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SEPTEMBER 1, 2019 | The News Source for Radio Managers and Engineers | $5.00 | RADIOWORLD.COM

U.S.-Based Shortwave Broadcasters Eye Digital

Group seeks a path to "affordable, distributable" DRM receivers

BY JAMES CARELESS

Relatively few Americans are aware of it, but the United States is home to many commercial/religious international broadcasters that transmit programming worldwide using analog shortwave radio transmitters. They are supported by an industry group called the National Association of Shortwave Broadcasters.

Unfortunately, analog shortwave radio transmissions are notorious for interference and signal dropouts. For listeners in other countries, the sound coming out of their shortwave radios lacks the superior audio range of domestic U.S. AM (yes, we said AM) and is often wracked with static and signal fading.

For years, NASB members have wanted to replace (or at least augment) the poor audio quality of analog SW with the crystal-clear sound of digital SW radio, specifically the Digital Radio Mondiale standard developed in Europe that is now being used in China and India.

"DRM sounds very much like FM, with a wide audio range and no static," said Charles Caudill, president emeritus of World Christian Broadcasting, owner/operator of U.S. SW station KNLS. "It is also consistent: Either the DRM signal is received on your SW radio in full, or it isn't. There's no in-between."

There are some DRM radios in use now, which is why some NASB members are offering limited DRM broadcasts alongside their regular analog SW transmissions.

"But the current generation of DRM SW receivers cost about $100 each,

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Commissioner Michael O'Rielly, center, at a recent FCC meeting next to Chairman Ajit Pai and Commissioner Jessica Rosenworcel.

Getty Images/Alex Wong

O'Rielly in Middle of C-Band Debate

Commissioner talks about broadcaster reimbursement, other current radio issues

BY RANDY J. STINE

FCC Commissioner Michael O'Rielly believes society is standing on the brink of a revolutionary 5G wireless technology that will generate countless innovations and utterly change the way we work, play, communicate and interact.

The commissioner said so at the Brooklyn 5G Summit this year, and his raves about 5G didn't surprise observers. Among many implications of 5G is a possible repurposing of the C-band in the United States. That's the 500 MHz of spectrum (3.7 to 4.2 GHz) currently used by broadcasters who receive programming via satellite downlink earth stations. The FCC has proposed giving wireless companies some portion of the spectrum for 5G

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RADIOWORLD

Vol. 43 No. 22 September 1, 2019

www.radioworld.com

"Don't Be Afraid of AoIP"

From our latest ebook: A chat with Aaron Farnham of Bonneville

BY PAUL McLANE

AoIP has touched thousands of radio and audio facilities to date, but the audio over IP landscape continues to evolve and grow. Radio World's new ebook "AoIP for 2020" — our biggest ebook ever — asked manufacturers and industry experts about trends and best practices.

Aaron Farnham is the chief engineer for Bonneville Salt Lake City and former chief for Bonneville Phoenix; he has been in radio engineering since he was 16.

Aaron Farnham

Radio World: What is your company's philosophy in 2019 about audio over IP? What equipment are you using?

Aaron Farnham: AoIP is the next evolution in audio and the death of analog audio, with a few exceptions, i.e. microphones, speakers and headphones. The capability to pass hundreds of audio channels, status and GPIO down one Cat-6 cable drastically reduces the amount of cable needed to operate a facility.

Being able to take one feed from your console and take it all the way into the transmitter without ever leaving the AoIP world means no conversions take place. There are no chances for sample rate issues. For every box you had to go through in the past, you added delay because every box needs to re-clock the signal.

We use Wheatstone LXE for our consoles, Telos VX for phones and we are working with Comrex on the Access multirack.

> **I would love to see** integration with video, as more stations do live video; it would get rid of the need for so many converter boxes.

RW: What features do you want to see or anticipate from manufacturers?

Farnham: AoIP needs to be more plug-and-play. AES67 allows the devices to talk to each other but you need to know the multicast address for everything. This leaves the potential for collisions since no two systems talk directly to each other.

I would love to see integration with video, as more stations do live video; it would get rid of the need for so many converter boxes.

RW: How have AoIP trends affected design of technical centers, rack rooms and control rooms?

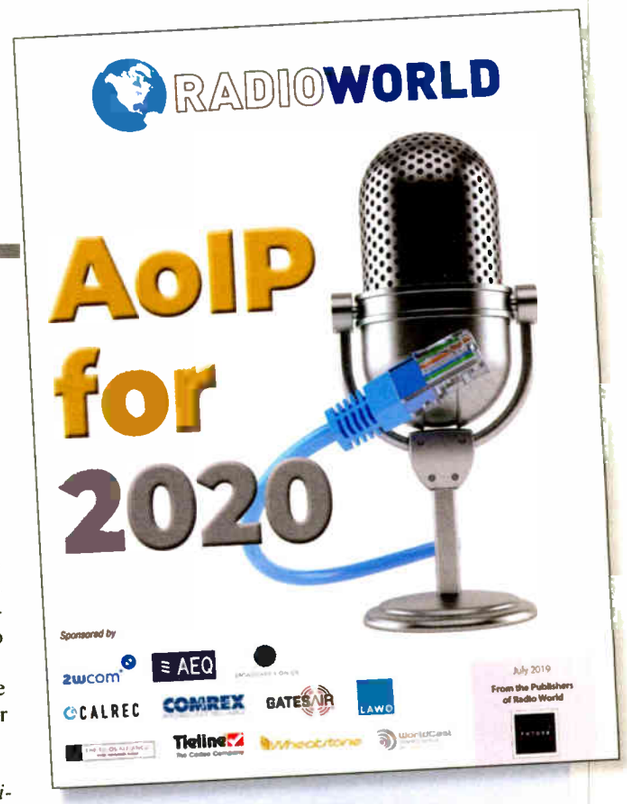
Farnham: Because of AoIP you need far less space in your rack rooms and control rooms. In the control room you are able to use one rack because equipment can live in the rack room without large amounts of wiring. AoIP allows many channels of audio and logic over one Ethernet cable. In the rack room, redundant power and network are a great idea. Systems are getting smaller. In technical centers you can have all audio come through your center, leaving the ability to monitor all streams at once with visual and audible alerts.

RW: What should someone new to AoIP need to know?

Farnham: Don't be afraid. A well-laid-out plan will have you running AoIP fast. Manufacturers are happy to help you lay out your system. Think about your sources, lay out your air chain and write it down. Network switches are key to your AoIP system; quality switches will make your life better and help with troubleshooting later on.

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

Read the free ebook "AoIP for 2020" under the Resource Center tab at *radioworld.com*.



SHORTWAVE

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whereas you can buy a cheap analog SW radio for as little as $10," said Dr. Jerry Plummer, a professor at Austin Peay State University in Clarksville, Tenn., and frequency coordinator for U.S. SW station WWCR. "Given that the audiences being targeted by NASB members are largely in the third world, the lack of inexpensive DRM receivers keeps them listening to analog shortwave."

Mindful that other digital audio sources are gaining ground even in less-developed countries, the NASB has decided to take action. At its recent annual meeting in North Carolina, at the facilities of U.S. SW broadcaster Trans World Radio, the NASB formed a DRM Receiver Working Group. Headed up by TWR engineer George Ross, this group has been "tasked to evaluate what it will take to get affordable, distributable DRM receivers," Ross told Radio World. "What is holding DRM up is the lack of affordable receivers."

CHICKEN-AND-EGG

Given the NASB's interest in low-cost DRM receivers, it was no coincidence that Johannes Von Weyssenhoff was invited to speak at the annual meeting. Von Weyssenhoff said his StarWaves manufacturing firm (*www.starwaves.de*) has the technology, capability and existing prototypes to build DRM radios for $29 each, but only if the sale order is large enough to deliver economies of scale. (He also estimated $18 DRM modules could be built for installation in other radio models.)

"Twenty-nine dollars is doable at volumes staring at 30,000 receivers," Von Weyssenhoff told Radio World. "Even smaller quantities would be possible at this price for very simple radios — for example, without graphics displays — but these would be special projects that had to be discussed individually. But even more advanced radios with Bluetooth or premium designs will be possible to offer at a reasonable price," he said — as long as the sales orders was in the tens of thousands or more.

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Members of the National Association of Shortwave Broadcasters are shown at their annual meeting in North Carolina, hosted by Trans World Radio.

THIS ISSUE

SEPTEMBER 1, 2019

Photo from The National Archives

Getty Images (Cleanrtd)

Radio World (ISSN: 0274-8541) is published bi-weekly with additional issues in February, April, June, August, October and December by Future US, Inc., 11 West 42nd Street, 15th Floor, New York, NY 10036-8002. Phone: (703) 852-4600, Fax: (703) 852-4583. Periodicals postage rates are paid at New York, NY and additional mailing offices. POSTMASTER: Send address changes to Radio World, P.O. Box 282, Lowell, MA 01853.

WRNJ: AM STATIONS SHOULD CONSIDER DRM+

U.S. international radio broadcasters aren't the only ones interested in the DRM digital radio transmission standard. WRNJ Radio co-owner Larry Tighe would like stations on the AM band in the United States to have the option of broadcasting using the DRM+ standard if they choose. Licensed to Hackettstown, N.J., "Oldies 1510 WRNJ" broadcasts on 1510 kHz and simulcasts on FM frequencies 92.7 and 104.7 MHz.

Mindful that the current AM band doesn't have space to add DRM+ stations, he has filed a petition for rulemaking with the FCC, asking that the 45 to 50 MHz section of the VHF spectrum be reallocated for this purpose.

"The 45–50 MHz band was allocated to two-way radio users in business and government, who have since migrated to higher bandwidths where they can use handsets with smaller antennas," said Tighe. "As a result, this spectrum is extremely quiet right now. WRNJ monitored this bandwidth for an extended period of time, and heard very few distant signals."

According to Tighe, allowing AM broadcasters to broadcast in DRM+ on 45–50 MHz would vastly reduce their operating costs due to the more efficient broadcast coverage of DRM+, with 1 kW effective radiated power over DRM+ being equal in coverage to 5 kW ERP with AM. His FCC petition argues that allowing AM broadcasters to use DRM on 45–50 MHz would also free the FM band from the thousands of AM-operated FM translators now in use, thus reducing congestion for actual FM broadcasters.

Tighe's FCC petition acknowledges that DRM+ radio receivers are not widely available to consumers but says that "just like any new spectrum usage, receiver manufacturers will respond to the demand for new receivers."

It remains to be seen what the FCC's response to Tighe's petition will be. Meanwhile, this New Jersey broadcaster also has his eye on the lower half of the once-busy VHF band for AM stations on DRM+.

"There were 660 TV stations between Channels 2 and 7 before the transition to UHF for HDTV," said Tighe. "There are now only approximately 60 TV stations in the USA on those old VHF channels. There is plenty of spectrum to share with a new service, i.e., DRM+ or any modulation, if the FCC really wanted to move AMs."

— James Careless

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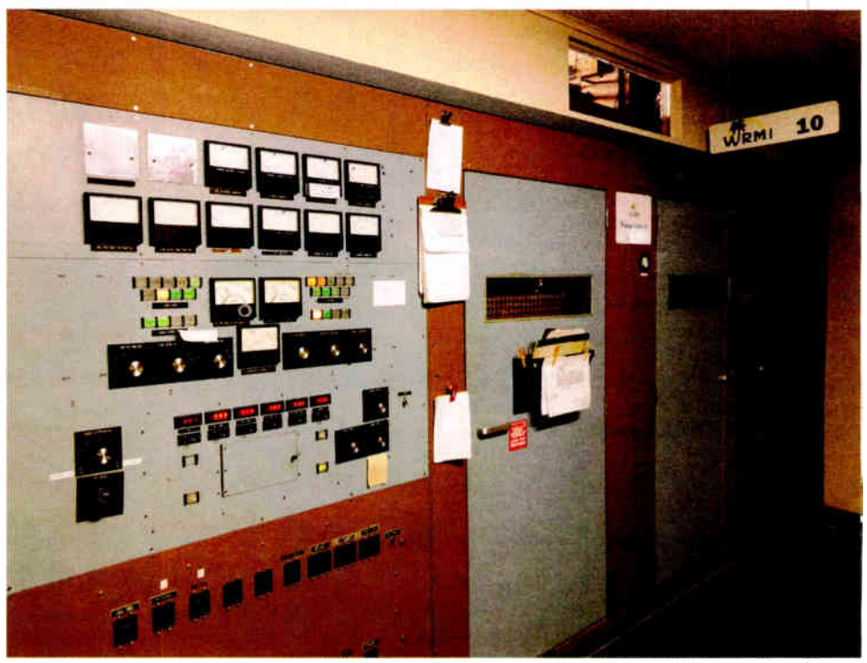
Given that India and China have committed to the DRM standard, there appears to be a mass-market for these receivers. But the problem for StarWaves is finding the money to build enough of them to drive per-unit costs down.

"In recent years I have tried to convince quite a number of potential investors but either I have not yet found the correct audience, or I was not yet able to communicate this great opportunity convincingly," said Von Weyssenhoff. "You just have to imagine that alone in India, according to All India Radio, there is a demand of up to 150 million receivers within the next few years. This market could have been served with tons of receivers by now and big profits could have been made, but instead I had to grow the development in very small steps."

The money StarWaves needs is not huge: "An amount of $150,000 or even $100,000 would certainly do wonders and enable us to start production within a few within a few weeks," he said. "A commercial order of 10,000 receivers or more would have a similar effect."

NASB's members don't have this kind of money available. Saddled with huge antenna farms and multiple power-devouring 50 kW to 500 kW transmitters, the commercial/religious shortwave broadcasting sector is tight for cash.

"Broadcasting DRM requires either a new transmitter or the modification of an existing transmitter," said Kim Andrew Elliott, a retired Voice of America broadcaster and host of "Communications World" who has organized many demonstrations of DRM reception at the annual Winter Shortwave Listeners Fest going back to 2003.



WRMI's transmitter could be modified to transmit DRM.

"These days, many shortwave broadcasters are thinking about whether they should keep their existing shortwave transmitters on the air, rather than thinking about buying or modifying a transmitter."

Their situation isn't helped by the lack of audience measurements detailing SW's far-flung listener base. Not only does a lack of SW ratings make it difficult to sell spots to advertisers, "but the squeaky, staticky sound of shortwave makes it hard for us to talk to the people at Coca-Cola, who fear that listeners will associate their product with inferior quality," said Caudill.

The resulting conundrum is a classic chicken-and-egg dilemma. StarWaves and other DRM radio manufacturers don't have the money to produce DRM radios in volumes that would make them cheap to buy.

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O'RIELLY

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wireless development. It is expected to take action on the matter before the end of 2019.

O'Rielly, 48, was nominated for a Republican seat on the FCC by President Barack Obama in 2013. He has been active in a number of radio-related policy issues on the FCC's action list including AM revitalization, the quadrennial review, FM Class C4 and pirate radio. Radio World checked in with him recently on these issues.

Radio World: *What do you see as the ideal split of the 500 MHz of C-band spectrum? What do you support?*

Michael O'Rielly: Industry stakeholders have discussed different options, including the market-based approach that could repurpose 200 megahertz of spectrum relatively quickly while ensuring the incumbents will be accommodated. I hope the satellite incumbents who are willing to surrender their spectrum rights will be able to find a way to increase the amount to be reallocated to 300 or more megahertz.

As for the spectrum split I say between 200 and 300 MHz, but closer to 300 for wireless right now. I've testified to that fact. I think we'll end up eventually in the 300 range to repurpose. We need to tee up even more mid-bands for review. It's critically important that we look closely at those prime bands for 5G.

RW: *Are you supportive of the C-Band Alliance proposal, which calls for 200 MHz for wireless and 300 for satellite earth-stations?*

O'Rielly: I haven't endorsed it. I've said some nice things about it. There are some nice parts to it. We are still trying to work through some things, like how much spectrum we are talking about, what is the auction mechanism and the band plan. There are pieces of it that are still open for consideration and that's why I haven't endorsed it.

RW: *The proposal contains money for the repacking of the spectrum and moving broadcasters during a migration. Will whatever the FCC decrees contain some money for broadcasters to cover expenses of moving?*

O'Rielly: Oh yes, it's going to have to. And I've said as much all along. We are going to have to make sure broadcasters are made whole in any kind of repack. Repack is a term we use in incentive auctions, but it kind of functions here, too. We are going to relocate and retune the earth stations. Therefore that expense should be addressed.

What I have told the broadcast community, and I've done this in a thoughtful way, is not to be greedy. This is not an opportunity to make money, but rather a process to be made whole. And to make sure your services are not interrupted and mindful of how important use of the C-band is to your technology package. A number of broadcasters have told us they use some fiber in their operations already, but they want the redundancy of using satellite. They want both.

RW: *Speaking of fiber, some of the wireless companies have told the commission they believe broadcasters could use fiber to replace the C-band for distribution of programming. Do you think that is in the public interest?*

O'Rielly: No I don't believe we will go down that path. I don't believe forcing anyone to using just one technology is good. Broadcasters have highlighted the fact that having different redundant technology is crucial. Some wireless companies have even suggested using redundant fiber networks, but broadcasters have made it clear that they have seen nothing to make them want to go to just fiber. I'm respectful of that.

Regarding the C-band, O'Rielly said, "We are going to have to make sure broadcasters are made whole in any kind of repack."

RW: *There have been lots of other proposals floated for C-band repurposing. Have any of these stood out in your mind?*

O'Rielly: There have been a lot of ideas put forward. And I think that signals that we are close to a decision point and a commonality. Different views are coalescing around different pieces. And now we see groups are fighting over specifics instead of generalities. There's been less yelling at each other. That's progress I think. But we still have work to do.

RW: *Ideally, would the FCC like to see the stakeholders involved come to a consensus and get behind one of the compromises? And would that simplify the proceeding?*

O'Rielly: That would be great if it worked out that way. I suspect it may not given the strong views involved. But as regulators, part of our job is to find the right outcome. In general, the outcome would be better if you had all sides on

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SHORTWAVE

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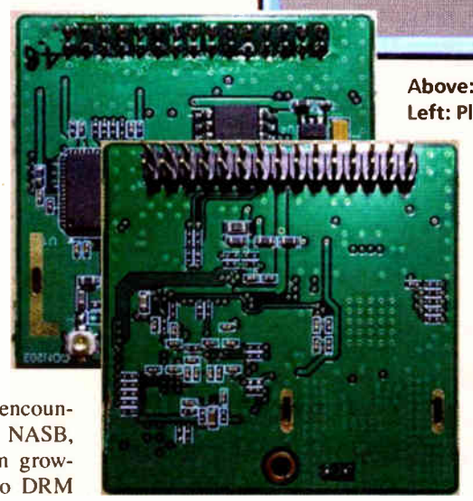
"To determine when we can consider broadcasting in DRM, there needs to be a 'completed broadcast network,' i.e. broadcasts and receivers," said Ross. "Without receivers, broadcasts are futile. So broadcasters are still waiting for manufacturing of receivers."

Jeff White, general manager of U.S. SW broadcaster Radio Miami International (WRMI), said, "We know it's a chicken-and-egg situation, but no one is willing to invest a lot of time and money into transmitting DRM programs unless they know that there are at least some listeners out there who are able to hear the programs. The other factor is that there are probably billions of analog shortwave receivers out there, and more being manufactured every day in China. So there will still be a large audience out there listening to analog shortwave for a long time to come."



Above: DRM radio prototype from StarWaves. Left: Plug-in DRM module.

INEVITABLE?

Despite the hurdles being encountered by StarWaves and the NASB, there seems to be momentum growing for DRM. India's move to DRM will create a mass-market for low-cost DRM receivers as soon as they become available. Meanwhile, China's recent DRM deployments has made it "the world's largest DRM shortwave broadcaster," wrote Hans Johnson in Radio World earlier this year. "China operates the most DRM transmitters in this band and has the most extensive schedule."

It is this context that U.S. SW broadcasters are making their DRM push.

"From my knowledge of the situation, many of these broadcasters have been interested in DRM since its inception," said Christopher Rumbaugh, administrator for the blog DRMNA.info that covers DRM developments in North America. "The reason they are pulling together now is that the time is right for affordable receivers."

His site posted a recap of NASB 2019 including Von Weyssenhoff's NASB StarWaves presentation, at *drmnainfo.blogspot.com/2019/05/nasb-2019-after-action-report.html.*

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O'RIELLY

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board, but here it seems unlikely. So we will find the right landing spot.

***RW:** What are your thoughts on congressional involvement on the C-band matter at this point? Would that complicate or simplify matters for the FCC?*

O'Rielly: I always welcome congressional involvement, whether it is informal or legislation. Certainly I appreciate anytime Congress passes a statute and the president signs it. If it happens here if something is enacted, I would follow it to the letter. In the meantime, there are a lot of different views from Congress, just as there is from all the different parties, so we have to take all of them, digest them and rule on an outcome.

***RW:** Were you satisfied with the compromise solution expediting FM translator interference claims? What are your expectations?*

O'Rielly: Generally yes. I think we are open to fine-tune it going forward. I think it addresses both sides of the issue. Some of the issues were unintended consequences of having all these new FM translators available and the growth of that service. So we want to make sure we don't cause disruption and we want the process to be more simplistic and easy to use. We'll see if in operation it works as we think it will.

***RW:** You've been instrumental, along with Chairman Ajit Pai, in making pirate radio take-downs a priority. Some broadcasters sense a slowdown in the FCC's pursuit of pirates. What is your response to those assertions?*

O'Rielly: Well, I would say to those claims that if any broadcaster is feeling that way, don't worry. I'm still pushing as hard as I can. We do have some actions coming. At the same time there is legislation moving through Congress to provide the commission more tools that will be incredibly valuable.

I was just in New York working on the issue of pirate radio, specifically in the Bronx, and figuring out how to remove the enticement for groups to do pirate radio.

***RW:** Do you believe the recent joint action by the U.S. attorney in Massachusetts and the FCC signals increased interest by the DOJ to act? [In March the FCC Enforcement Bureau praised a civil action brought by the Justice Department, intended to prevent an unlicensed station from operating in Worcester.]*

O'Rielly: I hope so. I wasn't involved in that issue. I hope it will stir further compliance. Every little step matters.

***RW:** The Class C4 Notice of Inquiry hasn't moved to NPRM stage yet. Do you expect that to happen soon and do you support that move?*

O'Rielly: I would defer to the chairman to the timing of the item. I've been raising issues regarding the C4 proposal. What I have said publicly is that it is hard to move an item such as this that causes such consternation within an industry. And there are strong takes in favor and against. A number of broadcasters are strongly opposed. That is a harder thing to move in those instances, given the technical issues involved. So I don't know the timing but I am suspect in terms of where we might go with it.

***RW:** The comment periods have been closed for some time on proposed changes to the Class A AM interference protection rules. Do you expect an order soon and what could it mean for AM going forward?*

O'Rielly: Again, I'm not sure about the timing. The comments have been collected. I just don't have a good insight on when the item moves forward. A lot of those pieces are still up in the air.

***RW:** Comments in the 2018 Quadrennial review were filed in March and April. What is the likely timeframe for an FCC decision in this proceeding? Will the timing be affected by litigation over previous quadrennial reviews still pending in a U.S. court of appeals? [Editor's note: The FCC has defended its most recent rule changes against a challenge by Prometheus Radio Project.]*

O'Rielly: I'd hope it's not dependent on the Third Circuit because they haven't had the mindset of the current marketplace for some time. They've been stuck in a previous time that we have all moved past. I hope we are not stuck waiting for their decision.

I think we can take some steps to move forward. Hopefully this year still, but that will be up to the chairman. But in the next six months I'm hoping we can move our quadrennial review ahead. We should have already done that considering our statutory requirement.

***RW:** The question of market definition is key to the FCC's broadcast ownership rules and to the Department of Justice's review of broadcast mergers. Should the DOJ define the relevant market for reviewing radio and TV station mergers in the same way as the FCC (or vice versa)?*

O'Rielly: I don't know about the same, but they need to update their current review, which I have criticized extensively. I have a deep concern. They are living in the past and have blocked a number of mergers that make sense.

I hope the workshop the DOJ put together on how digital advertising should affect its broadcast merger review will lead to the decision to change their definition of a marketplace.

***RW:** What changes would you like to see the FCC make to its broadcast ownership rules in the 2018 quadrennial?*

O'Rielly: On the radio side of things, I think the subcaps are ripe for review and ripe for change. Ownership limits on the AM side are anarchistic. Allowing more consolidation of AM stations may be a key way to preserve this function.

And on the FM side we just need to find the sweet landing spot. There are larger ownership groups that are critical of NAB on their landing spot, but I think we will be able to find a number to make most entities happy, including the community at large.

We need to bring our rules up to date to reflect the current marketplace. Everyone is competing for audience. It's not just radio versus radio, or versus TV. It includes all of the high-tech companies battling for the eyes and ears of the American public.

***RW:** Does your schedule slow down at all in summer?*

O'Rielly: I wouldn't call it a slowdown. We move our meeting in August up a bit and slide the September meeting back to create some space for vacation and family time. There's nothing official about it. I do hope to take some time off and spend it with my daughters and family.

> **We need to tee up** even more mid-bands for review. It's critically important that we look closely at those prime bands for 5G.
>
> —Michael O'Rielly

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BY BRETT MOSS

The traditional fall audio gathering, the AES Show, approaches. This year's event once again is at New York's Jacob Javits Center.

The show floor will be a two-day affair, Oct. 16–18, while the sessions run for three days, Oct. 16–19.

As usual there will be plenty of equipment exhibitors on the show floor. Attendees will find more than enough to put gray hairs on the GM.

Many of the sessions that would of most interest to the Radio World audience can be found in the Broadcast and Online Delivery track (see *www.aes.org/events/147*).

Track chairman Dave Bialik says, "We're very open. A lot of people have gotten the opinion, 'AES, that's above the broadcaster level,' but people don't realize that broadcasters have to care about audio quality."

For sheer star power you can't beat the "Innovations in Audio Processing" featuring an all-star lineup, no, make that a Murderers' Row lineup of processor gurus: Bob Orban, Orban Labs; Frank Foti, The Telos Alliance; Steve Dove, Wheatstone; George Massenburg, GML; and Tim Carroll, Dolby Labs. The session will be directed by Bialik.

Radio World Editor in Chief Paul McLane will be overseeing "Performance Spaces for Broadcast," a look at the proliferation of live stages at broadcast facilities. Joining him will be Sam Berkow, SIA Acoustics; John Carraciola, JVC Communications; Gary Kline of Kline Consulting; and Jason Ornellas, Bonneville International–Sacramento. The session will help provide tech ideas, design tips and guidelines to navigate the concept to completion of building a performance space in a facility.

If there's a theme being explored, perhaps it is "streaming." There are several sessions taking on that multifaceted topic.

We can start with "Anatomy of a Stream." Triton Digital's Sam Sousa will be joined by Bob Orban, John Kean of Cavell and Mertz, Iaon Rus of The Telos Alliance and Mike Smith of Mainstreaming. This is a dig into where streaming is today, including its construction, and where it might be going tomorrow.

Several from the panel will also be involved with "Metadata: What Works, What Does Not and Why?" Joined by Kent Terry of Dolby Labs, they'll turn their attention to metadata.

"Convergence of Broadcast Over-the Air and Streaming Delivery" is headed by the NAB's David Layer. Broadcasters still reach the majority of their listeners via over-the-air transmission but few deny that digital streaming will play an increasingly larger part of their program distribution effort. He'll be joined by Sayon Deb of the Consumer Technology Association, Jeff Detweiler of Xperi and Todd Baker of Vizio.

As part of streaming, the subcategory of podcasting is also starring. "Podcast Production Story" is led by Walters-Storyk Design Group's Romina Larregina and John Storyk. Joined by Austin Thompson of Gimlet Media and John DeLore of Stitcher, they will examine podcast-oriented production facilities at the two podcast production houses.

There will be a related tour of the new WSDG-designed Stitcher production studios in Manhattan.

American Public Media's Rob Byers will also helm a podcast roundtable taking a look at crafting a quality podcast.

For the really ambitious the session "Facility Design for IP," with Andy Butler of PBS, Kent Terry of Dolby and Emeric Feldmar of WGBH, promises to be barn burner. "If you think you know IP, think again" is the tease for this session, a co-production between AES and the SBE.

In addition, there'll also be a whole track on Networked Audio. Many of the sessions will provide updates on current technologies, some look at the next big thing while others are trying to get an idea where IP audio is going in a longer run scenario. Radio broadcast engineers, listen up.

EMERGENCY PREPAREDNESS

Be sure not to miss "Emergency Preparedness and Safety for Broadcasters." Scott Fybush, Tom Ray, Jim Leifer and Howard Price will discuss the multiple approaches that encompass a station's emergency plans. These can include everything from personnel to facility design plus dealing with emergency officials and how to recover from an emergency. This session is a co-production with the SBE.

IF YOU GO

AUDIO AES NEW YORK PRO AUDIO CONVENTION

What: AES New York 2019

Where: Jacob K. Javits Convention Center

When: Oct. 16–19, 2019

Info: www.aes.org/events/147

How Much:
Three-Day All-Access
AES Member: $520–620
AES Student: $145–165
Nonmember: $655–755

Two-Day All-Access
AES Member: $350–420
AES Student: $100–120
Nonmember: $430–530

Single-Day All-Access
AES Member: $195–230
AES Student: $65–75
Nonmember: $235–285

Exhibits-Plus Onsite: $75

The event targets anyone whose work or interests include broadcast and streaming, studio recording, live sound or a range of other industries touched by audio.

After all of that serious stuff, perhaps it might be time to take a break.

The "Technical History of WNYC," featuring New York Public Radio's Chief Technology Officer Steve Shultis, Director of Engineering Jim Stagnitto and Andy Lanset, director of archives, is a look back at the evolution and development of the influential noncommercial station, especially from a broadcast engineering viewpoint.

There's also a pair of sessions that look at very "edgy" audio — things like 3D audio. Maybe not relevant at the moment for radio broadcast engineers but we've seen how fast technology can change the dynamic. "Live Broadcasting With Object-Based Audio" features presenters from Television France, Radio France and Fraunhofer discussing recent demonstrations in Europe highlighting "immersive and interactive content" in actual TV and radio productions. These include 3D audio, multiple language broadcasting and real-time alternative version mixes of programming.

In a similar vein there is a session called "Immersive Audio Mixing and Workflow for Broadcast." A bit heavy on TV but possibly a hint of things to come in the next decade.

Photo by Suzie Alvey

Mark Twain, played by Rob Alvey, will make an appearance on Oct. 16 in "An Intimate Evening With Tesla and Twain" presented by HEAR Now Festival and SueMedia Radio Waves Studios.

Other fun stuff and items that might be of interest include a number of Audio Builders Workshops. These are DIY sessions on how to build and repair equipment.

For history buffs, the HEAR Now Festival and SueMedia Radio Waves Studios will present "An Intimate Evening With Tesla and Twain," Oct. 16. The two men, with their oversized personalities, who need no introduction, really met in the 1890s. The event features professional Mark Twain reenactor Rob Alvey.

And, finally, as is now tradition, the attendance of sessions can count towards SBE recertification, and there will be a certification exam conducted at the show on Oct. 18.

NAB SHOW NEW YORK

The NAB Show New York, Oct. 16–17, is collocated with the AES Show in the Jacob Javits Center. Attendees of the AES will also have access to the NAB Show New York.

It describes itself to be the "largest gathering of the media, entertainment and technology community on the East Coast."

The show offers a floor with equipment dealers along with sessions on a range of topics, from video production to monetizing opportunities provided by cutting edge technology to a Streaming Summit.

More info can be found at *www.nabshowny.com*.

Emergency Streaming on the Cheap

Also, Buc Fitch suggests plugging those pipes

WORKBENCH
by John Bisset
Email Workbench tips to johnpbisset@gmail.com

It can be a dreaded call: "The STL is down," or "The stream isn't functioning." Usually the goal is to get something back up — *fast*. It may not be perfect audio, but good (and reliable), and at least you are back on the air. Consultant and projects engineer with Chicago's Scope+Focus, Len Watson, has been down this road and offers a solution: If you can locate an old computer (desktop, laptop, Windows, Linux) you can put together an audio backup that can be fired up in little time, and for about zero dollars. Translation: You're a hero to the GM.

For two different clients, Len has found old laptops in storage, and pressed them into backup service. One of these computers is a really old AMD Sempron (see Fig. 1) which actually took Windows 10. Len also converted a Lenova T42 (that's not a typo) with Windows 10 and it works, too.

Once you've secured that computer, head to Icecast and SourceForge and get Icecast 2 and the Icecast GUI and BUTT respectively. Install Icecast, customizing the XML file, changing passwords, etc. Then load BUTT (it stands for Broadcasters Using This Tool); and customize it, selecting the stream rate and format. You'll also want to enter the same password you gave Icecast.

Note, too, that BUTT will record an archive on the local hard drive if you want. Now, run audio and Ethernet to the computer and you have a cheap standby streamer. Icecast will tell you what the address is, and you can make it public or private.

In short, it will "find its way" to the web. You may have to open a couple of ports in a firewall, but it's aggressive in getting through. If your back's against the wall, you're on the air with just that. If you drag Icecast and BUTT into the startup menu (for Windows, run shell:startup), the machine will begin streaming when it boots up.

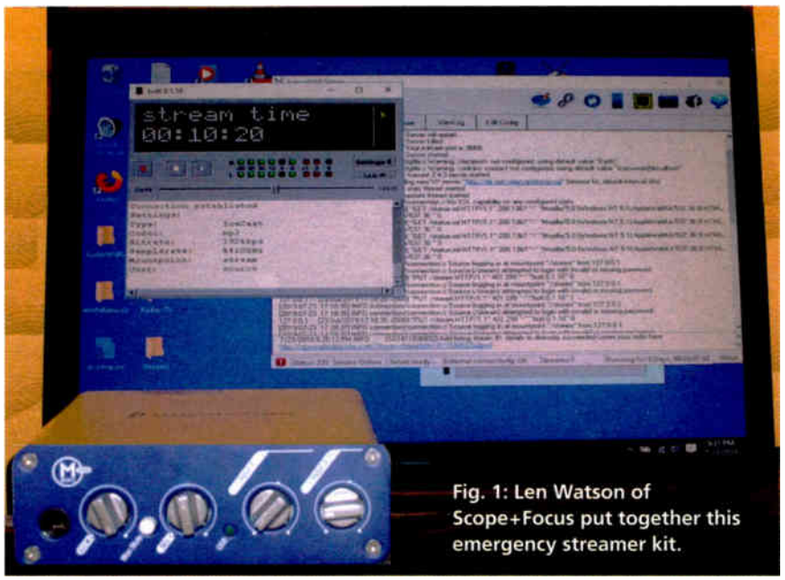

Fig. 1: Len Watson of Scope+Focus put together this emergency streamer kit.

Here's a neat idea for contract engineers. Len has set up an HP ProBook 450G as a loaner/rental for his clients. The equipment pouch includes the computer, power supply, Digidesign Mbox2 audio interface, a couple of Ethernet cables and a number of audio adapters. It kept one station on for about six days.

Of course, you can make it better. Adding a used Mbox2 will improve the sound over an onboard sound card. They're about $25 to $35 shipped on eBay. Len suggests you don't buy an Mbox1.

Another tip — changing the name of Kastor.exe to .ex_ will disable Icecast's internal audio recorder/importer so it won't go hunting for something to record.

Len also cautions to be prepared for the "Nag Screen" that pops up looking for donations to SourceForge. You can close it out but they're just looking for 20 bucks. If this kept a station on the air, have the GM send 'em some money — it's worth it!

If you can locate an old computer (desktop, laptop, Windows, Linux) you can put together an audio backup that can be fired up in little time, and for about zero dollars.

If you don't want a lot of control of the stream — fewer format choices and having to adjust audio with the computer's software slider — you can go with NCH's Broadwave Streaming Tool. It will set you up nicely, too. It's a pay program, but NCH makes a pretty trustworthy suite of audio and video tools.

If you're using this setup to get your signal to the transmitter, you may want to install a VPN for security, too.

Here's the SourceForge link: *https://sourceforge.net/projects/butt/*

The link for Icecast: *http://icecast.org/download/*

Other helpful links include the Mbox2 driver download page: *https://tinyurl.com/8b3gmdc*; and the NCH Software Broadwave Streaming Audio Software page: *https://www.nch.com.au/streaming/index.html*.

Although not designed for full-time use, having one of these set up and ready to go as a backup is cheap, yet invaluable, insurance. Thanks, Len, for the great ideas.

(continued on page 14)

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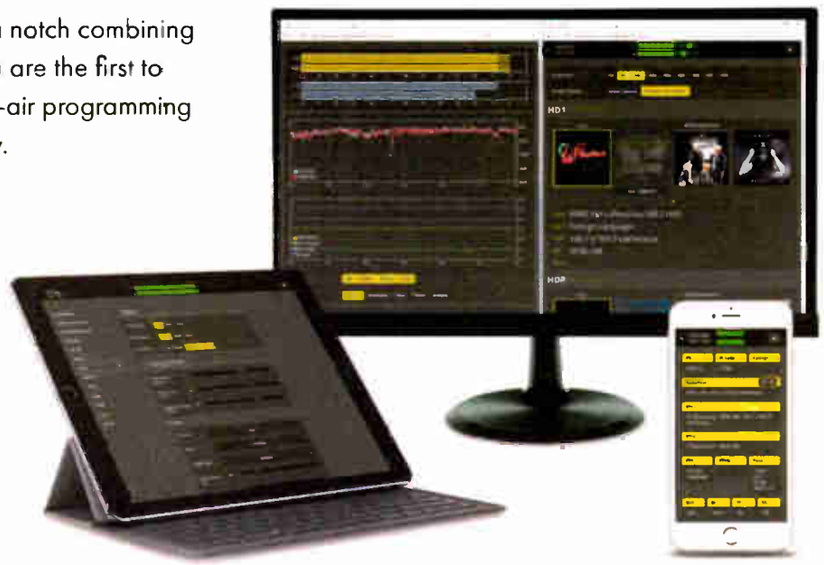

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Meet the Mosquito Network

Inside the U.S. effort in a battle of the airwaves during the Pacific campaign of World War II

ROOTS OF RADIO

BY MARK DURENBERGER

We can't fully appreciate the importance of *news from home* to those who served in World War II. In the Pacific campaigns, G.I.s, sailors and Marines fought bloody island-hopping battles; as each island was cleared, garrison troops and hospitals moved in and carried on their own war against mosquitoes, isolation and boredom. The island fighters were fortunate if dated mail caught up with them before they moved on to the next target. Timely personal-level communications were pretty much absent.

Radio programming from America was available but only on shortwave. And shortwave radios were not generally available. The fortunate few had been issued "Buddy Kits" that included a radio, a small PA system and a record player for discs sent by mail. But for most there was no way to receive short-lived information such as news and sports. They were left with enemy radio propaganda such as Japan's "Orphan Ann/Annie" (aka one of several Tokyo Roses) and the "Zero Hour" program.

No wonder that the idea of having a local island radio station doing "live from home" was so fiercely supported. Enlightened commanders saw the idea as a terrific morale-builder. The only problem was how to pull it off.

A solution, not uniquely, came from within the ranks. It started with the work of some bored but talented soldiers in the Panama Canal Zone who in 1940 built a couple of 50 W transmitters and put them on the air without authorization, labeling them "PCAN" and "PCAC."

In Alaska, 7,500 miles northwest of Panama City, what started as programming through a loudspeaker system became a bootleg radio operation at Kodiak. Coming on the air in January 1942 and calling itself "KODK," it

Possibly the earliest military station in World War II — this one located in the Panama Canal Zone.

delivered a whopping 15 watts to the troops. Sources with hindsight later said that the Armed Forces Radio Service ("AFRS") was born here, when one of its progenitors visited the Alaska operations and "came up with the idea."

There were similar stations in Hawaii and the Philippines, including the ill-fated island of Corregidor, where a station called "The Voice of Freedom" was an AM repeater for shortwave broadcasts from the U.S.

As troop buildups began in the South Pacific, joint Allied radio operations were established, notably in New Zealand and Australia. These stations were popular with Americans but they also kindled an appetite for "real radio from the States."

Meanwhile things were happening in Washington. The government's "Morale Services Division" had been created in 1940, though its mandate hadn't focused on radio. But as cumbersome as government can be, soldiers' demands for American radio content eventually reached the right people. Increased priority was given to the recording and distribution of network radio programs by electrical transcription. But that still wasn't live broadcasting.

The Morale Services Division was renamed the "Special Services Division" (SSD) and tasked with live broadcasting. The broadcasting division of the SSD would become the fabled Armed Forces Radio Service.

AFRS began to place "local/relay stations" among the troops. In the Eastern theaters such stations often used existing facilities, but in the Pacific they had to build from the ground up. To facilitate the effort, AFRS created a "station in a box" package that included a transmitter, long-wire antenna and recording and reproducing equipment. Installation teams boated from island to island to plant these mini-stations. Most of them came alive in 1944 and 1945 and, as the island-hopping campaign moved toward Japan, many were soon abandoned, some after only a few months' operation.

"Stations in a box" were first unpacked in Noumea New Guinea; then it was on to New Caledonia where AFRS hatched the first of the "Mosquito Network" stations. As WVUS it was among the first such to be given an FCC license (most

(continued on page 16)

Photos from The National Archives

An affiliate of the Mosquito Network

WORKBENCH

(continued from page 12)

Sealing conduit is a must to avoid vermin, water and trash from incursion. Although foam or putty are satisfactory, removing the "plug" to get other wires into the pipe can be messy. Plus, rodents will chew right through the foam unless you include a stainless steel or copper wool component.

Consulting Engineer Charles "Buc" Fitch, P.E. offers another idea especially for unused pipe or conduit — use a pipe stopper. These are cost-effective seals that you insert in the conduit or pipe and when you hand tighten the nut, the rubber gasket expands to seal the opening. Of course, these are ideal when you are capping off an end, because if you have cable entering the pipe or conduit, you will need to carve a small notch in the plastic to permit the cable to pass, but it will keep the rodents and snakes out.

These handy devices can be found at Newman Tools — *http://www.newmantools.com/cob/nylon.htm.*

But you'll also find them at the big box stores as well as plumbing suppliers. Buc advises if you buy these plugs locally, to take a small piece of the pipe with you, to insure you get the right inner diameter size.

One last thought from Buc — if you have those metal coax feedthrough ports for coax at your transmitter site, these stoppers are ideal for plugging unused ports, and they are a lot quicker to remove than the rubber boots held in place with a hose clamp!

Contribute to Workbench. You'll help y our 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 US Radio Sales for the Telos Alliance. He holds CPBE Certification status with the SBE, and is a past recipient of the SBE's Educator of the Year Award.

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PACIFIC RADIO

(continued from page 14)

of the Pacific's licensed-station calls would then begin with "WV").

Guadalcanal was the next priority for AFRS. Space precludes station-by-station descriptions, so I'll use Guadalcanal as a definitive example. The "studios" were in a wooden shack humorously called "Radio City." The first antenna was a 60-foot-high long-wire stretched between two palm trees (climbed by the more dexterous of the youthful assembly gang). Somehow the wire was "tuned" to work on 730 kHz. Later the antenna was raised to 90 feet and the frequency to 690 kHz. "AES-Guadalcanal" would be licensed as WVOQ.

The "studio" was equipped with a rudimentary mixing console and a Presto Model "Y" disc recorder that doubled as the program-transcription playback turntable. A good shortwave receiver was critical (a favorite shortwave receiver was the Hammarlund "Super-Pro"). Some stations actually built diversity-receive systems to improve reception.

A typical broadcast package: note the simple mixer and a turntable that pulls double-duty — able to cut or play back discs.

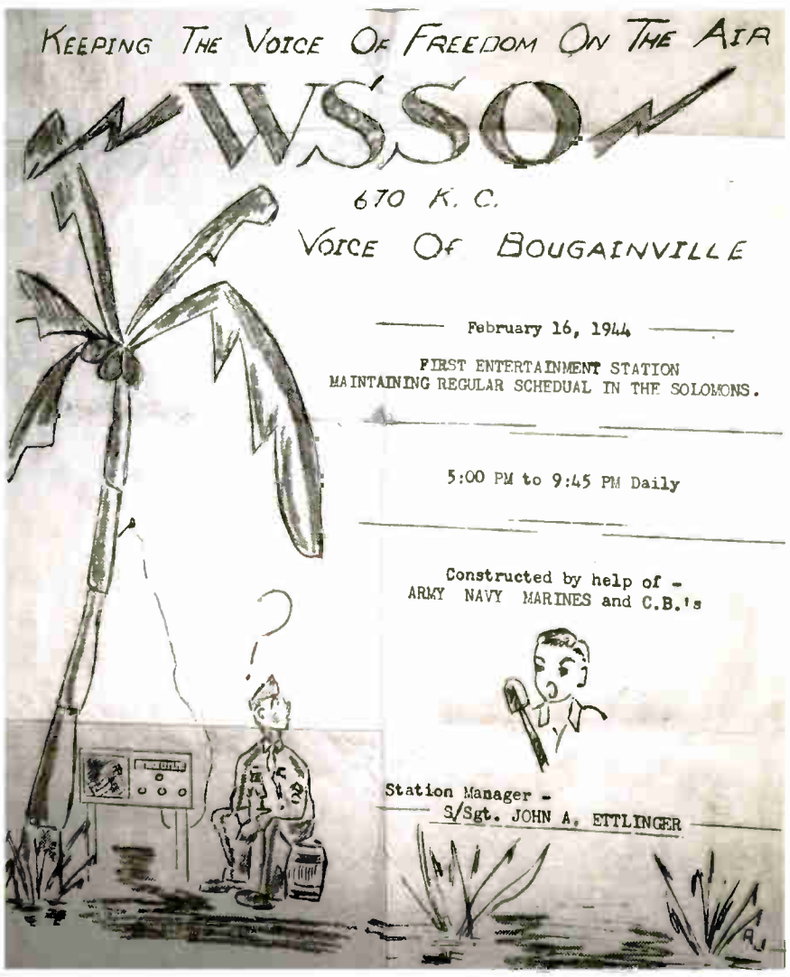
Soldiers in the field listen to a broadcast.

A staff usually consisted of five or six soldiers. The station kept an intermittent schedule based around troop downtime and usually went quiet around 10 p.m. local time. The typical broadcast week was 80 to 90 hours; part of that filled by shortwave programs from the states. Forty to 50 hours per week were taken by transcribed network programs shipped by AFRS, and the rest of the flexible schedule was "live and local" — GIs-talking-to-GIs (a precursor of "Good Morning Vietnam!").

Power for the station came from a shared generator. At night, when the load on the generator often increased, record speed would vary with generator load.

Of course each island station had its own story to tell: soldiers shinnying up palm trees with a wire in their teeth; "studios" usually in tents (sometimes made more soundproof and weather-impervious by the addition of a second tent above the first). Some listeners may have had the "Buddy Kits" or perhaps a radio sent from home … or maybe something home-built by the tech-savvy soldier. The stations were also rebroadcast on hospital and mess-hall PA systems and on ships within reach.

It didn't take long before each station had 100% listener penetration.



Photos from The National Archives

Where radio goes, promotion follows — even in the military.

Live stateside programming was usually captured from shortwave stations in California (John Schneider and Dr. Adrian M. Peterson have told their stories in Radio World). There were, however, two problems with this arrangement: 1) Shortwave propagation to the Pacific was generally at its best during the period when American radio networks were silent and 2) the politics behind AFRS and the rules of the International

(continued on page 18)

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Community Broadcaster Rocket Fuel

Community radio podcasting gets a boost, and a reminder of its potential

COMMENTARY

BY ERNESTO AGUILAR

The author is membership program director of the National Federation of Community Broadcasters. NFCB commentaries are featured regularly at radioworld.com.

Ernesto Aguilar

There was big news recently on the podcast front for community media outlets. Community radio hosting service Radio Free America emailed its partners to announce a pilot project in collaboration with a nonprofit journalism funder to adapt programming from its member stations for podcast distribution.

RFA's announcement is perhaps the first real rocket fuel as far as developments in community media podcasts go. According to the message, Radio Free America will format a station's terrestrial originated radio programs for wider podcast distribution at no cost.

NEW AUDIENCES

RFA's Jeff Abrams, a former head of community station KRBX/Radio Boise, commented, "In addition to providing free access to thousands of archived community radio shows every week, Radio Free America is now working with stations to serve new audiences by adapting their locally-produced public affairs programming for podcast distribution. RFA feels that by using all delivery mechanisms, stations and producers can stretch the reach of their content, and thrive at a time when audio is bigger than ever. It's really just another way to accomplish their local mission. It's the natural extension of their core area of expertise. There's no reason why great radio shows should only be heard on the radio."

Abrams adds that Radio Free America does expect to introduce advertising inserts of various types, but has not decided how these messages will be implemented or what the editorial nature of them will be. However, RFA expects to consult with stations ahead of making any decisions regarding ads. In addition, RFA's monetization model does include revenue sharing with its participants and other content partners "at an appropriate juncture."

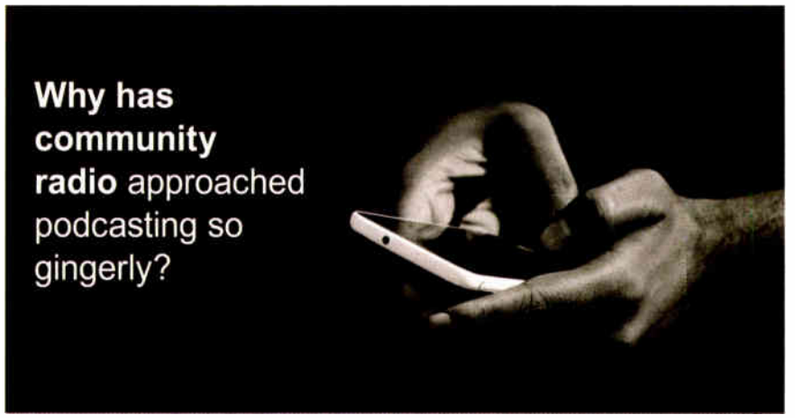
RFA moves from its traditional archival vertical into a relatively wide-open space. Virtually none of the known podcast players have been associated thus far with community media, either radio or the Public, Educational or Government (PEG) television side. How this absence came to be bears examination.

Truth be told, there are some dynamic community radio podcasts for sure — check out superlative podcasts like WXPR's "We Live Up Here," Marfa Public Radio's "West Texas Talk" or WTIP's "Boundary Waters" podcasts as some of the best in class. However, it is fair to say there may be some unrealized potential so far. There are perhaps a dozen or more quality community radio productions that would flourish brilliantly as podcasts, but lack the wherewithal to make a splash in the already crowded podcast system.

OBSTACLES

It is possible community media's pace may be a deterrent. Why has community radio approached podcasting so gingerly? Literally every station certainly has high-quality gear and studios that would make any podcast sound good. Instead, the hesitation may be due to resources, lack of clarity on digital capacity, or any number of issues. Potential partners could see this lack of in-house skillsets and local investment in podcasting to be a major obstacle. In this regard, RFA's commitment to handle the production end of the work and give technical know-how may be exactly what community radio stations with the right talent need to get ahead in the podcasting space.

As an intervention of sorts, content quality has to also be acknowledged as a stumbling block. Unfair though it may be, it is not hard to find those who perceive community media content to be inconsistent and at points marginal. It can be on occasion, and more than occasionally in some pockets. Addressing this issue may simply come down to stations countering that perspective by delivering more with what they have, where possible, and zeroing in on audience needs over internal inclinations, which may favor a bygone sound. To be clear, there are many stations offering top-shelf podcasting and content. May they inspire others to raise the bar locally.



THE TIME IS NOW

As more radio listeners and younger demographics are being wooed to podcasts, rarely has there been a better time for community radio stations to hop into podcast offerings. These podcasts could be original productions or repackaged radio programs — and more studies indicate audiences like to hear traditional radio shows in an on-demand fashion as podcasting inherently provides. Audience interest is growing. Stakeholders such as governing boards love a station in the podcasting game as well. In addition, radio station donors want to see their dollars put to work keeping a station up with the times, as podcasts undoubtedly are doing for organizations like KPCC, which just launched a local podcast studio.

Still, it is incumbent on a community radio station to consider where podcasting fits into its strategic plan for its content and programming. Stations have so many competing priorities at any given moment that each needs to decide the time, resources and attention station podcasts can occupy. Such may call for a review of a station's long-term objectives and its allowances for emergent needs. With proper focus and balance of all the demands at the station level, however, there are many wins to be had.

PACIFIC RADIO

(continued from page 16)

Telecommunications Union (ITU) dictated that programming must be shorn of its commercial content. This last was a new task for pre-eminent studios such as Radio Recorders in Hollywood. Such service providers had been recording network shows for delayed West Coast broadcasting. Deleting commercials from these disc-recorded network programs required them to learn "The Three-Turntable Two-Step."

Many of the Pacific island stations were informally part of the "Mosquito Network" or affiliates of the "Jungle Network." Stations in the Central Pacific (often by and for the Navy) were part of "PON" (The Pacific Ocean Network).

There were probably 50 or more island stations installed, removed and relocated in 1944 and 1945. Their numbers diminished rapidly as the Allies congregated closer to Japan. And as the war wound down and ended, the AFRS stations came together in the Philippines and Japan as the long-lived "Far East Network."

Photo from The National Archives

GIs listen to a radio, possibility one of the AFRS broadcasts.

Chances are that if your father or grandparents served in the Pacific during World War II, he, she or they would have been informed and entertained by these stations.

They brought the front lines just a little closer to home.

Mark Durenberger is a technology consultant with the Minnesota Twins and has six decades of broadcast and satellite experience. Mark began his contributions to Radio World forty years ago. Reach him at mark4@durenberger.com.

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Omnirax Eases Rebuild for Entercom Houston Cluster

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USERREPORT

BY ROBBIE GREEN
Director of Technical Operations
Entercom Houston

HOUSTON — At Entercom Houston, our studio facility might best be described as "vintage." Originally built in the mid-'90s as a duopoly facility for two AMs and two FMs by Westinghouse/Group W, it was expanded several times by subsequent owners, eventually growing to house six stations and 15 studios.

The studios were built on custom raised floors, which over the years had become soft in many spots. Efforts to repair the soft spots proved unsatisfactory, so eventually, we decided to scrap the floors and rebuild all the studios. A 15-studio build anywhere is a major effort, but making it happen while several live and local, high-profile stations, including two sports talk stations and the radio network for an NFL team are broadcasting from them requires careful planning and execution. Any time-saving advantage you can get is welcomed.

I've known David Holland and his guys at Omnirax for many years, and their solutions have helped greatly during a few challenging builds. Many years ago, while working for another company, I was tasked with building a new facility for four stations in a medium-sized market. We had a few months to plan and stage equipment, but the new studio building was handed off to us by the contractor just two weeks before a hard deadline to vacate the old facility — during the Christmas holidays. Omnirax helped us meet the deadline.

For this project, our biggest challenge was budget. We had a number we needed to stay under. Omnirax worked with us to design furniture that met our needs, fit our budget and looked great — all without sacrificing their consistent quality.

AUTOCAD

If I could pick just one word to describe working with Omnirax, that word would be easy. You send them a floorplan of your facility, then log into David's AutoCAD machine, and work through design options with him. Not long after, he gets back to you with finalized plans, and your new furniture moves into production.

The whole process is efficient and easy.

Assembly is easy too. Everything arrives clearly marked, with photos detailing every step of construction, and a couple guys can assemble the furniture for an average studio in about an hour. Everything fits together flawlessly.

When the furniture is assembled, you don't have to worry about cutting holes for consoles, or wire runs through the countertops — it's already done for you — all planned out during your AutoCAD session.

Over the last 25 years, I've been involved with a lot of studio renovations — sometimes with new furniture, but sometimes not. Many times, when rebuilds didn't involve new furniture, I've been left scratching my head when contemplating the furniture designer's decisions. When assembling studios around Omnirax furniture, I often find myself marveling at just how thoughtful and functional their designs are.

Given the opportunity, I always choose Omnirax.

For information, contact Philip Zittell David Holland at Omnirax in California at 1-415-332-3392 or visit www.omnirax.com.

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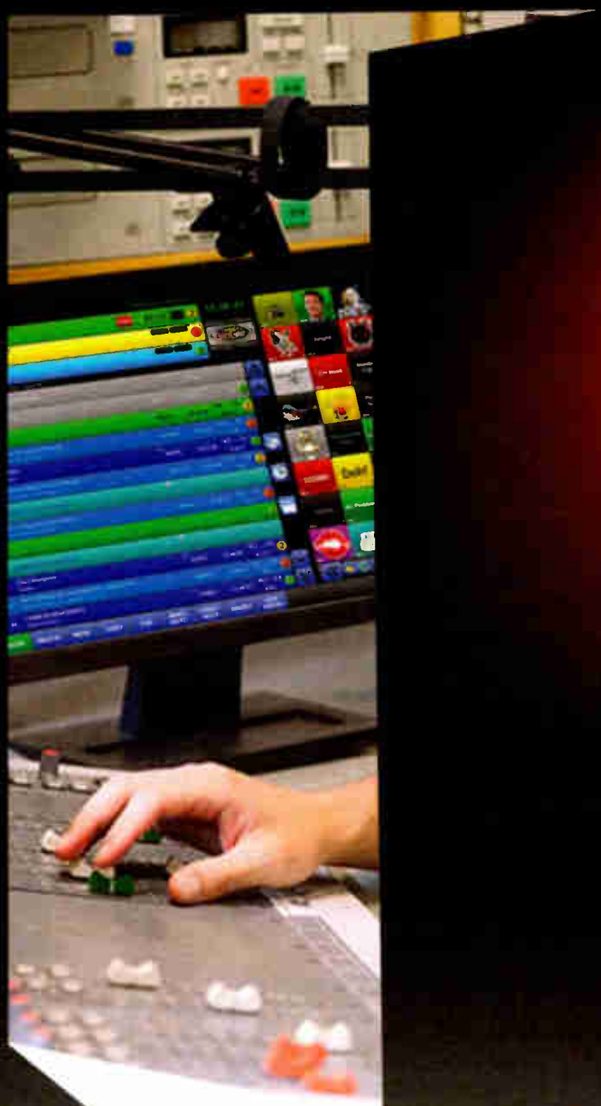

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TECHUPDATES

TITUS TECHNOLOGICAL LABORATORIES REDESIGNS LIGHT FIXTURES

Titus Labs says that quite often a custom design light fixture becomes a standard option for its series of light fixtures and that is the case with several new offerings. The standard Hanging Plexiglas Light (HPL) has recently undergone a design change. The supporting extruded aluminum frame that also holds the LED array(s) has been reduced in height and depth allowing 14% more viewable acrylic height for laser engraving.

Additionally, Titus Labs now has a series of split signs in the HPL series. These fixtures sport side-by-side hanging engraved acrylic sheets in one aluminum extrusion that are edge-lit in different colors. Two different related engravings can be displayed such as "IN CALL" (lit with green LEDs), next to "MIC MUTE" (lit with red LEDs).

Other combinations can be "STANDBY" next to "ON AIR," or "UNCLASSIFIED" next to "CLASSIFIED." Either side can be illuminated in green, white, red, blue or yellow. Titus can also make one-half of the fixture flash the LEDs to call attention to it. Custom lettering and station logos are available.

Other options are ceiling "T" grid top-mount, 12 or 24 VDC input, acrylic "plates" to cover single-gang electrical mounting boxes (in white or black) as well as powder-coating for the extruded aluminum frames.

For information, contact Titus Technological Laboratories in Connecticut at 1-860-633-5472 or visit www.tituslabs.com.

ARRAKIS PUTS THE ACCENT ON ACCENT

With the introduction of its Accent line of component studio furniture for radio, Arrakis Systems says it has redefined the standard for studio quality and beauty.

The company says that the metal structure is artfully integrated into the visible design decor of the cabinetry, creating a durable and attractive studio. Arrakis describes Accent furniture as a contemporary blend of brushed metals, pleasing colors and interesting textures. Cabinetry and electronic equipment complement each other to create a bold visual environment for talent, guests and clients, according to Arrakis.

Accent is available in standard models as well as custom configurations. The hybrid metal frame and structural panel design combined with Arrakis' CNC manufacturing systems tailors the product to fit the studio's size and shape. Colors and textures can be matched to décor.

Because of its origins in the console market, Arrakis is a pioneer in the metal post and wood panel construction found in most high-end radio studio furniture in use today. The internal metal structure improves manufacturing tolerances and makes high-quality modularity possible. It also allows for custom designs that meet the client's needs.

For information, contact Arrakis Systems in Colorado at 1-970-461-0730 or visit www.arrakis-systems.com.

ABOUT BUYER'S GUIDE

Radio World publishes User Reports on products in various equipment classes throughout the year to help potential buyers understand why colleagues chose the equipment they did. A User Report is an unpaid testimonial by a user who has already purchased the gear. A Radio World Product Evaluation, by contrast, is a freelance article by a paid reviewer who typically receives a demo loaner. Do you have a story to tell? Write to **brett.moss@futurenet.com.**

STUDIO

TECHNOLOGY

Studio Furniture

Voice: 610-925-2785

Email: sales@studiotechnology.com












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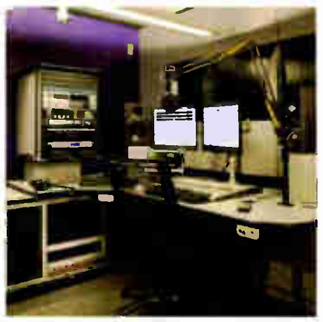
TECHUPDATES

FURNITURE FROM WHEATSTONE COMPLETES THE STUDIO



Wheatstone says it has studio furniture to fit just about any studio size.

Its QuickLine studio furniture has five modular components that can come together in 32 functional configurations. That flexibility lets customers modify furniture to meet changing requirements.

Its surfaces are made of durable, high-pressure laminate, both top and bottom so it can be flipped for left- or right-hand configurations. QuickLine furniture has racks below the counters, removable rear access doors and quick-disconnect hinges. Configurable for sit-down or stand-up operations, QuickLine is delivered knocked down to minimize shipping costs and has standard punch-block integration to make equipment installation a snap.

Also from Wheatstone is SmoothLine modular furniture that features sleekly styled surfaces similar to custom-level craftsmanship, but without the custom-made price tag. SmoothLine is moderately priced for any room size and features freeform countertops, modular casework based on standard equipment racks, concealed hinges and rounded edges, and extensive laminate and solid surface options for any studio style.

For information, contact Wheatstone in North Carolina at 1-252-638-7000 or visit www.wheatstone.com.

RAM BROADCAST SYSTEMS HAS FURNITURE AND MORE

RAM Broadcast Systems specializes in the design and integration of studios for radio major networks, group stations and news organizations. Fronted by Ron Mitchell, a veteran in the broadcast engineering field for over 45 years, RAM Broadcast Systems says it specializes in the full-service approach to meeting their customers' needs.

From small-market family-owned stations to major-market group-owned, RAM Broadcast Systems can fulfill any role of support for an engineering department. It can provide custom studio furniture, system design, integration, long-term planning or complete studios delivered to a facility ready to broadcast.

In a major-market station, there are a lot of unique challenges facing engineering to support major-market talent. In some cases, the latest and greatest in technology is not the answer, but revitalized "classic" gear is incorporated into a modern system. RAM Broadcast Systems says it can help with those integration plans.

Past and present clients include: WLUP "The Loop," Q101–Chicago, Journal Broadcast Group, Bliss Communications, SBC Radio, Citadel Broadcasting, Spanish Broadcasting System, CBS Radio and Emmis Communications.

Also available from the RAM Broadcast Systems family is the Studio Items line of studio signage and accessories and the Torpey Time family of studio clocks.

For information, contact RAM Systems in Illinois at 1-705-487-2915 or visit www.ram68.com.

HEIL SOUND PRESENTS THE PR77D

According to Heil Sound, the recently introduced PR77D, a large-diaphragm microphone, is designed to provide focused directionality, full-range response and a vintage appearance.

Its applications include use in podcast, broadcast, recording and live stage applications.

The PR77D features a classic side-address design based upon popular RCA microphones from the '50s and '60s. Its cardioid polar pattern delivers 40 dB of attenuation 180 off-axis, resulting in a tight pickup area and minimized bleed. The PR77D is an updated version of the PR77 from Heil Sound.

The Heil PR77D features a two-position switch allowing the selection of the best characteristics for voice or music. The voice position rolls the audio off at 120 Hz at –6 dB per octave while the music selection removes the filter and the entire audio spectrum of 60 Hz to 16 kHz is present.

Standard 5/8-inch– 27 microphone stand threads allow the PR77D to be mounted directly to booms or bases. The PR77D retails for $249.00 and is available from authorized Heil Sound dealers.

For information, contact Heil Sound in Illinois at 1-618-257-3000 or visit http://heilsound.com.

NEW DESKTOP AUDIO MONITORS FROM JBL

Created with an eye towards the needs of on-the-move content creators, JBL says, its One Series 104 monitors sport newly engineered JBL 4.5-inch coaxial drivers, 3/4-inch tweeter, reportedly contoured using the same research that led to the waveguide found in M2, 7-Series, and 3-Series monitors, providing users with a sizable sweet spot for the price point.

JBL 104 Reference monitors include integrated 60 W Class D amplification that, according to JBL, can drive the speakers to 104 dB SPL (peak) without distortion.

Features like a front-panel volume control allow level adjustments without straying from the sweet spot. A front-panel headphone jack automatically mutes the speakers, and dual 1/4-inch balanced and single 1/8-inch unbalanced TRS inputs can accommodate various sources. An optional, protective carrying case will also be available for production on the go.

For information, contact JBL Pro at 1-844-776-4899 or visit www.jblpro.com.

TECHUPDATES

STUDIO TECHNOLOGY: CUSTOM, NOT COOKIE CUTTER

Studio Technology designs, constructs, delivers and installs technical furniture for radio and television. It says it will provide true custom furniture that is price-competitive with modular furniture, rather than what it calls a cookie cutter solution that is customized.

It can also provide and warranty higher-end furniture using solid surface materials because they are certified fabricators.

The company says that its furniture can be found in broadcast facilities large and small countrywide because its goal is to develop a design that fits a station's budget and operational needs.

"We will work with your architect, systems integrator, and local staff and offer complete delivery and installation using our own employees," says President Vince Fiola.

For information, contact Studio Technology in Pennsylvania at 1-610-925-2795 or visit www.studiotechnology.com.

ACOUSTICS FIRST'S PLAN 9 FOR ACOUSTIC TREATMENT

Though it could be mistaken for a miniature science fiction movie special effects set, the Acoustics First Art Diffusor Model D is actually an organic quadratic diffuser. This diffuser improves sound clarity and ambience while increasing the overall perceived space of the room. The range of the Art Diffusor is extended over those of other designs by its unique organic curvature to further control specular reflections above 4 kHz.

The Model D can be mounted on a wall or a ceiling. It deflects the sound hemispherically, a result of the bicubic concentric rings, and the various quadratic well depths.

Made of Class A thermoplastic, the Art Diffusor Model D is over four inches at its deepest and is 23 5/8 x 23 5/8 inches.

For information, contact Acoustics First in Virginia at 888-765-2900 or visit www.acousticsfirst.com.

BROADCAST EQUIPMENT EXCHANGE

RADIOWORLD September 1, 2019

ANTENNAS/ TOWERS/CABLES

WANT TO SELL

CCA FM8000G Trans 107.9, great cond; 4-Bay Jampro antenna w/deicers; 3-bay Shively antenna FM. D Brockman, 606-965-3436.

AUDIO PROCESSING (INCLUDES ON-AIR)

WANT TO BUY

Teletronix LA-2A's, UREI LA-3A's & LA-4's, Fairchild 660's & 670's, any Pultec EQ's & any other old tube compressor/limiters, call after 3PM CST - 214 738-7873 or sixtiesradio@yahoo.com.

Wanted: real plate reverb. abgrun@gmail.com.

RADIOWORLD *Equipment Exchange*

MICROPHONES/ HEADPHONES/ SPEAKERS/AMPS

WANT TO SELL

1934 RCA 77A double ribbon microphone, originally used by Arthur Godfrey at WFBR Baltimore. 100% perfect condition. Contact Bill Cook, 719-684-6010.

WANT TO BUY

RCA 77-DX's & 44-BX's, any other RCA ribbon mics, on-air lights, call after 3PM CST, 214 738-7873 or sixtiesradio@yahoo.com.

MISCELLANEOUS

WANT TO SELL

UPGRADE consoles to international specs with world standard Weston 30B illuminated 4" vu meters. 4 in like-new condition. GramOphone@earthlink.net

I'm selling between 150 and 200 cassette tapes that consist of old-time radio shows, sports shows, some local New York radio talk shows, etc... Must take entire collection and the price is negotiable. Please call me for details and, my phone number is 925-284-5428.

Radio broadcasts of Major League Baseball, NFL, and some college football games that are on cassette tapes, approx 100 to 125 games, time period of entire collection os from the 1950's – 1970's, BO. Must purchase entire collection. Contact Ron, 925-284-5428 or ronwtamm@yahoo.com

WYBG 1050, Messina, NY, now off the air is selling: 250' tower w/building on 4 acres; 12' satellite dish on concrete base; prices drastically slashed or make offer. 315-287-1753 or 315-528-6040

CONSULTANTS

WANT TO BUY

Collector wants to buy: old vintage pro gears, compressor/limiter, microphone, mixing consoles, amplifiers, mic preamps, speakers, turntables, EQ working or not, working transformers (UTC Western Electric), Fairchild, Western Electric, Langevin, RCA, Gates, Urei, Altec, Pultec, Collins. Cash - pick up 773-339-9035 or ilg821@aol.com.

2" plastic "spot" reels 6.5 or 8" diameter, as used for quad video. Wayne, Audio Village, 760-320-0728 or audiovlg@gte.net.

Equipment Wanted: obsolete, or out of service broadcast and recording gear, amplifiers, processing, radio or mixing consoles, microphones, etc. Large lots preferred. Pickup or shipping can be discussed. 443-854-0725 or ajkivi@gmail.com.

I'm looking for KFRC radio special of Elvis Presley which aired on January 8, 1978. I'd be willing to pay for a digital copy. Ron, 925-284-5428.

I'm looking for the Ed Brady radio show in which he did a tribute to Duke Ellington, the station was KNBR, I'd be willing to pay for a digital copy. Ron, 925-284-5428.

MISCELLANEOUS

WANT TO BUY

I'm looking for KTIM, AM,FM radio shows from 1971-1988. The stations were located in San Rafael, Ca. Ron, 925-284-5428.

I'm looking for San Francisco radio recordings from the 1920's through the 1980's. For example newscast, talk shows, music shows, live band remotes, etc. Stations like KGO, KFRC, KSFO, KTAB, KDIA, KWBR, KSFX, KOBY, KCBS, KQW, KRE, KTIM, KYA, etc, I will pay for copies… Feel free to call me at 925-284-5428 or you can email me at ronwtamm@yahoo.com.

Looking for a broadcast excerpt of a SanFrancisco Giant's taped off of KSFO radio from 1959, interviews with Willie Mays, Dusty Rhodes & some play by play excerpts, also features a homerun by Willie Mays and Felipe Alou stealing second base, running time is 18:02, also looking for SF Giants games and/or highlights from 1958-1978 also taped off KSFO Radio. Ron, 925-284-5428 or ronwtamm@yahoo.com.

Looking for KFRC signoff radio broadcast from 1930 Andy Potter, running time is 0:22 & also the KLX kitchen the program guest is Susanne Caygill, a discussion of women's affairs with a long promotion for Caygill's appearance at a local store. Anne Truax, Susanne Caygill, running time is 13:44. Ron, 925-284-5428 or email ronwtamm@yahoo.com.

Looking for K5FX radio shows, Disco 104 FM, 1975-1978. R Tamm, 925-284-5428.

Looking for KTIM FM radio shows from 1981-1984 if possible unscoped. R Tamm, 925-284-5428 or ronwtamm@yahoo.com.

RECEIVERS/ TRANSCEIVERS

WANT TO SELL

Johnson Electronic SCA880 module, 67/92 Khz, 417-881-1846.

WANT TO BUY

AM Stereo radio. Call 417-881-1846.

RECORDING & PLAYBACK HARDWARE

WANT TO BUY

1960s-vintage MacKenzie Repeater machines, magazines, spare parts and manuals, complete or "parts" machines considered, James, 870-777-4653.

Schnader telescriptions 16 mm musical films produced in the early 50s. Bill Cook, 719-684-6010.

Large or small collections of 16" transcriptions or 12" transcriptions, not commercial LPs. Bill Cook, 719-684-6010.

Standard Short-tune series. Bill Cook, 719-684-6010.

(2) LPFM radio stations for sale, located in the NW part of central Florida on the gulf coast, covers the county, get out of the cold weather, come to Florida, call or write for particulars, 352-613-2289 or email boceey@hotmail.com or Bob, PO Box 1121, Crystal River, FL 34423.

RF CONNECTORS

WANT TO SELL

RF CONNECTORS & GADGETS – Parts, Products & More! www.W5SWL.com

TAX DEDUCTIBLE EQUIPMENT

Donate your broadcast facility; IRS approved 501(c)(3) nonprofit charitable organization. Fair market value. License (AM/FM/FV), land, building, tower, equipment, etc. The Augustus Foundation, Inc., 2902 Main Street, La Marque, Texas 77568. (409) 359-3435. Contact Dr. M. Augustus

SPACE IS AVAILABLE!

TRANSMITTERS/ EXCITERS/ TRANSLATORS

WANT TO SELL

BE-25T 25KW FM transmitter 2007 frequency agile tube transmitter in good working condition on 90.7 (all its life) when pulled from service. Approx. 6 mos. on rebuilt tube and a newly rebuilt fan motor, also spare optical modules, manuals and maintenance logbook. $17,500/OBO. As-is, where-is: Hayward, CA, Jeff Cotton, 530-279-6262 or info@kdup.org.

BE 35kW FM, and QEI 3.5kW FM. Make an offer on either or both. All working when removed. Steve Tuzeneu 704-973-0438 (9 a.m. to 4 p.m., Monday-Friday) or stuzeneu@bbnmedia.org

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Are you a small market station needing a good nuts & bolts engineer in the Los Angeles area? I will make your station shine! CET, fully FCC Licensed. Available for Full/Part-time/Contract work. Available immediately. Mitchell Rakoff, 909-446-6820, mitchellrakoff@yahoo.com.

SITUATIONS WANTED

Manager-engineer with multiple decades of experience in many areas, seeks full-time executive level position (G.M.) or higher with CCM, modern Inspo, or G-rated family-friendly secular format(s). Prefer warm climates. Send complete details to: radiogm@hotmail.com

The FCC Failed on Translator Interference

Engineering consultant says the system remains open to abuse and isn't fairly balanced

COMMENTARY

BY CHARLES M. ANDERSON

Charles M. Anderson

An FCC order that took effect in August provides for non-adjacent channel changes for FM translators that are experiencing interference issues caused or received.

This will be very helpful in smaller markets to resolve interference complaints and where excessive incoming interference seriously limits coverage. Unfortunately, there are no available frequencies in most medium and large markets.

On the other hand, the final rules provide protection from translator interference to existing facilities out to their 45 dBμ contour, an increase beyond their defined maximum class protected contours from 17.6 miles to 35.2 miles for a Class A, 40.4 miles to 53.6 miles for a Class B and 57.1 to 83.5 miles for a Class C.

When combined with the procedures whereby complaints may not be challenged, as few as six determined complainants at the edge of those contours (and only three for an LPFM) can cripple or kill a translator — a powerful weapon in the hands of overzealous stations seeking to protect the "owner's contour" or eliminate competition.

BIG RADIO SPOKE UP

In its original Notice of Proposed Rulemaking, the commission presented a very well reasoned and balanced proposal to limit interference complaints to the 54 dBμ contour, which appeared to recognize the changed role of FM translators in the modern broadcast radio landscape, where some 8,000 FM translators are operating or authorized, many serving to sustain local service of AM stations.

The commission stated in that proposal that its goal was to "provide translator licensees [with] additional investment clarity." The commission asserted that it was (emphasis added):

> *[c]larifying the process and balancing the interests of the various services involved ... we must not only balance the needs of translator, low-power FM and full-service licensees, but also [the technical integrity of the FM band]. We believe that the measures adopted herein strike a balance between managing FM band spectrum, providing greater certainty for translator operators, and preserving existing protections for full-service stations ... .*

However, like the cattle barons of the Old West defending grazing rights to the open range and opposing homesteads, Big Radio once again came forward in full turf protection mode, opposing the commission's proposal (just as they have opposed and stalled the FCC's very reasonable and rational proposed modification of AM daytime allocations, which were supported by some of the industry's most respected engineers).

They advocated an incredible 39 dBμ contour limit, citing interference concerns for audiences well beyond their protected contours with purported radio listening data. It is noteworthy that their audience data was based on "cume" (five minutes listening per week) and Zip code centroids for "panelists home addresses" (see Beasley Media Corp., et al, comments at footnote 13).

Such data is at best exaggerated and misleading given the size of Zip code areas, many extending across a 6 dB contour span, and the presumption that the home address represented the location of a significant portion of their listening. Since these data are from the larger PPM markets, it seems reasonable to expect that much of the five-minute "cume" listening is spent in transit to those markets at contours far greater than 45 dBμ.

The commission relied heavily on this data, and in doing so failed to achieve its stated goal of balancing the interests of translator audiences.

GAMING THE SYSTEM

To actually effectuate the balancing that the NPRM proclaimed was taking place between the interests of FM translator listeners and other station listeners, it would have been necessary for the commission to do a comprehensive engineering study of all authorized FM translators determining the impact of limiting their interference contours (25 dBμ co-channel and 39 dBμ first-adjacent channel) to the new 45 dBμ protected contours for FM stations.

Getty Images/Gearstd

"Big Radio once again came forward in full turf protection mode," the author writes, "opposing the commission's proposal."

That data could have informed a fair and balanced evaluation of the alternatives weighing the relative impacts on translators and FM stations, something the current FCC decision failed to do.

I studied the potential impact of the new rules on the Louisville, Ky., market. The 45 dBμ limit would put into jeopardy the continued, viable service from nine of the 10 currently authorized Louisville market FM translator stations.

If interference complaints were pursued under the FCC's strict, no-recourse procedures, six would be ordered to discontinue operations. Three would be forced to power levels ranging from 5 to 21 watts ERP. Only one would not be in jeopardy from a full-service station interference complaint (see my *ex parte* comments in docket 18-119). I have since evaluated a number of small- and medium-market translators with similar results.

Under the combined effects of the extreme 45 dBμ contour limit and the new non-recourse complaint procedures, some full-service stations will "game" the system to obtain complaints that once established are not subject to challenge.

Now, a full-service station or existing translator or LPFM wishing to eliminate an FM translator for any reason will be able to work backwards by first identifying the area in which there will be, as an engineering matter, predicted interference. Then the full-service station simply identifies listeners who, at least twice a month, drive or travel through that predicted interference area, and obtains from such listeners the required signed form.

If, after signing the form the listeners are instructed to say nothing more and accept no interference remediation, then under the FCC's new strict procedures, the only interference remediation possible where alternate frequencies are not available is a substantial facility impairment or cessation in operations for the besieged FM translator.

Allocated service areas have been clearly differentiated in the longstanding processes developing the FM allocations system. The dramatic extension of those service areas out to 45 dBμ is clearly inconsistent with the dictates of §307(b) of the Communications Act, which requires that the FCC "provide a fair, efficient and equitable distribution of radio service" to each of the states and communities. It could be argued that translators also represent an efficient use of the spectrum for communities using the unallocated, open grazing areas of the FM band.

The 45 dBμ contour is neither fair nor balanced. After all, authorized LPFMs only have to protect stations' 70 dBμ or in some cases the 60 dBμ contour, and are effectively immune from interference complaints. LPFMs may defend their 45 dBμ contour from translator interference but are themselves *de jure* exempt from the reverse.

The 45 dBμ limit is also at odds with the Local Community Radio Act, which requires equal treatment of translators

(continued on page 29)

Will 5G Be Part of Broadcasting's Future?

The technology is on its way and could become complementary to digital broadcasting — but is not a replacement for it

COMMENTARY

BY RUXANDRA OBREJA

The author is chairman of Digital Radio Mondiale.

What is 5G? Is it a bird or a plane or yet another good topic for myriads of conferences?

It seems to me, as a "laywoman," that 5G is an exciting new wireless communication project. It is an improvement on 4G that hopefully will revolutionize our lives by optimizing many of our daily activities, including providing access to fast internet and video.

Ruxandra Obreja

5G began as a technology for mobile network operators to deploy. In principle it should ensure faster speeds — great for video then — more volume of data transported with very little delay. Since 5G, when compared to 4G, allows for better, faster, cheaper and more reliable data distribution, it could also optimize other activities in addition to telecommunications. In fact, the new platform may have wide applications in the industry (e.g. to control and move equipment in a factory), as nowadays data transport is the currency of everyday life and logistics. Software will program 5G for a lot of applications, of which broadcasting will be just one slice.

5G started as a technology developed by mobile operators, but it is highly unlikely that the telecom companies will be able alone to roll it out as "a network for everything" at profit. So, there is already talk of private 5G networks and also of repurposing existing terrestrial broadcast networks or using satellites, or a combination of all these.

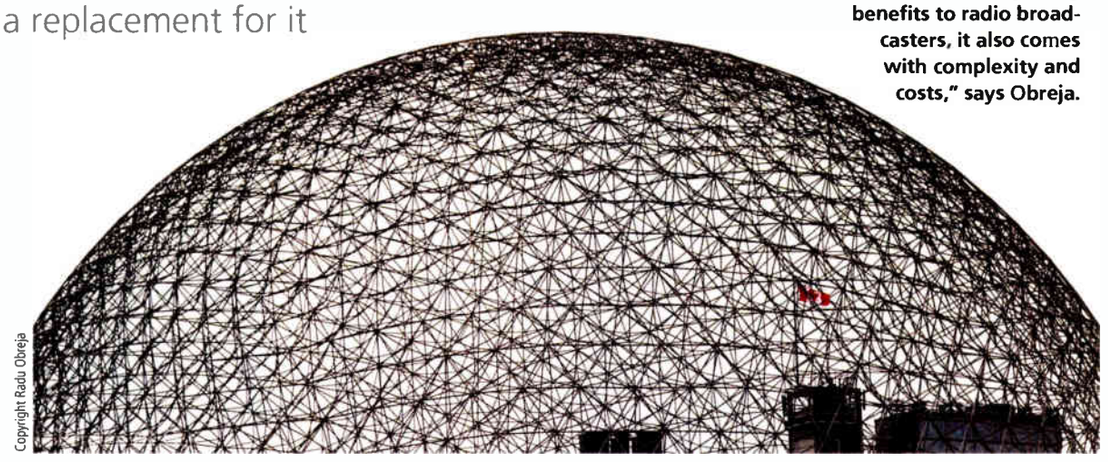
(continued from page 28)

and LPFMs. Since translators are clearly not intended to be "secondary" to LPFMs, it does not seem defensible to extend 45 dBµ protection to them or currently operating translators for that matter.

It all comes down to what is best overall for today's radio listeners. The FCC only considered a discrete, small number of radio listeners well outside the allocated coverage contours of existing stations in its decision. It wholly ignored FM translator radio listeners. Perhaps there was a compromise contour that was fair and balanced; 45 dBµ is neither, nor supportable as such as the commission lacked the data with which to make a reasoned decision. As shown with the Louisville example above, the new interference rules have the potential for dramatic and unintended consequences.

Charles M. "Chuck" Anderson is a broadcast engineering consultant with more than 35 years experience. He owns FM stations and FM translators.

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



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"While 5G may bring benefits to radio broadcasters, it also comes with complexity and costs," says Obreja.

ISSUES

It is clear that 5G is still a nebulous concept, which is being worked on technically at the moment, with standardization at an advanced stage. 5G has a big chance to become a truly global standard, widely accepted and thus delivering economies of scale.

But, alas, the technology will not be the answer to all our digital prayers. And there are many other "issues." For example, 5G is a very small-cell application, i.e. it works well and fast at short distances. So, it will require even more transmitters than FM, DAB+ or the RF-efficient DRM for the same coverage. More spectrum, even below 470 MHz or just as low as Band III, will have to be made available, if we want connectivity for a lot of devices simultaneously.

5G, at least in the beginning, will need a new and very dense (read: expensive) infrastructure. Recently, authorities halted a pilot project to provide high-speed 5G wireless internet in Brussels due to fear of radiation. Belgian Environment Minister, Celine Fremault, wrote in the Brussels Times that the people there "are not guinea pigs whose health I can sell at a profit."

In addition, the United Kingdom government recently announced that it has ditched part of its £35 million trial of 5G-based mobile and fixed line fiber technology on a rail route between Manchester and York in northern England. The reasons given were mainly complexity and costs.

Even if we will eventually overcome these hiccups, new receivers will have to be manufactured and sold. A solid business model will need to be defined, too.

5G will progress and offer new opportunities in both content creation and distribution. Some specialists estimate that 5G will become reality in 10 years. According to Darko Ratkay of the, EBU, it would be premature to consider 5G as a replacement of technologies and infrastructure in use (tech-I, *tech.ebu.ch*, March 2019).

Those who still hesitate to go the digital radio way, invoking the mirage of the 5G, are simply using it as an excuse for their lack of determination and courage. After all, 5G is still in its infancy; it will be great for internet and video but will not deliver the large coverage that digital DRM can do in AM, for example, or what DRM, DAB+ and HD can do for local coverage.

COMPLEMENTARY TECHNOLOGY

And we have not even touched the question of audio in cars. But neither can 5G and its potential be ignored, as the industry worldwide and the policy makers are behind it, considering it to be the future.

This year 5G broadcasting tests are taking place in Germany and the U.K. The BBC is pioneering *(https://www.bbc.co.uk/programmes/p075n41s)* live radio broadcasts over 5G mobile networks in the first public trial of its kind in the far away Scottish island of Orkney where 4G/5G mobiles will be used to deliver BBC content.

So, is digital terrestrial audio broadcasting at the moment just a stepping stone to the predicted benefits of 5G? The answer has to be an emphatic no.

Digital radio (DRM and other digital standards) can already distribute rich multimedia content to many, at low energy costs and with clear spectral efficiency.

Radio has been recently declared the most trustworthy medium in both Europe and the U.S. Duncan Stewart, director of research with Deloitte's Technology, Media and Telecommunications division, boldly predicts that 18- to 34-year-old Americans will spend more time listening to radio than watching TV by 2025.

And this might be happening already in the Nordic countries (except Norway) "as radio listening minutes for younger demographics was already higher than linear TV viewing minutes in Sweden and Finland, and was going to crossover in Denmark in 2019."

Radio is in a good place just now and in the words of Bob Pittman, CEO of iHeart Media, "is hot for the first time in decades." Radio does not need to be shy and apologetic in the new media landscape, or fear the advent of 5G. Conversation, discussion and discovery are central to this medium that is resilient and has shown how it can reinvent itself digitally.

If you are in a part of the world where 2G and 3G are the norm, where electricity might be sporadic and data plans unaffordable, you can be connected and linked through radio.

Broadcasters, regulators and the industry need to watch, experiment and develop 5G but, before anything else, digital radio has to be available everywhere in good quality and for free.

If you start experimenting and developing digital content and also renew your analog infrastructure by upgrading to digital with DRM, for example, you might be using the good place audio is in just now, while video is planning on the huge boost it will receive with 5G.

By becoming digital and putting your faith in radio, you might be even better prepared to benefit from 5G, too, once it is clearly defined and available.

Voice of America Begins Rohingya Language Programing

It is one of 22 VOA language services still broadcasting via SW and MW frequencies

COMMENTARY

BY AMANDA BENNETT

Amanda Bennett

Voice of America has launched its first radio program in Rohingya, the language of more than 800,000 refugees who fled Myanmar and are living in camps across the border in Bangladesh.

Many international organizations are working to provide the refugees with necessities such as food, clean water and shelter, but there is another critical need facing these refugees — the need for information. When I visited the largest camp in Cox's Bazar, Bangladesh, last year, many who had just recently been driven from their homes, wanted to know what was going on back in Myanmar. They wanted to know what the international community was thinking about them, or if they had been forgotten.

The life for these and other refugees and displaced persons is extremely difficult. They are basically stateless, homeless, with little opportunity for education or jobs, and few hopes for the future. They are very isolated and want to know what, if anything, is being done to try to resolve their crises.

VOA's new Rohingya program is called "Lifeline." It airs for 30 minutes, 5 days a week, on shortwave and medium-wave frequencies. The program focuses on the lives and needs of the refugees, providing them with valuable information about the situation in the camps — security issues, food rations, education and health. In addition, a daily segment of the program offers the refugees the opportunity to share their stories and try to connect with relatives in other camps.

VOA Director Amanda Bennett with two Rohingya broadcasters Mohammed Hussain (on her left) and Sami Ahmed (on right), Bangla Language Service Chief Roquia Haider and the Bangla language service group.

There is also a need to address rumors in the camps. Refugees are particularly vulnerable to human trafficking and recruitment by extremist groups. In Bangladesh, they also must deal with natural disasters such as flooding and landslides, especially during the rainy season.

We've already had feedback expressing great appreciation for programming in the Rohingya language, and for giving refugees a window to the outside world.

Why did VOA choose to use SW and MW? While there is Internet access in the refugee camp, and limited power supply for televisions or computers, the camp-based refugees, however, share a practice that has been common throughout VOA's history: They gather around shared radios and listen as a group, much as SW listeners did in years past.

Rohingya is now one of 22 VOA language services that still broadcast radio programming via SW and MW frequencies. Most of these are targeting audiences in Africa and South or East Asia.

VOA's distribution strategy has evolved over the years to meet changes on the ground in its markets. Where we can get placement on local television, radio, or online affiliates, we do. Where we can build our own FM towers, we do. And in areas where VOA content is aggressively blocked, such as China and Iran, we employ circumvention technology.

A growing proportion of VOA's audience is now accessing content via mobile devices and social media platforms. In fact, while still the smallest share overall, the digital audience is the fastest growing segment of VOA's audience over the past five years.

The weekly radio audience has also grown during that time frame, increasing 23 million to a total of 107.9 million. During that same period, VOA's television audience doubled to more than 174 million, accounting for the largest share of audience.

VOA will continue to adapt to changing market environments in an effort to provide truthful, fact-based news and information to those needing it most: those with little or no access to a free press and those who are inundated with misinformation and disinformation from state-run media or extremist groups.

The growing number of refugees and displaced persons are among those with the greatest need. With numbers now totaling a combined 70 million globally — more than the population of France — and with many children knowing no other life than that in a refugee camp, their needs will continue to grow.

One other way VOA is helping refugees is through its popular Learning English program — another one of our historic practices. Prior to launching the Rohingya language broadcasts, a VOA Learning English team traveled to the Rohingya refugee camps at the invitation of the United Nations High Commissioner for Refugees. The VOA instructors offered six days of intensive training on teaching techniques and methods for 100 selected English teachers. The teachers, in turn, will use the acquired knowledge and the VOA curriculum to train another 5,000 of their colleagues in the camps.

Amanda Bennett is director of Voice of America.

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