guys who use Chopin's "Funeral March" or something equally depressing, for when their ex-wives call, for instance. I know about using the phone for iTunes downloads, and I'm just becoming aware of the ability to download the latest videos for viewing on your phone. I'm being told that whole movies are next. Then there's the ubiquitous camera phone, which is exactly what I chose my present phone to avoid. And the iPhone, which to me really begs the question: "Why?" I know about all these wonderful phones with all of these really extraneous features. I'm not interested in any of them. Period. Sorry.

It's as if the phone makers and the cellular providers are trying to distract you from a cold hard fact regarding the state of the art of the cellular telephone in the last five years: Cellular phone audio quality and reliability suck wind, big time. And it's getting worse, folks. At least in my ears it is. It's the one area of the electronic revolution where the improvements are not being made in the basic reason for the existence of said electronics. They're being made everywhere else where the phone is involved, but not in the basic reason for which people buy a phone, namely for a good, reliable call.

Garbled messages, dropped calls, the inability to make calls, really strange phone connections and audio anomalies – I experience all of those in spades. I recently tried to call a co-worker

and suddenly found myself, instead, in the middle of someone else's conversation, an experience I didn't need. They didn't try to hide the fact that they didn't need it, either.

I guess that all these "features" belong to me because I've paid for them, though I can't find a reference to them on my monthly bill. All I really want to see, frankly, is a reliable phone system with a reliable phone attached to both it and me. I want to be able to hear clearly the audio from the other end, my tinitus notwithstanding. In other words, I just want a phone that works well as a phone. And yes, maybe my own special ring tone. Which I can't find. Wagner's trumpet fanfare, "The Entry of the Guests" from the opera Tannhauser would be ideal. That's all I want. Is that asking too much?

Anyway, I told Cris all about this. After he quit laughing, he told me to tell you.

Meeting about HDR, in Sam's Club?

Maybe the public is starting the message about HD radio. Anecdotal though this story is, I have to share it because it gives hope.

I was in Sam's Club recently. Now, that's a great place to go to save a lot of money on stuff you need but not in that much quantity, check out the samples until you've ruined your lunch (or maybe that was your lunch) and generally use your oversized shopping cart to just get in the way. I think that grid lock was invented there, though I can't locate anyone who would swear to it.

Anyway, I had one of those moments which can only happen there: A family of four was trying make its way through the frozen foods when one of the kids just backed into my shopping cart, knocking it into me. Now, I wasn't concerned about it but the

parents were and they really gave the kid what-for, then started apologizing to me, at which point the wife noticed my station logo jacket and asked if I worked there. Upon my "yes," she immediately asked if the station was using HD radio. That was a huge surprise; it had never happened before. Well, I got into that conversation real quick and pretty deeply, forcing other customers to take detours to get around the grid lock we were causing. To make a long story short, the wife proceeded to confess that she had wanted an HD radio for her car for Christmas, a statement which really caught the husband by surprise. I didn't want that tangent going on any further, so I told them about the formats which await HD-2 listeners in the Chicago market. They were most interested.

Maybe, just maybe, that conversation pushed them over the edge and on to Crutchfield or Best Buy for that new HD Radio. I don't know. But I left them after that, without mentioning something I'm going to mention now, something for which I wish I could cite a source, but here it is: There is a new generation of HD Radio coming, and it isn't being designed by Ibiquity. It's coming from the Japanese, and it promises superior performance in both sensitivity and sound quality in the HD modes. That means that reception of FM-HD signals may be possible outside the limits of city-grade contour. If that's true, if that kind of radio is soon to be out there, then don't worry about consumer acceptance. I've also heard that the Consumer Electronics Show in Vegas featured new portable HD radios, which is also good news. Let me look around and get some real documentation on all this, and let's meet here next month to share it.

Until then, blessings!

The Portland Report

By
John White, CBRE
Chief Engineer, CBC-Portland

The days fly by when you are having fun. The question is, what kind of fun? It's winter, so of course more snow and ice is on the agenda. Is that fun?

A few moments for housekeeping... A few columns back, I discussed correlation and causation. I happened to mention the correlation between declining numbers of pirates and increasing temperature as an example. Later I was made aware that satellite data indicates declining temps worldwide for the last decade so. As such, I thought the correlation with pirates must not hold.

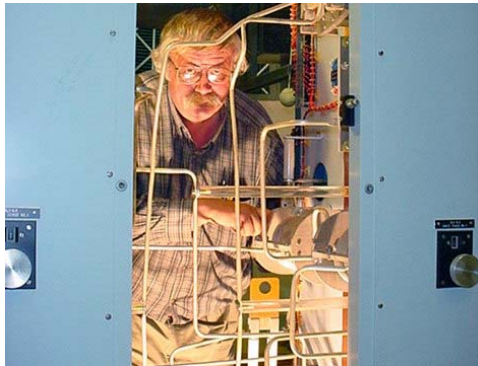
So I did a little research and found that as temps declined, the number of pirates has been increasing lately; pirates are becoming more prevalent in the Caribbean. It turns out that piracy has also been increasing in areas near Somalia, causing a major problem for Japanese shipping. So the correlation holds! Oh well, so much for ridiculous examples used to illustrate a point.

I noticed that Art Reis commented last month about an unlighted tall tower near WSRB and the intersection of I-80/94. As I was reading his comments about the "doesn't apply to me" attitude, I thought of the potential for pattern distortion. Here in Portland, I have an ongoing problem with a nearby tower which is in violation of the AM protection rules. Also owned by a government agency, the owner claims that they are licensed under Part 93, so the rules don't apply to their tower.

Some years ago, I noticed the proliferation of cell towers along Portland area interstate highways. The towers are often between 50 and 90 feet, well below the normal height that requires aircraft obstruction lighting. I also noticed that without many exceptions they had obstruction lighting. It took a few minutes of thinking to understand why: Life Flight! Life Flight helicopter ambulances operate in and around the major freeways on a regular basis. Even quite short towers pose a

real air safety hazard in that environment.

I have also been asked, "How could someone at KVI in Seattle listen to KFXD in Idaho?"



The two stations are first-adjacent to each other, just 10 kHz apart. Actually it turns out it's not that hard. The key to doing so is the antenna. A loop antenna has a figure-8 pattern with a sharp null and broad lobes. By placing the null on the local station, it's quite easy to hear the distant station with little if any interference.

T1 Woes

Our T1 STL line has been a real problem lately. The problems showed as blips and bursts in the audio stream. Initially, I thought (wrongly it turns out) that the problem was from another source. Our line is a true T1 4-wire copper circuit at the Mt. Scott span.

First, a bit about the symptoms, as I expect this is the kind of problem we are likely to be seeing more of in the future. Basically, when our T1 is good, it's good, but when it's bad, it's very bad. There are short bursts of missing frames which occur when they occur but not when Telco is looking at the line. Intermittent problems are the hardest to find unless you are looking at the exact moment they happen.

Most disturbing is that the Telco statistics do not show the useful information one might expect, which raises questions about detecting problems and maintaining line quality. Two examples from my ongoing experience really show this problem.

I reported this T1 problem to Telco some time ago, so I had an open monitor ticket on the problem. Telco was monitoring line statistics and doing loop tests during off hours when I was able to allow them to go intrusive on the line. For monitor purposes, Telco was looking at the statistics last central office (CO) interface for the studio and transmitter end spans. I did have one incident where Telco went into the line intrusive and took the line

down at the wrong time for testing, but that is another story.

It turned out the monitor ticket was a key blessing when the line went down hard. Stone cold dead. With the monitor ticket, I was able to bypass the trouble report process and get directly to the Seattle test center. The conversation went something like this.

TELCO: This is Seattle Test, may I help you.

ME: My T1 line is down. Is someone doing intrusive tests?

TELCO: Let me check... no sir, we are not testing the line.

ME: My T1 line is down hard.

TELCO: Let me check... the statistics look good at both ends, the line is okay.

ME: The line is down hard.

TELCO: May I go intrusive?

ME: Yes

TELCO: Oh, I am getting all 1s at the Z end. The line is down.

Now, all 1s is a dead line at the Mt. Scott (Z) end of the line. I found out later this fault killed the power to all the repeaters (9 repeaters) in the line and the NIU (Network Interface Unit) at the transmitter. The Mt. Scott end span is an all-copper 4-wire circuit.

The point here is that the line was stone cold dead and the Telco (non-intrusive) monitoring did not detect the problem – something to keep in mind as I would guess that the monitoring here in our area is not vastly different than other areas of the country.

The fault was found to be a “wet connection” and the fix was to cut over to a different pair in the cable serving Mt. Scott. At that point, Telco wanted to close the ticket. Telco and Oregon PUC monitors staff productivity by the number of days a ticket is open, so I said okay and insisted a new monitor ticket be opened.

That turned out to have been wise. The line ran clean for a few days then went intermittent again. So there I was again, back to the original problem but not at square one, as I had the monitor ticket open.

My problem is still ongoing; however, I now have some additional observations. From the studio,

our line runs copper for a short distance to a fiber hut, then from that hut to the local CO and on to “Portland 18.” When the problem started again, the open monitor ticket allowed me to get directly to Seattle test. I also got a responsive test operator. He started by looking at the statistics, which were okay (no big surprise). When I told the tester about the previous statistics showing good while the line was all 1s, he took the time to look further.

Here is what he found as he looked at Code Violations (CV). CV errors are a mix of Bipolar Violations or Excessive Zeroes events. I’m not sure I have all the locations exactly correct, although the pattern is correct: at the studio NIU, 7 CVs; at the fiber hut, 25,000 CVs; at the CO, 4 CVs. What that’s telling me is that the Code Violations are being patched and bad data sent on in correct format. Looks like more to come on this saga.

Snow

Snow events have been the big news lately in Portland. On average, Portland gets snow once every few years and Portland drivers go crazy. This year, we have had five snow events, the most recent having been nearly a week in duration. I learned to drive in southern Idaho. If you didn’t learn to drive in snow there, you didn’t go out for a good part of the year. Normally snow isn’t a big deal for me except that it keeps me busy sweeping out the satellite dishes and dealing with other snow-related issues.

Local west coast weather is driven by Pacific Ocean currents. Contrary to newspaper articles, we are in a La Niña phase of the ocean current oscillation. The Eastern Pacific is cooler than usual, and the cool water extends farther westward than is usual. Last summer, the local newspaper, *The Oregonian*, ran a series of articles advising the local ski resorts to look to how they can survive without snow. How did that prediction work out? With six weeks or more of winter to come, the northwest has been setting snowfall records. The Cascade Range is currently at 150 percent of average. Saddle Mountain (west of Portland) is at 350 percent of average. And we’ve had more than a dozen eastern Oregon all-time record snowfalls going back to the late 1800s. Hmm, I guess I can’t put away the satellite dish broom just yet.

**Rocky Mountain "Hi"
The Denver Report**

by
Ed Dulaney, CSRE, CBNT, AMD
Chief Engineer, CBC - Denver

Oops!

Thanks to an email not making it through to Cris before the deadline, my January Rocky Mountain "Hi" column didn't make it into the *Local Oscillator*. I sent it, and it's even in my "Sent Items" folder. But it didn't traverse the ethers all the way to Cris' mailbox. Oh, the wonders of the Internet!

So I'll start off with what I had intended to be printed in last month's newsletter, then get right into the new stuff!

Finally!

After almost a month of frustration, I managed to get the NE-IBOC at KLDC to function normally again. Just sit right back and you'll hear a tale...

Late in November, the NE-IBOC at KLDC failed. The initial problem seemed to be that the power supply was fried. We bought a new one at CompUSA and installed it. It powered up, but there wasn't any keyboard or mouse input to the unit. Further, I had many error messages coming from the Ibiqity software.

The next step was replacing the motherboard. Nautel wanted \$600 to ship a new motherboard to us! I thought that was a little "over the line" as far as cost goes, so I tracked down the manufacturer of the motherboards (Itox). They could sell me the exact same motherboard, with the exact same BIOS version, for \$80! Now that's more within reason. I ordered six of them so that we'd have some spares on hand, and waited for them to arrive.

It took a few weeks to get the motherboards, as they didn't have any of them on the shelves. When the board did arrive, we hastily went about installing it into the NE-IBOC. However, things did not go all that well. When we powered up the NE-IBOC, the system immediately started showing errors. One of those errors stated: "Unable to read DUC CPUID." Oh great! So I have a bad digital up-converter (DUC) too? A quick phone call to Nautel seemed to confirm

that the DUC was not sending out the proper CPU ID information, so they would overnight me a new DUC... for around \$3,000!

It was time to get our Corporate Director of Engineering involved in the struggle. He made a call to Nautel, and after a bit of wrangling they agreed to exchange the DUC under their warranty exchange program. Now that was more like it! Unfortunately, the overnight delivery ended up taking five days, as the DUC got held up in customs at the Canadian

border! (Was the DUC spinning a "web foot" of deceit? Did this DUC have a past-due "bill"? Permission to groan granted!)

We installed the new DUC and powered up the NE-IBOC. When it finished booting, we still saw the same error message. I gave Nautel another call to see what they thought.

Scott, the technician at Nautel, went to the back room and asked the technicians if

they'd ever heard of something like this happening. One of them said, "Yeah, it just happened to me!" As it turned out, he re-seated the RAM in the computer a couple of times, then the problem went away.

I had some doubts whether this would work or not, but I gave it a try. Sure enough, the third time I removed the RAM and put it back in, the NE-IBOC powered up normally! The reason why this works is still a mystery, but the fact is that it did work. We put the unit back in at KLDC and called it a day.

Five hours later, the station started broadcasting the most obnoxious noise and buzz on the air. Figuring that this probably wasn't the normal programming for that time slot, I logged into the system. Power output was normal, but I could not access the NE-IBOC by either a VNC connection or by attempting a login to the shell via SSH. It was clear that the NE-IBOC was again down for the count. We switched to the backup transmitter, and on Monday we went back out to the site.

By this time, Nautel had sent us another



complete NE-IBOC unit. We ended up installing that unit, and it seemed to operate normally. But it was impossible to maintain an HD lock on the station. Even at the site the HD signal would come and go. Since it was the end of the day, we decided to call it quits and picked back up on the adjustments on Tuesday morning.

Upon arriving back at the site the next morning, we installed the NE-IBOC that had the buzzing problem. It booted up perfectly and from all outward appearances seemed to be fine. But even it wouldn't hold a lock. We then tried installing the latest Ibiqity software, but it still wouldn't work.

Finally, we pulled the original NE-IBOC out and reinstalled the backup unit that Nautel sent us. We then tried tuning and tweaking settings until we were blue in the face! But still, despite everything we tried, the HD signal wouldn't stay locked.

I then looked at the spectrum with the Anritsu spectrum analyzer. KLDC is diplexed with KCFR here in Colorado, and one of the third-order products was above the FCC limit. A-ha! The plot thickened! Apparently there had been a shift in the diplexer, and this was causing the distortion of the signal. I did a few adjustments of the traps in the diplexer and managed to get the product down to -80 dBc, but the HD still wouldn't lock.

So the next day Amanda and I dragged the 500-pound gorilla, known as the "HP Network Analyzer and Back Breaker," to the KLDC site. I went through the usual steps to set up the analyzer into the system. Then I plotted the Smith chart of the current network. Sure enough, there had been a change in the system. By now Cris had arrived at the transmitter, and he observed the display while I went out in the 34-degree weather, with a 20 mph wind, and adjusted the diplexer.

After a few iterations and a little training for Cris on the operation of the analyzer, we had a plot that was more in line with our expectations. A few minutes of adjustment with the NE-IBOC, and the HD signal was as solid as ever.

So what made the difference? The cusp rotation was at roughly 10 o'clock on the Smith chart. The Nautel ND-1 transmitter prefers a cusp at 9 o'clock for proper operation. So all we had to do was slightly change the tuning of the ATU input and

output leg to enable the cusp to rotate to the proper position. Again, this demonstrated to me the fragility of the HD carriers. Unless things are properly adjusted, the HD carriers will not be in their "box," especially when the load is "challenged" as it often is through a diplexer.

The KLDC-KCFR IM products are still well within tolerance, and the HD lock has been solid ever since. Why did things change? Who knows! It might have been weather related, or it could have been just a curious individual playing with the network. Nevertheless it's stable now, and that's all that matters.



Amanda loves the new Agilent network analyzer – which doesn't weigh 500 pounds!

Creative Solutions

In January, the STL for the KLZ site had some issues with getting the signal from point "A" (the studio) to point "B" (KLZ).

Engineering-101 specifies

that a link that is designated as an STL is a "Studio to Transmitter Link," and therefore this link would no longer be considered an STL. Instead it was an STN (Studio to Nowhere!).

Amanda and I scrambled to figure out what had happened. The Canopy link showed good connection on both ends, but the Intraplex would not connect. We decided to fire up the ISDN backup for the site, and that's when we ran into our first snag!

When KLZ was upgraded to AES audio at the transmitter, the ISDN unit was supposed to get an analog-to-AES converter installed. However, as others know, sometime things are forgotten in the midst of solving other problems. Therefore, a call to the ISDN backup produced nothing. It was time to dig into the Intraplex problem with a vengeance!

As it turned out, somehow the TOS bits on the Intraplex card had been changed. The "Immediate" bit had been cleared, and therefore the Intraplex had been relegated to a low priority within the Ethernet chain. When you have a network that is shuffling traffic around that nears the bandwidth of the Canopy link, it's very important to keep the TOS "Immediate" bit set! I'm guessing that at some point in time we were looking at the Intraplex, and accidentally clicked on the "Service Level" drop-down in the configuration. Those changes don't take effect until the Intraplex is rebooted. So it was likely that a glitch in the Intraplex caused it to reboot, then it took on the new TOS settings. And that, in turn,

brought us to a screeching halt.

With that problem solved, I started to work on the ISDN link to KLZ. Our operations manager, Charlie Grimes, pointed out that even if the ISDN link worked for KLZ, it still wouldn't solve the problem of getting the program audio to the uplink for the satellite shows that originate from Denver. This called for wisdom...

I sat down, scratch pad in hand, and started drawing out the program flow. The feed to the uplink came from a different processor than the feed to the transmitter. So I needed to keep those separate. However, in an emergency, the ISDN audio needed to feed both the transmitter and the uplink.

Finally I drafted a plan that seemed to be a good idea. At the transmitter I fed the output of the ISDN into the Nautel EASU. If you have one of these, you know that there are two sets of form-C relays available with XLR input and output. The plan was to take the Comrex DXR.1 "Ready" line and switch the relays from one input to the other. The "A" relay would drive the Omnia processor (as an AES signal) and the "B" relay would drive the satellite uplink (as analog).

Now all I needed to do was take the analog out of the ISDN and feed it to the normally open side of the "B" relay. Then I'd bridge that with a Kramer analog-to-AES converter and connect that to the normally open side of the "A" relay. Voila! Analog to the satellite and digital to the Omnia!

The normally-closed sides of the relays would be fed with the lines that are already connected to the processor and satellite. This would be the Intraplex program output from the studio for the transmitter, and the uplink program output from the satellite processor.

A test of the system shows that it works perfectly! Although it's not what the EASU was intended to do, it serves us well in this capacity!

True Experience

We've talked about the "Listener Experience" and how it impacts what we do as engineers many times in the pages of *The Local Oscillator*. But the question is: are they really listening?

If you read the reader comments in *Radio*

World or browse many of the Internet broadcasting forums, it seems that everyone is ganging up on HD Radio. There are literally hundreds of people complaining each month about how HD Radio has destroyed broadcasting as we know it. And, to a point, they are correct. Broadcasting as we knew it in the analog days has gone away.

But this, in my opinion, is a good thing! Broadcasting is not a hobby, but a business. We don't do this just for the joy of hearing our voices carry over the airwaves. If that's what you want to do, then get an Amateur Radio license and chat with your buddies as much as you want! That's what I do when I want to just have a hobby. However, as you and I know, you can't make money doing that.

Radio needs to do everything it can to present a quality product to the listener. This not only means programming that people want to hear. It also means that the audio needs to be the best it can be. And while I will admit that a well-tuned C-Quam analog signal sounds better than a well-tuned HD Radio signal, the fact is that C-Quam is not a viable method of broadcasting. And there are those that say that we need to stay analog and broadcast a full 10 kHz bandwidth signal. Yet 99% of the radios in the marketplace can't hear anything above 4 kHz.

Anyone that's given an objective ear to an HD Radio broadcast will tell you that it's better than the analog alternative. Sure, there's artifact heard within the music. Even on FM HD broadcasts where the bandwidth is greater than AM, you will hear the artifacts. There's no getting around that. But the average listener won't hear it.

And that brings me back to my point. We need to make sure that we cover both of our bases. We need a product that makes people want to listen, and a sound quality that will keep them listening. I've tuned into many HD Radio signals that have driven me away, even though I was enjoying the programming, because the sound quality wasn't up to the standards I demanded. Likewise I've listened to stations that have great audio quality, but the programming sounded like something developed by the Keystone Cops while practicing a Chinese fire drill!

Until next month... press on!

Digital Diary

by

Larry Foltran

Corporate Website & Information Technology Coordinator

The Long Arm of WiFi

While flipping through a photography magazine recently, I came across a short article about a new memory card with WiFi capability. Needless to say, it snagged my attention and sent me right into techie day-dreaming mode.

Dubbed the "Eye-Fi" card, it allows you to snap pictures with your digital camera as you normally would with 2 gb of storage capacity. If there's an available WiFi network nearby, it will automatically upload the photos to the online storage service of your choice and to your computer via the storage service. As long as there is a wireless signal nearby, you can shoot indefinitely. If you're like me, this is pretty exciting, especially if you're tired of keeping tabs on an army of CF memory cards.

That brings me to the day-dreaming part. How useful to the masses is technology like this? This specific product's market base is somewhat limited, but the technology it represents holds quite a bit of potential. Although many cities are moving quickly to develop their own public WiFi networks, signals are mostly limited to the confines of homes and businesses. But following the lead set by St. Cloud, Florida, Corpus Christi, Texas and Philadelphia, Pennsylvania, municipal WiFi service may soon be commonplace.

That type of availability can definitely encourage the improvement of many modern conveniences we use on a daily basis and provide a foundation for numerous new tools. For example, a dependable and high-speed municipal WiFi system could someday make the traditional cell phone a museum piece and usher in the use of mobile voice over IP (VOIP). Think that's far fetched? It's already here.

Voice over Wireless LAN (VoWLAN) is already being used in limited capacities and companies are jumping on board quickly. In fact, I recently read that analysts see the VoWLAN industry

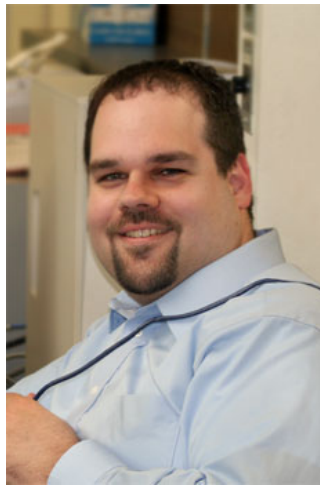
growing to \$10 Billion by 2010 in Europe alone. This technology is currently being utilized inside large facilities with existing WiFi networks. But with the expansion and broader availability of WiFi networks, VoWLAN phone users will be able to move outside the confines of their building without switching over to the traditional cell mode that today's Mobile WiFi phones feature.

WiFi technology seems to be making its way into all forms of communication, including radio. Visitors to the 2008 Consumer Electronics Show had the opportunity to see a new portable WiFi radio hitting the shelves in April. Although this is not the first WiFi radio to hit the market, a much longer battery life makes this unit unique. That opens the door to many different variations of hand held units and dashboard mounted car units.

Not too long ago, my cousins in Brazil celebrated the birth of their new baby. WiFi technology helped bridge the vast geographical gap. Thanks to hospital-wide WiFi, a laptop computer and a web cam, we were able to see the baby minutes after she was born and speak with the new parents as if we were in the same room. Our family has also used this technology to participate in birthday parties and other family events that were impossible just a few years back without making a 12-hour trip. Although watching as everyone enjoys cake that is over 5,000 miles away does slightly put a damper on things.

These examples clearly represent only the early stages of WiFi development, but the future of expanded WiFi use will lean on increasing its dependability and speed. Increased demand will fuel that fire as well, pushing us closer to high-speed data streams that are consistent and widely available. We look forward to a day where we can instantly connect to the rest of the world wherever we may roam. Now if they can only figure out a way to make my laptop battery last longer!

...until next month!



SBE IRLP Hamnet

Those Amateur Radio operators in our ranks are invited to check in to the SBE IRLP Hamnet on the first and third Saturdays of each month at noon Central. 2-meter or 70 cm IRLP nodes exist in most CBC markets. More information on the IRLP is available at <http://www.irlp.net>. The SBE net is on the Great Lakes Reflector, which is node 9615.

For more info on the SBE IRLP Hamnet, go to:

www.qsl.net/ke0vh/SBEhamnet.htm

You can claim ½ recertification credit for checking in!

The Local Oscillator
Feb 2008

KBRT • Avalon - Los Angeles, CA
740 kHz, 10 kW-D, DA

KCBC • Riverbank - 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 • Buffalo, NY
99.5 MHz, 110 kW/195m AAT

WDJC-FM • Birmingham, AL
93.7 MHz, 100 kW/307m AAT

WEXL • Royal Oak - Detroit, MI
1340 kHz, 1 kW-U, DA-D

WLGZ • Rochester, NY
990 kHz, 5 kW-D/2.5 kW-N, DA-2

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, 6 kW/65m AAT

WYCA • Crete - Chicago, IL
102.3 MHz, 1.05 kW/150m AAT

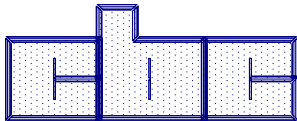
WYDE • Birmingham, AL
1260 kHz, 5 kW-D/41W-N, ND

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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