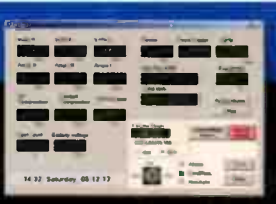
AM MODERNIZATION | AD INSERTION | COMRADE VIRUS | MONITORING & CONTROL >



Radio

THE RADIO TECHNOLOGY LEADER

Rancheria Radio Gambles on Streaming

California station is online-only and custom-designed by the Miwuk tribe

OCTOBER 2017 | RADIOMAGONLINE.COM

NewBay

Map indicates the extended range from Wheatstone's processor with multipath control.

Great Sound Is Subjective
Increased Coverage is Measurable...

Scottie Rice, engineeer for KSDS in San Diego, shared his experience in putting a Wheatstone processor on the air in place of another top-of-the-line audio processor. He was able to increase the distance of his listening area substantially.

To see/read Scottie tell the whole story, go to
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Another view of Rancheria's on-air studio. A Telos Vset and E-V mics round out the equipment complement. Furniture built by the Miwuk tribe from a RadioDNA design.

On the cover: The Rancheria Radio on-air studio, featuring a Wheatstone LX-24, Zetta by RCS, Wheatstone VoxPro, and Yellowtec monitor and mic stands.

VIEWPOINT

Considerations for Radio On-Demand

My desktop folder for the October edition of Radio magazine is nearly 75 MB, clearly indicative of the fact that we have a complex edition for you this time around. One thing missing is the Salary Survey — it's coming next month. The location is: *https://www.surveymonkey.com/r/YSTRNS7*. Take a few moments and complete it, please!

This month in Trends in Technology, we're looking at a myriad of vendors and services that are in place to help you monetize your online offerings, which, although they probably only account for a small fraction of your station's revenue, are important because they are growing. Besides, your station needs to be available by whatever means match a listener's preference. Often, that will be digital today.

Our Facility Showcase this month looks at a small, internet-only station called Rancheria Radio, custom-built for the Miwuk tribe in northern California by RadioDNA. Quite a few broadcasters in Europe started online only, and later added over-the-air radio transmission. One wonders if and when that will occur stateside.

How would your station react to a ransomware attack? We have an extensive article on how San Francisco's KQED radio and TV responded to just such a thing in June. Enough time has passed that the work-arounds developed, and the lessons learned, can be discussed. Fortunately things are back to "normal" there now, although it is a new normal. This is an article every radio engineer should read; if you have a separate IT department, share it with them, too.

This month's edition isn't devoid of plain old radio topics though. Jeremy Ruck is back this month, with an article on the unfortunate and accidental generation of intermodulation products (in the FM band). Just how are these products generated, found, mitigated and then measured for compliance? If you have an FM at a shared communications site, by all means read this.

The FCC announced its third set of AM revitalization rule revisions in September, this time focusing on reducing the obligations associated with conducting proofs of performance measurements and updating the requirements for Method of Moment proof of performance studies. Lee Petro has the finer details for you.

Dennis Sloatman has our Tech Tips column this month. Is it possible to measure too many parameters with your remote controls? You might say "yes" but I'm of the school, like Dennis, that says "no." It's best not to have to wonder what's really going on at that remote site — far better to get on your smartphone or laptop and simply look at it. Dennis discusses some ideas about the monitoring of generators. After the hurricane season we've just been through this article should hit home for everyone.

And, of course last but not least, the Wandering Engineer is back this month, taking on the topic of Blue Alerts. While no one would say these alerts aren't important and useful, the Wandering is wondering if by using the EAS system for more and more alert messages, its original, simplistic feature set isn't being lost. See if you agree.

Thanks for reading the October issue!

Doug Irwin, CPBE AMD DRB | Technical Editor

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Radio
THE RADIO TECHNOLOGY LEADER

October 2017 | Vol. 23 No. 10

EDITORIAL
Technical Editor: Doug Irwin, CPBE DRB AMD
Managing Editor: Emily Reigart
Web Editor: Michael Balderston

CONTRIBUTORS
Fred Baumgartner, Chris Cottingham, Dennis Sloatman, Jason Ornellas, Lee Petro, Jeremy Ruck, The Wandering Engineer, Chris Wygal

CORPORATE
President and CEO: Steve Palm
Chief Financial Officer: Paul Mastronardi
Controller: Rick Ng
Vice President of Web Development: Robert Ames

VIDEO/BROADCAST GROUP
Executive Vice President: Carmel King
Vice President of Sales/Group Publisher: Eric Trabb

ADMINISTRATION AND PRODUCTION
Publisher: John Casey
Editorial Director: Paul J. McLane
Production Manager: Lisa McIntosh
Advertising Coordinator: Caroline Freeland

AUDIENCE DEVELOPMENT
Corporate Director, Audience Development: Meg Estevez
Circulation Manager: Kwentin Keenan
Circulation Coordinator: Michele Fonville

ADVERTISING SALES REPRESENTATIVES
U.S. Regional and Canada: John Casey
jcasey@nbmedia.com | 212-378-0400 x512

U.S. Regional: Michele Inderrieden
minderrieden@nbmedia.com | 212-378-0400 x523

International Sales Manager: Rafaella Calabrese
rcalabrese@nbmedia.com | +39 320 8911938

Japan: Eiji Yoshikawa
callems@world.odn.ne.jp | +81 3 3327 5759

Asia-Pacific: Wengong Wang
wwg@imaschina.com | +86 755 83862930/40/50

Member: American Business Media

A NewBay Media Publication

NewBay Media, LLC
28 East 28th Street, 12th floor
New York, NY 10016

SUBSCRIPTIONS: Free and controlled circulation to qualified subscribers. Customer Service can be reached at: newbay@computerfulfillment.com or by calling 888-266-5828 (USA only) or 978-667-0352 (Outside US) or write us at Radio Magazine, P.O. Box 1884, Lowell, MA 01853, USA. Back issues are available by calling Customer Service.

LIST RENTAL: 914-386-1024
jganis@meritdirect.com

REPRINTS: For custom reprints and eprints please contact our reprints coordinator at Wright's Media 877-652-5295 or NewBay@wrightsmedia.com.

Radio, Volume 23, Number 10, (ISSN 1542-0620) is published monthly by NewBay Media LLC, 28 East 28th Street, 12th floor, New York, NY 10016. Periodical postage paid at New York, NY and additional mailing offices. Postmaster: Send address changes to Radio, PO Box 1884, Lowell, MA 01853.

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The Next Phase of AM Revitalization

by Lee Petro

The Federal Communications Commission announced its third set of AM modernization rules revisions in September, this time focusing on reducing the obligations associated with conducting proofs of performance measurements and updating the requirements for Method of Moment proof of performance studies. The commission tabled the still-unresolved issues relating to the reduction of daytime and nighttime interference protections, skywave interference rules and legacy expanded-band AM licensees.

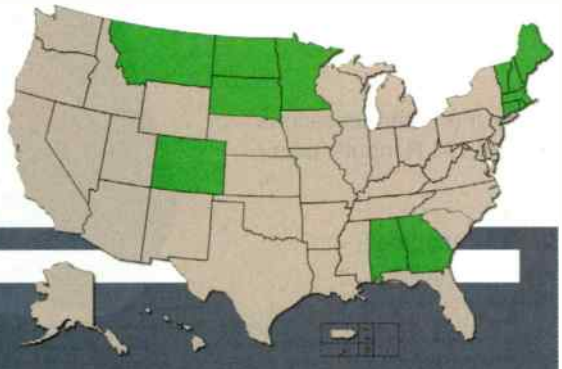
The commission revised its AM service rules in 2015 and 2017 as part of its effort to reinvigorate the AM service. To that end, the commission's 2015 First Report and Order modified the community coverage standards, eliminated the AM Ratchet Rule and established the rules to guide future FM translator filing windows for AM stations. Subsequently, the commission modified its rules in February 2017 to relax the siting restrictions for new FM Translators to be used to rebroadcast AM stations.

TECHNICAL RULE UPDATES

The new rules adopted in September 2017 address several technical rules.

First, the commission eliminated the requirement that partial proof of performance studies must include measurements on radials that do not contain a monitoring point specified on the station's license authorization. The FCC agreed with commenters who argued that taking measurements on only the radials with monitoring points will demonstrate that the station is operating within licensed parameters.

Next, the commission made several changes to the requirements associated with Method of Moments proof of performance studies. The commission noted that it had received over 220 MoM studies since 2008, and the computer modeling approach to verifying a station's compliance with its licensed directional antenna pattern was successful. As a result, the commission eliminated its rule requiring biennial recertification of MoM studies and, instead, will only require recertification if system components have been repaired or replaced.



Additionally, the commission eliminated the requirement that stations submit new reference field strength measurements when submitting new license applications with MoM proof of performance studies. Instead, the commission determined that the requirement for field strength measurements taken to confirm an initially licensed MoM-proofed directional pattern is sufficient.

The commission also eliminated the requirement that a MoM-proofed station obtain a new surveyor's certificate each time it is relicensed, except in those cases where the towers' geometry has been altered or additional towers have been added to the array. The commission also clarified that its rules establishing the criteria for when new MoM proofs must be prepared and submitted also apply when adding antennas to AM towers, and eliminated the requirement of submitting current distribution measurements for top-loaded antennas as a condition of obtaining a license authorization.

On the other hand, the commission declined to permit stations with "skirt-fed" AM towers to use MoM modeling. The commission determined that AM towers that do not utilize simple, series-fed towers raise different concerns than those currently authorized to use MoM modeling, and there remain concerns that the standards for using MoM modeling software with skirt-fed towers have yet to be fully tested and verified.

As noted above, the commission did not address the pending, and much more controversial, proposals regarding changes to the interference protection requirements. Given Chairman Pai's strong interest in the AM modernization movement, one can expect that these issues will be addressed in a subsequent order.

Petro is of counsel at Drinker Biddle & Reath LLP. Email: lee.petro@dbr.com.

DATELINE

Oct. 10 – Issues/Programs List must be placed in stations' public inspection file.

Nov. 13 – EAS Participants must file ETRS Form Three regarding the National EAS Test held on Sept. 27.

Nov. 13 – Rules requiring On-Air Disclosures for Third-Party Fundraising commences.

Dec. 1 – Stations with five or more full-time employees in Alabama, Colorado, Connecticut, Georgia, Maine, Massachusetts, Minnesota, Montana, New Hampshire, North Dakota, Rhode Island, South Dakota, and Vermont place Annual EEO Public File Report in public inspection file.

Dec. 1 – Stations with 11 or more full-time employees in Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont file Broadcast Mid-Term Report (FCC Form 397) with FCC and place in public inspection file.

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Ad Insertion for Streaming Audio and Podcasts

by Doug Irwin, CPBE AMD DRB

Gaining the ability to generate revenue from streaming media is like the search for the Holy Grail for most radio stations. All stations want to be available to listeners that seek us out, whether by over-the-air radio, or by connections made over the internet.

The means by which we attempt to monetize our streams has changed over the years considerably, and now quite a few companies are in the business to facilitate revenue generation for radio companies and podcast publishers. We're going to look at some of those offerings this time around.

SERVER SIDE

Not that long ago, it was common practice to insert spots in to the audio that was subsequently encoded as an audio stream at the station. While this is still done to a large degree, many companies now provide the same result by means of ad insertion downstream from the source encoder.

At the recent fall Radio Show, I had a chance to speak with StreamGuys' Mark Griffin about what "server side" means.

A station can generate an embeddable player skin for any episode of a podcast using SGrecast.

"When I say 'server side,' literally running in addition to the streaming servers or podcast servers, are web servers themselves," said Griffin. "There is an ad server that's running completely separate from that server and it is communicating with it, communicates typically via metadata triggers or subaudible tones, ID3 tags for triggering when ads need to be served.

"Those ads can be scheduled or trafficked very specifically via features like geo-targeting by regions. It can be targeted very specifically by times of day. There are a lot of parameters for ads can be set up and those campaigns can be structured to fulfill the broadcaster's needs," he said.

Ad insertion and monetization services offered by StreamGuys can be used for either advertising or underwriting, depending on the broadcaster. I asked Griffin about the process of starting the service from the ground up. What would a station need to do?

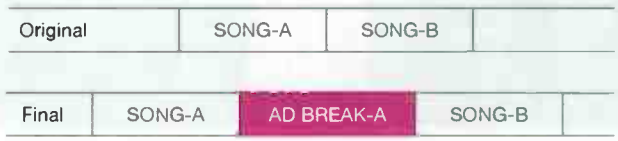
"From a streaming side of things, there is just this traditional set up for encoder, automations, getting a signal flow together, getting us their stream," he said. "Once we have a signal coming to us, the servers are provisioned and set up. We are able to provide the tools for the broadcaster, things like their custom players, which would be embedded on to the station's website."

Ads need to be uploaded to the StreamGuys servers, and the ad campaign parameters need to be configured.

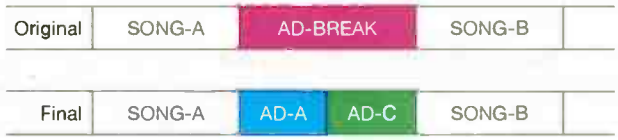
StreamGuys also feature a service known as SGrecast which allows broadcasters to record live streams into archives of any length, making them available for rebroadcast, or as podcasts. StreamGuys' podcast hosting service delivers content to users as scheduled by their own choice of podcast application and SGrecast's customizable Podcast Player automatically pulls new episodes as they are recorded. Using SGrecast, a station can also insert adds as pre-roll, mid- and post-roll ads, and content can be kept "evergreen" by the automatic replacement of old ads with new.

ADSWIZZ

AdsWizz is a major player in the streaming media advertising space. The AdsWizz AdServer enables publishers, which in our context means those producing streams or podcasts, to manage targeted and trackable audio advertising campaigns on any device and application, regardless of audio type (live, linear, podcast, on-demand) or distribution platforms (mobile application, connected devices, aggregation services).



Adswizz Flexible ad insertion



AdsWizz Pliable ad insertion

AdServer offers multiple targeting parameters including demographic, location, device, user agent, format, genre and day-parting. AdServer can also match uploaded audio ad creative to the audio content's encoding bitrate and volume levels, "streamlining creative workflow [and] eliminating the need for multiple audio creatives for different audio content formats."

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RCS Sound Software rcsworks.com

is the software that enables stations to generate revenue from their content by managing the precise ad insertion into any digital audio content. It enables server-side ad insertion on major streaming servers (as well as client-side ad insertion on standard player technologies).

Flexible Audio Insertion Solution Supports dynamic, pre-, mid- and post-roll sequencing of audio advertisements within live, linear simulcasts, as well as, on-demand audio including podcasting. It also supports audio insertion in both, "PlayLater" (download and play later) and "PlayNow" (on-demand streaming) consumption scenarios.

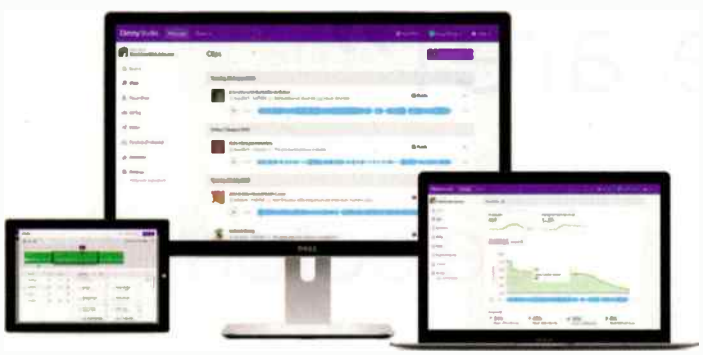
Pliable Ad Insertion is used when there is no underlying content or "set" ad breaks, typical of on-demand music services, playlist feeds and podcasts. Ads will only be inserted if there is an ad available for the listener. Ad Replacement is used when there is an existing ad which needs a replacement within a "set" ad break.

TRITON DIGITAL

Triton Digital offers many services to digital publishers, such as its own content delivery network. According to the company, its CDN is compatible with all popular format, codec and media players and will adapt to the needs of a station's audience.

For ad insertion, Triton offers Tap On-Demand, which is designed to work with playlist-based or on-demand music services; and, Tap Live, which is designed for live stream of terrestrial station programming.

Omny Studio is Triton's product for the monetization of podcasts. The Omny Studio platform enables audio publishers to replace static ads with dynamically inserted, targeted ads while automating key aspects of campaign management, such as industry separation, frequency capping and volume normalization. Features include radio broadcast capture; editing; podcast hosting; publishing and sharing; and analytics.



Triton Digital Omny Studio

SECURENET

The Cirrus streaming service is offered by Securenet. A station can earn revenue by running ads on the Cirrus player and mobile apps by using the company's Programmatic Advertising Delivery Network. The ads are geo-targeted. When a station turns its ad inventory over to the Cirrus Ad Delivery network, the player will display "IAB standard, family-friendly banner ads" to all of the station's listeners.

A station can earn revenue by running ads on the Securenet Cirrus player and mobile apps and by using the company's Programmatic Advertising Delivery Network.

The company also offers a free ad replacement and insertion service for streaming media. Stopsets are filled with audio ads when your station goes to commercial breaks. The station then splits the revenue with the ad service. Alternatively, a station can also run its own ad campaigns for local advertisers and sponsors, and fill the rest of the schedule automatically from the Cirrus network.

WIDEORBIT

WideOrbit also offers server-side ad insertion services for streaming media.

"We offer complete monetization solutions, soup to nuts from the bandwidth, to the ad insertion, to the stats and analytics, sound exchange reports, anything that you would need to stream a radio station," said WideOrbit Sales Manager Dana Murphy.

I asked Murphy what it takes for a station could get started.

"Right now, you would need one PC per station that is dedicated just for streaming, it's very basic. You could use refurbished type machines and not spend too much, because it just sits and handles the encoders and sends out the stream," she said. "We provide all of the bandwidth, and we have servers that we use through other companies as well as some of our own. At the moment there are hardware requirements at the station. We are moving to a more cloud-based insertion where you shouldn't need as much hardware as you do now."

I also confirmed that the spots are played out in the WideOrbit side of the system.

"Right, because then we're able to then account for how many impressions, when the spot ran so that you can effectively produce affidavits for your clients as well as get proper stats back," she said. "We look at your metadata in order to place the spot. We can see your spot code coming up and so we get a call to our servers to then insert the spot at the right moment."

I also asked Murphy about WideOrbit's podcasting monetization. "We have a product called WideOrbit On Demand. It allows the publisher to dynamically insert ads at the time of download," she said. "We provide a web-based console that allows you to set up a template for your podcast. It gives you the opportunity to have a prequel spot, and then a sponsorship title, your first segment, and then your ad break in the second segment. It's also what allows you to insert spots at the time of download."

The console also allows the user to ad spots without having to re-do the entire podcast. "If you have a podcast from the summer with a beach theme type of ad going on or an opening monologue, at Christmas time — for example — you can just change out that one sponsorship

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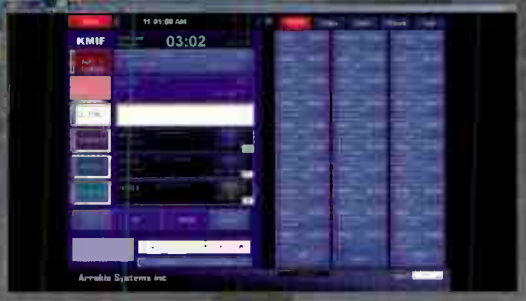

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instead of recreating the whole file."

Automation systems manufacturers often refer their customers to server-side ad insertion services. BSI, DJB, and Arrakis use Securenet; ENCO partners with StreamGuys.

WideOrbit offers everything a station needs to stream: bandwidth, ad insertion, stats and analytics and Sound Exchange reports.

SOURCE SIDE

Inserting spots locally into the audio feed that subsequently goes in the streaming encoder is a technique I'll refer to as "source side."

RCS has been accomplishing spot-insertion on the source side for many years. I spoke with Neil Perchuk of RCS about their automation system, Zetta.

Perchuk described their method of local ad insertion: "Zetta has the capability of doing splits, which is our way of creating alternative schedules for the automation system for multiple channels. Say, for example, you have your main terrestrial channel, an HD1, an HD2 and a webcast. We go from the main content to the spot block, and we can cascade off into multiple blocks — one each for HD1, HD2 and a web stream, with separate spots from the main terrestrial channel," said Perchuk.

RCS Zetta

"Zetta will also perform a pitchless 'stretch and squeeze' of all of those blocks, so that they all can then cascade back at the exact same time to the terrestrial channel, so that wherever you're hearing those spot blocks on, you'll seamlessly go back to the main content point."

The audio stream generated by Zetta is subsequently fed in to an audio streaming encoder and then off to a CDN, such as Amazon Web Services or other server-side companies mentioned earlier.

I asked if a publisher could essentially use both source side and server side.

"Yes, you could mix and match. You could get insertion from another provider for some of your streams and still use Zetta for other parts of your streams."

Needless to say, that could make log reconciliation complicated.

FUTURI MEDIA

Futuri Media facilitates streaming from the source side, even providing clients what they call the streaming transmitter.

Support for Futuri's source-side streaming system includes ongoing support, real-time analytics and proactive monitoring of stream uptime and connectivity. The streaming transmitter includes Omnia audio processing, AdsWizz ad integration, HTTP-live streaming (HLS) and "the same Flash-free Media Source Extensions technology in use by YouTube and Netflix."

Futuri's POST is for stations that want to facilitate audience and revenue growth through on-demand audio. Using POST, the station can make use of its broadcast audio, edit it, and then add an image from Futuri's fully-licensed library, after which it can be deployed across Facebook, Twitter and the station's website. Speed to publish enables stations in PPM markets to receive credit for audio listened to within one day, and Planner function stations to automatically add sponsorships to on-demand audio.

Futuri's streaming transmitter includes Omnia audio processing, HTTP-live streaming (HLS) and "the same Flash-free Media Source Extensions technology in use by YouTube and Netflix."

OMT

WebSecure+ is a stand-alone web server for OMT's iMediaLogger Digital Logger. One of the features of WebSecure+ is the ability to set up podcasting on your station's website. Station personnel select the external podcasting option in WebSecure+ for a selected iMediaLogger feed and then integrate the direct link to the website, thus allowing access for podcasts to listeners. WebSecure+ also provides support for iTunes and RSS so listeners won't have a difficult time finding what they want to hear.

Spot insertion for both streaming and on-demand media provides an opportunity for a station to grow its overall revenue.

Using source-side, a station has greater control of CPM, but will need at least some amount of time from personnel to manage sales and trafficking. Using server-side ad insertion reduces the involvement of local personnel but means the station will have little control over what spots play out to on-line media users.

The bottom line? If you find yourself involved in the decision about which method to use, it pays to listen online to examples of each before committing either way.

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KQED Responds to Ransomware Attack From Comrade Virus

by Larry Wood, CPBE

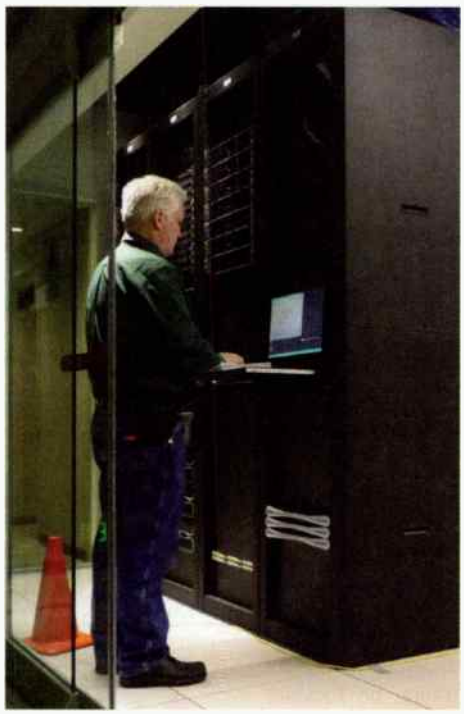
It's been several months since the ransomware attack on KQED(FM) in San Francisco on June 15. Since then, every work day feels like I am trying to run under water. That's because life without normal network services in a modern large broadcast operation (about 350 employees) is, to say the least, a major challenge.

Many of my daily activities are impossible, while others require re-inventing the wheel or doing things the old way, BC — before computers.

After consulting with expert infection consultants and the FBI, KQED's initial decision to not to pay the ransom and proceed to making a full recovery on our own was confirmed as the best approach. Without going into too many details of exactly how the attack was able to succeed, I will try to give you an idea of what was affected and how we got through the problems.

My first clue that something was wrong was a call from the Burk remote control, informing me our Sacramento station had no audio. The KQEI(FM) site audio is fed over a GatesAir Intraplex by an MPLS data line. We occasionally get short line drop-outs, so my first response was to call our master control to get them to connect via ISDN, if they had not already done so.

I also turned on my little radio to make sure our main San Francisco station had audio. It did. I could not get through on the MCR hot line and quickly discovered I could not call any phones at KQED. We have a VOIP phone system, and it was down hard.



KQED(FM)'s Steve Pinch worked almost around the clock for days to develop work-arounds for every problem and showed the production and news people how to make them work.

OK, I thought, that all made sense: The MPLS and the VOIP phone system share IP services. I reasoned there was a network issue at the studio.

About this time, my colleague Steve Pinch, our FM engineering IT expert, called me to let me know there was a virus attack on the network, and he was headed back to work. He wouldn't be able to go home for a full night's sleep for the next several days.

Not fully trusting VoIP, we have a second hot line into MCR that provides a dial tone from the telco central office. Once I got through, I found the ISDN was connected and audio had returned to our Sacramento station. I could now assist the announcer getting traffic reports on the air by using our Telos phone system, which was connected to the telco central office with a PRI and was working normally.

Our Comrex BRIC-Link for getting traffic reports via AOIP was dead. The traffic reports would have to come from one of our talk show lines for the next three days. It didn't sound great, but it worked. Our multiple streaming audio feeds to various streaming providers were down. These would not be back until we cautiously began restoring the most critical network services, 12 hours after the shutdown.

Steve and the IT staff immediately placed themselves into the trouble, but I didn't have to be at work until the next morning. It gave me time to ponder what the changes would be and what work-arounds we would need to keep going.

The next morning, I was met with hand-written signs scattered throughout the building, warning people not to use their computers or phones, and that information updates could be found on the white board in the central atrium. Except for the fact we were on the air with normal programing, it felt like we were back in the 19th century.

The IT staff, assisted by Steve from radio engineering, worked at a feverish pace to keep what wasn't infected safe and to restore services. Virtually all ports on the network switches were immediately shut off when the infection was detected. Until we knew exactly what happened and how it spread through the network, "disconnect everything" was the philosophy, in the hope the infection could be kept from doing any more damage.

This means several things were turned off that weren't infected and couldn't be infected. But as we all know, it's better to be safe than sorry.

That is why we lost the traffic report BRIC-Link and program audio to the Sacramento transmitter and a lot of other things. The Intraplex uses IP for its connection and the

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ports were shut off. That's also why ISDN was able to keep going for the next three days, no IP needed. Higher priorities came first and then we could start getting other things going again, port by port. The highest priority was staying on the air with normal programming. On air and news came first, and finding ways to keep them going was a challenge for both the engineers and the news people.

We hired outside consultants to assist us in protecting what was not infected, while at the same time getting services going again. The FBI was on site to collect evidence of the crime. They copied the entire contents of several PCs, including both those that had been left on and those that had been power cycled. Other PCs, like mine, had been "touched" earlier by the malware, but had been turned off before the actual attack. All of these details helped determine just how the bad guys worked and perhaps give clues as to who was the culprit.

In many ways, we were lucky. We have a great IT department, good backups and the resources, both human and financial to take the crisis head-on and keep going.

Our main bit of luck was that our on-air broadcast systems for both TV and radio were not hit by the attack. More about this later, but for now let's just say it could have been a lot worse, were it not for several good decisions made to keep critical systems isolated.

Dalet Galaxy, our news and production system, was not so lucky. This was hit, and in the end, the servers and clients needed to be completely reloaded. The Dalet database and file storage, including all audio, stories and metadata were not hit, but they would not be accessible for four weeks.

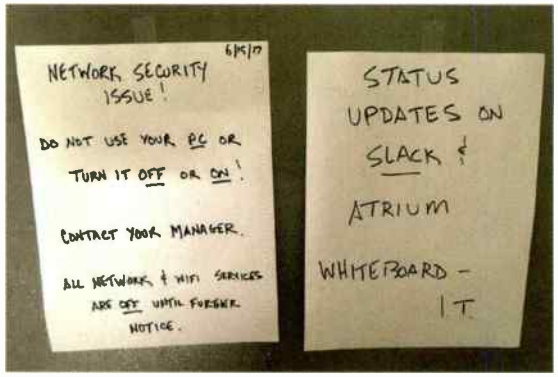
We were also lucky that our Public Radio Satellite System equipment was unaffected and on the same network as our on-air Dalet system. We were still receiving both live and non-real time programming. Also, our Telos phone system was still working for the two-hour daily talk show and news interviews. The assistant producer call screening program was not working. It needed to link to the Telos on a different VLAN, and that link was disconnected. Communication with the hosts became primitive, and the next event countdown clock was gone.

Why were some computers affected and not others? The infection agent gleaned a system password and found its way into the active directory server. From there, it found and attacked every PC that was on active directory and was powered up. All of this we would figure out later.

How did our on-air Dalet keep going? Dalet Radio Suite, our on air system, was not on the KQED Active Directory. By design, Radio Suite had a separate domain and its own network switch. The ports on the network switch for Dalet Radio Suite were never turned off, but its link to the main KQED network was removed. It truly became an island with no outside connectivity.

Most production and news was done with Dalet Galaxy, which was on the KQED active directory. On Thursday morning before the infection, we had about 50 working Galaxy servers and clients. By late Thursday afternoon, we had zero. However, each production room had one on-air Radio Suite computer mostly used by producers as a utility PC and call screener. Despite their reduced capacity, these Radio Suite PCs became the new main production computers.

The Sadie computers we use for craft editing were not infected, but with the network disconnected getting audio to and from the computers became a real challenge. Dalet Galaxy computers in the news edit rooms were replaced with Radio Suite PCs, and several were added in the newsroom for editors and other news use.



Here's what else was affected:

- The Nautel Importer
- the Arctic Palm HD and RDS scrolling information manager
- the main shared production utility computer
- the on-air utility computer
- the main VOIP phone system computer
- the computer at the KQED transmitter
- most desktop computers on the network
- and the building security system. (It's not a broadcast PC, but access rights could not be changed to get people into areas they needed to get to in order to fix network problems.)

There were other computers and services not infected, but since we could no longer connect them to the KQED network, we could no longer use them, and those included our new Telos VX phone system; the PC that received Associated Press and Bay City News wires and passed them on the Dalet; audio file converters and file transfer between systems; the Burk remote control and the Burk Autopilot application; the EAS CAP network connection; and the transmitter status and control via IP. Our NTP server couldn't be reached by 50+ devices. The Comrex and Tieline devices were off for several weeks until we turned their network ports back on.

We quickly rebuilt the Nautel Importer,

since we are part of the Broadcaster Traffic Consortium. It was a bit of a challenge to get it going on 64 bit Windows 7, but after several days we got it going and back in use. In the mean time, we discovered we could feed the Harris Importer to the Nautel Exporter and it worked fine.

THE SLOW ROAD TO THE NEW NORMAL

IT set up a full-time help desk in the main atrium, and this is where staff could go to get laptops connected to the internet-only Wi-Fi.

At first, smartphones were also connected to the Wi-Fi, but the Wi-Fi slowed down so much that they had to be removed. The LTE at our building is ultra-fast and a better choice for the phones.

There were also several printers set up, and requests for important files to be retrieved from the backups could be made there, as well. After four weeks, the network printers were added to the Wi-Fi, and people could print directly from their laptops.

Almost immediately after the attack, most people installed Slack, an instant messager for business, on their smartphones and that became the message service in place of email in the days after the attack. Although the main Exchange email server was down, we had a backup email service through Mimecast, which people were able to access in the first week.

Phone lines returned after two weeks.

After three weeks, most files could be retrieved from the network by request and placed in a Google drive.

Before the attack, reporters could already get audio into Dalet from the field by using FTP. This became the main source for audio imports. Since the network connection was off for protection, in order to provide a method to connect to the FTP site over the internet, a wireless dongle was added to the PC that runs the audio importing application. The Wi-Fi-to-internet was shared with all of the KQED staff, and at times ran so slowly the app would need to be restarted. Even when it was running, the change from a direct Gig connection to a Wi-Fi connection that would drop to 1Mb and the huge increase in use caused many extreme slowdowns.

One work-around was for the production people to copy files in real time over an audio cable between PCs in order to meet a deadline. At first the use of USB drives to transfer files was prohibited. These can be used to spread viruses and we weren't taking any chances. Later some USB drives were used, but these had to be scanned by the IT department.

NETWORK SERVICES RETURN

After patching network routers and switches, new filters could be created to limit what devices could be seen on the network. No PC needs to be able to see every other PC on

CONTINUED ON PAGE 20

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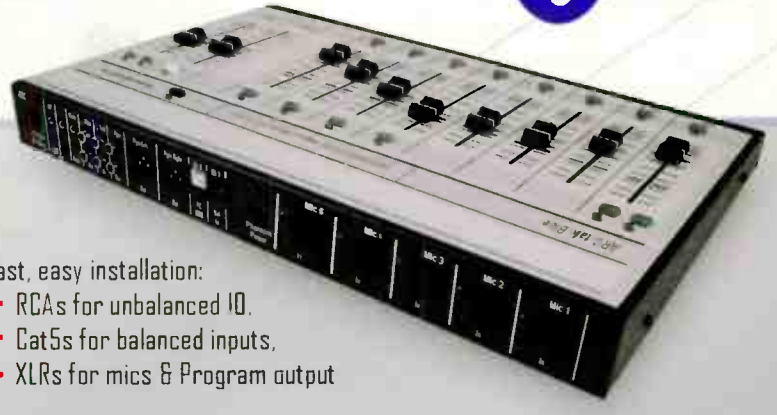

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CONTINUED FROM PAGE 17

the network, even if it is password protected. As in our case, network accounts can be compromised. To be sure nothing stopped working, the implementation of these filters had to be a careful process.

Needless to say, there were a few surprises when some device would quit working. The filter would be removed, and the device with the issue would be examined to see what it needed to work and the filter would be modified and reapplied.

File importing and exporting was reconfigured and placed back on the high speed network and that made life easier for News and Production. The call screening software was re-enabled for our talk show. The roll out of rebuilt PCs started in early August and people could once again log into a network. The completely rebuilt Dalet Galaxy system returned, and at that point everybody breathed a collective sigh of relief.

This story is by no means over. It will probably be several months before all the noncritical services and utilities return.

With the benefit of this experience, there are certain things I'd like you to know and consider:

Takeaway #1. Have a reliable way of communicating with your MCR. It could be a landline. It could be every operator's cell phone number. It could be a good old radio two-way; we use them at KQED and having one in our MCR is now a priority.

Takeaway #2. Have a way to communicate with staff, such as a general voicemail box off site, or a business instant message program, like Slack. Make sure all staff members know how to access it. A cloud-based station wiki could contain lots of "what to do if" documents. Keep it updated.

Takeaway #3. Have hard copies of critical documents on file, and a copy on an engineering laptop not normally on the network.

Although disconnected from the studio, the network at the transmitter continued to work, allowing the Burk Plus to function normally. Operators could dial into the Burk Plus for readings and control.

My network documentation, including all IP addresses and passwords, was not available for three weeks — including transmitter wiring, shipping forms, EAS log masters, time sheets, etc. Don't forget to keep the hard copies updated. I had a copy of all important network, engineering and transmitter files on my home PC, but they were nine years old.

Takeaway #4. Have work-arounds in place for everything. How do your news people get interviews into their computers and edit them without a network? And then how do they get those files into your on-air system? If any equipment in your air chain requires a network connection to function, have a non-network dependent device as a backup.

Takeaway #5. Some staff will be more understanding and adaptable than others. Keeping people up to date about the crisis will go a long way. But there was also a large increase in sweet treats throughout the building in the weeks following the attack.

Takeaway #6. Keep your critical systems in protected islands! Our radio listeners and TV viewers could never tell there was a problem, as our regular programming kept going.

Takeaway #7. The staff working on the crisis will work longer and harder than anyone could expect. Keep them fed when they are here because they won't take the time out to feed themselves, as they should. Don't get in their way and make sure all staff requests go through managers. Recognize their efforts, thank them regularly.

While we don't know who the villains in this story are, we do know who the heroes were.

First, the IT department led by Michael Kadel. They were the real saviors of the day and the weeks that followed.

Steve Pinch in FM engineering is truly responsible for ensuring that KQED(FM) stayed on the air with normal programming. He worked almost around the clock for days to developed workarounds for every problem and showed the production and news people how to make them function.

His counterparts in TV, Jay Strauss and Larry Bursten, kept the TV station on the air.

I also think the production people, the news people and all the staff at KQED deserve credit for their dedication and perseverance in difficult times. We often talk about how we would respond to a disaster like an earthquake. This was a disaster of a different kind, and we got through it intact and still going strong. We are a news organization with a mission to serve our listeners, our viewers and our internet audience. We lived up to our mission, and we will apply what we learned to future disaster recovery planning.

UPDATE FROM LARRY

It's now been three months after the attack, and I have a few updates on how KQED has recovered and what permanent changes we have been adopted to keep us safe from future attacks.

First, I will state that we know that no safeguards will ever be 100-percent affective. With that in mind, backing up and keeping the network secure continues to be KQED's first priority.

Next in importance is making the operational network environment as usable and straight forward as possible. Secure and usable are two different goals that often fight each other. The more secure the network is the less

useable it is, and vice versa.

One way we try to keep usability high while still keeping the on-air and production audio systems secure is with virtual machines. While our Dalet client PCs are on isolated networks, users can log into virtual machines using remote desktop and get full virtual network access for email, printers, storage and Internet. This maintains the direct network connection to Dalet Galaxy, while at the same time allows for news and production to complete all the tasks associated with their workflow, i.e., uploading raw audio, writing stories to go with the audio, sharing drafts and early edits for review with editors and then sending them to production as needed for the final mix and then to air. The VM login adds an extra step, but provides full isolation.

One new software anti-virus program we have implemented is Carbon Black. Should any user connect an infected file directly to their computers, Carbon Black stops the attack two ways.

First it works by detecting known viruses, malware and ransomware the conventional way, through a virus definition database. And second, for previously unknown threats, it works by detecting suspicious activity on a PC and shutting down the network port of the suspect PC.

And since email is a major source of infection agents, we have increased the security level of our email by enabling more features in Mimecast, including requiring all email client devices to register before they can be used. This is easily done, but for me it included almost a dozen devices, including PCs, laptops, phones and tablets. Mimecast also examines every link that gets clicked on for potential problems. The Mimecast security page opens first and there is a pause while the site is examined for possible problems.

From an engineer's standpoint, almost all of my troubleshooting tools are back.

I can once again log into equipment at the studio and my various transmitter sites via VPN. I can do this from within KQED, at home or anywhere with a fast Wi-Fi connection.

Several times in the last few months, because I didn't have remote connectivity, I was hampered in quickly correcting a fault condition. In one case, I had to drive to the transmitter at 2:30 a.m. because I could not connect from home to troubleshoot and correct a problem.

Not having remote connectivity to your broadcast equipment is like not having your best assistant there to help you — the assistant who is always where you need them to be, when you need them to be there — even on a mountain top at 2:30 in the morning. The equipment manufacturers have done a great job of building that little remote helper into much of today's vital broadcast equipment. I won't be taking those for granted again.

Larry Wood is Chief Engineer of KQED(FM) San Francisco and KQEI(FM), Sacramento, Calif.

You Can Never Have Enough Control (or Monitoring)

by Dennis L. Sloatman

I'm a confessed control freak.

Not the kind who longs to be the unquestioned supreme leader of corporation or a small sovereign state. Rather, the kind who needs to have granular control and telemetry of my remote sites.

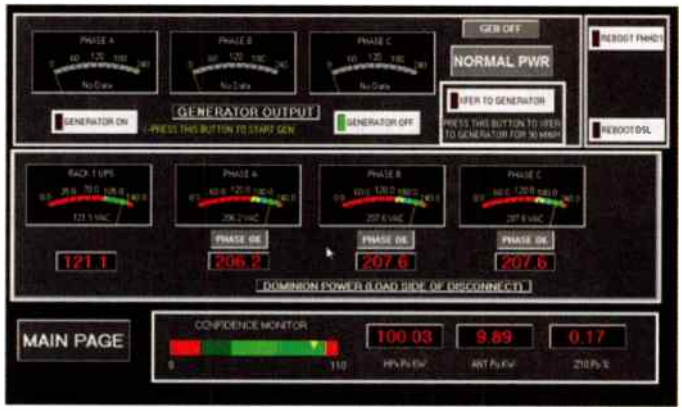
Those who know me are aware that I never believe I have enough control, no matter how much I already have. It never seems to be quite enough when some late-night issue crops up at any one of my seven sites.

This is a broad topic worth a series of articles, but for this issue, I'll focus on the emergency power system.

Sure, you have status alerts to warn you the generator is supporting the load at the transmitter site (or studio), but is that enough? I say no! I will now try to make the case that this is little but the bare minimum — and what do you think of someone who only does the bare minimum? You need some flair here!

At minimum, you also should have status (or metering) to alert you when the generator is running (not necessarily carrying the load), generator line voltage, alarm status (such as over-speed, over-crank, oil pressure, low water level, etc.) and the all-important fuel level. I'll get to another important bit of telemetry a bit later, but I'd like to develop the justifications for the items I just mentioned before getting to that.

The vast majority of the time, your generator sits quietly at the remote site and awaits its mission to maintain your signal when the lights go out. But if you've been the business as long as I have, you come to realize that the generator, with all its moving parts, sensors, batteries, liquid levels and outdoor location, can well be among the most troublesome equipment you have in your purview.



Metering for the "normal" side means that engineering can keep track of utility power as well as generator power.

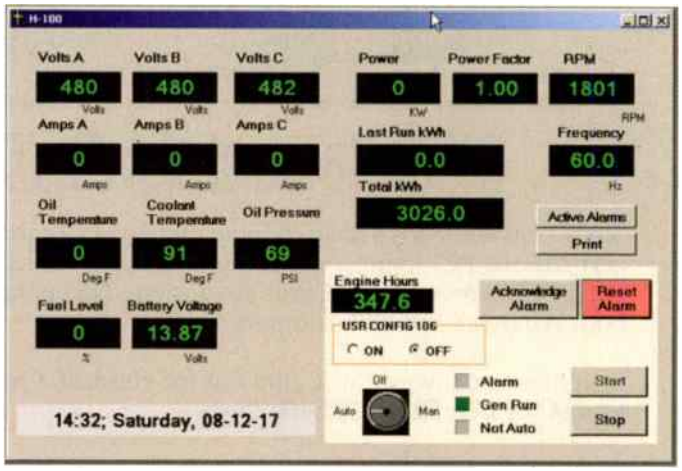
I can't recall how many times the generator failed in the moment of truth, despite its twice-yearly inspections, weekly tests and various visual inspections by the engineer. Sensors fail without notice, as do batteries, belts, hoses — and then there are the rats that build a nest in the controller and chew crucial wiring (yes, that happened to me in 1984).

Recently in Los Angeles, we had a power outage in Beverly Hills, during which the generator failed to come on online (good thing we had an alternate site — another important topic for another time). The deal was the generator ran during a weekly test scheduled by the ATS plant exerciser (days before the power outage) and then shut down due to an over speed condition. We were unaware of that.

After that, the engineering department came up with a comprehensive "wish list" of everything we should have for generator monitoring. The list included remote generator alarm monitoring (even if only a "summary" alarm), generator run status, load-on-generator status, and a few other, really cool ideas: battery voltage (also alerts you charger issues) and block heater current.

We went to work deploying these ideas for all our sites in LA, and trust me, all the work paid off, particularly when coupled with email/text alerts.

For example, we knew a battery was dead before that became a problem, and we knew



Screenshot of the GenLink user-interface monitoring critical parameters of the gen set.

WE NEED YOUR TIPS

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I can't recall how many times the generator failed in "the moment of truth," despite its twice-yearly inspections, weekly tests and various visual inspections by the engineer.

if a generator failed a weekly test for some reason, such as an "over crank" alarm.

It was a lot of work up front, but this pays long-term dividends. Newer generators may come equipped with web servers, and better yet, SNMP — a godsend as you'll have access to every parameter available to a service technician.

I have included a picture of the GenLink software I use to monitor parameters the gen set at my studio plant. Essentially, all these serve to remove the "surprise" factor from your job, insofar as the critical generator system.

Earlier I alluded to "another important bit of telemetry." Let's say you know when your site's generator is running, when it has an alarm condition, when the site is actually on emergency power, and if the battery charger or block heater has failed.

That's still not enough — has the normal power returned yet? You've checked your utility's outage website, and you see they're aware of the power outage and have "dispatched a crew" but can't be sure when the power has been restored, unless the Automatic Transfer Switch switches back to utility power.

I know that waiting for that to happen can seem like days. So, some time ago while an ATS was being installed and still de-energized, I added metering on the utility side, so that I would be alerted when the utility power was restored. In that fashion, I knew the generator had 30 minutes more to run, because that is how I choose to adjust the Time Delay Emergency to Normal setting system in my ATS.

You just can't have enough of this stuff, folks. Let's resolve to reduce or eliminate unscheduled site visits!

Dennis Sloatman is the director of engineering and IT for SummitMedia Corporation's Richmond, Va., stations.

Rancheria Radio's production studio accommodates live DJ mixing, with Pioneer's Serato.

Miwuk Tribe Bets on Online Radio

by Jason Ornellas CBRE, CRO

The Jackson Rancheria Band of Miwuk Native Americans own and operate Jackson Rancheria Casino Resort, which is located in Northern California, in the city of Jackson. The tribe of the Miwuk Indians are in charge of the casino, hotel, RV park, general store, gas station and Rancheria Radio. The current studio facility was once an unused, open room that was part of the tribe's government building.

The four brands of Rancheria Radio were founded in November 2015 and all were designed by the tribe themselves. Rancheria Radio currently has four music channels: Spin, Fuze, Ranch and Sage. (In the near future, a fifth brand, a Native American channel, will start.) Spin is a top 40 hits station; Fuze is active rock; Ranch is country; and Sage is easy listening soft rock music. These brands create a wide variety for all of the resorts customers as well as members of the tribe.

The whole project of creating four radio brands from the ground up took a collection of professionals to accomplish. The following is a list of key personnel in the build out of its new and current studios: Rich Hoffman, CEO; Justin Valencia, program/music director; Manny Duarte, broadcast assistant; Dan Rehart, director of IT; JJ Kaden, programming consultant; and, the Jackson Band of Miwuk Indians. Rob Goldberg, RadioDNA president, and Adam VanConant, RadioDNA engineer, played crucial roles as well.

The studio furniture was custom designed by the folks at Radio DNA. The tribe, on the other hand, does all of its own manufacturing and craftsmanship, and built the studio furniture themselves for both the on-air studio and production room.

RadioDNA designed and constructed Rancheria Radio as a Wheatstone WheatNet-IP facility. The On-Air Studio consists of the versatile, low-profile Wheatstone LX-24 console. The LX-24 console works with the whole WheatNet-IP intelligent network to access, control or utilize any or all sources on the same network. The on-air studio uses three different blades; a Mix Engine blade, A/D Blade and the M4 mic processor blade. The Mix Engine blade handles all the DSP processing power for the console, logic (GPIO) and distributes the four stereo PGM buses, four stereo AUX sends, per-channel mix-minus feeds, monitor outputs, and other bus signals to the network. The A/D Blade is a combined analog and AES digital input/output BLADE. It handles both the input and output, each with eight stereo channels, 16 mono channels, or any combination totaling 16 discrete channels. The Wheatstone M4 microphone processor provides four completely independent channels of mic amplification and processing in a single rack unit of space. The TS-4 is one of Wheatstone's smallest Talent Stations, the TS-4VW is vertically orientated, and fits virtually anywhere around the three guest positions on the countertop. In addition

to all the Wheatstone gear, the on-air studio uses a Telos Hx6 telephone hybrid with two VSet6 headsets. Also found in the air studio is a Denon USB/SD media player, multiple Yellowtec mounts and Electro-Voice RE320 dynamic vocal microphones.

The production room serves as a backup air studio as well as a mix studio for DJs. The studio console is the Wheatstone IP-12. The IP-12 is a 12-fader control surface that is part of the WheatNet-IP through its IP88CB console audio BLADE engine. Each of its 12 input modules is equipped with an LED source name display and an A/B source selector; sources can be set via a rotary encoder in the master section. This studio

Another view Rancheria Radio's on-air studio, featuring furniture built by the Miwuk tribe from a RadioDNA design.

also contains a M4 microphone processor and two TS-4 guest turrets panels. The DJ equipment that is setup in between the guest positions consist of a Pioneer DDJ-S2 Mixer with built in Serato. This is used for live DJing on the air for any of the radio stations.

Rancheria Radio uses RCS Zetta for automation and music playout and G-Selector for the scheduling of music. Because they are both products of RCS, they are easily compatible for Rancheria Radio. The group of four brands doesn't have a TOC, but they do utilize two WheatNet-IP all-digital blades for integration of the automation playback.

And because Rancheria Radio does not have a terrestrial FM or AM signal, it's available only through its website and mobile apps. When figuring out how to stream and build its mobile platform, RadioDNA and the staff of Rancheria Radio turned to Securenet Systems for a full turnkey solution. (Securenet, a Florida-based company provides radio streaming services and website hosting to customers in over 200 countries and the US.)

The playout audio streams from Rancheria's four different formats are all processed by an Aura8IP-3 audio processing blade. (This single-RU device has eight independent processors built-in, giving the group some room to grow.) Outputs from the playout system make their way in to this blade, by way of WheatNet-IP, and are processed and sent to audio codecs which generate streams further distributed to end-users by the Securenet system, either by a streaming player or mobile apps customized for Rancheria. The company provides mobile app templates for every client for both iOS and Android streaming, and each music station of Rancheria Radio is able to customize its own look on the app with the brands logo and creative skins.

Rancheria Radio is the official radio station for the Jackson Rancheria Casino and Resort.

You can stream any of the stations online at *www.rancheriaradio.com* or any of their mobile apps.

Rob Goldberg of RadioDNA also contributed to this article.

Handle the Nuisance of Intermodulation Distortion

by Jeremy Ruck, PE

Unless you are a hermit or a Stylite, robust interaction with your neighbors is usually a good thing. Of course, this is not the case with broadcast transmitters, where living in isolation is usually the preferred state.

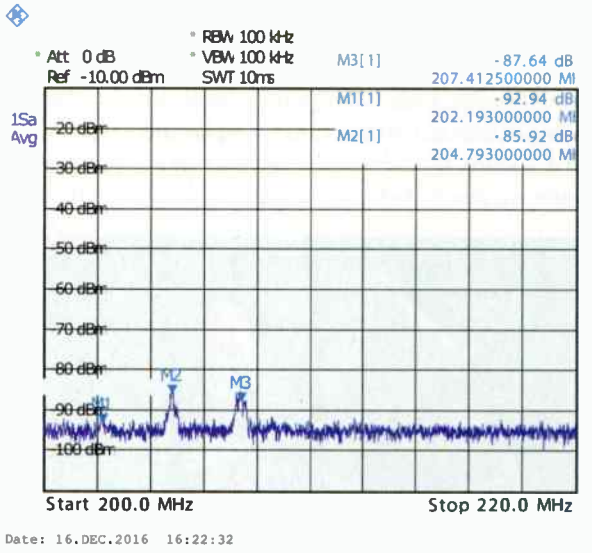
Systems that start talking together are kind of like the neighbors on either side of you who party together and leave beer cans in your yard. Those guys are a nuisance, and so is the RF equivalent, intermodulation distortion, or more simply, intermodulation.

This phenomenon has at its source the fact that we live in an imperfect world. In school, it was convenient to neglect air resistance and consider all systems as being linear. Unfortunately, it ain't that way out here in the cold, and the actual non-linear nature of systems can cause multiple signals to combine and form transmitted products at new and undesired frequencies. These new products may land on frequencies used by other systems, and if high enough in magnitude, cause interference to other users.

Most times intermodulation products are created in a transmitter power amplifier, which is reasonable, given its active nature. IMD can also be created in receivers, and many times occurs in vintage radios or, in some cases, in the front end of a receiver pounded by high signal levels. In much less common cases, usually limited to ones where the field strength is high, metallic objects can act as a rectifier or mixer and create trash.

The late great Don Markley used to talk about a case where a spur created from the mix of two proximal FM stations was wreaking havoc on aircraft communications. Through direction finding techniques, he traced down the source of spur as being rusty fasteners on the siding of a communications shed. The kicker was the shed belonged to the FAA — the original complainant!

If we consider an amplifier that is perfectly linear and inject two signals at different frequencies, then our output will contain only those two original frequencies shifted only by amplitude and phase. The non-linear nature of devices allows for the creation of the additional products. In the simplest case of intermodulation, non-linear conditions create harmonics, which are integral multiples of a single fundamental frequency. Most transmitters will have a filtering scheme to reduce the level of these products of which the second and third are usually the most egregious.



Spectrum analyzer results showing low-level IMD products.

As the quantity of signals increases, the number of potential products increases as well. Products are referred to by "order," which is the sum of the absolute values of the coefficients of the fundamental frequencies.

As an example, the product of twice one frequency minus the other is third order. Similarly, an example of a fifth order product is three times one frequency minus twice the other.

Note that as the order increases, the probability of a given product decreases, as amplifier harmonics typically decrease in magnitude as their frequency increase. Although the probability of a seventh or higher order product occurring is non-zero, it is very small.

To see how the number of potential products spirals upward, consider a site with two FM stations. The number of potential third, fifth, and seventh order products are 12, 30 and 56, respectively. Increase the number of stations by one, and the result is 31, 114 and 286 products, respectively. Make it four stations, and now you are at 64, 337 and 1,115 potential products.

At large communications sites, the number of potential products can easily be in the thousands. Of course, not all products will be there and consideration of modulation types, equipment design and frequency separation factor into the potential of a given product. While a microwave and AM transmitter creating a spur is possible, if you find one of these actually occurring, I would suggest buying Powerball tickets.

FILTERING

In the event that products are found to exist, no equipment issues are present, and the cause of products is outside frequencies coupling through the antenna system, the typical way of elimination or reduction is through filtering.

Filtering reduces the magnitude of outside signals reaching the device, thereby reducing the magnitude of products created in the

amplifier. Products transmitted also travel through the filter and are therefore reduced in magnitude.

Four basic filter topologies exist, and the utility of each depends on the source and frequency of the signals involved.

In a case where two FM stations are potentially mixing, a band reject in the form of a notch in the path of each may be sufficient. The use of notch filters becomes impractical and costly if a greater number of signals are involved as each external frequency entering a device requires its own notch. Low pass or high pass filters may be appropriate in cases where the frequencies are disparate. Ultimately, the best solution is probably a band pass filter centered on the desired transmit frequency. Such filters can be thought of as high pass filter cascaded through a low pass filter.

FIND THE SOURCE

If the location of a generator of an undesirable product is unknown, direction-finding techniques will be necessary. Triangulation of the source location can usually be made through successive iterations of identifying a peak azimuth from various locations in a circle around the source and plotting them on a map. If the horizontal plane pattern of the receive antenna is broad, it may be necessary to triangulate multiple times to converge on a location, while moving closer to the apparent source each time.

When the source is finally determined, it is desirable to establish the level of the products to determine compliance with the commission's rules, or lack thereof. A spectrum analyzer, filter assortment and sample method is the equipment set of choice. Filters are important to ensure that the fundamental frequencies are sufficiently reduced not only to provide sufficient dynamic range, but also to ensure that other spurious products are not generated in the front end of the analyzer.

Filters and cable assemblies must be accurately characterized at the frequencies under consideration in order to derive correction factors for their responses. Depending on the methodology utilized, additional correction factors may be required for the sample apparatus, as well. Transmission line sections that use removable plug-in sample slugs can be assumed, based on manufacturer literature, to have a flat response across their specified operational range. Directional couplers, however, typically have a frequency-dependent coupling value. Variations in the coupling value can induce inaccuracies into measurements, especially those that diverge from the fundamental by a significant amount such as harmonics and higher order products.

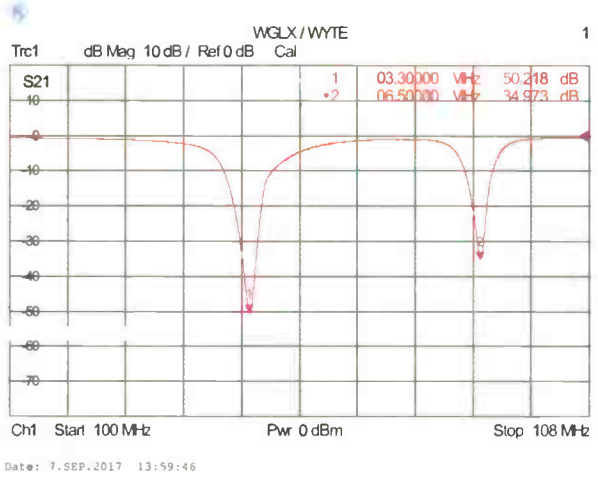
Ideally, the frequency response of a directional coupler should be fully determined across the entire spectrum under consideration. If this data is not available, or cannot be acquired, then the assumption must be made that

the coupler will provide a sample that increases in magnitude by 6 dB per octave. In other words, a measured second harmonic, which is twice the frequency of the fundamental, will be 6 dB higher than the actual sample or level being "transmitted". The third harmonic will be 9 dB lower than measured, the fourth 12 dB lower, and so on.

The ideal equipment for characterizing and tuning filters and other apparatus is a two-port network analyzer.

Once the measured levels are determined and appropriate corrections for cables, filters and other components made, the actual value relative to the fundamental carrier should be checked to ensure rule compliance. The two sections pertinent to radio broadcasters are 73.44 for AM stations and 73.317 for FM stations. In each case, the emission limits are frequency based relative to the carrier.

For AM stations, the emission limitations form the familiar NRSC mask and vary with frequency. Closer to the carrier the attenuation limits are lower, reaching -65 dBc in the range removed 60-75 kHz from the carrier. Beyond 75 kHz from the carrier, products must be attenuated to at least -65 dBc for transmitter powers of 158 Watts or less. Above this threshold, the attenuation level is the lesser of -80 dBc or 43 plus ten-times the base-10 logarithm of the power in Watts. Good practice is to shoot for 80 dB down, and if it is not achieved, run the calculation and see if compliance is achieved. The 80 dB figure is based on transmitter powers of at least 5 kW, so lower transmitter powers will allow for a lower attenuation level.



Network analyzer characterization of notch-filters to be used ahead of spectrum analyzer input. These filters reduce the amount of the fundamental signals getting in to the analyzer, which effectively increases the dynamic range of the measurement, allowing an easier "capture" of the actual IMD products, should they exist.

In the case of FM stations, the attenuation required is -25 dBc in the 120-240 kHz from carrier range, -35 dBc in the 240-600 kHz from carrier range, and beyond 60 kHz out, the familiar 43 plus ten-time the base-10 logarithm of the transmitter becomes relevant. As was the case with AM systems, the attenuation level is the lesser of this value and -80 dBc. It is important to note that even signals attenuated well below these levels can cause problems to other users, namely LTE uplinks. In that case, and others, filtering may require the addition of shielding to keep the neighbors happy.

Identification and elimination of intermodulation products is usually straightforward, although every once in a while, a curve ball is thrown that challenges the acumen of the most astute engineer. In such cases, a combination of elimination theory and Occam's Razor will usually get you to the answer, and more importantly, get the beer cans out of the yard.

Ruck is the principal engineer of Jeremy Ruck and Associates, Canton, Ill.

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In our November issue, we'll present the results. Last year, we learned some very interesting things, and in 2017, I expect we'll learn more about industry trends. I know that you'll find the results to be useful, and I can't wait to share these important insights with you!

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Statement of Ownership, Management, and Circulation (Requester Publications Only)

1. Publication Title	2. Publication Number	3. Filing Date
Radio	3758	9/27/2017
4. Issue Frequency	**5. Number of Issues Published Annually**	**6. Annual Subscription Price**
Monthly	12	Requester

7. Complete Mailing Address of Known Office of Publication (Not printer) (Street, city, county, state, and ZIP+4)
NewBay Media L.L.C.
28 East 28th Street, 12th Floor
New York, NY 10016-7958
Contact Person: [illegible] Keenan
Telephone: [illegible]-4504

8. Complete Mailing Address of Headquarters or General Business Office of Publisher (Not printer)
NewBay Media L.L.C.
28 East 28th Street, 12th Floor
New York, NY 10016-7958

9. Full Names and Complete Mailing Addresses of Publisher, Editor, and Managing Editor (Do not leave blank)
Publisher (Name and complete mailing address)
John Casey
5285 Shawnee Road, Suite 100
Alexandria, VA 22312-2334
Editor (Name and complete mailing address)
Doug Irwin
5285 Shawnee Road, Suite 100
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Emily Reigart
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Full Name	Complete Mailing Address
NewBay Media L.L.C.	28 East 28th Street, 12th Floor New York, NY 10016-7958
wholly owned by The Wicks Group of Companies	400 Park Avenue, New York, NY 1002[illegible]

11. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 Percent or More of Total Amount of Bonds, Mortgages, or Other Securities. If none, check box → ☒ None

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12. Tax Status (For completion by nonprofit organizations authorized to mail at nonprofit rates) (Check one)
The purpose, function, and nonprofit status of this organization and the exempt status for federal income tax purposes:
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PS Form 3526-R, July 2014 PSN 7530-09-000-8855

13. Publication Title: Radio
14. Issue Date for Circulation Data Below: September 2017

15. Extent and Nature of Circulation		Average No. Copies Each Issue During Preceding 12 Months	No. Copies of Single Issue Published Nearest to Filing Date
a. Total Number of Copies (Net press run)		5497	[illegible]
b. Legitimate Paid and/or Requested Distribution (By Mail and Outside the Mail)	(1) Outside County Paid/Requested Mail Subscriptions Stated on PS Form 3541 (Include direct written request from recipient, telemarketing and Internet requests from recipient, paid subscriptions including nominal rate subscriptions, employer requests, advertiser's proof copies, and exchange copies.)	4467	4480
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c. Total Paid and/or Requested Circulation (Sum of 15b (1), (2), (3), and (4))		[illegible]	4480
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f. Total Distribution (Sum of 15c and 15e)		[illegible]	[illegible]
g. Copies not Distributed		[illegible]	130
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GALLERY

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Put the "A" in "EAS"

by the Wandering Engineer

The Blue Alert system was designed to give law enforcement the means to speed the apprehension of violent criminals who kill or seriously injure local, state or federal law enforcement officers. At the request of the Justice Department, the FCC is now considering the creation of a designated Blue Alert "event code" that will be disseminated by the EAS system.

Long before anyone figured out that broadcasting could be entertaining, informative or that it could be financed by advertisers (in fact, before radio could speak and TV see) broadcasting's most obvious and highest purpose was front and center: saving lives and property. Everything else we do, good or evil, pales in comparison. If we don't do this, we have no legitimate reason to exist and "our" spectrum should be given away to unlicensed services, mobile alerting, and all those IoT devices and things that do good.

That said, emergency communications are a complex topic, and an arena filled with special interests, including us broadcasters. The proposed addition of a "Blue Alert" exposes the complexity of this spooky world. Let's go through the basics.

First: alerting and informing are two distinct functions. Alerting is a brief message that quickly and unavoidably tells people to take cover to prevent death or injury. EBS did that. All EAS did was automate the alerting function, prioritize it and target it with a resolution of down to one-ninth of a county. It is intentionally simple, fast, compact and language agnostic. Alerting has many enemies. The most perverse is complexity. As the alerting codes expand and the processing of those alerts becomes more complicated, the odds of failure and thus death and disaster increase.

Second: every available means should be used to get the alert message out quickly and unavoidably. EAS was designed to create a "road block," when necessary. No matter what button you pushed on your radio or TV channel you turned to, you would be greeted with the same emergency message at the same time. Not so gloriously, many a broadcaster elected to delay certain messages to better fit in the program stream. Nonetheless, broadcasters were certainly correct in believing that under some circumstances, they could and should hit the alert button themselves. Many a broadcast weather department has identified a tornado long before the weather service managed to validate the situation, enter all the data and push the button. (This may become moot as the weather services shift to artificial intelligence and automate their processes.)

Yesterday at 9 p.m., while I was on the light rail, all of the smartphones simultaneously went off with the age-old, skeuomorphic 853 and 960 Hz tones from the EBS days of a quarter century ago. It was an Amber Alert. I tuned around, looked at a few web pages… nothing for several minutes, until broadcasters began posting their material. By default, smartphones will all alert.

There were a few broadcast EAS receivers built that would automatically turn on/wake up, and of course, Weather Service radios do — but weather radios don't necessarily carry alerts that are not weather related, even storm surge is a recent addition to WX radio alerting. Probably the best part of "Advanced Emergency Alerting" (in progress as part of Next Gen broadcast) is that it more-or-less mandates that Next-Gen media devices be able to alert and then direct people to the relevant information.

Third: informing is entirely a different matter, which may or may not follow an alert. Informing is what news departments do. There is no other establishment that aggregates, parses, verifies, prioritizes, analyzes and presents and explains timely information. After "take cover" — alerts instruct us to "tune to our local station" for a reason. Obviously, only a handful of broadcasters take on this role, but for every square inch of this country, if not the whole world, there is at least one broadcast news organization that serves it.

We can separate broadcasters into participating and none-participating stations, but in the end, it is a broadcast news organization that traffics in school closings, shelter locations and general directions.

Katrina was a disaster, but it would have been orders of magnitude worse without broadcast news departments and broadcast engineers stringing up antennas and reviving communications equipment — with a healthy hand from the other guys with "free spectrum," and some know-how, the Hams.

There is absolutely no other organization in our world, government or private, that can come close to performing this function. Conflating the functions of alerting and informing makes nothing but an incomprehensible and unmanageable mess.

So, Blue Alerts? Only a bad person would go on the record opposing this, or any other use of emergency alerting and informing. And that's a problem. There are no adults in the emergency communications room to keep things that conflate the two functions apart or weigh the risks/rewards of added complexity.

We broadcasters have either given up or lost our lead in emergency alerting, and while they are low probability events, they are high impact. Only broadcasters have any chance at all of processing the information and distributing it, albeit now on many platforms. If we don't do this, we really don't deserve the spectrum.

The Wandering Engineer is an industry stalwart who has been in broadcasting since the days of Marconi and Tesla. He gives his thoughts on the current state of broadcast engineering and the broadcast engineer.

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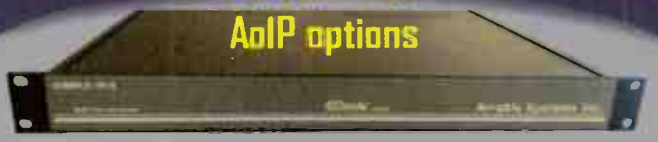

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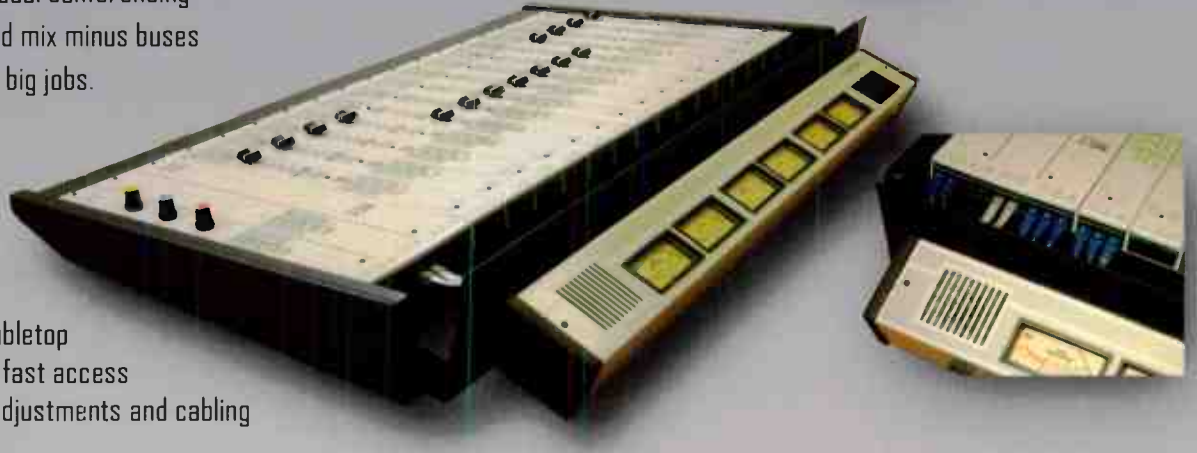

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