The Local Oscillator

The Newsletter of Crawford Broadcasting Company Corporate Engineering

OCTOBER 2017 • VOLUME 27 • ISSUE 10 • W.C. ALEXANDER, CPBE, AMD, DRB EDITOR

Fire!

A large and fast-moving wildfire in Orange County, California made the national news the last week of September, so there's a good chance you saw the story. What you may not know, however, is that the fire was in the area of the KBRT transmitter site at Oak Flat, in the Santa Ana Mountains on the Orange/Riverside County line.

The Canyon Fire started in the vicinity of the 91 Freeway and Green River Road at or about 3:30 PM on Monday, September 25. My guess, just based on location and conditions, is that someone tossed a cigarette butt out the window, but it could have been something else. One way or the other, it had to be human caused.

One thing I have learned after living in Colorado for so long is that fire races uphill and crawls downhill. The terrain slopes sharply upward from the 91 Freeway going south, and the fire raced up that mountainside, driven by northeasterly winds. Within minutes, it had reached the top of the ridge and was moving southwest, right at the Sierra Peak tower site and the KBRT transmitter site.

This Sierra Peak roof, several transmission lines/waveguides and antennas were damaged by the Canyon Fire.

At some point, it appears that a rooftop at Sierra Peak caught fire, and from there the fire burned up the jackets of transmission lines and waveguides, destroying several lines and antennas on one of the towers. I don't know the extent of the damage to the equipment building. It does not look as if the roof caved in, so perhaps something can be salvaged there.

Orange County Fire Authority, Cal Fire and other agencies threw everything they had at the fire, including 1,900 fire personnel, over 200 pieces of equipment, 11 helicopters and seven fixed-wing air tankers, including one converted DC-10. I watched a live feed from an L.A. Fox News helicopter as that DC-10 dropped load after load of red fire retardant ("slurry") along the ridgetops south of Sierra Peak. I could clearly see the fire in the foreground and the KBRT Oak Flat site in the background. I was profoundly grateful that the slurry lines were between the fire and our transmitter site.

By Wednesday evening, the fire was 65% contained and fire personnel were starting mop-up operations, putting out hot spots and preventing flare-ups that could start another run.

Sierra Peak site -- the burn scar below it is clearly visible.

On Thursday morning, Todd Stickler was able to caravan up to our site to get eyes on it. This was important because right after the fire started, we lost power at the Oak Flat site for 12 minutes. The generator started up and we got right back up, but when the power went out there was evidently a surge of some sort that scrambled the brain of the Dragonwave Horizon Compact Plus 11 GHz microwave radio at the top of Tower 2. There are no utilities at the site other than electrical power, so everything else – phone, security, video, audio and internet – are transported on that link, and when it went down, we lost eyes and ears on the site.

Fred Folmer was able to get up to the site Monday evening before they closed off the area, and he found that the station had run on generator power for 12 minutes in the 3-o'clock hour, and he confirmed that the generator's diesel tanks were full, but we weren't at all sure if Edison power stayed on after Fred left the site – did some of the Edison infrastructure burn up as it did on Catalina in 2007? By Thursday, we would probably be getting pretty close on fuel if the generator had been running since Monday night.

Thankfully, when Todd got to the site on Thursday, he found that the power had remained on all the way through the fire, and he spoke with an Edison lineman that told him our power feed does not come through the fire area but rather from the south. I knew we were fed off the Pleasants Peak sub, but I didn't know where that feed came from. Evidently it comes from a substation farther south.

Everything at our site was pretty much normal except for the dead microwave radio, which was not dead but rather was "scrambled" (he could hit the telnet or GUI login but the unit would not take our credentials). We have a tower crew coming to swap in the backup radio.

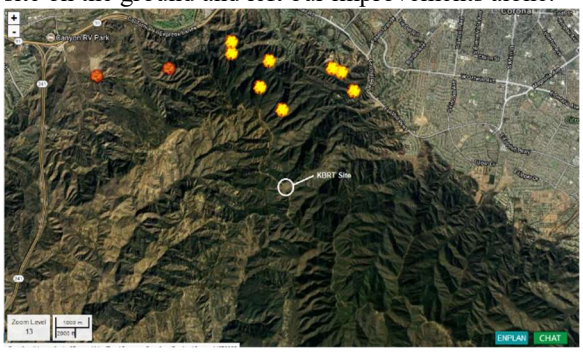
We did sustain some ground system damage from the fire crews – they bladed another fire break up by tower 2 and unearthed some strap. We can't figure out where it came from – there shouldn't be any strap in that area. The array seems to be normal – parameters are all normal, as is the common point impedance.

A 12-foot length of strap was unearthed by a fire crew cutting a new fire break near tower 2. We can't figure out where the strap came from.

The backup satellite feed had done its job, seamlessly providing programming to the site, and the Burk ARC Plus remote control was doing its job as well, monitoring all parameters and taking care of power changes. Our contingency planning worked exactly as it should, keeping the station on the air even when we lost the STL.

As the fire was moving toward the site, I was concerned but not really worried because Todd had done a marvelous job keeping up with the fire mitigation at the site. He kept the grass mowed down

to the roots in a broad area around each tower base, guy anchor and building, and he kept a "keyhole" mowed under the guy wires as well. Had the fire come through our site, I'm certain we would have been okay. It would have moved quickly through the site on the ground and left our improvements alone.



In this graphic, the fire is depicted by the yellow and red symbols. The KBRT site is circled near the center.

When all was said and done, the fire got within 1.3 miles of the KBRT site. It burned 2,662 acres and damaged four houses, the equipment building at Sierra Peak and one outbuilding. There were no reported injuries. Because of the rapid and overwhelming response of OCFA, Cal Fire, Corona Fire, Anaheim Fire and the Forest Service, the fire was quickly contained and our site was kept safe. Thanks to all the great folks who worked so hard to make this happen.

I would also extend a special thanks to Jake Rodriguez and all the great folks at the U.S. Forest Service Trabuco District of the Cleveland National Forest. We have enjoyed a great relationship with these folks since we bought the Oak Flat property, and have worked with them on our project as well as theirs. During the fire, Jake and his good people helped get Todd included in the caravan on Thursday, working with several other agencies to get him up to the site.

National EAS Test

The national EAS test went fairly well for all of our stations. We had a 100% "pass" rate with all stations receiving and forwarding the test. That does not, however, mean there were no issues.

In just about every market, we received and forwarded the LP-1 and LP-2 forwards before we got the IPAWS test. That meant that we retransmitted forwarded audio, which wasn't necessarily a bad thing, but it was not as clear as it would have been had we forwarded the IPAWS audio.

In Portland, we had no audio at all. Evidently the forwarding station did not have audio, so the test, while received and retransmitted successfully by most if not all the stations in the market, consisted of 17 seconds of silence. In a real emergency, that would have been worthless. The problem was evidently in the Washington County Emergency Operations Center, but that's unofficial. I'm sure that FEMA and the FCC will get to the bottom of the issue.

The Denver test that I heard on KLVZ had what sounded like double audio toward the end of the voice message. I'm not sure what that was all about. The message was still intelligible, so I consider it a "pass."

Thanks to all our engineers and operations people who got the test results to me immediately after the test. I had a medical appointment that afternoon and had to leave less than an hour after the test, but I still got all the Form Twos filed before I left. The Form Threes all got filed within the following couple of days. The FCC's ETRS system worked fine.

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

Hello to all from Western New York! Just when we thought we had turned the corner with the beginning of fall, we in the northeast were hit with unseasonably high temperatures the last week of September. With the mercury reaching well into the 90s, we broke records that dated back to the early 20th century. It is unusual that we ever hit 90 degrees, and we experienced three straight days of ninety-plus temperatures.

I was concerned with cooling at the WDCX-FM transmitter site, as we have been having problems with our electrical service overheating recently. You may recall in last month's report that our electrical service is severely underrated, causing the meter socket and main disconnect to overheat due to excessive amperage draw, causing the 200-amp fuses to blow. In order to keep the disconnect cooler, we shut down the digital carriers on the Nautel NV-40 transmitter to reduce the amperage draw, opting for this choice over reducing both analog and digital power levels. This seemed to do the trick, as we have not had any fuse failures and the temperature was reduced almost 30 degrees in the disconnect, and the amperage draw reduced about 20 amps per leg.

We have obtained bids to replace the aged meter panel and disconnect with a new 300-amp service, new weatherhead and upgraded grounding on the electrical service. New York State Gas and Electric (NYSEG) has agreed to change our service to a closed delta, eliminating the "wild leg" service we have had since the site was built in 1963. Our electrician estimated that the transformers supplying power to our plant were in excess of 50 years old, and in all probability, should have been changed out years ago! These upgrades in our electrical service should meet and exceed our electrical demands for years to come.

We are continuing to learn more about the Wheatnet-IP system as time goes on. I am truly, amazed at the versatility of this system, and the different things you can accomplish. One item we are struggling with is the ability to turn the NexGen channels on from the control surface *and* use the mixer to control audio for satellite programs. For some reason, we cannot do both, its either/or. Josh Myers has been working with NexGen and Wheatstone on this issue, but as of this writing, an acceptable solution has not been found. If any of you have any ideas, drop me an e-mail with your suggestions/ideas, I would love to have this issue resolved this month.

Speaking of NexGen, we still have several audio servers and workstations in service from our original installation some 12 or so years ago! We are beginning to experience issues with some of these, most notably, the audio server for WDCX(AM). In late September, the audio server began to lock up, and a hard reboot was the only thing that would make it come back and connect to the file server. It looks as if the processor is overheating, although the fan is running on the processor's heat sink. Cris has ordered a suitable replacement for the audio server, and I am certain that the remaining machines will soon go to that great computer junkyard in the sky. We are indeed fortunate that these computers have lasted this long, as they have been used 24/7 since they were installed!

On an overnight September 30th, I replaced the 4CX15,000A tube in the WLGZ-FM Continental transmitter in Rochester. For years, I have used rebuilt tubes in my rigs, but as of a few years ago, I had to quit purchasing rebuilds, as they were very unreliable. I would have to go through two, sometimes three tubes before I got one that would work properly. This is very stressful on the tube socket, not to mention the cost of shipping the bad tubes back to the manufacturer for replacement.

Several years ago, I discovered the Chinese-built tubes manufactured by the Ningbo Shinekoo Co., Ltd and sold through Richardson Electronics. These tubes are new, and cost about the same as a rebuilt tube, thousands below the price of a new Eimac tube. The recent installation went flawlessly, and the transmitter's operating parameters were very near the factory test data. I have been getting no less than two years life out of these tubes, and in one instance, the transmitter ran over three years without a tube replacement!

If you still have a tubed rig, it would be worth your while to try one of these next time you need to perform a tube replacement. I'm sure you will be pleased with your choice!

The Motown Update
by
Brian Kerkan, CBTE, CBNT
Chief Engineer, CBC – Detroit

After several record setting days of 90-plus degree heat, the cool Michigan breeze is back in the air. It has been an exciting time for us. We have been doing a lot of work at our new transmitter site. Our new Nautel NX50 is sitting pretty next to the phasor. We have been working with our electrical contractor to get everything powered up.

We are in the process of installing new hardline to plumb the NX50 into the phasor, and control wiring to the equipment racks. After spending time doing some investigation into the control wiring, we have configured the existing Harris to be the backup transmitter instead of the main. We modified the input flange for the AUX transmitter on the phasor to accept the Harris 3-1/8" EIA input. It was previously connected to a 5 kw DAX5.

We have installed a Burk ARC Plus Touch to serve as our new remote control system. With 10 towers to be monitored, there is a lot of telemetry.

In the upcoming days, we will be installing our new STL system, an 11 GHz Trango Apex Lynx. I have setup VLANs for the Wheatstone and Nexgen networks. The trunk ports are set up, and the Apex Lynx radios have been configured to support 802.1q VLAN trunking and QOS. This will provide prioritization of delay-sensitive AOIP traffic over standard network data.

We will be running fiber to the radios, which will provide isolation between the tower and the switch inside our TOC. I am looking forward to the flexibility we will have for routing multiple channels of audio through the Wheatstone blade network to the transmitter site.

We recently brought on a new carpet company as an advertiser, and the opportunity presented itself to replace the 20-year-old carpeting in our main control room for WMUZ. I thought it would be a great time to purge a lot of the old wiring, clean the furniture, and dust out the room.

We started on a Thursday night after the Bob Dutko show concluded, and completely stripped the room down to the floor. We switched the WMUZ programming into the WRDT control room using its program bus, and used the utility bus of that G6 surface for WRDT. I transitioned the WMUZ phone lines into the WRDT hybrid, and we were able to run from that studio throughout the project. This was good practice for the staff in case we need to do this in the future.

Once we transitioned the programming, we dismantled the studio furniture. We had to detangle the existing wiring to separate the furniture bases. Once we had them free, we removed them from the room. A number of folks on staff helped to clean the furniture to make it ready for reinstallation.

We had everything ready for the carpet crew when they arrived on Friday morning. Once they had the carpet installed, we started to go through the wiring. We eliminated a lot of unused cables and separated them by function and location.

We brought the cleaned-up furniture back into the control room and reassembled it. That is when the fun part started, putting everything back

together. I ended up re-routing the cables and cutting them to the required length. We were able to locate equipment in such a way to eliminate extra cable runs. When we finished, we ended up with much better cable management. The staff was happy to see us putting the time in to improve the room.

We will be working this month to finish the AM 1200 transmitter and studio work, and will launch on Nov 1st.

Until next month, ‘73 from Brian, W8FP.

The WMUZ(AM) Nautel NX50 in place next to the Kintronics 10-tower two-pattern phasor.

The WMUZ-FM control room cleaned and ready for new carpet

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

Another month has flown past. Hurricane (by that time a tropical storm) Irma gave us a little trouble, but she had mostly spent herself by the time she reached our area. A lot of rain, a few power outages, but nothing major at our transmitter sites, thank the Lord.

National EAS Test

All five of our primary signals did fine during the National EAS test on September 27th. On Facebook, some engineers complained of terrible audio, but it seemed OK here. Our main concern was the fact that the test arrived over a minute late. From talking to Amanda in Denver and Rick in Chicago, it seems we weren't the only ones. Waiting on a signal that wouldn't come, we naturally started wondering: is everything on our end OK? Finally, about one minute and 15 seconds after the scheduled 1:20 PM CDT, the annoying tones started coming in. I breathed a big sigh of relief.

Data Links and Blinky Lights

We have replaced the old incandescent beacon at the WXJC-FM tower site in Pumpkin Center. We had an LED unit on hand that originally came from WDJC-FM on Red Mountain; it had been damaged by water. We cleaned it up and Jack replaced the power supply, bringing it back to life. It's now in service at WXJC-FM.

The data link between the studios and 1260 AM, WYDE, is finally back in service. Yay! Todd gets the nod for that one. The original symptom was that the unit at WDJC-FM on Red Mountain stopped working; we couldn't get it working in a bench test, so we sent it to Trango. They told us that it needed to be replaced. We ordered the new unit, installed it and still had no link.

You've probably run across this, and if not, you will eventually. Things change so often nowadays, you're going to find yourself stuck with equipment pairs that have mismatched versions, hardware, software – or both. The symptoms can be really puzzling: for example, maybe you can get into each end of the link separately, but they won't pass data. If you upload the wrong firmware for the hardware version, you could even brick the unit. (Cough. Speaking from experience.)

In this case, the unit at 1260 had an older hardware version, so Todd had to fiddle with the firmware to finally get the two radios talking. But he did and we had a working link. Thank the Lord again.

Finally, another month has passed with several tower climbs, and we still don't have a working AOL (top strobe) at WYDE-FM in Cullman. This is a full-time strobed system on our 1330-foot tower, and under the rules, all lights must strobe in sync. The AOL at the top had been blinking, but it was out of sync with the other stations (all of which *were* in sync).

I mentioned this last time, but it didn't help that TWR Lighting was located in Houston. For a couple of weeks after hurricane Harvey, getting anything in or out of there was iffy. We are beginning to believe that we may have to replace the entire AOL, or have TWR do a complete refurbishment of the existing AOL. That will cost, but compared to what we've paid for tower crews thus far, it'll end up saving money in the long run.

VLANs

You're troubleshooting a Nanobridge. You plug it into your new Cisco switch and the port doesn't even light up. You suspect a bad cable, but almost as an afterthought, you move that "nanner" over to another port on an older switch. It lights up and you can access the unit in a Web browser! What gives?

Here's another example. You have a modest-sized network with a bunch of Windows machines on it. You figure, it's not that busy, so there's no reason you can't connect the STL data link to that switch. But when you do, you get random, unexplained dropouts in the data. Again: what gives?

Welcome to the wonderful world of Virtual Local Area Networks, or VLANs. The second example, that of dropped packets on a modest-sized network, is one reason why VLAN was invented. By adding a numerical tag from 1-4095 to each data

packet, you can put them on their own virtual LAN. Only machines that have the same tag are supposed to respond.

If you know how "smart" network switches work, you know that they already do a bunch of internal network "routing." A smart switch will learn where packets are going and will tend to route them, internally, to the correct destination port, without sending those packets to all other ports. (A device that sends all data to all ports at all times is called a "hub," and not a switch.)

There's one common exception: broadcast data. Windows machines, for example, are constantly broadcasting "are you there?" and "where are you?" packets all over the place. Each time you look up a new PC on the local network, broadcasts may occur. When someone connects to your network and tries to fetch an IP address from your DHCP server, that involves broadcast packets, too. The entire network "hears" what should be limited to only one or two other devices.

In the old days, broadcast and multicast were only a small percentage of the total, but it's entirely possible now to have these "all points bulletin" packets everywhere. On a network that is even approaching capacity, this can be enough to cause significant delays and dropouts. VLANs help prevent this by limiting broadcast packets to each virtual LAN. If you're not part of the VLAN group, you won't see everyone else's broadcast or multicast data.

VLAN exists for another reason: security. Most vendors now recommend one or two Big Switches instead of a star or (especially!) a daisy-chain of smaller network switches. If, for example, your traffic and billing is plugged into that switch, you might want to isolate this group onto its own VLAN (if nothing else, you can prevent people from sending documents to the wrong printer!).

All of that said, though, for most of us, VLAN is more aggravation than anything else. Frankly, it's a solution in search of a problem. Network switches are so cheap nowadays, you might actually do better to create two physically separate networks, with firewalled routing between them as needed. This takes care of both security and broadcast packets.

But since it's the current Thing™, let me share some tips and pointers. The biggest caveat, before you read the following, is that some of this isn't standardized. The days of throwing a network switch into the rack and expecting it to just work are disappearing. There's no way around it: you must read the documentation *for each device* carefully.

Because the documentation tends to be mind-numbingly geeky and hard to follow, I present the following *very* incomplete set of tips and suggestions. Be warned that some of this is still in flux, judging from all the "how in the world do I ..." questions in the support forums online.

Tagged Vs. Trunk

Tip #1: most devices, from computers to printers, don't use VLAN. The VLAN ID tag will be assigned *at the switch*. Cisco calls this an "access port." Look for that setting in the switch's config. Read the documentation for your specific switch. There may be other settings (for example, make sure the port is enabled; you may also need to select "private" mode for isolated groups).

For example, our traffic and billing group might be put on, say, switch ports 1-6. You might then set each of these ports to access mode, enabled, with privacy, and with the same unique VLAN tag (you can use a text name for the tag). The Cisco switch adds the VLAN tag internally, then strips it off at the other end. Your billing computers, printer, and other hardware will be none the wiser, but are now isolated from everyone else. They're on their own *virtual,* isolated LAN.

Tip #2: some equipment is VLAN-aware and VLAN-capable. You'll need to go into the config on these units and set the same VLAN ID for each end. This ID tag must match the port on the network switch, too. Otherwise, the port may act like it's dead. It won't even light up. This can be baffling the first time you see it.

Tip #3: multiple Web searches and visits to Cisco support forums have shown that it's not easy to get a single computer onto several different VLANs. Just like separate physical networks are isolated, so are VLAN groups. One hopes that this can be added in the future, or you need to specifically confirm this feature if you need it when purchasing.

Tip #4: obviously, it matters which switch port each device is plugged into. The days of moving cables around to get a little more slack are gone with active VLANs. If you're not careful, you'll move a VLAN-tagged unit to a port with the wrong tagging, and it won't work. You should make (and maintain) a spreadsheet or chart with all port assignment, including VLAN settings.

An Example

Figure 1 is a simple example. The unit labeled "Other PC" could actually be any number of them. With Cisco routers, VLAN #1 is the default. This is where all non-critical devices would belong.

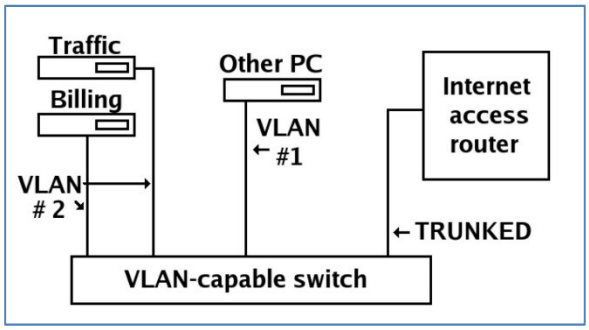


Figure 1 - Using a VLAN to isolate the traffic/billing machines from everything else.

To the left of the image, as mentioned above, we've put the Traffic and Billing PCs into a separate VLAN (#2). They will be able to see and share files with one another, but the Other PC(s) won't be able to see them at all.

The most important twist is to ensure that the router/firewall for Internet (to the right) is on a *Trunk* connection to the switch. In the unlikely chance that your firewall PC has VLAN tagging, it should be turned off. This way, all PCs on the network will be able to get Internet access, but the network switch will still keep the Traffic and Billing PCs separate from everything else.

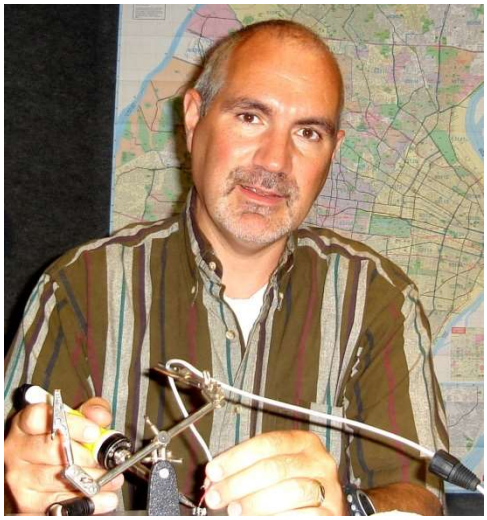
It doesn't take a lot of imagination to see other uses here. For example, you could have the output of your audio automation assigned to VLAN #3. The input to your STL data link could be on VLAN #3. This way, they're both isolated from everything else, which improves throughput and quality of service. However: see the caveats above regarding stuff being on more than one VLAN. I'm still pondering this one and hope to have an update in the near future (and if you have suggestions, I'd love to hear them).

I haven't even scratched the surface. In fact, I haven't even marked it. It would appear that some of this stuff is still vendor-specific and the terminology (and abilities) will vary from one device to the next. You'll be reading a lot of documentation while this is still settling out.

That's it for this time; keep praying for this nation!

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

Social media memes are rife with using the phrase, "That awkward moment when…." I guess you could say we had more than an awkward moment this last month when, during the middle of afternoon drive, our main station, WPWX, went off air. It soon became a frustration moment when I couldn't get into the web server of the remote control. I grabbed my phone and dialed the remote control and hit the "filaments on" for the aux transmitter. I waited a minute for the warm up and then proceeded to "plate on." Nothing happened. Now it had turned into a full-blown "panic moment."



I got into my car to head to the site only to find a fire truck blocking the route. It was taking its time to back into the fire station. Great! I was thankful that there were no trains on the tracks into the site, as there are two sets of double tracks, so the potential to be held up during an off-air event is always high.

Since we had just run the aux transmitter two days before this event, I knew that I was probably looking at a power issue with both transmitters not working. I was surprised by the remote control showing the generator not running but no alarm on the generator. We also have a main flywheel UPS for the site, and it was not reporting an alarm or even a discharge event at the time. So, my pre-diagnosing session as I drove to the site was telling me I was looking at something different than I had seen before.

When I got to the site, I first confirmed that there were no alarms on the generator or the UPS so

the remote was accurate with these conditions. I then got my meter and tested the Edison power on the generator transfer switch. We had power on all three legs. Just to make sure I had steady power, I transferred the site to the generator. We were still off the air. I figured it had to be something downstream from the transfer switch.

My biggest fear was an issue with the step-down transformer that brought 480 volts down to 208. I checked the output of that transformer and confirmed the 208 volts on all three legs, so that fear was allayed. Now, there is a knife disconnect in the building that is labeled "Main Disconnect." My experience had always seen these as a pre-transfer switch in the flow of the electrical chain of most transmitter plants. So, if it had an issue, the generator should have come on.

In this case, there are two large disconnects at the site. There is one outside the building that disconnects the Edison power from the plant and another inside the building that is between the generator transfer switch and the equipment load. Once I had that in my head, I tested the all three legs in that box and found them all good pre-fuse, but the first leg was missing voltage after the fuse. So, we had a bad fuse. Once it was replaced, we were back on the air.

Still, we had a 250-amp fuse that blew and we needed to know why. My initial look at all the physical junctions of the main electrical wiring showed no obvious issues. I also used my infrared thermometer to look at the temperatures of the same joints and all the readings seemed reasonable to me. To be one-hundred percent sure that we are not sitting on a potential fire maker, we have scheduled a commercial electrical contractor to bring their scope to check all the junctions as well.

Since then, we may have actually found the "smoking gun" for the blown fuse. The day after the event, we received alarms of high room and transmitter temperatures at the site. Upon checking the air conditioning at the site, I found that one of the Eubank AC units had cold air at the supply register but there was no air movement. It appeared that the blower motor was bad. This was later confirmed by the HVAC tech, who had to replace the motor.

My take on the event was that during a very hot afternoon, with temps in the mid-nineties, all the air condition units were running. So, when this particular unit turned on, its blower motor locked up when it pulled a lot of amps, and that took out the fuse. Short of finding another as yet undiscovered problem, this is the most likely scenario.

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

In the previous weeks, we have been busy installing a new Wheatstone WheatNet-IP system at KCBC. Our on-air studio console, an Audioarts D-75, was replaced by a WheatNet E-6 surface and several IP Blades.

The project was considerably more than just a console swap. One of the most extensive changes was how the Nexgen audio is handled. Previously, the two Nexgen machines in the studio used the typical sound cards and audio switchers for on-air and the DRR system. Now, all audio is handled on a dedicated LAN using AOIP via a second network card in each machine.

All of the studio's audio goes into the blades as AIOP, AES, or analog signals. In our case, all of the audio is either IP or AES with the exception of the microphone and an auxiliary computer.

Through the installation process, we have rewired most of the studio. Vast quantities of analog wiring have been replaced with CAT6 (for LAN connections) or CAT5 (for AES connections). Being collocated with the KCBC 50 kW AM transmitter site, the change is welcome as these digital signals are very immune to RF from our transmission system and from hum from the pad-mounted utility transformer just outside of the studio.

The change in audio handling has been a culture shock for me with a significant learning curve. I did not want to rip out the entire studio and then rebuild with the new system. The complexity of the studio operations, combined with my unfamiliarity of the new system, was more than I wanted to tackle in that manner. Instead I took a slow and easy approach.

John Yazel with the new Wheatstone surface in the KCBC Control Room

I set up all of the new equipment – the surface, the blades, and the routers – in the conference room to get them all talking together and to give me some time to get familiar with the system. After that was accomplished, we moved the surface and the small rack containing the blades and routers into the control room and started interfacing as much as possible without disrupting the station operation.

My original concept was to place the blades throughout the studio in whatever available rack spaces were available. This was a chicken vs. egg situation where there would not be good rack space available until we removed the old analog equipment, something that we could not do until the new system was installed and on-air. The temporary small rack that I was using in the conference room for the mock-up looked good as it was, so we decided just to move that into the studio as a tabletop rack. We finished it out with a 10-outlet power strip and short power cables. It became a very nice rack with easy access. It actually is impressive, and the blades have VU meters that can be used in the event of a failure of the surface's VGA monitor. As a bonus, it provided a place to mount the station's broadcast delay within easy reach of the operator.

We were able to connect almost all of the studio equipment to the new system without disturbing the existing system, so we were able to do a lot of testing and configuration while not affecting the on-air operation. The day came when we switched over the main Nexgen machine to IP audio, including the DRR system. The intent was just to test and then go back to analog until we were ready for the switchover. However, the complexity of the changes that were needed to make it all happen on AIOP was something that we did not want to reverse. This is when we took a hard look at what we had set up to this point.

We realized that we actually had a fully-functional WheatNet-IP studio operating in parallel with the old system (which was no longer fully functional). With the changing of a few wires, we switched over to the WheatNet system, with the new surface sitting on a cabinet to the side of the operating position. The system ran perfectly, and the next morning we found that the DRR had recorded all of the overnight shows perfectly as well.

It was a simple matter to remove the old console and cut hole in the table top for the new surface. Moving the surface was uneventful. We just turned off the power to the surface, removed a few cables, moved the surface, reconnected and re-powered. Through the short process, the station stayed on the air with the blades, routing the audio without the surface.

I went into this project with a certain fear of the unknown. Through careful planning, the installation went very well. I am looking forward to the further implementation of Wheatnet throughout the facility as time goes on.

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

September was busy following a series of power surges. KKPZ is situated at the end of the power lines at the top of Mt. Scott. Over the years, housing has built up around the station, resulting in increased power loading, producing less power stability. Most recently, an auto accident took out a 115 kV transmission line resulting in phase-to-phase faults. The power surge and spikes from these kinds of incidents propagate to the end of the line.

This last year, we have experienced an increasing number of surge events, which suggests these events will continue to get worse. Several of our computer systems are server-class machines. These computers are built more robustly than desktop computers. The power supplies monitor for spikes, surges, and dropouts. When detected, the power supply will shut down and lockout until the power issue is corrected.

On one hand, protecting the computer is a priority. On the other, if the computer is mission-critical, we want the computer to continue operating to the highest degree possible.

In the past, we have placed a UPS on the AC power source for critical components and computers. The UPS provides power while the generator cranks up. A side-benefit is that the UPS includes surge protection devices. One unit serves a dual purpose – simply install and forget it. That may be the advertised claim, but it's not reality.

Overvoltage surge protection relies on some form of clamping circuit. When a particular voltage is exceeded, the protection component clamps or loads the AC circuit to prevent any further increase of applied voltage. Several kinds of voltage-dependent components are available. Some claim to function through multiple surges. The truth is less optimistic: no clamp device works forever. After several surges, the protection is no longer available, with no warning to alert the user. Fortunately, the protection components are installed to fail open and prevent power failure. Unfortunately, the protection components are installed to fail open without warning and no longer provide protection.

An exception is the surge panels provided with Nautel transmitters. These panels have very high surge-current components and include a tally lamp for each phase. Should any of the surge protectors fail, the tally will extinguish, indicating a repair is needed.

A UPS doesn't warn when surge protection has failed. Worse, replacing a UPS due to potentially failed surge protection is expensive. Clearly, a better solution is desirable. After some research, I found a rack-mountable stand-alone surge protector. This unit has high-capacity surge protection and includes tallies to indicate operation and surge failure. At a $50 price point, this surge protection placed between AC power and a UPS will help insure continued surge protection.

Stand-alone surge suppressor with a UPS in a rack at KKPZ.

After two power surges shut down several instruments at the KKPZ studio/transmitter facility, it became apparent that surge protection was no longer functioning correctly. I checked and refurbished several critical UPS systems, insuring that surge protectors were not shorted. Replacing batteries, double-checking that power switching circuits were working properly, and testing the inverter operation were musts. Once completed, I had reliable surge and power dropout protection at a reasonable cost.

A word about UPS batteries: be aware that better quality is a key factor for service life. Batteries that are available at cut-rate bargain prices are no bargain. I have experienced short operating life compared to the expected five-year life. Two years

KKPZ's Annette Dexter interviews EAS committee chairman Kent Randles.

actual life on a planned four-year replacement cycle is not a good deal.

September brought us the National Periodic Test of the EAS system. This year, KKPZ took the opportunity to promote the EAS system as a positive contribution by our station and the industry for public safety. Probably the most visible facet of EAS is Amber alerts. There are many examples of motorists spotting and reporting the location of a vehicle.

Other aspects of the EAS system are less well understood. This year, Annette Dexter invited Kent Randles to discuss the EAS system. Kent is chair of the local EAS committee.

The NPT this year was mixed results as the test was missing the audio message in Portland. Analysis is still ongoing, although it appears that steps taken to mitigate earlier problems may have contributed to the audio failure. Stay tuned as we continue to investigate.

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

Carpet

As you read last month, the carpet in the common areas of our studio/office suite has been in need of replacement for a long while now. We were hoping to get through this year and budget for it next year. The hallways were clearly worn. Unfortunately, the carpet had other plans this year.

We had an area come up that we had to have glued back down, and a few months later another area right in front of a studio came up. This time, however, we couldn't get it fixed. The pile separated from the backing. We decided it was time to move on this.

While I was looking forward to new carpet, let's face it, replacing carpet is a pain. In this case, it required us to move chairs, file cabinets and a desk as well as to disassemble and move 10 cubicles out of the space. We are grateful for building management for allowing us to use some unused space on another floor to store all our stuff during this process.

It took the company we hired several days to get the work done. There were even some re-dos as the carpet has a pattern and the lines were not straight down one hallway. It stuck out like a sore thumb. They did get it done, though, and it looks great. We even got the cubicles put back together. It took some doing. It turns out the one desk we had the most issues with, the first one we tried, was a fluke. It was put together differently than the rest, and that fooled us for a little while.

Now I am working to budget carpet replacement for the studios for next year. Some of them, KLZ especially, look horrible. You can definitely tell what stations have the most traffic by looking at the carpet. We are looking to get carpet tile since we will not be able to move all the furniture out of these rooms

KLTT Pattern Switching Issues

This has been an ongoing issue for us. KLTT will sometimes not switch to the night pattern and instead will just be off because of an issue. This occurred nearly every day for a week. Of course, when I went to the site to troubleshoot, it worked perfectly. So I have begun "babysitting" the station

at the evening pattern change, checking in on it right at sunset. Now that it knows I'm watching it, it is, of course, switching with no issues. We keep thinking it is a microswitch going bad, but you'd think it'd just quit working and not be intermittent as it has been. So until it becomes more of a permanent issue, or at least misbehaves when I am at the site, I will continue to babysit it.

Dell Computer Issues

We have a newer Dell laptop we purchased for an account executive last year. This person didn't last but a week, so the laptop sat in my storage room for several months until we hired someone new. I got the laptop set up for the new account executive and gave it to her, as I normally would. It was nothing but issues from day one.

The laptop would never remember the network key for our Wi-Fi. The AE would come into my office nearly daily so I could enter the information in. Even after doing some research and applying the fixes I found, while not happening as often, it would still regularly lose its mind. Then she would tell me it crashed, but by the time she told me, the computer had rebooted and I found no evidence of this ever happening. To be honest, I thought it was her. Finally, she was able to catch me while it was doing its thing and I got the proof I needed.

I regained possession of the laptop and decided I would attempt to reinstall Windows 7. Dell doesn't seem to like to send out the DVDs with Windows 7 anymore. I attempted to use our commercial account through Microsoft to install. While I have done this with no issues before, for some reason, this time it would not install. I decided to grab the Windows 10 disc that came with the computer (it was a Win7 downgrade), but even that did not work. When this happened, I knew the issues with the computer were far greater than I thought.

I contacted Dell, since the computer was still in warranty. They had me run test after test. They opted to send me a new hard drive with Windows 7 pre-installed. Within days, the computer crashed again. I again contacted Dell support and they finally had me send it in for repair. It came back within days with a note saying they replaced some chip inside. Okay, great. The note they left with it said it had been thoroughly tested and was working properly. I put too much trust in Dell and gave it back to the AE, and within a week it crashed again. I contacted Dell support again, and once again sent it back. This time, they reinstalled the operating system themselves.

When I got it back, I decided I'd keep the computer on my desk for a little while. I had it running videos from YouTube nonstop. I was trying to find a way to make it work some without me having to try and do my own work on it. After a couple weeks, it crashed. At this point I am furious with Dell.

I do believe the issue is with the Windows 7 system on that laptop, not the laptop itself. I say this because Cris, the account executive and myself, while not using the exact same computer, have laptops very similar in models. The look is the same for all of them. Cris has been having issues since doing an Intel update with his crashing (blue-screening). Mine, however, continues to work without issue. The difference? Mine runs Windows 10 while the other two run Windows 7.

Finally, Dell sent me a refurbished laptop to replace the one I had been working on. I actually got it the last Friday in September. It has Windows 10 on it, so hopefully it won't have any more issues. I still plan on getting it set up and have it run in my office for a good week before I call it fixed. And while I have my irritations with Dell, I do appreciate them honoring the warranty and working with me and finally replacing the computer. I honestly thought I was going to have to keep sending it in for repairs. I am still not confident a new computer will fix the issue, but only time will tell.

Telos

We ordered a new Hx6 on-air phone system to replace one of our older TwoX12 units. We decided to put the unit in the KLZ control room because it gets the most use. I do enjoy the look of the Hx6. Getting it set up was rather simple. We actually hooked it up in a different control room first for testing purposes. It seems most people have figured out how to use it without too much trouble.

There are a few quirks we hope Telos will look into for us. The biggest one for us is the ringer. With the TwoX12 and Nx12, it didn't matter if you were on the phone or not. When a call would come in on any other line while you were screening, if the ringer was turned on, you would hear it. This is especially helpful for our producers who aren't looking at the phone. While screening a call, they would be looking at the NexGen screen in front of them, giving cues to the hosts in the talk studio and doing everything but staring at the phone screen. The way our studio is set up the phone is to the left of the board so you have to turn your head to see it or the call screener program.

The VSet6 phones do not ring aloud when the handset is off-hook. I know the gentleman in support I spoke to said he would mention this feature

to their software guys in hopes of getting it in a firmware update in the future. I know we have some people over at Telos Alliance that read this column, so I want to mention it again. Please find a way to make the ringer work regardless of if the phone is in use. I know it would be a great help to us in Denver, and no doubt it will be helpful to other stations around the country.

So you remember I mentioned we put the Hx6 in the KLZ studio right? Well this replaced their Nx12. We had plans of moving the Nx12 to the KLVZ control room where the TwoX12 is. Due to the rewiring I needed to do, I haven't gotten to it yet. This is a good thing, though. I got a call from one of our producers in the KLTT control room and he told me he cannot get anyone on the air from the phone and there is a high-pitched tone on that channel.

I went in to investigate and found that indeed I could not get calls to come up on the board. I rebooted the unit and that got rid of the tone. I looked at all the routing, and once I confirmed it was still correct, I looked at the unit. It wasn't getting any audio from anything. Thankfully, since I hadn't yet replaced the Twox12, I was able to take the old KLZ Nx12 and install it in KLTT. This got them back to working order. Turns out the motherboard in the Nx12 was bad. I guess we'll retire it and budget for a replacement for next year.

October

Fall is officially here. My husband and I were actually at our cabin up in the mountains near Grand Lake this last weekend and closed it up for winter. It is always sad time for us. We enjoy the weekend getaway trips we are able to make up there. And so many of you may wonder why we closed it up for the winter when it is only fall. That's simple; fall weather in the mountain includes snow and sub-freezing temperatures. We actually had several inches of snow up there overnight the day after we closed it up.

I do get to finally schedule some time this month to install the snow cover we purchased for our C-band dish at the KLZ transmitter site. I am hoping it all goes smoothly and fits and works well.

That about covers it for this edition, so until next time… that's all folks!!!

KBRT • Costa Mesa - Los Angeles, CA
740 kHz/100.7 MHz, 50 kW-D/0.2 kW-N, DA-1
KNSN • San Diego, CA
1240 kHz/103.3 MHz, 550W-U
KCBC • Manteca - San Francisco, CA
770 kHz/94.7 MHz, 50 kW-D/4.3 kW-N, DA-2
KKPZ • Portland, OR
1330 kHz/97.5 MHz, 5 kW-U, DA-1
KLZ • Denver, CO
560 kHz/100.3 MHz, 5 kW-U, DA-1
KLDC • Brighton - Denver, CO
1220 kHz/95.3 MHz, 660 W-D/11 W-N, ND
KLTT • Commerce City - Denver, CO
670 kHz/95.1 MHz, 50 kW-D/1.4 kW-N, DA-2
KLVZ • Denver, CO
810 kHz/94.3 MHz, 2.2 kW-D/430 W-N, DA-2
WDCX • Rochester, NY
990 kHz, 5 kW-D/2.5 kW-N, DA-2
WDCX-FM • Buffalo, NY
99.5 MHz, 110 kW/195m AAT
WDCZ • Buffalo, NY
950 kHz, 5 kW-U, DA-1
WDJC-FM • Birmingham, AL
93.7 MHz, 100 kW/307m AAT
WCHB • Royal Oak - Detroit, MI
1340 kHz/96.7 MHz, 1 kW-U, DA-D
WRDT • Monroe - Detroit, MI
560 kHz, 500 W-D/14 W-N, DA-D
WMUZ-FM • Detroit, MI
103.5 MHz, 50 kW/150m AAT
WMUZ • Taylor - Detroit, MI
1200 kHz, 50 kW-D/15 kW-N, DA-2
WPWX • Hammond - Chicago, IL
92.3 MHz, 50 kW/150m AAT
WSRB • Lansing - Chicago, IL
106.3 MHz, 4.1 kW/120m AAT
WYRB • Genoa - Rockford, IL
106.3 MHz, 3.8 kW/126m AAT
WYCA • Crete - Chicago, IL
102.3 MHz, 1.05 kW/150m AAT
WYDE • Birmingham, AL
1260 kHz/95.3 MHz, 5 kW-D/41W-N, ND
WYDE-FM • Cullman - Birmingham, AL
101.1 MHz, 100 kW/410m AAT
WXJC • Birmingham, AL
850 kHz/96.9 MHz, 50 kW-D/1 kW-N, DA-2
WXJC-FM • Cordova-Birmingham, AL
92.5 MHz, 2.2 kW/167m AAT

Crawford

Corporate Engineering

2821 S. Parker Road • Suite 1205

Aurora, CO 80014