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C-Band Contention Ramps Up



NAB urges the commission to ignore "a win staring us all in the face"

Getty Images/Jaroszpilewski

SPECTRUM

BY RANDY J. STINE

Seems like everyone has been floating a proposal on what the FCC should do with the C-band. Plans from competing groups in Washington have generated buzz in broadcast circles, and even members of Congress recently released some details of their own compromise proposals for the spectrum.

At this point it seems certain that the FCC will transfer some or all of the

500 MHz spectrum of the C-band to wireless companies for new terrestrial 5G networks, in some manner. Experts say radio broadcasters who receive programming via satellite earth-stations could face disruptions and financial ramifications of a massive C-band migration caused by a repack.

The value of the band — and we are finding out just how valuable it is — is drawing lots of attention from broadband companies who want to see the repurposing of the spectrum (3.7–4.2 GHz) for 5G use. Other groups including the National Association of Broadcasters, National Public Radio and the Society of Broadcast Engineers,

(continued on page 8)

ConnectedTravel Seeks a Radio Connection

Tech-oriented company brings AI, data fusion and gamification to bear

BY PAUL McLANE

ConnectedTravel is a company that caught the radio industry's attention this spring when it announced agreements with station clusters in San Diego and Las Vegas to promote its HyperDrive Rewards mobile app to listeners. But the firm's vision goes beyond apps as it seeks to find a place, along with radio broadcasters, in the fast-evolving con-

ConnectedTravel®

ected car environment, for instance through a partnership with Honda.

Founded in 2016, ConnectedTravel puts technology right up front in its marketing. It says it offers cloud-based platform services that use artificial

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For SiriusXM There's Now an App for That

The numbers and innovations speak for themselves: Radio broadcasters should be smelling smoke

▶ SATELLITE RADIO

BY FRED JACOBS

The author of this commentary is a consultant and president of Jacobs Media Strategies. The firm's annual Techsurveys seek to identify trends in the mobile, social and "connected car" spaces.

The audio renaissance just gets bigger, broader and bolder with each passing week. After years of audio being essentially limited to just AM/FM radio and personal music collections, it's no longer accurate to refer to it as a "space." It has truly become a massive, expanding universe unto itself with many different tentacles that are seemingly sprouting up every time we turn around.

Of course, there's still good old broadcast radio — as more and more brands attempt to tack the "R-word" onto their logos and positioning statements. Podcasting continues to be in the center ring, despite lousy metrics, a glut of really mediocre content and an overall lack of accountability. ("How do we know it works? We just do.")

Mobile apps that focus on audio entertainment and information are all over our smartphones and desktops — including iHeartRadio, Spotify and TuneIn, along with thousands and thousands of apps for individual radio stations and shows throughout the U.S. and the world.

We've discussed audio signatures and branding several times during the past year, as companies as diverse as Nationwide Insurance, McDonald's and Netflix are



working feverishly to embed their sonic ditties into our brains.

There's audio hardware and software, too, as turntables and vinyl have made their respective comebacks. Audio in the home has become a high quality pursuit, thanks to brands like Sonos, Bose and others.

Our smartphones — and now our smart TVs — also provide the ability to punch up a broad variety of audio information and entertainment with just a touch on a screen or a voice command.

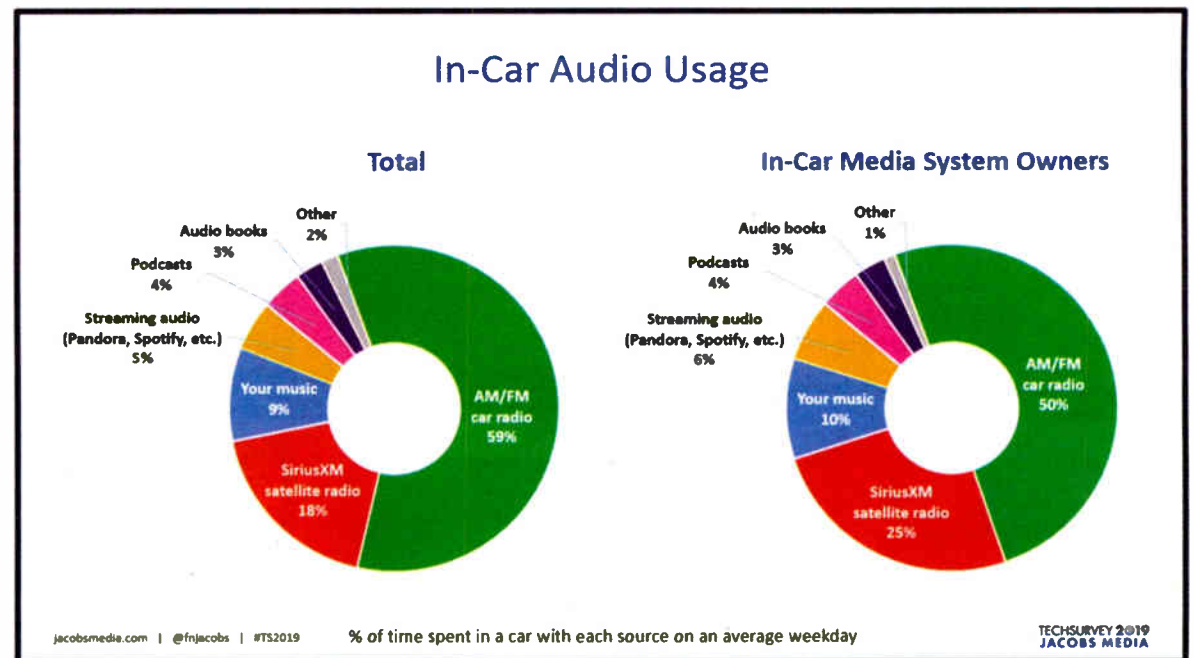
And speaking of which, there's the smart speaker/voice phenomenon, showing up on nightstands, kitchen islands and car dashboards seemingly everywhere. Our words now conjure up our audio choices. Amazon and Google are in a drag race, trying to scarf up as much voice real estate as they can (before Apple wakes up).

When consumers can get Alexa in their cars via the new Echo Auto after-market product for the low low price of \$25, you know we're in the midst of a revolution that shows no sign of stopping.

Now don't be alarmed; I didn't leave out pureplay streamers like Spotify and Pandora. While it seems like they've been on the scene forever, they are each in serious expansion/pivot mode. Spotify's foray into podcasts has vaulted it into the No. 2 position behind Apple. This is smart brand diversification, bringing Spotify into the spoken word and podcast arenas, while also providing the company with a content/monetization play that involves no music royalty penalties.

Meantime, it sure looks like Pandora was snatched

(continued on page 4)



SIRIUSXM APP

(continued from page 3)

up by SiriusXM at just the right time. Clearly, the folks that brought us the “Music Genome Project” were running out of bullets. Especially among younger generations of consumers, Spotify had already made serious inroads, despite Pandora’s “first-in” position.

That left Pandora in a ... well, box. Losing share to Spotify, complicated by onerous streaming expenses, and simply falling out of favor, integration into the SiriusXM family was a godsend for Pandora ... and an opportunity for both brands to get stronger by combining forces and assets. In short, synergy.

SMELLING SMOKE

SiriusXM is a fascinating audio brand. It’s been around (starting with XM) for longer than most of the aforementioned audio content platforms. And yet, it is often overlooked by analysts and pundits, especially in and around the broadcast radio industry. But the moves SiriusXM have made in just the past year or so make it an imperative to understand the impact of satellite radio on the broadcast radio ecosystem.

We’ve been tracking SiriusXM’s progress in Techsurvey since Year One, going all the way back to 2005. After the growth spurt Sirius experienced following the hiring of Howard Stern, satellite radio’s growth trajectory has been slow, but steady. Clearly, technologies like smartphones, smart speakers and pureplay streaming platforms have had more dramatic growth, greatly overshadowing satellite radio’s aura.

So, where is SiriusXM today, and should radio broadcasters care? I have been accused by some of starting four-alarm radio fires with this blog post. But in the case of SiriusXM, the numbers and their innovations speak for themselves. We should all be smelling smoke.

Our Techsurveys have shown that when most consumers buy or lease a new car with connectivity, SiriusXM becomes the main beneficiary of tune-in, often at the expense of broadcast radio. You can see that in the two accompanying pie charts (page 3). The left side is the state of all in-car listening among our radio-centric sample. On the right, it’s the same data among people who have vehicles equipped with

in-car media systems.

What explains this? Why don’t Spotify or podcasts show a big leap when drivers get behind the wheel of a connected car?

Part of the explanation is that most new cars come with a free trial of SiriusXM, and that usually means months and months when consumers pig out on satellite radio. And the other fact is that in most cars, it is as easy to discover and preset SiriusXM channels as it is to punch up Z100 or WTOP.

But the SiriusXM brain trust is well aware that its growing in-car presence will only get the platform so far. That’s why in the past year, they’ve integrated Amazon Alexa technology into their channel lineup, enabling millions of consumers to listen to The Bridge or Howard 100 in their homes or offices — wherever there’s an Echo or a Dot.

SiriusXM’s purchase of Pandora in 2018 was met with many raised eyebrows. But the reality is that it opens the door for strong mobile phone and tablet presence — an environment where Pandora has historically excelled. SiriusXM has had an app, but its influence has been limited by its design and its accessibility.

Until now.

NICE PIECE OF WORK

In July SiriusXM launched their new app — and as importantly, made it available to all of their subscribers.

After installing and playing with it, I can tell you it’s a nice piece of work. And to that point, it provides a strong mobile interface that showcases the growing lineup of content on SiriusXM. There’s a video portal, as well as Howard Stern’s content (Howard has his own tab on the nav bar, as it should be). But there’s also the new roster of what they call “Xtra Channels” — where it seems like some of the choices are as granular as “Alternative Rock for Your College Reunion.”

But the application (within the app) that may be most noteworthy is its Pandora integration, which you can see on the far right in the accompanying image. The ability to create your own music channels is a new innovation for SiriusXM, leveraging their acquisition of the popular pureplay.

In short, there’s a lot here, it’s easy to use, it looks good and it opens up a whole new window of opportunity for the satcaster. I even tried the app in my car, where the dashboard visuals were better than when listening to SiriusXM



The app as it appears in the author’s car.

through my system.

It feels like they thought of everything. And it’s a sign SiriusXM plans on being big players in the audio entertainment and information landscape well beyond cars.

And one last thing: They are marketing the hell out of the app on their own “air.” Turn on any SiriusXM channel and it’s all about this app. And justifiably so. The best, most efficient way for them to promote downloads is to go right to their subscribers to ask for the order.

HOW TO RESPOND

So, what are the action steps here for broadcasters?

They’re obvious, but also difficult. Especially for operators that have fallen behind.

First, stations (and the companies that own them) need a coherent, researched and thoughtful content and distribution strategy. Notice I’m not calling it a “digital strategy.”

Second, on that same note, it’s another reminder broadcast radio stations compete with everybody. That graphic at the top of today’s post is only a partial illustration of the audio ecosystem. Those days when radio operators were up against the other country station across town are rapidly coming to an

end. Operators need to determine what their stations provide that isn’t available on SiriusXM, Spotify, podcasts, and the potpourri of other audio offerings.

Third, it’s an imperative radio broadcasters have a coherent mobile strategy in place with apps that are clean, easy-to-use and well-designed. They need to have Apple CarPlay and Android Auto integration, and they need to directly reflect the essence of the brand. The days of cookie-cutter apps

have come to an end.

Fourth, radio broadcasters need a marketing strategy for their mobile app program (as well as their other key content assets). Too often, stations buy an app, promote it when it goes live and then move on to promoting the \$1,000 national contest. It is obvious to me, as it will be to you, that SiriusXM has a marketing plan in place for their app — and it’s aggressive.

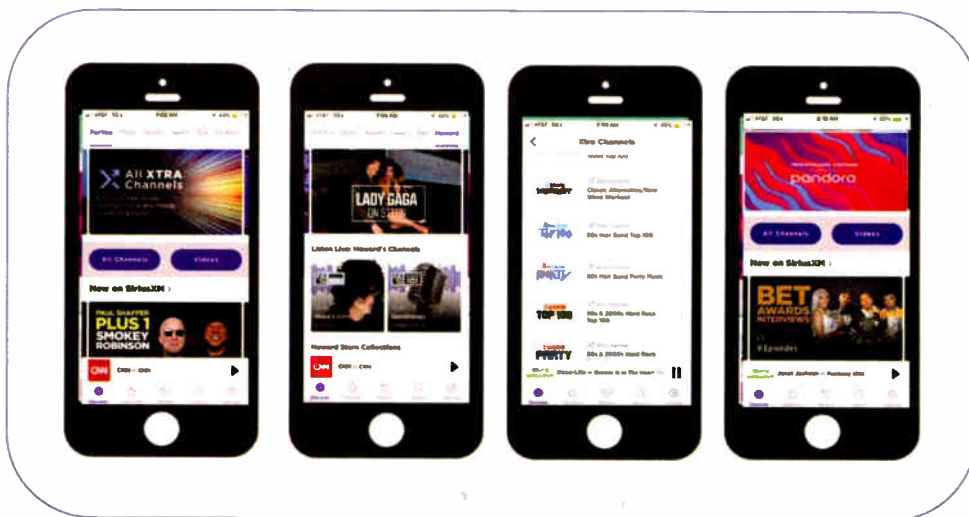
Fifth, radio broadcasters need to teach their audiences how to listen to their stations in an ever-expanding universe of options. How and where to access streams, downloading and using the app, accessing the station on smart speakers, and where to find podcasts and on-demand audio — we should take nothing for granted.

Most competitors in the audio space have gotten smarter and more strategic. They’re doing their homework, analyzing their data and boldly pursuing opportunities in a fast-changing environment.

To stay relevant and vital, radio broadcasters will need to do the same in order to keep pace.

Fasten your seat belts.

This commentary originally appeared on the blog of Jacobs Media. Visit <https://jacobsmedia.com/blog/>. Special thanks to Scott Jameson.



Images from the SiriusXM app. Pandora is at right.



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intelligence and machine learning, data fusion, behavior science and gamification technology to “capture, understand and drive consumers’ day-to-day mobile activities.”

Radio World asked Bryan Biniak, founder and CEO of ConnectedTravel, to explain how this relates to radio.

Radio World: ConnectedTravel offers what it describes as a “driver and passenger location-based application services platform and business that serves the automotive ecosystem on a SaaS basis.” Briefly, why should radio entities be interested?

Bryan Biniak: ConnectedTravel’s platform is enabling auto OEMs to make radio FM broadcast, streaming and podcast programming actionable, transactable and attributable. Drivers and passengers can engage in programming and advertising by voice when they are driving, enabling them to instantly buy what they hear, which fundamentally changes the commercial opportunity for advertisers in vehicles.

RW: Reading about your company in media coverage, a word that jumps out at me most is “gamify.” Why would gamification matter to radio executives and technology managers reading this?

Biniak: ConnectedTravel built a points-and-rewards solution that is utilized by auto insurance companies to gam-

ify driving, turning safe, undistracted driving into a game. The application, HyperDrive, challenges drivers to not speed, not use their phone while driving, reduce hard braking, leaving early or on time for driving routines and most importantly to use the app every day.

We have connected this to the radio audience and are working to establish a direct connection between drivers and listeners to gamifying listening, engagement and the retail funnel.

RW: Tell us about your partnership with Honda and how you envision this affecting the radio industry.

Biniak: ConnectedTravel built an infotainment, commerce, advertising and rewards platform for Honda and Acura vehicles that it will operate on behalf of Honda. This includes working with content partners, application developers, retailers, advertisers and brands to provide compelling, engaging and profitable services to drivers and riders.

This includes enhancing the radio experience in vehicles, making it measurable, actionable and transactable. It also includes influencing the next generation of programming and advertising in the car as it becomes contextually personalizable for each and every trip. When a driver can buy what they hear by voice in real time without taking their hands off the wheel, the fundamentals of radio change exponentially.

RW: What features or benefits does Honda Dream Drive offer to drivers?

Biniak: For the driver, we bring a voice UI and payments to radio, enabling them to safely and conveniently engage what has been a passive, linear medium to date.

For the passenger, they have the ability to control the tuner, audio sources and channels from their smart device and not have to rely on the driver.

RW: Forbes reported in January that Honda said “nothing was definite, including production years.” Can you update us on the status of the relationship?

Biniak: We have started the final step before production, which is commercial testing with consumers and Honda employees.

RW: When you talk with radio organizations, what action or commitment are you looking for from them?

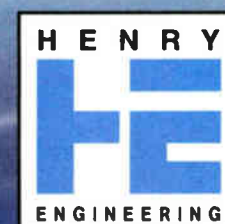
Biniak: Honda and ConnectedTravel are focused on collaborating with radio organizations that are willing to roll up their sleeves, lead the market and collaborate to develop, deploy, test and commercialize these next-generation services.

RW: A lot of people agree that “voice” is crucial to the car ecosystem, but can you specify what “voice” means to you, exactly, and again why radio should care?

Biniak: To date, distracted driving concerns and laws have prevented radio from providing an engagement interface that makes it competitive with online and mobile devices. Voice bridges that moat and provides an interactive inter-

*(continued on page 6)***GUEST POD II Solves “Headphone Headaches”!**

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face into programming and the drive is then measurable in real time.

RW: You have an app project called HyperDrive Rewards, and said Beasley Media in Las Vegas and Local Media in San Diego are involved. How does it work to discourage distracted driving?

Biniak: HyperDrive is an iOS and Android application that consumers download to their smartphone. The application learns about consumers' daily driving habits including when,

where and why users speed, their phone handling while driving, hard braking incidents and more. It then dynamically offers AI-based challenges to users in order to help them sustainably change their behaviors, making safe driving a part of their daily routines.

We are able to see in real time the impact of the experience while consumers are driving their vehicles. The points they received for improving their driving can be redeemed with other rewards programs, or directly for free and discounted services at local and online retailers. These retailers include Walmart, Target, AMC Theaters, Star-

bucks, Amazon, Apple, Best Buy, Burger King and Home Depot.

RW: In your own career you worked in the in-car media space at Nokia. What did you learn there that is informing your involvement with ConnectedTravel?

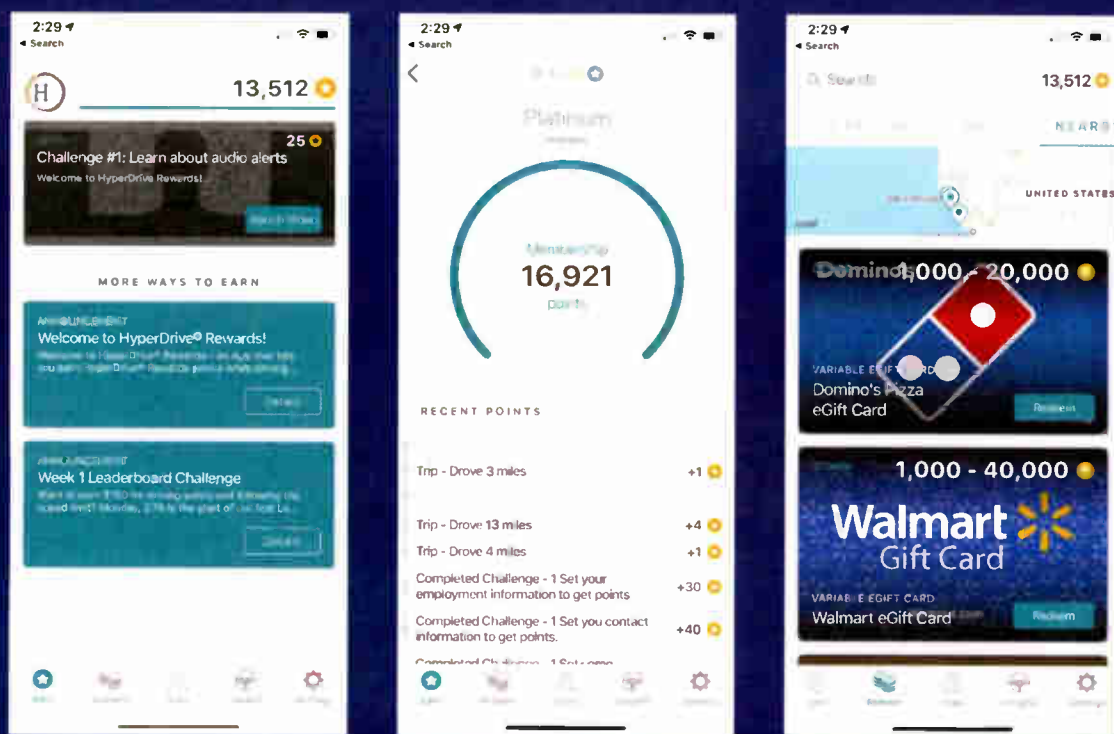
Biniak: In 2011, my team built a mixed reality game for cars with DreamWorks Animation call Dragons Adventure World Explorer that leveraged telematics data from vehicles, telemetry data from phones and mapping data from HERE, which Nokia owned. This was our first experience with building appli-

cation services for vehicles.

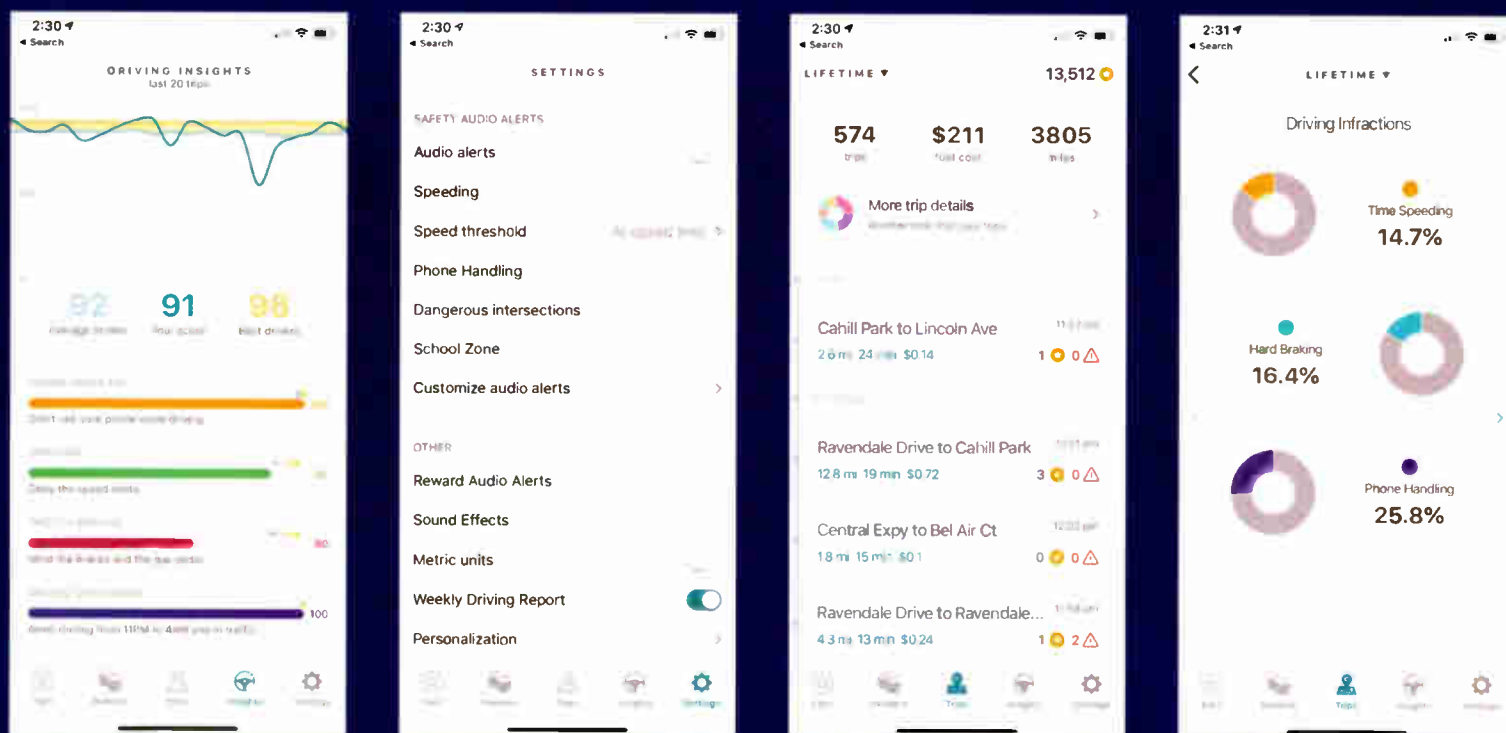
Additionally, I was responsible for Nokia's global developer ecosystem including the Nokia App Store in 190 countries, application and content development for the 1.5 billion consumer features and smartphones that were in the market and helping to drive commercial success for the companies developing applications for Nokia devices.

In many respects, the emerging connected vehicle marketplace is very similar in that we need to develop compelling, profitable applications and services for drivers and passengers to drive

(continued on page 8)



The HyperDrive application discussed in the article challenges drivers to not speed, not use their phone while driving, reduce hard braking, leave early or on time for driving routines and to use the app every day. "We have connected this to the radio audience and are working to establish a direct connection between drivers and listeners to gamifying listening, engagement and the retail funnel," Bryan Biniak said.



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C-BAND

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want to avoid a spectrum crunch; they regard the spectrum as essential for broadcasters and the fixed satellite service licenses using the 500 MHz for distribution of programming.

Some of the stakeholders told Radio World in July that the interest groups involved are trying to find what one called “a mutually acceptable landing spot for the spectrum shakeup.”

BIG AUCTION COMING

The FCC will ultimately resolve the 5G mid-band state of affairs, observers said, with a Report and Order expected later in 2019.

The commission’s options include splitting up the C-band spectrum or mandating the sharing of the same spectrum by both commercial wireless and fixed satellite users. The latter is something NAB and NPR oppose.

Ideally, the FCC could just pick the proposal with the most stakeholder support behind it, but none of the competing proposals has gained universal support from wireless carriers or broadcasters, said one industry insider.

One thing that is clear to observers is that the 5G FAST plan spearheaded by FCC Chairman Ajit Pai is moving forward.

The 5G FAST plan includes three central components: freeing up much more spectrum for the commercial marketplace, promoting wireless infrastructure deployment and modernizing regulations to promote more fiber deployment, according to Pai.

The commission in June voted to modernize the legacy regulatory framework for the 2.5 GHz band to make it available for advanced wireless services, including 5G. It’s not clear how that move could impact the C-band decision, industry observers said.

ted to working with the commission and other stakeholders to protect viewers and listeners from disruption or loss of service,” McFadden said.

There are more than 16,000 registered receive-only dishes in the field, according to NAB, being used to receive

cast community’s C-band dishes near the top of the range. Observers said the plan keeps 5G away from aeronautical mobile folks above 4.2 GHz.

The CBA’s proposed approach would clear 200 MHz of the C-band in 18 to 36 months for terrestrial 5G use via a market-based mechanism.

The commission has asked for comment on auction-based and market-based proposals, according to FCC filings.

“There are some very compelling parts to it,” said one person familiar with the alliance proposal. “This is what (the alliance) are expert in, so I would imagine it will carry weight at the commission.”

In addition, the alliance has established a schedule of “transition-related expenses” that satellite operators would reimburse customers, including broadcasters, for repacking expenses — if the FCC accepts its plan.

NAB asked the FCC in an early filing to ensure that “costs for implementing such a plan should be entirely borne by the beneficiaries of any private or public spectrum transaction: either the satellite operators or the mobile carriers who acquire spectrum usage rights.”

PUBLIC RADIO CONCERNS

National Public Radio also is pressing the FCC for clarity in its final decision when it comes to the financial ramifications of a massive C-band migration of satellite earth-stations caused by a repack.

NPR has a lot riding on the FCC’s decision, according to public radio officials, since the Public Radio Satellite

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There’s a win staring us all in the face: reallocating 200 MHz of C-band spectrum as quickly as possible while protecting critical content distribution infrastructure in the remaining 300 MHz.

— Patrick McFadden, NAB

In addition, the FCC intends to start its third 5G spectrum auction in December 2019. It will be the largest spectrum auction in the nation’s history, according to the FCC, with 3,400 megahertz in three bands to be auctioned.

BROADCAST VOICES

NAB says it is playing a constructive role in the FCC’s C-band rulemaking process, according to Patrick McFadden, associate general counsel for NAB.

“More than a hundred million American households depend on the C-band spectrum for news and entertainment they enjoy every day. As the FCC weighs options for reallocating a portion of the C-band, NAB is commit-

national and syndicated programming for TV and radio.

NAB has asked the FCC to take a cautious approach into wireless expansion of the band and continues to press for a realistic resolution.

“Small missteps in this proceeding will have dramatic ramifications that threaten the stability and reliability of the infrastructure that distributes content American viewers and listeners enjoy, and in which programmers invest billions of dollars every year,” it wrote the FCC in an early filing.

The C-band Alliance, led by Intelset, SES and Intel, has proposed to split the band frequency, with 200 MHz for 5G and reserving 300 MHz for the broad-

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new revenue streams for auto OEMs beyond what we called, in the mobile phone world, “hardware.”

RW: Speaking about the connected car more generally, what role do you see for radio organizations in a 5G, fully connected future in the car?

Biniak: The opportunity for radio is truly dependent upon whether or not they want to be the driver or the passenger in the future.

Today, radio owns the relationship between advertisers, drivers and passengers in the vehicle. Voice, payments, applications, ATSC3.0, etc. will bring a whole new world of opportunities and experiences into the vehicle cabin and thus consumer choices. Owning drivers’ time, attention, money and data will become increasingly more important and competitive.

In addition, movie studios, TV networks, game publishers, sports leagues, travel companies, event producers, restaurants, news producers, social networks and retailers will all be looking to become the daily commute companion. The question radio organizations must ask themselves is what will be their

role in this new world and where in the food chain will they play.

Will radio continue to own the vehicle ad platform and make it extensible to new players, or will they concede the car to someone else and then sit on their platform? One must also keep in mind that the definition of an ad will change once they become actionable and transactable.

RW: Since you started talking about ConnectedTravel to the industry, what you learned about radio that surprised you?

Biniak: We have been pleasantly surprised by how nice people are in the radio industry. It’s like a small town where everyone knows each other, is passionate about and looks after the town and each other, and works tirelessly to address the changes taking place in the world around them.

We have learned that despite common motivations, the challenges are complex. Particularly when the broadcasters aren’t industry partners but commercial competitors fighting for listeners’ ears, times and advertiser dollars.

RW: What else should we know?

Biniak: Data will bring incredible insight to the radio

industry. It will also bring transparency and accountability that fundamentally changes the expectations advertisers have for stations. The industry won’t be analyzing 30-day-old listening data. They will be looking at data in real time, and they will access to listeners that will enable them to change and manage the future. There will be the equivalent of a Bloomberg trading terminal for vehicles, drivers and passengers and, like sophisticated hedge funds, algorithms that will change the market in milliseconds.

The relationship between a station and their listeners will be more important than ever. The value of extending, expanding and deepening that relationship will provide the highest ROI.

When Nokia sold to Microsoft for \$8 billion, there were 1.5 billion people on the planet that owned a Nokia phone. Nokia did not have a day-to-day, engaged relationship with those consumers because it sold phones to mobile operators, retailers and distributors versus consumers. Subsequently, Microsoft gave Nokia \$0 value for those consumers in the purchase prices. To put it in perspective, WhatsApp sold to Facebook for \$22 billion with 450 million subscribers who used their app an average of 29 minutes a day for messaging — 250 million of them on a Nokia phone.

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C-BAND

(continued from page 8)

System (PRSS) depends on C-band for distribution of programming to approximately 1,278 public radio stations, said Adam Shoemaker, counsel for NPR, in an FCC filing.

"We've been very active at the FCC and seen every one of the commission staff and most of the commissioners," said Mike Riksen, VP for policy and representation for NPR.

"We've also been very active on Capitol Hill with members of Congress. We want to make sure the policymakers who will make decisions on this are aware of our heavy reliance on the C-band."

The public broadcaster is supportive of the Intelset approach, Riksen said, and the "continued access to C-band frequencies that are affordable to us in the public broadcasting world."

NPR prefers a "division of spectrum" with designated spectrum for incumbent and commercial wireless users rather than mandating the sharing of the same spectrum, Riksen said.

"(NPR) has some basic requirements. We need access to C-band frequencies at affordable rates and we need it for reliable service," Riksen said.

The FCC began vetting the idea of repurposing the C-band in July 2018 with a notice of proposed rulemaking. The commission earlier this summer asked for additional comments on several questions, including protection criteria for licensed or registered receive-only earth station operators against co-primary terrestrial operations; and how to accommodate licensed or registered earth station operators that are displaced as a result of repurposing the C-band.

Some experts told Radio World they see the FCC eventually splitting the band evenly 250/250 MHz each with most stakeholders willing to accept some frequency division. However some of the big commercial wireless carriers, like T-Mobile, still believe they have the horsepower to carry this through and gain more spectrum.

T-Mobile has gone so far as to recommend that all satellite downlink sites be replaced by fiber, something NAB and NPR and other broadcast groups call "completely unacceptable."

"It's become quite obvious that the

FCC has no intention other than accommodating 5G since there is fear this country is already behind Europe and Japan in 5G rollout," said Chris Imlay, SBE general counsel.

POLITICS

And the fight for spectrum for next-gen broadband and wireless services has taken a political turn, according to industry insiders.

To be determined is whether the commission ultimately chooses to reallocate some portion of the C-band through a private arrangement, a government-administered auction or some other mechanism.

Rep. Mike Doyle (D-Pa.), chair of the House Energy and Commerce Subcommittee on Communications and Technology, earlier this year blasted the C-band Alliance proposal, which, if conducted as a private sale, would be worth billions of dollars to the consortium, he said.

It's "irresponsible and unconscionable" for the FCC to give money to satellite companies when "the broadband needs of our country are so great," Doyle said at a May subcommittee meeting, as quoted in media reports.

Doyle, who said he has seen some accounts that place the value of the C-band as high as \$70 billion, wants the money to go to 5G deployment in this country.

More recently, Rep. Doris Matsui (D-Ca.) vice chair of the same committee Doyle oversees, proposed a compromise to repurpose the C-band. Her plan, called the "WIN 5G Act," would use a "consensus-based, compromise approach to reallocate" the spectrum.

We want to make sure the policymakers who will make decisions on this are aware of our heavy reliance on the C-band.

— *Mike Riksen, NPR*

NPR asked the FCC in July that "receive-only earth stations be allowed to participate in any reverse auction or other reallocation procedure that would affect their existing use of C-band spectrum," according to its filing.

Since Congress makes laws and an agency like the FCC implements them, NPR's Riksen said, the FCC must ultimately follow the lead of Congress.

"The FCC can make policy only through regulatory action. It has no statutory authority to do so," Riksen said.

Wireless groups, like the Competitive Carriers Association, ACA Connects: America's Communications Association and Charter Communications, have proposed an even larger chunk of C-band's 500 megahertz be reallocated for wireless than what the C-band Alliance would create. CCA proposes 370 MHz or more for 5G and broadband development.

In addition, the FCC is still considering the flexible use of parts of C-band spectrum. The sharing of the 3.7 GHz to 4.2 GHz band between satellite earth-stations and point-to-multipoint (P2MP) systems remains a possibility, experts say.

The Wireless Internet Service Providers Association along with Google and Microsoft have presented the FCC a plan and submitted research that shows the two services can co-exist on the same frequencies. The companies want to development of broadband service to rural parts of the country over fixed wireless access points, according to published accounts.

You can read comments on the proposed C-band repurposing by going through the FCC ECFS database using Docket 18-122.

Comment on this or any story. Email radioworld@futurenet.com with "Letter to the Editor" in the subject field.

"THE DISEASE OF MORE"

In late July, NAB Vice President of Strategic Planning Patrick McFadden blogged about the FCC's proceeding about possibly reallocating carriers a portion of the C-band to wireless carriers. Some excerpts:

The conventional wisdom in the communications arena is that the United States is engaged in a race to be the first nation to deploy the next generation of wireless technology: 5G. But while many insist on the importance of winning the 'Race to 5G,' we somehow can't quite get out of the starting blocks. ...

Up to this point, the FCC has been working as quickly and responsibly as it can to resolve the critical questions regarding what to do with the C-band ... That process has led to a consensus that it is possible to reallocate a portion of C-band spectrum while protecting television viewers and radio listeners from disruption.

Further, a consortium of satellite companies has demonstrated that they can make 200 MHz of spectrum available in the very near future while continuing to accommodate programming distribution in the remaining 300 MHz. While certain details still must be worked out, including the mechanism for the sale of spectrum to wireless companies and the interference rules to ensure a peaceful coexistence between wireless and satellite operations, a 200/300 split has emerged as a bird in the hand



Patrick McFadden

that would allow the FCC to move forward quickly without running the risk of programming disruptions. ...

Unfortunately, because of pressure from competing interests, the FCC has been reluctant to take the win. The devastating consequence is that the C-band Alliance, a consortium of satellite operators that currently use the C-band, is feeling undue pressure to come up with even more than 200 MHz to reallocate for wireless services. This pressure will lead to bad results for consumers across the country. As they themselves have insisted to the FCC and their customers, there is simply no reasonable way for satellite operators to provide the same level of service to their existing customers if they must immediately surrender more than 200 MHz. ...

There's a win staring us all in the face: reallocating 200 MHz of C-band spectrum as quickly as possible while protecting critical content distribution infrastructure in the remaining 300 MHz. A relentless insistence on getting to a higher number for the sake of getting to a higher number carries real risk of breaking the content distribution system that viewers and listeners depend on today. ...

The commission can revisit the C-band as technology evolves and alternative distribution mechanisms become more viable. But forcing a messy, disruptive and delayed result for multiple industries for the sake of a higher number of megahertz right now seems to benefit no one.

We urge the commission not to make "more" the only goal of this proceeding. ...

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World Radio History

Bad Electrolytic Capacitors Can Cripple Your Exciter

Troubleshoot and replace them to prevent headaches

WORKBENCH

by John Bisset

Email Workbench tips to johnbisset@gmail.com

One of the biggest hassles in maintaining older equipment is getting it repaired when it fails. A lot of companies don't even want to deal with older, "legacy" equipment. Others will attempt repairs, but dwindling or discontinued parts may be an issue.

A number of contract engineers and special project/consulting engineers have picked up the slack, offering repair services.

One such repair service is Frank and Dave Hertel's Newman-Kees RF Measurement and Engineering (newman-kees-hertel-rf-eng@twc.com).

Recently, one of their clients sent in a Broadcast Electronics FX-50 exciter for repair. The reported problem was that the exciter was producing "spurs" (spurious emissions) up and down the FM broadcast band, causing interference.

Once hooked up on the bench, Fig. 1 shows what the RF output looked like. It's not a friendly picture — and a great invitation for an FCC visit, if allowed to continue.

Because of the precise repetition of the unwanted frequencies, Frank and his son questioned if it really was, in the pure sense of the definition, a spurious condition. The precise spacing of the unwanted

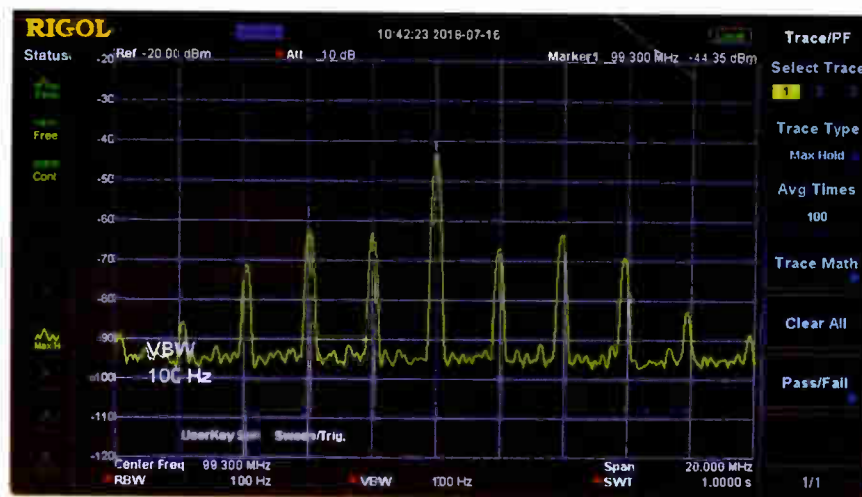


Fig. 1: Spurious emissions seen on the exciter RF output.

frequencies pointed them to look at the frequency modulated oscillator and the filtering of the automatic frequency control voltage that is sourced from the phase locked loop.

To their surprise, the AFC control voltage appeared to be free of any pulses that could be inducing the spurious problem. Next, they dismantled the Modulated Oscillator module and opened it up. Fig. 2 shows what they discovered.

Inside the FMO module there are three electrolytic capacitors. C4 and C7 are 100 MFD @ 35 V and C6 is 10 MFD @ 35 V. The 100 MFD capacitors

are used to buffer and filter the FMO modules on board regulator's DC. The 10 MFD capacitor is used for bypass filtering of the modulated oscillator's (Q-2) "drain" element.

Considering the age of the exciter, and since the FMO is a sealed unit and has no ventilation, they decided to replace all of the electrolytic capacitors. They replaced the C4 and C7 — 100 MFD @ 35 volts capacitors with 330 MFD @ 35 volts capacitors. The C6 — 10 MFD @ 35 volts capacitor was also replaced with a new 10 MFD @ 35 volts capacitor. The deteriorated foam was removed from the lid and the residue cleaned away and blown off all of the internal parts. Fig. 3 shows the RF output as a result of the repairs.

After the successful repairs, they
(continued on page 15)



Fig. 2: Inside the exciter module where electrolytic capacitors were replaced.

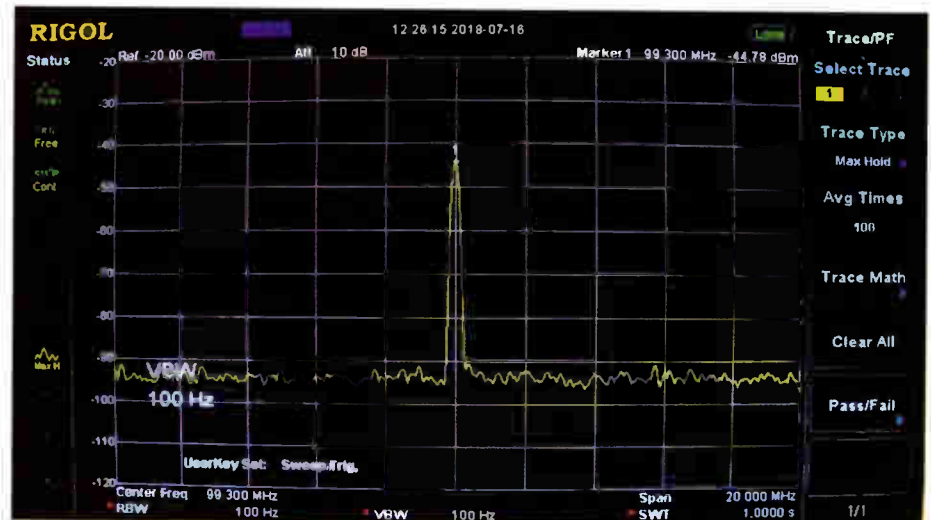


Fig. 3: A nice clean spectrum after electrolytic replacement.

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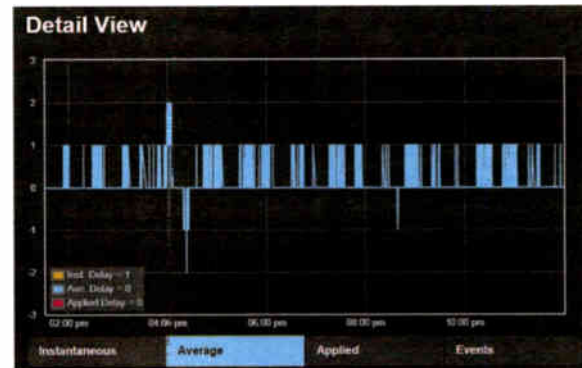
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Broadcast History Cards Provide Peek Into Past

Available online, these images offer a trail of tantalizing bits of info over decades of radio

ROOTS OF RADIO

BY JAMES CARELESS

From 1927 to 1980, the Federal Radio Commission and its successor the Federal Communications Commission recorded the legal details of every licensed U.S. broadcaster on 5-by-8-inch sheets of cardboard known as Broadcast History Cards.

accumulated in the commission's filing cabinets.

To save their data while freeing up filing space, these cards were photographed in "film-negative" form, with the black type on white reversed to white type on black for easier readability, then stored as miniaturized photos on microfiche films. The physical FCC Broadcast History Cards were disposed of.

The digitized microfiched images are viewable online today.

Find them using AM, FM and TV Queries on the FCC's website. For AM,

You see a lot of mainstream American history in these cards — plus small local events like nighttime football games that rural daytimers were given special permission to broadcast.

— Michelle Bradley

Now called FCC Broadcast History Cards, they provide a fascinating if abbreviated look into broadcasting's past. This is because every change of frequency, transmission power, operating permissions, and ownership were carefully hand-typed onto each station's History Card over time.

"There's a lot of good information in these cards," said Michelle Bradley, founder of REC Networks, a low-power FM advocacy group with a strong interest in preserving U.S. radio's history.

"It's neat to go into these little rural stations and find see how a station has changed hands; from a husband-and-wife team who started it in the 1940s and then left the station to their kids who sold it to a larger company, and so on."

Over the years, the number of cards grew dramatically. By the time the FCC phased out the cards in 1980 in favor of its first computerized database, the Broadcast Application Processing System, more than 100,000 cards had

gone to www.fcc.gov/media/radio/am-query. Select the Detailed Output option, and select the Links and Maps tab under the station record. The History Card link will appear approximately in the middle of the tab information. Remember, not all stations have History Cards. (For FM change the URL to end in */fm-query*. For TV, edit to */television/tv-query*.)

AN INCOMPLETE HISTORY

The data contained in the FCC Broadcast History Cards "were never intended to provide a detailed record of broadcast station transactions, nor was that necessary for the FCC's purpose," said an FCC spokesperson who responded to Radio World's questions. Instead, they simply contained a centralized "skeleton record of filings made by applicants and licensees since their initial filings."

Depending on which station you look up, "the amount of information contained on the cards varies," the spokesperson continued.

"Some records may only include a filing and disposal date, while others have additional information such as coordinates, licensee names, first licensed dates, and for some television stations, the first on-air date." As well, any stations whose licenses were deleted before 1980 had their cards pulled from the FCC filing system, because there was no need perceived to hold onto them.

App. No.	Date Issued	Freq.	Power	Type Div.	Period
B1-R-202	1-9-39	990	50kw	U*	2-1 8-1-39
B1-R-202	7-12-39	990	50kw	U*	8-1 2-1-40
B1-P-2161	8-30-39				Install new transmitter & move trans. Directional antenna D & N 10-30 4-30-40
B1-UP-806	12-5-39	990	50kw**	U*	10-30 4-30-40
					Mod. of C.P.(B1-P-2161) for change in equip. **Directional antenna day and night
B1-R-202	1-29-40	990	50kw	U*(H)	2-1 8-1-40
B1-UP-954	4-3-40				Mod. CP 2161, as modified (Temp. Clause) for ext. completion date 10-30 6-30-40
					Mod. 2161 as modified for ext. completion date 10-30 6-30-40
Order	8/12/40	Extension of License			8/1 10/1/40
B1-R-202	9-4-40	990	50kw	U*	9-4 10-1-40
Order	9-10-40	Extension of License			10-1 3-29-41
B1-P-2998	1-21-41	990	50kw**	U*	3-23 9-23-41
					C.P. to reinstate C.P.2161 as modified for new T,**DA for day and night use and move T.
B1-APL-11	2-18-41				Vol. assignment of license and construction permit to WESTINGHOUSE RADIO STATIONS, INC. Effective 10:30 a.m., 3-1-41
NABFA NEW LOCATION					
B1-R-202	3-24-41	1030	50kw	U*	3-29 2-1-42
B1-L-1337	7-3-41	1030	50kw**	U*	7-3 2-1-42
B1-2-293					Lic. to cover C.P.2998 for new T, **DA for day and night use and move T. Determine operating power by direct method.
B1-R-202	1-20-42	1030	50kw DA	U*	2-1 4-1-44
B1-P-3419	2-2-42				C.P. changes in equipment 4-3 10-5-42
B1-L-1648	4-22-42	1030	50kw**	U*	4-22 4-1-44
					Lic. cover CP 3419 for changes in equipment
*Unlimited with synchronized with WBA					

This WBZ card records the reassignment of the station frequency to 1030 under the North American Regional Broadcasting Agreement.

INSIGHTS

Despite limitations of the format, the cards offer many insights about the evolution of American broadcasting. The fact that the commission has digitized these microfiched cards and made them accessible online represents "the FCC's last-ditch effort to preserve the engineering history, and the actual ownership history, of these stations," said Bradley. Although station-by-station data can be slim, the aggregate can be informative.

A case in point: Using information culled from the FCC Broadcast History Cards, REC Networks' REC History Project has created historical lists of AM stations broadcasting in the top nine U.S.

markets from 1924 to 1980. This data can be found online at <https://recnet.com/radio-history-project>. The markets are New York, Los Angeles, Chicago, San Francisco, Dallas-Fort Worth, Houston-Galveston, Washington, Atlanta and Philadelphia/Wilmington.

The History Cards can also reveal forgotten battles, such as a 1960s feud between WNYC 820 kHz in New York and WCCO 830 kHz in Minneapolis. According to Bradley, when WNYC asked the FCC to allow it to run at 50 kW on a directional antenna, a signal that might reach into WCCO's coverage area, the latter retaliated by asking to boost its power from 50 to 75 kW.

(continued on page 16)



WORKBENCH

(continued from page 12)

measured the values of the removed electrolytic capacitors. The C4 and C7 (100 @ 35 volts) capacitors checked good in their value, but exhibited a slightly elevated equivalent series resistance.

The C6 (10 MFD @ 35 volts) capacitor was only slightly lower than its rated value, but its ESR value was elevated. An elevated ESR, in an electrolytic capacitor, will tend to make them become slightly inductive, and thus, they become resonant and can "ring" at some frequencies.

The rated value of a capacitor can be misleading when working with RF circuits. Frank writes that it is wise to check the ESR value of any capacitor that is used in an RF (or any) circuit. If you do not have an ESR capacitor tester, play it safe and replace the electrolytic capacitors.

Keep in mind that electrolytic capacitors are rated in temperature range and projected hours of use. Research and use only the "best" rated electrolytic capacitors. This is not a place to cut corners.

In recent columns, we have discussed the need to replace electrolytic capacitors about every seven years. If you have older equipment with the original electrolytics inside, your best preventive maintenance is to shotgun (replace) them all.

If you're troubleshooting older gear with the original electrolytics, a lot of time can be saved by first viewing the power supply voltages on an oscilloscope for excessive ripple on the DC power supply rails.

The list of problems that bad electrolytics can cause is a long one. Save yourself the headache by getting rid of these ticking time bombs!

Dan Slentz found another interesting product on Amazon. It's an \$8,000 tiny home that can be constructed in just eight hours. Manufactured by Allwood, the structure cannot be used as a house, as there is no kitchen or bathroom, but a permanent structure for a remote broadcast studio at a fair or similar location is certainly a possible use case.

Here's the link for more information: <https://amp.businessinsider.com/amazon-tiny-home-kit-8-hours-2019-5>.

Contribute to Workbench. You'll help fellow engineers and qualify for SBE recertification credit. Send Workbench tips and high-resolution photos to johnpbisset@gmail.com.

Author John Bisset has spent 50 years in the broadcasting industry and is still learning. He handles western U.S. radio sales for the Telos Alliance. He holds CPBE status with the SBE and is a past recipient of the SBE's Educator of the Year Award.

MARKETPLACE

Car Chip: OEM chipmaker Silicon Labs has announced that software-defined radio technology is being introduced into its Si479xx line of chips.

The notable point of the announcement is that the Si479x7 set will offer DRM digital radio reception along with AM/FM.

Juan Revilla, general manager of Broadcast Products at Silicon Labs said: "Our tuners with advanced digital radio features enable radio manufacturers to develop a single platform to demodulate and decode worldwide digital radio standards, greatly simplifying car radio designs and reduc-



ing system cost. A single digital radio platform can be achieved either with an SDR-based design approach or by using a tuner-plus-co-processor design."

The announcement also notes: "These features enable automotive radio manufacturers to support global digital radio standards with a common radio hardware and software design. This added flexibility helps OEM and Tier 1 customers reduce design, qualification, sourcing and inventory costs while avoiding the complexity and inefficiency of supporting multiple automotive radio platforms."

Info: www.silabs.com

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A Sample of Opinion on All-Digital AM

BY PAUL McLANE

A recent Radio World ebook explored the question "What's Ahead for All-Digital AM?" Below are excerpts from that ebook's main article, providing a sampler of opinion on questions it explored. You can read this and other recent ebooks at radioworld.com/ebooks.



James D. Bradshaw, senior deputy chief of the Media Bureau's Audio Division: "The commission has recently authorized an AM station to conduct experiments of the all-digital AM system. We remain supportive of the digital transition for both AM and FM radio and welcome input from the industry on the results of those experiments and the industry's future plans for adoption of AM all-digital. We also welcome input from industry on a formal standard for all-digital service."

Juan Galdamez, product marketing director, automotive and radio technologies at Xperi: "Our system has always been designed and advocated for digital conversion of both FM and AM. We believe that there are many advantages of an all-digital AM broadcast — audio quality, data capacity for other services, robust signal coverage — and are supportive of further experimental authorization for additional testing of all-digital AM. We would encourage the FCC to allow for voluntary transition for broadcasters that feel all-digital fits their business model."

Dave Kolesar, senior broadcast engineer with Hubbard Radio's WWFD(AM) in Frederick, Md., which has been broadcasting an all-HD Radio digital: "A digital future for medium-wave broadcasting is on the horizon; and such a future will help ensure that services in this portion of the spectrum are both included and desirable in automotive receiver menus."

Mike Raide, a senior manager of broadcast technologies for Xperi Corp., said the potential of digital is breathtaking: "First off, it's stereo audio, free from fading and noise, no static. Secondly, program service data — analog mono

AM has no way of conveying artist and title information. HD Radio, or for that matter any digital platform, has the ability to transmit title and artist information and album information. ... You can run Artist Experience, you can run your station logo, even traffic and other data services that run in the background. Also, AM radio's bread and butter is emergency communication; with MA3 the emergency alerts feature enhances that."

Gary Cavell, president of Cavell, Mertz & Associates: "I believe that the time has come for the FCC to allow broadcasters, at their own election, to oper-

ate with all-digital operation if they so desire. ... With FM radio and other program delivery methods like cell phones or MP3 players, most listeners simply do not have the tolerance for listening to noise or static. All-digital AM provides an alternative that can help broadcasters compete with these other program delivery methods. Further explorations and tests will reveal its true potential and capabilities."

Crawford Broadcasting Director of Engineering Cris Alexander: "In just [recent] months, we replaced several AM transmitters with new ones that have integral HD Radio excitors. We look forward to the day of all-digital AM and would likely take some all-simulcast AM stations 100 percent digital if the FCC made that an option." He said it's way too early to think about switching AMs to all-digital at Crawford, "but we can certainly see a day out there somewhere, and we're making investments today in preparation for that."

Anonymous Engineer: "Whether it's

digital or not, no one is listening to [AM] anymore. It's the old person's medium, like TV. Good content has moved to FM or the Internet. Not all, but most AM is running block programming or talk." Though HD Radio penetration in cars is growing, he doesn't think there's a sufficient argument to go to his company's leadership and say: "Let's turn off the analog and broadcast digital only. He also noted that the number of HD Radios in homes and offices remains small."

Mike Cooney, VP of engineering/CTO of Beasley Broadcast Group and chair of the NAB Radio Technology Committee: "The number one issue for me is the lack of robustness of the signal. When you have a strong RF signal, the experience is pretty good and very similar to a low bit rate stream. It is not FM quality, but much better than our current AM signals. As you drive into weaker signal areas or approach strong power line interference, the signal frequently drops out and goes to silence. The stronger the signal you have, the more infrequent the dropouts are, and you can drive under bridges, or have other environmental interference,

(continued on page 18)

CARDS

(continued from page 14)

"Both requests were denied," Bradley said.

On an individual level, the History Cards can tell a lot about a given radio station and its activities, especially the FCC exemptions for permit special programming.

For example WBZ(AM) — 1030 kHz Boston, originally on 900 in Springfield and 990 in Boston as WBZA — was allowed to cover the Marblehead Boats Races in August 1937, using on-sea signals originating from the U.S. Coast Guard cutter Chelan. Just 18 days later, WBZ rebroadcast radio signals from the Coast Guard as it searched for the missing ship Endeavor, an America's Cup racing yacht that had broken free while being towed across the Atlantic to England. (It was found as a wreck, rebuilt and returned to sailing in 1989.)

And when the North American Regional Broadcasting Agreement recognized station frequency allocations, WBZ moved to 1030 AM in 1941, a move recorded in its History Cards.

Daytime-only stations often received FCC permission to broadcast special events at night, which allowed them to keep transmitting outside their allocated hours.

"You see exemptions in the New York City History Cards for speeches by Mayor La Guardia and other political figures who were important at the time," said Bradley. "You see

a lot of mainstream American history in these cards — plus small local events like nighttime football games that rural daytimers were given special permission to broadcast."

America's radio history is waiting to be discovered in the FCC Broadcast History Cards. Like tracking previously unknown family members on Ancestry.com, browsing the cards offers broadcasters a chance to learn more about their station's heritage and even pass on historical information for the interest of their audiences.

Comment on this or any story. Email radioworld.com with "Letter to the Editor" in the subject field.



The radio room of the U.S. Coast Guard cutter Chelan. WBZ obtained permission to cover the Marblehead Boats Races in 1937, using on-sea signals originating from the ship. Source: www.naval-history.net

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Could a Radio Review Herald End of FM in U.K.?

Process aims to look at ways people listen to the radio in the digital age

BY JAMES CARELESS

Radio is under review in the United Kingdom, a process scheduled to conclude sometime in mid-2020.

At least one interested observer thinks that a shutdown of the U.K.'s FM radio broadcasts may be the real purpose.

Announced by Department for Digital Culture, Media and Sport (DCMS) Minister Margot James at the annual U.K. Radio Festival in May, the review's official rationale "is to look at the ways people listen to the radio in the digital age," noted Paul Chantler.

He is a radio programming consultant and co-owner of the Fix Radio DAB station in London; he heard James speak at the festival.

In reality, the government are responding to pressure from the big radio groups to turn off FM to allow them to focus on digital broadcasting platforms," Chantler said.

Minister James made no statements about shutting down FM or any other forms of U.K. analog radio broadcasting. But she did tell festival attendees that "Digital radio now accounts for more than 52% of all U.K. radio listening and we need a legislative structure that reflects this change, and gives us flexibility to deal with the change that lies ahead."

James added that the parties to be consulted during the radio review include the BBC and commercial radio broadcasters, radio manufacturers, the car industry and others in the radio supply chain.

STRATEGY NEEDED

With U.K. radio moving strongly into the digital realm — not just over the air, but also via smartphones and web-connected "smart speakers" — having the review now makes sense, according to John Evington, a partner at The Radio People consultancy and low-cost DAB solutions provider Viamux.

"There needs to be a clear strategy for radio as the lines between traditional linear radio, streaming services and podcasting become increasingly blurred," said Evington. Reflecting on



Margot James is minister for the Department for Digital Culture, Media and Sport (DCMS).



Paul Chantler is radio programming consultant and co-owner of Fix Radio DAB station in London.



John Evington is partner at The Radio People consultancy and DAB solutions provider Viamux.

the likely topics to be raised during the radio review, "The focus will inevitably be on platforms and delivery and the technological advances that are likely to impact on the listener experience."

For his part, Chantler believes that a complete "switchover" from FM to DAB — rather than the FM/DAB simulcasts taking place today — will dominate the radio review discussions, driven by Britain's big radio groups.

"The reason there is so much pressure from the big groups for a switchover is that for many years, radio companies have been financing dual transmission on both FM and DAB," Chantler said. "This is extremely expensive. Now

that DAB radio covers 90% of the U.K. and listening via digital platforms accounts for 52% of all listening, the government feels that now is the time to consider 'forcing' a full migration to digital radio."

Chantler predicts that the U.K. radio review will set a date for turning off British FM broadcasting, and that this shutdown "will probably happen in 2022–2023."

He is not in favor of this option: "My own view is that there is still a place for FM radio alongside digital," Chantler added. "Although there are some small-scale opportunities for smaller community and niche stations

to cost-effectively transmit on DAB, I still think some use could be made of FM for small nonprofit stations."

Evington agrees. "I believe that FM needs to remain for at least another 10 years," he said. "However, there are some interesting scenarios that could be developed during that time. For example, we would like to see a phased digital migration for BBC national services beginning with Radio 3, which still occupies a large portion of prime bandwidth despite a listening share of just 1.2%. This would free-up space for a range of new commercial services benefitting the consumer and the exchequer."

One thing appears certain: "Most people in the industry have been expecting this review for a long time and welcome it," said Chantler.

"Certainly, if the big groups get their way and a date is set for an FM switchoff, they will be able to save money by only broadcasting on DAB. They have been preparing for this for many years with the creation of big, well-branded national stations such as Heart, Capital and LBC (owned by Global) and Magic, Kiss and the Hits Network (owned by Bauer). Earlier this year, Wireless Group/News UK (the third biggest player in U.K. radio) invested heavily in revamping Virgin Radio — which is a national DAB-only station — by recruiting BBC Radio 2's star DJ Chris Evans."

ALL-DIGITAL AM

(continued from page 16)

and in many cases the signal is solid and does not drop. At night, the robustness is typically even worse, and our test station in Greenville, N.C., was almost unlistenable. That signal is 50 kW day and 10 kW night." Cooney's second big concern is acquisition time to reacquire the signal.

Martin Stabbert, VP of engineering for Townsquare Media and chair of the National Radio Systems Committee's AM and FM Analog Broadcasting Subcommittee, noted that initial efforts to run AM hybrid mode, especially at night, were not very successful: "Now over a decade later and with an all-digital mode, perhaps the outcome would be better. Empirical data is what we need." As to technical concerns, "The FCC would need to establish a meaningful and efficient means to identify and resolve interference issues caused to analog stations by stations operating in the all-digital mode."

Robert Crane, president of C. Crane Company, which manufactures portable radios: "The digital business plan has not been widely accepted by the public or broadcasters, while 65 million smart speakers will be sold in a few years." Moreover, "certain powerful AM stations need to remain analog AM because it is our ultimate and perhaps only backup service in a national emergency." But Crane believes broadcasters should be allowed the option as long as expectations are reasonable to

all interested parties.

"I will enjoy the analog AM format as long as it lasts. This may be 10 years or perhaps much longer if there is another chance new 'discovery' of its potential. AM broadcasters have a significant amount of time to develop unique content and offer streaming if they don't already."

The late **Ron Rackley** was principal at the consulting firm *duTrel, Lundin & Rackley*. Commenting not long before his death, he enthusiastically endorsed the idea of allowing licensed all-digital over-the-air broadcasting on the AM band in the United States: "It makes full realization of the efficiency of high-quality digital transmission possible. It will be far more robust than the simulcasting of digital and analog transmission on AM channels that has been tried and pretty much discarded by the industry."

Rackley believed the modulation standards of the FCC rules could be modified easily to regulate digital-only transmission.

"They should be focused on taking advantage of digital technology to reduce inter-station interference in a way that is not possible with the analog modulation standards being fundamentally incompatible with the 10 kHz channel spacing scheme, as is the case today. ...

"I believe that much can be accomplished in that regard if digital subcarriers are to be transmitted within the existing 10 kHz channels by themselves — without the need to manage their interaction with simultaneously transmitted analog signals."





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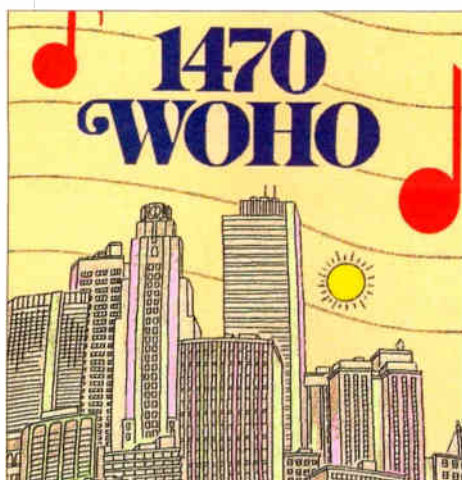
Adventures in 1970s AM: WOHO's Missing Call Letters

The year was 1972 and WOHO(AM) was second in the ratings ...

BY KEN DEUTSCH

The year was 1972 and WOHO(AM) was second in the ratings to the legacy market leader in Toledo, Ohio, WSPD(AM), a stuffy bastion of Frank Sinatra records and call-in recipe shows, all pushed by air talent well past its prime.

WOHO held weekly announcer meetings during which we would be scolded by our program director for not beating WSPD's 5,000 watts with our puny 1,000 directional watts that mostly couldn't be heard at night. A jock I'll call Gary interrupted the familiar harangue with an idea for a contest that would, in his words, "set Toledo on its can." Little did we know then that Gary would be the one getting canned.



"OK, guys, we'll take our jingle package and edit out the Os from our call letters and just replace them with silence," Gary said. "Then we'll get on the air and play the edited jingles and say that someone stole the Os from our call letters and buried them somewhere in Toledo. We'll give clues as to where they are, and whoever guesses the location will win \$500."

"Hold on there, pal," said our program director. "Let's make that prize \$250 because that's all the general manager will pop for."

So we marched down to the GM's office to let him know how we were going to finally beat WSPD. When presented with the idea, our general manager, a man I'll call Mr. Leonard, screamed, "That's crazy. How can you bury the Os from our call letters? It doesn't make any damn sense!"

"Look, Mr. Leonard," I explained. "No one will really be burying anything. We give clues about a secret

location in Toledo and people just guess it to win."

"OK, but make that prize \$150, boys," said Mr. Leonard. "You can throw in some of those free drive-in movie tickets we get every month. And for Christ's sake, don't be caught out there burying anything!"

And so it began. We started airing our WOHO PAMS jingles, the ones from which I had removed the Os. "One forty-seven, W_H_, the station with the happy difference."

We made no other comments on the air, just played the doctored jingles. The jocks began asking on their shows, "Hey, anyone out there know what happened to our call letters?" Listeners phoned the announcers and were put on the air to offer their theories. We feigned puzzlement and allowed this to go on a few more days. In fact the Toledo Blade, the local daily paper, put a mention of our phony predicament in its entertainment section.

Things were going well, so we sprang the next phase of the scheme, wherein we presented the rules in on-air promos like this:

(Brass stab!) Voice 1: "Someone has stolen the Os from WOHO's call letters, and we need your help in finding them!"

(Tympani roll) Voice 2: "We received a note in the mail and here is what it said:

(Mysterious background music)
'Your call letters are in a secret place. Guess where it is and begin the race. Go west and look for a big brick tower, The one that tolls this very hour. Locate the letters and win a prize, But don't use your hands, just use your eyes!'

(Tympani) Voice 1: "Tell WOHO in a postcard where you think the missing call letters are, and if you're right, you can win \$150 and free movie tickets from the home of the good guys! Send it to WOHO, Broadcast House, Toledo, Ohio!"

(Jingle out:) "W_H_, Toledo."

The location we had in mind was the bell tower at the University of Toledo, a local landmark. But before any postcards were received we got a panicked call from a security guy at the University of Toledo.

"Hey, what's going on over there?" the man wanted to know. "We got people digging the lawn over here and

they said WOHO was going to make them rich!"

I replied that I'd look into it, but at that point I didn't take this report very seriously. Who would be stupid enough to do that?

The next call was from the Toledo police department, asking the same question. That got my attention. While I was dealing with the cops, the program director walked into my office and said he'd gotten calls from three TV news departments asking if we were really telling people to dig up the lawn at UT. This was now officially out of control.

Panic time.

The program director called an emergency meeting of the air staff and told us that all contest promos were to be taken off the air immediately. He had made a return call to the police telling them there was a misunderstanding by a few listeners and that we were sure the problems would stop very soon. That's when he was informed that there were about 70 cars in the parking lot at the university and people were not only tearing up the grounds but also blocking traffic.

Now we got on the air and announced that under no circumstances was anyone to dig anywhere in the city. We said we would announce the contest winner shortly. The doctored jingles came off the air and in fact no jingles were played.

That seemed to calm things down, but that was not the end of the tale. Gary, the poor jock who suggested the contest in the first place, was given two clear messages by the general manager: get out and stay out.

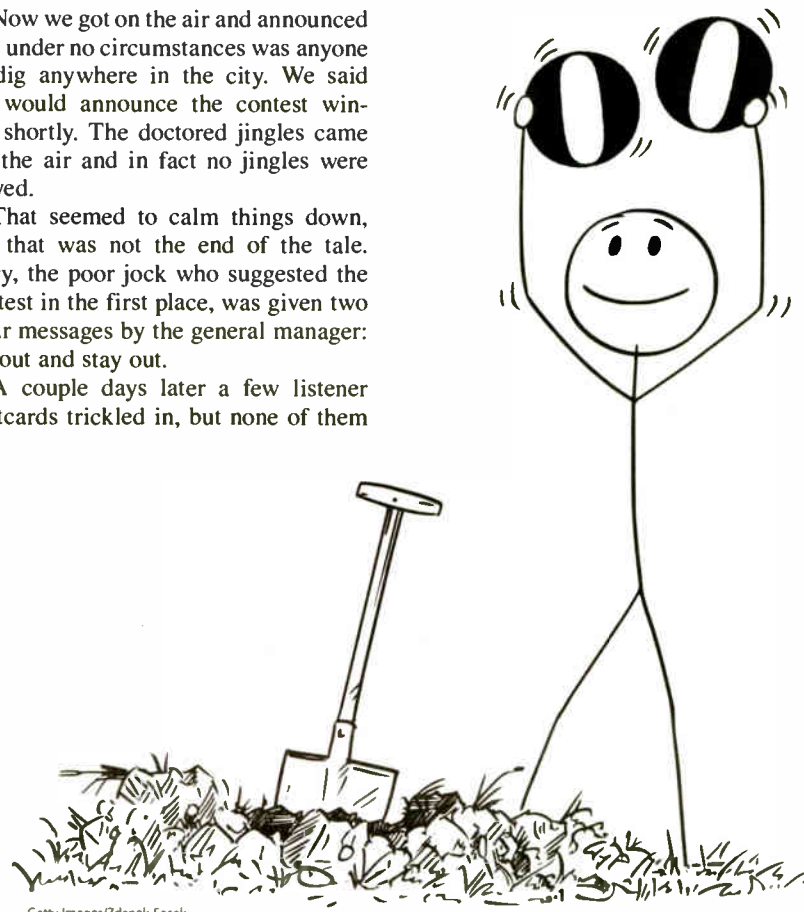
A couple days later a few listener postcards trickled in, but none of them

1470 W?H?

guessed the correct location of the never-to-be-spoken-of-again "missing call letters." The local newspaper editorialized about "poorly planned radio contests that endangered our citizens," and WOHO was mentioned specifically. We had to pay landscapers to repair the damage at the university and, embarrassingly, we were forced to air an apology. This was the Titanic of radio contests.

I managed to emerge from this fiasco with my job intact, but only by keeping my head down. I still have that tape I made of our jingles with the missing call letters, but don't ask me to play it for you.

Ken Deutsch is a writer who lives in sunny Sarasota, Fla., and has a book of these tales available, "Up and Down the Dial."



Getty Images/Zdenek Sasek

Introducing The Über-Node.

Power Core is designed with flexibility in mind. So you can combine AoIP streaming with device administration on a single Ethernet port... or place them on separate ports. Power Core lets you design your network your way.

Power Core can handle up to 128 MADI channels, standard. 4 front-panel ports (two dual-redundant pairs) with SFP make it easy to bridge your AoIP and baseband digital signals.

Think Power Core looks awesome outside? That's nothing compared to the sheer processing might inside, with a 1920*1920 routing matrix, 96 DSP channels and 80 summing buses. All your friends will be so envious.

Information please: high-resolution color display with rotary encoder provides easy front-panel access to network information and settings.

Power Core is 100% standards-compliant - because proprietary AoIP is so 2003. Up to 256 channels of true AES67 and RAVENNA streaming, on two front-panel Ethernet ports. Even complies with the ST2110-30 standard. Because you can't be too future-proof.

Power Core supplies 64 channels of GPIO via standard RAVENNA and open-source Ember+ protocols. Need physical connections? Use the front-panel interface. Highly logical.

The Lawo logo. Your assurance of meticulous engineering and premium components, uncompromisingly crafted to the highest German standards.



Power Core is the only broadcast AoIP node with ST2022-7 Seamless Protection Switching, giving you dual discrete links to your network core. Completely redundant, with automatic, inaudible switching. Now that's what we call peace of mind.

Connect your AES / EBU devices. Expansion card has 4 digital stereo inputs with broadcast-grade sample rate conversion, and 4 digital outputs.



Everybody's got a few analog sources. Line input & output cards with 4 stereo (8 mono) channels make connections a snap.

Lots of talking to do? 8x Mic/Line card with Phantom power does the trick.

Studio I/O card is perfect for on-air rooms. 2 Mic/Line inputs, 2 Line outs for speakers and 2 headphone feeds.

Got DANTE®? No problem. Power Core equipped with a DANTE expansion card gives you access to a whole world of pro-audio devices. Two mirrored ports with onboard SRC provide 64 channels of I/O.

If four front-panel MADI ports aren't enough, you can add more. Dual-port MADI expansion cards give you two SFP ports with 64 channels each.

Power Core is already the highest-capacity AoIP node + console engine in the world. 8 rear-channel expansion slots make it capable of even more.

Dual-redundant power, of course. Our hardened internal auto-switching power supply is backed up with an inlet for external power too.

As proof, we present Power Core: the modern, super-compact AoIP audio interface that packs hundreds of stereo channels into just 1RU. Handles AES67, MADI, analog, AES3 – even Dante®. You'd need 24 rack units of old-style nodes to equal all the I/O available in just one Power Core.

Impressive, yes? But audio I/O isn't the end of Power Core's capabilities. There's DSP; a lot of it — 96 channels of EQ, dynamics and mixing. AutoMix, too. Plus routing: 1,920 crosspoints, enough to switch an entire multi-station broadcast facility.

Power Core is flexible, too. Pair it with our award-winning Ruby radio console and it's the most powerful mixing engine ever. Put it in your rack room and presto! it's a high-density audio interface with built-in routing. Remote-control it with our VisTool GUI Builder software, and it's the heart of your TOC.

Power Core. The Über-Node has arrived.



Power Core is the perfect AoIP supernode. But it's also a powerful mixing engine. Pair it with our award-winning Ruby – the beautiful, powerful, intuitive surface your talent will be clamoring to get their hands on. Or control your Power Core with Lawo VisTool for a custom "virtual console" with context-sensitive multitouch controls.

What Do You Get When You Combine Legos and Radio?

WLGO is a miniaturized radio studio, made by a passionate broadcast pro

JUST FOR FUN

BY DAN SLENTZ

For many in radio, their career is kick-started as a kid “playing radio.” But for some, the passion starts in radio, and then, 20 years later, they’re turning toys *into* radio stations.

After more than two decades in the radio business, Matt Maneely decided to take his love for the radio business and combine it with the fun of Legos.



Matt Maneely

Matt comes from a long line of radio people. Starting with grandfather Don Payne, then going on to his mom and his brother, the family has radio in their blood.

In fact, today, Matt graces the same airwaves that his grandfather did — 1490 WICY(AM) in Malone, N.Y., where he is also operations manager and production director for the six stations that comprise the Martz Communications Group.

And the continuity line doesn’t stop there! Matt’s daughter and two sons are also into Legos (and will perhaps follow in the radio business as well).

Don Payne, Maneely’s grandfather and one of several family members with a radio connection.



WHAT IT LOOKS LIKE

The image shows Matt’s radio station — appropriately dubbed “WLGO” — and the characters all have a background. There are two DJs, male and female, as well as the gratuitous radio intern. (You have to have a coffee runner, right?)

It’s not as easy as it looks to design a Lego radio station, Matt says.

He started with the Lego Digital Designer Software and went through many revisions over two months until he “started Lego broadcasting.”

Matt also has a remote broadcast set complete with tent, station vehicle and even a prize wheel.

What’s next in the world of Lego radio? Matt says he’s working on a “vintage” radio setup — an old-school studio from the golden age of radio. He even hopes to pull it off in black and white. He’s also thinking he might need a Lego production studio, as well, to flesh out this miniaturized broadcast world.

You can find Matt’s work on the Lego website at <https://tinyurl.com/WLGO-lego>. You can also “like” or “follow” his station on Facebook at <https://www.facebook.com/wlgolegoradio>.

Matt hopes that his radio Lego work will fan the flames of the imagination for today’s creators, and might eventually lead kids onto the same radio path he and his family have taken.

<p>Studio Items Inc.</p> <p>Mic Booms On-Air Lights Speaker Mounts www.studioitems.com</p>	<p>TORPEY TIME <i>(The Good Time People)</i></p> <p>Clocks Up/Down Timers www.ram68.com</p>	<p>Dixon Systems</p> <p>News Mixers Line Matchers USB Audio Codecs www.ram68.com</p>	<p>RAM Systems</p> <p>Broadcast Furniture Systems Integration Sound Absorption Panels www.ram68.com</p>
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Getty Images/Dmitry Fisher

It's new equipment season again! Radio World's "Summer of Products" feature is all about new gear that has come onto the market in recent months, especially during spring convention season.

WORLDCAST AUDEMAT MC5 TEST AND MEASUREMENT EQUIPMENT



Users of WorldCast Systems' Audemat MC5 test and measurement equipment Version 3.8.1 get the latest GoldenEar Reader algorithms, an RDS2 generator and analyzer and integration into the company's SmartFM ecosystem.

The GoldenEar Reader provides information on anticipated listener perception of broadcast material.

A nifty feature is the onboard RDS2-compatible generator/decoder. The company says they'll be building on this feature in the coming year.

WorldCast says that its SmartFM technology aids in transmitter energy efficiency through artificial intelligence. SmartFM also uses AI to enhance the processing of the signal to enhance listener experience.

Info: www.worldcastsystems.com



ARISTA APOLLO DUO

Arista Corp. has introduced its Apollo Duo audio over IP product group — an analog audio to Dante interface, Dante to analog audio interface, and a sync interface.

The Apollo Duo ARS-0200-A00 two-channel analog audio to Dante interface allows users to connect legacy audio gear to a Dante network, so that two channels of analog audio can be integrated into a Dante network.

Conversely, the Apollo Duo ARS-0002-A00 converts a Dante stream into two channels of analog audio signal, allowing, for example, users to bring a stereo Dante feed of a live performance back into the analog realm in order to feed a PA.

Arista's Apollo Duo ARS-0002-A01 allows two audio signal outputs of lip-sync delay of up to 170 ms/ch (fs = 48 kHz) to synchronize the audio stream to the video stream. The delay control switch can add delay in the range of 0-170 ms by 32 increments. The Apollo Duo ARS-0002-A01 uses XLR analog outputs.

All of the range are AES67-compliant, using high-resolution 24-bit analog-to-digital conversion, and the units can be powered via PoE/power over Ethernet or 5 VDC via a micro USB connector.

Info: www.aristaproav.com

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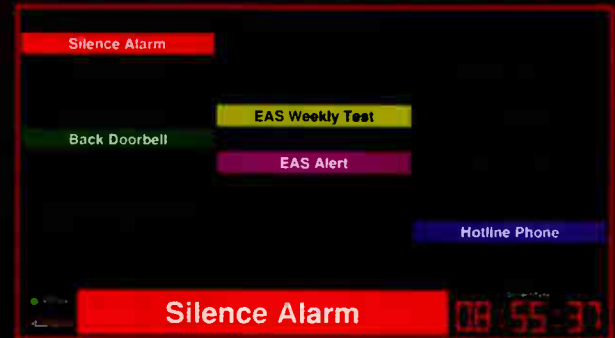
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RME BABYFACE PRO PODCASTING BUNDLE



Interface manufacturer RME has created an all-in-one podcast audio bundle, the Babyface Pro/Audio-Technica Podcast Bundle.

The selection brings together RME's Babyface Pro audio interface and TotalMix FX mixing software with Audio-Technica's BP40 Condenser Microphone. Also included is an On-Stage Clamp

Desktop Boom Mic Stand and a Podcast Engineering School educational course.

At the heart of the bundle is RME's Babyface Pro, an interface with multiple ins/outs allowing for a variety of podcast setups — two mic preamps, two headphone outputs for simple host/guest monitoring and the ability to configure a mix-minus as separate audio sources. The unit also allows independent adjustment of sound settings for every source, individual headphone mixes for up to six guests and compatibility with any recording software as well as Mac, Windows and iOS.

The Babyface Pro comes with a free TotalMix FX Remote iPad app which allows users to configure the mix-minus setup as separate audio sources, so podcasters can control what guests and listeners hear with no additional cables, mixer or hardware. Users can also mix multiple software applications simultaneously for adding music beds, sound effects and other audio clips.

RME has partnered with Audio-Technica to include the BP40 Condenser Microphone. Optimized for broadcast applications, the A-T BP40 offers a humbucking voice coil to prevent unwanted interference.

The final piece of the bundle is a Podcast Engineering School Educational Course, an online course providing an overview of the podcast production workflow using a Babyface Pro. The course covers setting up a Babyface Pro, production scenarios and tips, recording online guests and post-production tips.

Info: www.rme-usa.com

PRESONUS UNLEASHES ATOM PRODUCER LAB

Equipment manufacturer PreSonus has introduced the ATOM Producer Lab, a new all-in-one production bundle.

The kit includes the ATOM pad controller, the AudioBox USB 96 audio/MIDI interface, a M7 large-diaphragm condenser microphone, Studio One Artist production software, a MVP Loop content library, the company's Studio Magic Plug-in Suite, and various mic and USB cables.

The PreSonus ATOM performance/production controller can be used to produce beats, play virtual instruments and trigger sound effects and loops in real time, using 16 full-size, velocity- and pressure-sensitive RGB pads

with selectable pad velocity curves and pad pressure thresholds, eight assignable pad banks, four programmable rotary encoders and 20 assignable buttons.

Studio One 4 Artist production software includes drag-and-drop functionality; unlimited audio tracks, MIDI tracks, virtual instruments, buses and FX channels; and 25 built-in effects and virtual instrument plug-ins.

The two-in, two-out AudioBox USB 96 audio/MIDI interface is bus-powered and works with most Mac or Windows recording software. It has two combo mic/instrument inputs with Class A mic preamplifiers, MIDI I/O, and 24-bit, 96 kHz converters. Studio One instantly configures for the AudioBox USB 96.

The PreSonus M7 microphone features a large-diaphragm design and comes with a mic cable, mic-stand adapter, desktop mic stand and cloth carry bag.

The PreSonus ATOM Producer Lab is available now, with a street price of \$299.95.

Info: www.presonus.com



APPLE LOGIC PRO X 10.4.5

With an eye on optimizing the software for its new Mac Pro, Apple released Logic Pro X 10.4.5, the latest edition of its professional music production software.



Making full use of the Mac Pro hardware, Logic Pro X 10.4.5 will now support up to 56 processing threads, and reportedly can run up to five times the number of real-time plug-ins compared to the previous generation Mac Pro. Logic Pro X 10.4.5 also increases the available track and channel count for all users, supporting up to 1,000 audio tracks and 1,000 software instrument tracks.

Additionally, Logic Pro X now supports 1,000 auxiliary channel strips, 1,000 external MIDI tracks and 12 sends per channel strip. Responsiveness of the Mixer and Event List when working with large sessions is said to have been improved, and projects with numerous Flex Time edits and tempo changes should perform more efficiently under the new update.

The loop browser in Logic Pro X 10.4.5 can filter by loop type and allows drag and drop of multiple loops into your project simultaneously. Meanwhile, the redesigned DeEsser 2 plug-in provides more options to reduce sibilance on audio tracks, and now MIDI beat clocks can be sent to individual ports, each with unique settings like timing offset and plug-in delay compensation.

Logic Pro X 10.4.5 is available as a free update for existing users, and is available on the Mac App Store for \$199.99 for new customers.

Info: www.apple.com

KRK ROKIT G4 STUDIO MONITORS

KRK Systems' Rokit G4 studio monitor range has reportedly been completely redesigned. The line includes 5-, 7-, 8- and 10-inch models.

The Rokit G4s feature an on-board, DSP-driven, graphic EQ with 25 settings, visible via an LCD screen. The monitors also sport advanced drivers made with Kevlar, Class D power amplifiers and a front-firing port to aid bass reproduction and reduce listening fatigue.

Jimmy R. Landry, global director of marketing, Pro Audio Division, Gibson Brands, said in a press release, "If you compare the KRK G4 monitors with the G3s, you will instantly hear the difference between the two, especially on the low-end accuracy — it's dimensional with a lot of detail. The high-end is more open and detailed as well." He said that the user experience is improved thanks to selectable DSP-driven EQ presets and an onboard LCD.

The KRK Rokit G4 monitors feature a low-resonance enclosure and a high-density foam isolation pad that decouples the speaker from the surface.

The bi-amplified G4 range includes RP5 (5-inch), RP7 (7-inch) and RP8 (8-inch) models; an additional triamped version, the RP10-3 (10-inch), incorporates a 4.5-inch mid-range woofer and one-inch tweeter for midfield monitoring. The RP10-3 can also be arranged in horizontal mode by allowing the user to rotate the midrange woofer and tweeter by 90 degrees.

All G4 models feature a built-in brick-wall limiter, which automatically engages at maximum amp-level to maintain a balanced sound and protect the system. The company expects to release a smartphone app for iOS and Google Play that will assist with monitor placement; level matching; subwoofer level and crossover setting assistance; polarity; and EQ for all KRK monitor lines.

Info: www.krksys.com



WHEATSTONE GLASS LXE VIRTUAL CONSOLE

Modeled on the company's LXE console, Glass LXE takes it to the touchscreen. It will function within the WheatNet-IP environment, including attached consoles, talent stations, I/O units, accessories and SIP phone and codec distribution appliances.

The Glass LXE GUI imitates the physical look of the hardware LXE while matching functionality, including familiar buttons, knobs and multi-touch navigation and menus for setting EQ curves, filtering and other custom settings, according to the company.

Wheatstone Applications Engineer Kelly Parker said, "You can run it on a laptop or on multiple PC screens from a cloud. Glass LXE can be used alone or combined with the physical LXE surface to give broadcasters full console control anywhere that's needed, and on a UI that is very familiar."

Glass LXE comes with a hardware mix engine.

Info: www.wheatstone.com



AUDINATE DANTE-AS-SOFTWARE PRODUCTS

Digital audio network specialist Audinate has two new software-based Dante products — Dante Embedded Platform, which runs on Linux for x86 and ARM processors, and the Dante Application Library, which allows software developers to integrate Dante functionality directly into Windows and Mac applications.

These new software-based solutions give manufacturers and developers the ability to deploy Dante into products where it wasn't previously feasible, the firm said. Dante can now be deployed in products where the price point or form-factor made integrating dedicated Dante hardware challenging.

Dante as software also provides more flexibility, Audinate said, with the potential to enable new capabilities like Dante being deployed retroactively to products in the field, the ability to add features and functions to products on the fly, and the possibility for manufacturers, integrators or customers to configure the number of Dante channels they want for a particular application.

Lee Ellison, CEO of Audinate, comments, "This is an inflection point in the AV industry. The decreasing costs, increasing computational power and improved flexibility of the software approach will enable manufacturers and developers to deploy Dante into a plethora of next-generation AV products."

Info: www.audinate.com

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VB-Audio Software: France's Best Kept Secret

A small software company offers a trove of useful software

SOFTWARE

BY CURT YENGST

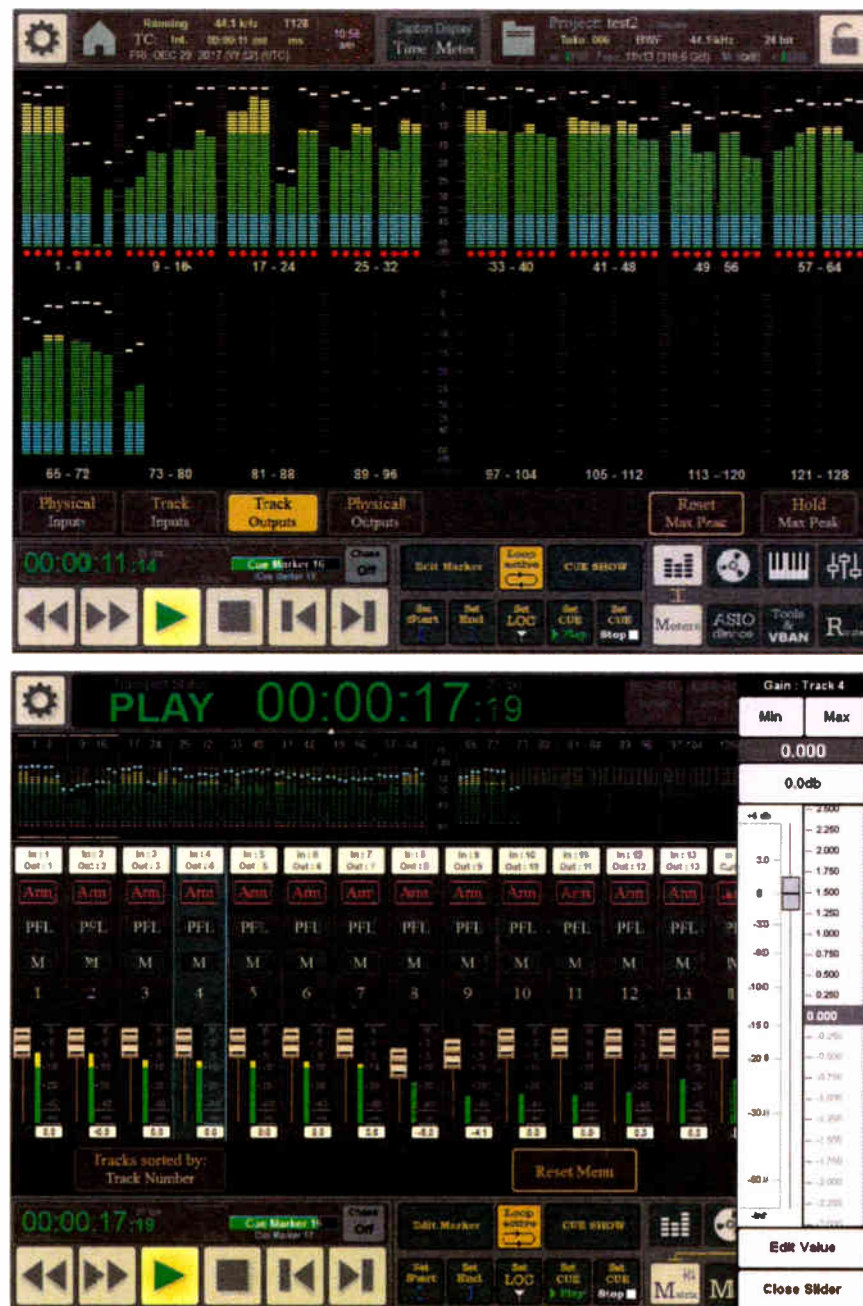
Vincent Burel, the brains behind VB-Audio Software (www.vb-audio.com), started out in the late 1990s writing DirectX and VST plugins, along with plugins in other proprietary formats. Most notable was his shareware Quickverb plugin, able to run on the original Pentium processor without maxxing it out; no mean feat back in those days.

Plugin development continued to be the core of VB-Audio's efforts through the mid-2000s. Then, teaming up with developer Joram Ludwig, Vincent created the MT128 multitrack recording system, VB-Audio's flagship product. Today, in addition to the MT128, VB-Audio offers several handy applications, from a software spectrum analyzer to software mixers, on up to DAWs like MT-64 and MT-32 SPLite, scaled-down versions of MT128.

REPLACEMENTS ON STEROIDS

One of the most useful apps I found on the company's website was the Voicemeeter mixer. Voicemeeter comes in three iterations: just plain Voicemeeter, Voicemeeter Banana and Voicemeeter Potato.

These are essentially replacements for the Windows audio mixer, but they're replacements on steroids. The Voicemeeter can present up to three hardware inputs, depending on your sound card configuration, and three virtual inputs, which can be configured from any software that uses an audio device, such as Skype, or a DAW program. Outputs can feed either a hardware sound card or any virtual destination. This makes it ideal for mixing mics and other sources for a podcast or a portable production rig. The Banana version includes a built-in recorder that can capture a stereo mix or individual channels. The interface is reminiscent of the old "Portastudio" multitrack cassette recorders



Two screenshots from the MT series

a lot of us cut our teeth on. The Potato version adds more tracks, effects, and aux sends.

I asked Vincent Burel where he came up with names like Banana and Potato for the different versions.

"When I developed the second version of Voicemeeter, I did not want to add a boring suffix like 'Pro' or 'XL' or ... whatever. The Voicemeeter name was already boring; so I said, 'Let's find something funny, that people will keep in mind.' The 'Banana' suffix comes naturally!"

As for Potato? "Potato version sounded obvious." Obviously ...

Another handy app is VBAN, a network-based audio delivery system designed to work with Voicemeeter or the MT series. Basically, audio being played back on one PC can be delivered over a LAN to another PC and monitored and/or recorded there in real time. This sure beats running additional audio cables through the building!

The Voicemeeter VBAN software hub can send audio to up to four destinations on the LAN that are running the

VBAN Receptor program. From there, the audio can be routed to the Windows default audio device, or to any DAW software input. A live performance in one studio can be captured in multiple production studios for recording, safety backup, or just confidence monitoring.

VB-Cable is a virtual device that, once installed, appears as just another available sound device in Windows. It behaves like an audio patch cable, allowing the user to connect various audio hardware devices with any audio software or vice-versa.

Let's say I need to record only the audio from a YouTube video. I can bring up my DAW software, and under audio input devices, select VB-Cable, route my Windows default sound playback device accordingly, and VB-Cable seamlessly routes Windows audio to my DAW. VB-Cable comes with a small app to control settings, allowing input level adjustments and analysis of the incoming signal.

The beauty of these smaller offerings is the "donationware" distribution model. To activate the software, a donation of any amount can be made to VB-Audio. Suggested prices (very reasonable) are listed in the site's web store. MT-64 and MT-128 have fixed license fees.

Speaking of MT-64, it provides up to 64 tracks of recording and playback, with a few nifty extras thrown in, for \$150. (The scaled down MT-32 version has many of the same features with half the available tracks, but doesn't include project management, which allows the user to save and recall projects.)

One handy feature of the MT series for broadcast use is the Sound Pad. This allows a user to very easily load soundbites, samples, loops, stingers, etc. into one screen and fire them off on demand. All of VB-Audio's apps are optimized for touchscreen operation, making this even easier to use.

LIMITED PROCESSING

In terms of project management, one well-thought-out trick MT-64 has up its sleeve is the ability to mirror hard disks right within the program. During initial setup of a project, the user can configure MT-64 to record to two separate drives simultaneously, with one mirroring the other, so a drive glitch or failure doesn't ruin a mission-critical recording.

It also has the ability to quickly edit and mix multiple tracks, record continuously or for a set duration (useful

when recording satellite feeds, etc.), and provide up to eight stereo aux buses for monitoring.

My only real complaint with MT-64 is the lack of audio processing features such as EQ, compression or effects. There's no VST or DirectX implementation either.

I chatted with Vincent on that point. He explained that the MT system was "originally made as a multitrack recorder only, designed to be connected to a mixing console, like a true tape recorder." He mentioned that plans are afoot to implement a complete mixing environment into the system. The Voicemeeter mixers do provide at least some rudimentary EQ and processing on the hardware input channels; and Voicemeeter Potato includes reverb. "Voicemeeter is a kind of proof-of-concept for all our virtual live mixing console projects," Vincent said.

This is the main reason behind the donationware payment model. I kind of wish VB-Audio would include a scaled-down version of the Sound Pad feature in at least one of the Voicemeeter mixers. I could even see paying a set price for that. I look forward to seeing full mixing and processing capabilities added to the MT series. Coupling that with one or two multitrack sound cards from the likes of RME, Digigram, or ASI would make for a powerhouse



The "Potato" Voicemeeter

standalone DAW.

Also, because of its optimization for touchscreens, the interface may not seem as intuitive as other applications. Gone are the usual Windows menus at the top of the screen, as is right-clicking; but standard Windows keyboard shortcuts remain. Fortunately, a well-written manual is provided; and the website is loaded with tutorial YouTube videos, many produced by users of VB-

Audio products.

These days more and more production elements are coming from virtual sources, and being delivered in similar fashion. VB-Audio has produced utilitarian, stable tools to make using and producing those elements a lot easier. Definitely worth a look.

Curt Yengst, CSRE, is an assistant engineer with WAWZ(FM) in Zarephath, N.J.

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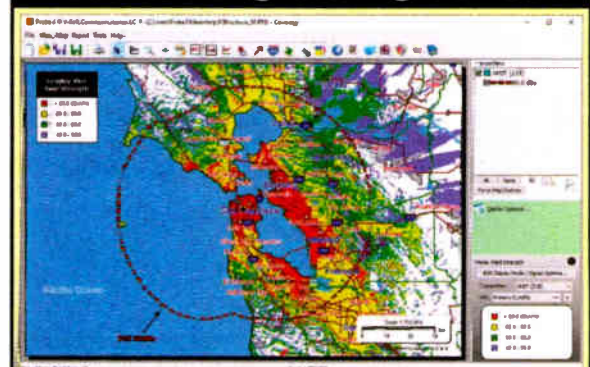
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Tower Rule Compliance: Whose Responsibility Is It?

Owners are primarily in charge, but that doesn't mean tenants are off the hook

COMMENTARY

BY MARJORIE SPIVAK

The author is an attorney with Womble Bond Dickinson (US) LLP. She represents telecommunications and broadband carriers across the United States.

Marking, lighting and maintenance responsibilities for multi-user communications towers can be confusing. Let's try to sort things out by looking at what the FCC's rules say.

The question of compliance responsibility is often a grey area. Part 17 of the Federal Communications Commission's rules governs the construction, marking and lighting of "antenna structures," which we generally refer to as "towers."

Violations of FCC tower rules by owners and licensees can and will result in FCC penalties and fines. Although the tower owner is primarily responsible for compliance with the FCC's tower rules, FCC licensee-tenants can also have significant responsibilities.

TOWER OWNER RESPONSIBILITY

Initial Construction: FAA No Hazard Determination, Antenna Structure Registration and Environmental Compliance Responsibility

In the initial construction of any tower, it is the tower owner who has the primary responsibilities for FCC tower siting rule compliance. These primary responsibilities include compliance with environmental rules and determining whether a new or modified tower requires a determination from the Federal Aviation Administration. If an FAA determination is required, then the tower owner must also register the tower on the FCC's Antenna Structure Registration system.

The registration of a new tower on the FCC's ASR system requires compliance with the FCC's environmental rules to ensure that the environmental effects of proposed towers, including their effects on migratory birds, are fully considered prior to construction. Such compliance requires environmental notification under the ASR rules and under the environmental rules for environmental consequences.

Under the environmental rules, there are eight environmentally sensitive categories of construction:

1. on wilderness areas;
2. on wildlife preserves;
3. near threatened or endangered species or critical habitats;
4. near properties listed on, or eligible for listing on the National Register of Historic Places;

5. on Indian religious sites;
6. in flood plains;
7. on wetland fill, deforestation or water diversion surface features; and
8. with high-intensity white lights in residential neighborhoods.

If a proposed tower construction falls within any one of these categories, the preparation of a formal environmental assessment is required before an FCC ASR will be granted.

Upon the grant of an FCC ASR, a tower owner may proceed with tower construction. It is the tower owner's responsibility to notify the FCC, and where required, the FAA, of construction completion within five days. Likewise, a tower owner must also notify the FCC of the dismantlement of a tower.

Once constructed, any change or correction of a registered tower in the overall height of one foot or greater, or of geographic coordinates of one second

Although the tower owner is primarily responsible for compliance with the FCC's tower rules, FCC licensee-tenants can also have significant responsibilities.

or greater in longitude or latitude, requires a revised determination from the FAA and the filing of an application for modification of the existing ASR with the FCC.

The tower owner is also responsible for posting the ASR number at the tower site and providing a copy of the ASR to each tenant on the tower.

Additionally, the tower owner must notify the FCC of any change in ownership within five days.

Constructed Towers: Tower Painting and Lighting Responsibility

The primary responsibility for tower painting and lighting falls on the tower owner. Tower owners are responsible for observing the tower's lights every 24 hours, either visually or by observing an automatic indicator designed to register any failure of such lights, to ensure that all such lights are functioning properly as required.

Alternatively, to detect any failure of tower lights, the tower owner must provide and maintain an automatic alarm system, and inspect the system every three months to ensure proper operation. The tower owner must also maintain the tower and clean and

repaint the tower as often as necessary to maintain visibility as required by the FCC and FAA rules.

Any observed or known improper functioning of a top steady burning light or any flashing obstruction light on the tower, if not corrected within 30 minutes, must be reported immediately to the FAA. A further notification to the FAA must be given immediately upon resumption of normal operations.

The tower owner must keep a record for two years of any observed extinguishment or improper functioning of a tower's lights including:

1. the nature of the extinguishment or improper functioning;
2. date and time;
3. date and time of FAA notification; and
4. the date and time of repairs or replacements made.

LICENSEE-TENANT RESPONSIBILITY

Pre-Collocation Responsibility

For FCC-licensed communications facilities located on an existing tower, the FCC's environmental rules apply to all FCC actions, including the granting

(continued on page 30)



Getty Images/Polawat Klitkulabhirun

TOWERS

(continued from page 29)

of any FCC license or permit.

Even where no specific FCC authorization is required for a specific facility, a person or entity that is otherwise an FCC licensee is required to ascertain whether the collocation of an antenna on a tower may have a significant environmental effect under the FCC's Nationwide Programmatic Agreement for Collocations.

Prior to locating an antenna on an existing tower, an FCC licensee must ensure that its collocation is permissible. To do so, the licensee should ensure that the tower went through the proper environmental review prior to construction by obtaining a certification from the tower owner that it complied with, and remains in compliance with, the FCC's tower siting and environmental rules.

Painting and Lighting Responsibility

While a tower owner is primarily responsible for maintaining the painting and lighting of a tower, if an FCC-

licensee-tenant on a tower is aware that the structure is not being maintained in accordance with the FCC's rules and underlying ASR, or otherwise has reason to question whether the tower owner is carrying out its responsibilities, the licensee tenant must take immediate steps to ensure that the tower is brought into and remains in compliance.

Specifically, if there are FCC or FAA tower maintenance violations, an FCC licensee-tenant must:

1. immediately notify the tower owner;
2. immediately notify the site management company (if applicable);
3. immediately notify the FCC; and
4. make a diligent effort to immediately bring the structure into compliance.

If a tower owner does not comply with the FCC's rules, the FCC could require each FCC licensee authorized on a tower to maintain the structure in accordance with the ASR and FCC rules for an indefinite time period.

Radio Frequency Radiation Levels Responsibility

The responsibility for maintaining safe radio frequency radiation levels on any tower falls squarely on its FCC licensee-tenants. The RFR limits apply to all FCC licensees.

In instances where RFR limits are exceeded due to the emissions from multiple fixed transmitters, the responsibility for bringing the site into com-

pliance is the shared responsibility of all licensee tenants. Tower owners are expected to allow licensees to take reasonable steps to comply with the FCC's RFR requirements.

pliance is the shared responsibility of all licensee tenants. Tower owners are expected to allow licensees to take reasonable steps to comply with the FCC's RFR requirements.

Licensee-tenants have responsibilities with regard to locating an antenna on a tower, and can almost always be held secondarily responsible if a tower owner fails to comply.

pliance is the shared responsibility of all licensee tenants. Tower owners are expected to allow licensees to take reasonable steps to comply with the FCC's RFR requirements.

not hold FCC licenses are not directly responsible for complying with this AM detuning rule. But, FCC applicants and licensees cannot locate an antenna on a tower that required an analysis and notice, or is causing a disturbance to the radiation pattern of an AM station, unless the applicant, licensee, or tower owner takes appropriate steps to complete the required analysis and notice or correct the disturbance.

Where a tower owner does not complete a required AM detuning analysis or provide notice, the licensee-tenant becomes the responsible party. The FCC will prohibit a licensee from locating on a tower within certain distances of an AM station, unless and until the required analysis and notice process is completed.

CONCLUSION

Both tower owners and FCC licensee-tenants have significant responsibilities with regard to tower rule compliance. While the tower owner is primarily responsible for compliance with the FCC's tower siting, maintenance and environmental rules, licensee-tenants have responsibilities with regard to locating an antenna on a tower, and can almost always be held secondarily responsible if a tower owner fails to comply.

SPECIAL RESPONSIBILITIES REGARDING AM BROADCAST STATIONS

AM Broadcast Fencing Responsibility

A specific responsibility is placed upon AM broadcast licensee-tenants. AM broadcasters are solely responsible under the FCC's rules for compliance with AM fencing rules. AM towers must be enclosed within an effective locked fence or other enclosure.

The FCC has clearly stated that the fencing responsibility does not shift to the tower owner where the licensee and the tower owner are different entities. In situations where required fencing is not completed before a tower is leased, the AM licensee-tenant must complete the process before locating its broadcast facility on the tower.

AM Detuning Responsibility

AM broadcast stations are required under the FCC's rules to be protected from nearby tower construction and antenna installations that may distort an AM broadcast station antenna pattern. Anyone holding or applying for an FCC

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