



RADIO WORLD

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FM Radio Waits for Repack Reimbursement Instructions

NAB dislikes "sliding scale" aspect of FCC's payment plan

BY RANDY J. STINE

WASHINGTON — A late push led by the National Association of Broadcasters could alter how the FCC distributes money to FM radio broadcasters for facility expenses incurred as a result of the TV spectrum repack in the United States.

As of early November, the FCC was still putting the finishing touches on the rulemaking (MB docket No. 18-214) for its payment plan for LPTV, TV translators and FM radio stations. Yet recent comments by NAB made it clear the group was not happy with the "sliding scale" of reimbursement proposed.

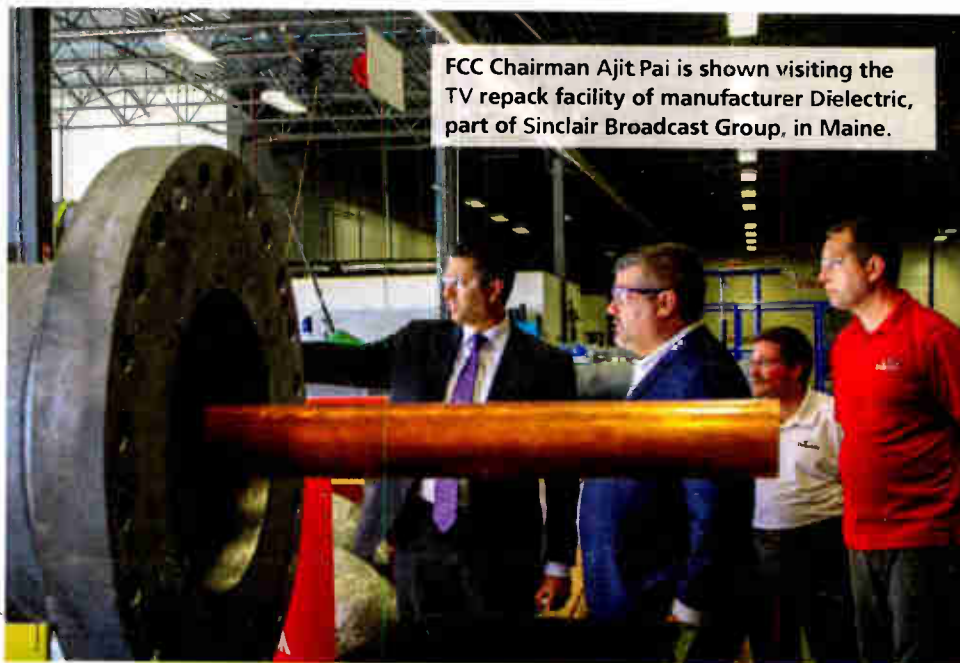
The money available is designated by the \$1 billion Reimbursement Expansion Act adopted by Congress in

March. Changes to the facilities of TV stations in the spectrum repack could affect collocated FM stations if, for example, an FM station antenna must be moved, temporarily or permanently, to accommodate the TV station's change or if an FM needs to power down or cease operating temporarily to permit a repacked TV broadcaster to modify its facilities. The commission estimates that up to about 500 full-service FM stations could be affected.

The initial phase of TV repack tower work is underway, so some FM radio stations are likely already being impacted, according to NAB, with "the first tranche of TV stations slated to complete their cut over by Nov. 30," according to an association official.

Under the three-tier "prioritized" proposal released in August, FM stations going off air for more than 30 days would receive reimbursement for 100 percent of their expenses to construct or modify existing aux facilities. However,

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FCC Chairman Ajit Pai is shown visiting the TV repack facility of manufacturer Dielectric, part of Sinclair Broadcast Group, in Maine.

Courtesy Dielectric

GM Surveys In-Car Radio Listening

Carmaker explores how connected car data might change measurement

BY JAMES CARELESS

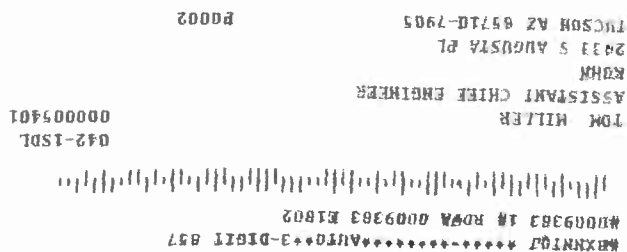
Want to accurately measure which radio stations drivers are listening to? Simply query their Wi-Fi enabled, connected in-car radio receivers on a minute-by-minute basis, and collect that data for later analysis.

There's no guesswork involved.

Today's connected car radios can record which stations the driver tuned to and for how long; and report this information to researchers via the car's internet-connected Wi-Fi system.

The resulting analyzed data would be a precise representation of who

(continued on page 12)



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SBE Puts Forth C-Band Alternative

Engineers say premise for the FCC's proposal for 5G in the mid-band is "patently false"

The leading organization of U.S. radio and TV engineers wants the Federal Communications Commission to rethink its ideas about using C-band frequencies in support of the 5G rollout.

The FCC earlier this year invited comment on future uses of the 3.7–4.2 GHz band while protecting incumbent C-band satellite earth stations from harmful interference. The Society of Broadcast Engineers responded, saying it wants to ensure that the public continues to receive radio and television programming distributed by C-band receive stations.

The following is excerpted from its filing in late October; the comments were signed by SBE President James Leifer and General Counsel Chris Inlay.

SBE supports compatible, flexible use of mid-band spectrum, which may include portions of the 3.7–4.2 GHz band, and is cognizant of the commission's dedication toward making adequate provision for 5G allocations. 5G implementation worldwide is proceeding at a rapid pace. There is value to the broadcasting industry in program production using 5G technology.

However, SBE takes the commission at its word that it "proposes [in this proceeding] to protect incumbent earth stations from harmful interference" as the commission increases the intensity of terrestrial use in the band. SBE asked the commission to extend the deadline for registering pre-existing C-band receive-



Fig. 1: C-band site registrations as of the end of October, shown in a map prepared by Sherrod Munday, vice president of engineering for the Sky Angel television network, using Google Earth and FCC data. A slightly earlier version was in the SBE filing.

The SBE offered a counterproposal to dividing the band, holding a reverse auction or other actions it says would not protect receive stations. It believes that, given the number of recent C-band registrations, the idea that the band could be shared with 5G as an overlay turns out to be wrong.

It noted that the European 5G proposal is at 3.4–3.8 GHz, which offers 1 MHz of overlap with the U.S. proposal. So SBE says the United States should adopt the European allocation, put commercial broadband providers in the 3.4–3.7 GHz band and use the small overlap segment with C band for local, private 5G networks that are important for future manufacturing and industrial applications.

"That is actually workable with C-band in the 100 MHz overlap segment," SBE wrote in a press release. "It leaves the vast majority of the spectrum, 3.8–4.2 GHz, intact with no 5G. In contrast to other proposals, nothing is lost for current C band users with the SBE plan. 5G moves into military radar spectrum, which was already designated years ago for broadband reallocation as part of the National Broadband Plan."

only Earth stations, and the commission has done so responsively and appropriately. The additional time available has resulted in a large volume of registrations which better illustrate the many thousands of C-band dishes operating in the 3.7–4.2 GHz band on a daily basis. (The programming distributed through these antennas is critical to the functioning of broadcast stations. It is expected by the public. It includes news, college and professional sporting events, music, and talk programming.)

FAULTY PREMISE

The following plot of registered downlinks [Fig. 1] ... reveals graphically the difficulty in any geographic sharing arrangement between incumbent FSS Earth station users and 5G commercial operators. The vast number of registrations that has occurred since the commission opened the filing window for registrations indicates that there are likely far more C-band receive-only Earth stations than were assumed to exist when the commission issued its Docket 17-183 in August of

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Voice-Controlled Hybrid Radio Demonstrated

PILOT and the EBU are partnering to co-fund development of a prototype

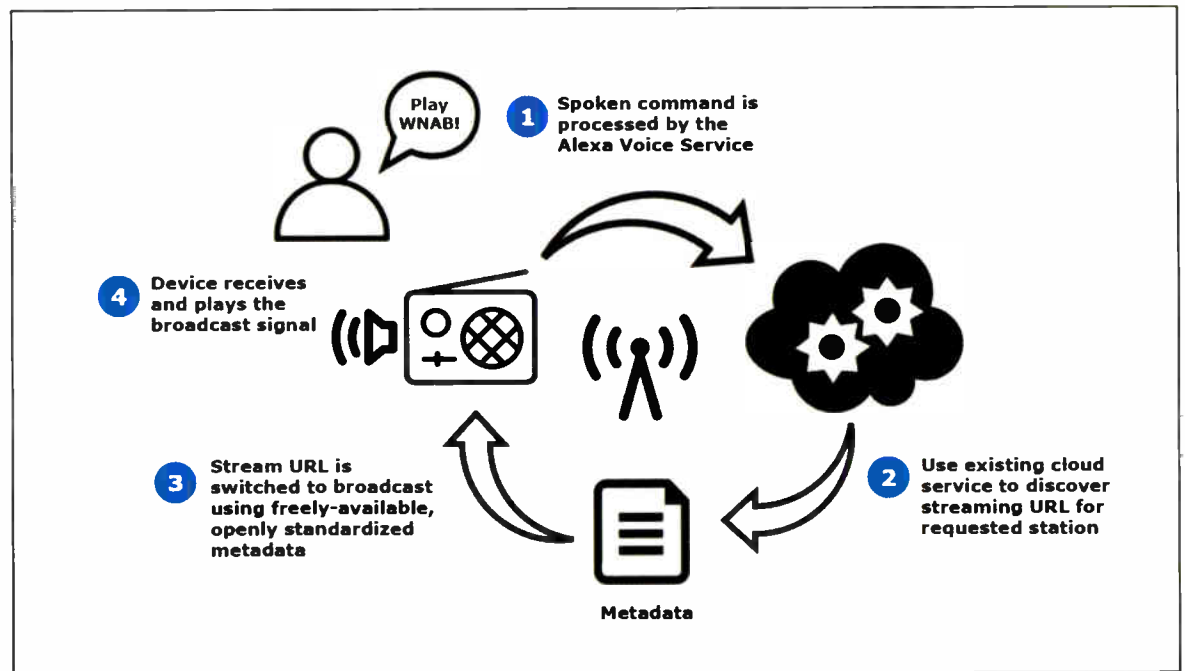
COMMENTARY

BY DAVID LAYER, VP, ADVANCED ENGINEERING, NAB and BEN POOR, PROJECT MANAGER, DIGITAL RADIO, EBU

Radio broadcasters worldwide have noticed the increasing use of smart speakers to listen to audio content, in particular terrestrial radio, where a recent Jacobs Media survey (October 2018) indicates that AM and FM radio are the third most listened-to category on smart speakers in the US.

Smart speakers offer a way for broadcasters to engage younger audiences with content that is traditionally carried by linear, over-the-air radio services. However, all smart speaker devices currently utilize streaming delivery and lack the ability to receive over-the-air content from broadcast services, thus losing the principal advantages of over-the-air delivery.

The EBU and the NAB recently collaborated on the development of a prototype device to enable over-the-air radio broadcasting with smart speakers.



COLLABORATION

This “voice-controlled radio,” unveiled at both IBC in Amsterdam and the Radio Show in Orlando, has shown that over-the-air reception can play a central role in the success of radio listening on smart speakers. This collaboration exemplifies radio as a global

platform and how broadcasters can work together to promote listener engagement on new platforms.

Amazon Alexa and Google Home devices have captured a large part of the smart speaker market and they rely on an active IP connection to stream radio

(continued on page 5)

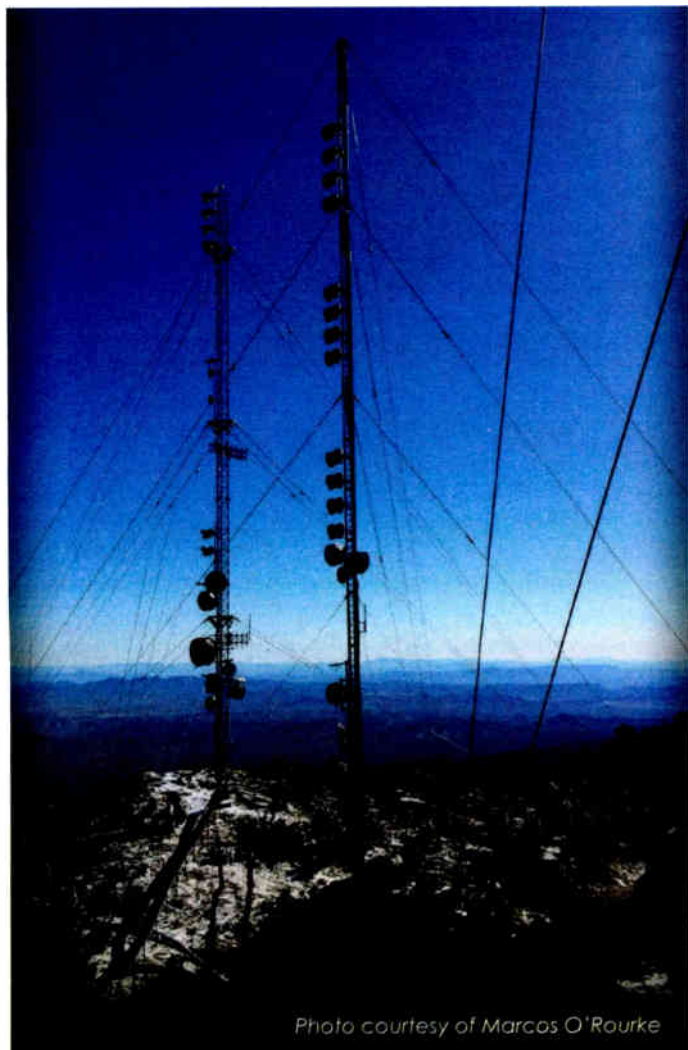


Photo courtesy of Marcos O'Rourke

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NEWS

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services. While broadcasters have benefited from this listening, the use case can be improved by enabling reception of the over-the-air signal.

Smart speaker ownership continues to grow around the world. Further, this voice assistant technology is expanding into areas outside of the home including into automobiles from most car manufacturers. Making radio easy to discover and receive via smart speakers and voice assistants is an important part of the future of broadcasting. This technology will be an important platform for engaging with younger audiences, and important for ensuring a bright future for terrestrial radio.

Digital or analog terrestrial broadcast is still the most effective way to deliver linear audio content to mass audiences as discussed in this EBU publication: https://tech.ebu.ch/publications/tr_2017_radio. This is true both in terms of pure economics and in terms of obligations of coverage. Hybrid radio,

This collaboration exemplifies radio as a global platform and how broadcasters can work together to promote listener engagement on new platforms.

combining over-the-air broadcast and an IP connection, blends the best of both, enabling reliable audio alongside additional content and features such as personalization. For broadcasters to reliably and consistently reach their audience, device support for over-the-air terrestrial reception remains key.

The voice-controlled radio prototype developed by NAB and EBU demonstrates how existing voice assistants such as Amazon Alexa and Google Assistant can be utilized to make smart decisions about the best way to listen to a radio station's content. The technology can apply the voice commands of a listener to determine whether to use over-the-air or streaming to tune the station based on broadcaster parameters (those sent

in FM, DAB+ and HD Radio broadcasts) along with available hardware in the device. Using voice recognition to access a broadcast signal for audio enables radio services to better scale onto these new platforms and enable a path to future innovative services.

HOW IT WORKS

When a user asks for a radio service by its name, the voice-controlled radio attempts to fetch the audio over an IP connection by obtaining its stream address, as its default behavior. To enable the use of over-the-air instead of IP, the device already knows about all of the available local broadcast services. By performing a hybrid radio lookup (using RadioDNS) the voice-controlled radio locates additional openly-standardized metadata from the broadcaster, including all the different ways to listen to their services. By linking the fetched stream address to available broadcast services, it is then able to activate its over-the-air broadcast hardware to receive the service, instead of needing to always open an IP connection.

The EBU's head of radio, Graham Dixon, welcomed the joint project, saying that "Voice-activated devices, smart speakers are entering our lives at a remarkable speed. Many people find them attractive and useful companions. This means a new opportunity for broadcasters and also new challenges. For this reason, I strongly welcome this collaborative initiative to explore the interface between voice and broadcast. It helps envisage new flexible ways of distribution, refreshing the radio experience with the latest technology."

NAB Executive Vice President and Chief Technology Officer Sam Matheny said: "Voice control and smart speakers are experiencing tremendous growth in popularity, and this prototype effort demonstrates how hybrid radio and OTA delivery can be a part of this evolution. We are delighted to partner with our friends at the EBU on this collaboration and we believe it can benefit broadcasters around the globe."

With success, PILOT and the EBU intend to release the proof of concept code on a royalty-free basis to manufacturers for use in production implementations of voice assistant devices and to further kickstart its deployment.

For more information, contact David Layer at NAB (dlayer@nab.org) or Ben Poor at EBU (poor@ebu.ch).

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SBE*(continued from page 3)*

2017 or when the commission released the instant Notice. [See Fig. 2.] *[SBE added in a footnote that as of late October it believed more than 16,000 C-band receive-only antenna registrations had been completed.]*

Thus, the identification of the 3.7–4.2 GHz band as a candidate band for 5G rollout in the United States may have been made due to a premise that has since been shown to be inaccurate: that the number of receive-only C-band Earth stations was manageably low and that geographic separation could be used as a means of accommodating the 5G/flexible use overlay in the band. Industry sources estimate that there are well in excess of the currently registered Earth stations.

Because the commission does not have the authority to waive statutory application fees, the aggregate fees that would be necessary for some broadcasters, especially radio broadcasters, and especially those broadcast stations located in hurricane-ravaged areas such as Puerto Rico and the Gulf Coast, are prohibitively high. Broadcast licensees simply cannot afford to pay them, and the Earth stations used daily by those licensees have been and will remain unregistered, and unknown to the commission.

It would be fundamentally unfair to cut off most of the broadcasters in Puerto Rico, as but one example, from their critical source of program material that their audiences have come to need and expect, especially during the prolonged hurricane recovery, merely because those local emergency conditions and the dire economic disaster that has resulted from it have precluded their dish registrations.

LITTLE ALTERNATIVE

Broadcasters have very little alternative to the use of their existing C-band antennas at broadcast studios.

If interference from a commercial wireless provider in the 3.7–4.2 GHz band occurs and the program feed is interrupted, the broadcast programming ceases. It is not possible in most cases for cost reasons to move a C-band dish to a new location away from a studio, and program delivery by other means,

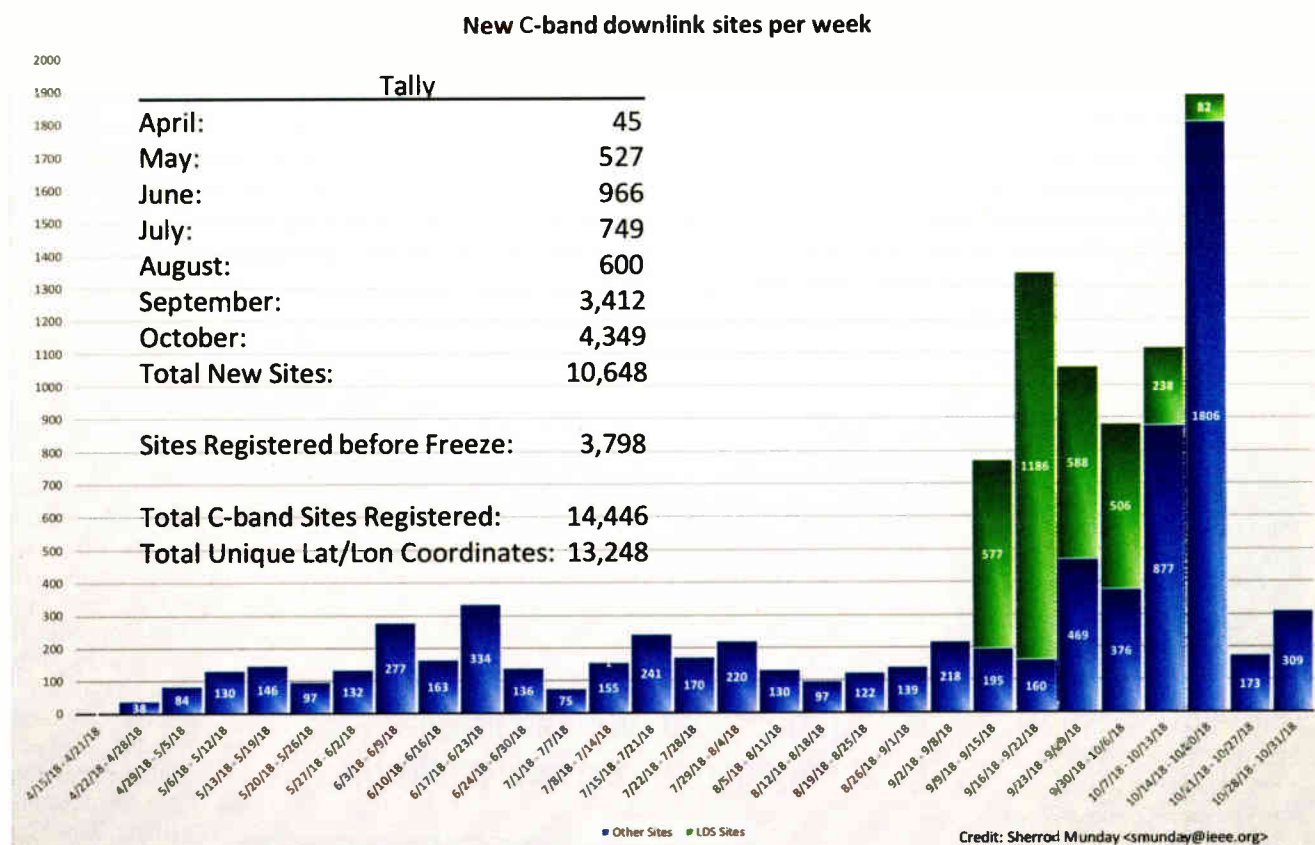


Fig. 2: This chart shows the trend in registrations of C-band downlink sites per week. It is an updated version of one provided in the filing. (In both images, Munday also highlighted registrations by the Church of Jesus Christ of Latter-day Saints stations, here in green.)

such as conversion to Ku-Band program reception is cost-prohibitive.

So, in order to accommodate compatible sharing, geographic separation or frequency separation are the two options principally available. Geographic sharing is difficult as between commercial 5G service providers which depend on seamless small-cell coverage of their service areas, and the need for ubiquitous deployment of 5G would tend to negate geographic separation as an interference avoidance mechanism.

LITTLE HARMONIZATION

It is notable that, as between the United States and Europe, there is very little harmonization among proposed mid-band 5G allocations. The European Commission has identified the band 3.4–3.8 GHz as a candidate band for 5G in Europe. The allocation status of this band is currently under intensive discussion in Europe. The commission's proposal to make the 3.7–4.2 GHz band available for flexible use in the United States would limit harmonization in the mid-band for 5G rollout as between Europe and the United States to only the 3.7–3.8 GHz band segment.

EURO MODEL

It is SBE's position that the commission is obligated to protect the public from the loss of broadcast programming that is delivered on an ongoing, continu-

“In contrast to other proposals, nothing is lost for current C-band users with the SBE plan.”

ous basis via C-band receive-only Earth stations, the downlink frequencies for which are in the 3.7–4.2 GHz band. Broadcasters, to be protected, require that full-band, full-arc protection be provided.

One way to accomplish this, and at the same time to achieve a necessary degree of international harmonization, is to consider as an alternative for mid-band 3G rollout the band considered in Europe, 3.4–3.8 GHz. This would create far fewer compatibility issues and obviate the need for reverse auctions and other options now under consideration to deal with what is obviously otherwise a fundamental incompatibility. It would also foster international harmonization that would expedite the 5G rollout.

If the European allocation of 3.4–3.8 GHz is implemented in the United States of the 3.7–4.2 GHz band, the

limited overlap between that and the C-band downlink frequencies is merely 3.7–3.8 GHz. That level of overlap could be accommodated easily and compatibly by permitting that segment to be used not by the 5G commercial broadband service providers for wide area coverage, but instead by manufacturing facilities which can implement local, private networks in that 100 MHz as part of the “Industry 4.0” or “fourth industrial revolution.”

(Industry 4.0, oversimply defined, is the digital transformation of industrial markets with smart manufacturing currently on the forefront. Also referred to as the “fourth industrial revolution” in discrete and process manufacturing, logistics and supply chain, 5G is envisioned as the key to near-term efficiency and automation in the chemical industry, energy, intelligent transportation, utilities, oil and gas, mining and metals and other segments, resources industries, healthcare, pharmaceuticals and even smart cities.)

FLEXIBLY DEPLOYED

5G is incorporated in short-term planning for flexible manufacturing in both the United States and Europe and the spectrum therefor can be harmonized within the band segment available in common: 3.7–3.8 GHz. The German Federal Network Agency

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World Radio History

SBE*(continued from page 6)*

(Bundesnetzagentur) has proposed that the band 3.4–3.7 GHz would be allocated and assigned by auction to traditional mobile broadband providers. The 3.7–3.8 GHz segment, however, would be flexibly deployed on local, limited-range licensed basis, and used locally by individual manufacturing and industrial entities. The local deployment by private sector manufacturing of local, private 5G networks would be a key component to the rollout of 5G in support of Industry 4.0 initiatives in manufacturing and industrial applications. As is the case with today's Wi-Fi hotspots, the manufacturing industry seeks to manage its own individual 5G networks without those networks being under the control of commercial mobile broadband service providers. There are several reasons for that, including liability issues and intellectual property protection and security.

PATH TO SUCCESS

It is understood that the commission has proposed in the notice to work

upward from 3.7 GHz toward 4.2 GHz in the deployment of 5G in this band. That plan is entirely consistent with the proposed availability of 3.7–3.8 GHz for licensed or unlicensed, private, local 5G industrial applications, leaving the remainder of the band 3.8–4.2 intact for FSS downlink antennas.

However, if the European planned allocation is implemented in the United States, the commercial providers could use the remainder of 3.4–3.7 GHz for commercial 5G wide area systems. The plan for flexible access of individual companies to the 3.7–3.8 GHz sub-band provides a path to success for numerous industry sectors engaged in industrial manufacturing, chemical and pharmaceutical manufacturing, energy generation, healthcare, smart transportation systems, and news and entertainment program production (especially relative to special events), among many other applications.

RETAINING PROTECTIONS

Authorizing 3.7–3.8 GHz local, private 5G networks is also consistent with the commission's stated inten-

tion to protect the many thousands of incumbent C-band downlink Earth stations in the 3.7–4.2 GHz band. Given the relatively low power levels needed for local, private 5G networks, the relatively short path distances involved; the likely geographic separation between industrial manufacturing facilities and broadcast studios (which could be ensured by either limited, local licensing or registration of 5G manufacturing facilities in the 3.7–3.8 GHz band); and especially taking into account the small portion of the overall 3.7–4.2 GHz C-band spectrum at issue, the local, private 5G networks would provide a compatible but partial overlay on spectrum heavily used for C-band satellite downlinks.

RELOCATION PROGRAM?

Should the commission, for some reason now unknown, be unable to adopt SBE's suggestion to convert 5G rollout in the mid-band to the 3.4–3.8 GHz band in lieu of the 3.7–4.2 GHz band, then the commercial mobile broadband service providers who would deploy 5G commercial networks

in the band segment 3.8–4.2 GHz in the United States should be in a position to, and should either pay all costs of relocation of incumbent C-band downlinks to another band in order to permit rollout in the 3.8–4.2 GHz band, or to accept whatever geographic separation requirements are ultimately deemed necessary to absolutely protect incumbents who register their existing receive-only Earth stations prior to the close of the C-band filing window, against interference from commercial 5G network overlays.

But the commission should provide protection for unregistered C-band dishes in locations such as Puerto Rico and the Virgin Islands, where hurricane recovery has necessarily superseded all other considerations. It would be unfair and discriminatory to penalize hurricane-ravaged areas by failing to protect unregistered C-band Earth Stations in those areas.

CONCLUSIONS

For all of the above reasons, SBE is of the view that:

- (1) protection of C-band services and ongoing full-arc protection of existing C-band facilities is critical;
- (2) the commission's premise for proposing the 3.7–4.2 GHz band for 5G rollout in the mid-band, that there is a presumptively low number of incumbent C-band downlink Earth stations has been shown to be patently false;
- (3) there is no cost-effective substitute for C-band Earth stations for broadcast program delivery;
- (4) there is compatibility between licensed (or unlicensed with registration, a process in which SBE could assist) private, local 5G manufacturing pursuant to Industry 4.0 concepts and C-band downlink facilities, properly managed and with appropriate coordination in the band segment 3.7–3.8 GHz; and
- (5) the commission should otherwise refocus on timely rollout of 5G mobile and fixed operation in the 3.4–3.8 GHz band, with the top 100 megahertz to be used only for local, private networks which can be sited and configured so as to not interfere with C-band receive-only Earth stations.

Therefore, the foregoing considered, the Society of Broadcast Engineers hereby respectfully requests that the commission make 5G technology available on a flexible, unlicensed basis as proposed hereinabove, and not otherwise.

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

NEWSWATCH**ROTELLA: NEW CONGRESS MEANS WE HAVE A LOT OF WORK TO DO**

Broadcasters must remain vigilant and guard against potential reintroductions of performance tax legislative and other threats to free OTA radio. So says Paul Rotella, the president/CEO of the New Jersey Broadcasters Association and a frequent presence on Capitol Hill for issues involving broadcast regulation.

He wrote a commentary highlighting policy issues coming out of the recent midterm elections.

"Broadcast association executives, and indeed all association executives, both national and local, have their work cut out for them this fall with the election and appointment of a record number of new representatives and congressional staff," he wrote.

"Make no mistake, with this new crop of freshman

congressmen and congresswomen, (along with a handful of new senators), it is imperative that we be ever-present on Capitol Hill to help educate and inform the hundreds of new congressional staffers, and perhaps more importantly, their hundreds of counterparts in House leadership and committee staff. And this important work can't begin too early as we advance our sacred mission of advocacy and education."

Rotella said the New Jersey Broadcasters Association would be "getting an early jump" on initiatives already being advanced including pirate radio legislation, the SANDY Act, enhanced FM signal emergency alerting technology and "the reinvigoration" of SECC authority by the FCC, reformulation of rules surrounding commercial radio ad disclaimers for car sales, streamlining of FCC procedures, and performance royalties.

Read Rotella's commentary at <https://tinyurl.com/y83cwmdy>.

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World Radio History

REPACK

(continued from page 1)

FM stations off-air between 11 to 30 days would receive reimbursement for only 75 percent. It drops to 50 percent for stations off air from one to 10 days.

“While NAB generally supports the commission’s proposals with respect to both FM radio and LPTV stations’ eligibility for reimbursement, the commission should not adopt a sliding scale for FM radio reimbursement based on the length of time a station will be off the air,” the NAB wrote. “This misguided proposal is wholly unnecessary, especially absent any indication that funding will be insufficient to reimburse all disrupted FM radio stations.

The NAB continued, “It is also unduly restrictive and appears to be based on erroneous assumptions concerning the impacts of relatively brief disruptions of service. Further, it would have significant unintended consequences that would disproportionately impact small and rural radio stations and their listeners.”

The association stated that the proposed graduated scale of reimbursement for FM stations would have devastating consequences, particularly for small FM broadcasters. One official described the proposed graduated reimbursement scale as “draconian and disconnected.”

Said a person familiar with NAB’s position: “Smaller stations just don’t generate the revenue to be able to absorb the costs if the FCC is going to say, ‘Hey, we are only going to reimburse you for 50 percent of your costs to construct backup facilities if you are disrupted for only a week.’ So that station might choose an option to spend less to cover a smaller part of their listening area and not incur the additional cost.”

The FCC is proposing that only FM stations licensed and on the air as of April 13, 2017, and using facilities affected by a repacked television station should be eligible to receive funding.

The commission also proposes that in order to qualify, an applicant FM station must maintain at least 80 percent of its coverage area or covered population via the interim facility, to provide reasonably minimal disruption of service for listeners.

Yet to be determined is whether FM translators will be eligible for reimbursement for expenses, according to those familiar with developments. The NAB supports the idea.

LPFM stations will be eligible for reimbursement funds. REC Networks, a LPFM advocacy group, said it was not aware of any LPFM stations being directly threatened with displacement by tower owners because of TV repack work “but can’t assume that LPFM stations will be immune from the impacts of the repack.”

Catalog of Potential Expenses and Estimated Costs for LPTV Stations, FM Stations and Translators

III. FM AND FM TRANSLATOR COSTS

A. TRANSMITTERS AND ANCILLARY COSTS

I. New Facility or Auxiliary and Interim Transmitters

There may be circumstances in which an FM station may need to construct an interim or auxiliary facility (in rare cases, a new main facility) in order to remain on the air during the TV repack, including stations on the same tower or nearby tower. Prices listed include notch and channel filtering as needed, but do not include installation, which can be found in Section III.A.2 below. Costs vary by manufacturer and power level, with additional pricing for hybrid models.

Air Cooled Solid State FM Transmitter (not including installation)	Range of Estimated Costs (in dollars)
10-100 Watts Analog	1,500 - 8,000
101-250 Watts Analog	3,215 - 8,850
300 - 500 Watts Analog	3,800 - 12,500
600-1000 Watts Analog	4,550 - 15,000
1.5 - 3 kW Analog	8,500 - 32,000
3.5 - 6 kW Analog	12,000 - 52,500
7 - 10 kW Analog	41,000 - 75,350
15 - 20 kW Analog	68,900 - 120,500
30 kW Analog	118,000 - 169,500
40 kW Analog	132,500 - 231,300
10-100 Watts Hybrid	7,000 - 17,000
101-250 Watts Hybrid	5,800 - 17,850
300 - 500 Watts Hybrid	3,850 - 21,500
600-1000 Watts Hybrid	7,000 - 24,000
1.5 - 3 kW Hybrid	9,200 - 40,990
3.5 - 6 kW Hybrid	19,200 - 61,500
7 - 10 kW Hybrid	52,900 - 83,500
15 - 20 kW Hybrid	78,900 - 129,500
30 kW Hybrid	128,000 - 178,500

This is a sample page from the “Catalog of Potential Expenses and Estimated Costs for Low Power Television Stations, FM Stations and FM and TV Translators.” Access it online at <https://tinyurl.com/rw-fcc-repack>.

WILL THEY RUN SHORT?

The first reimbursement checks will be written in 2019 with distribution of funds completed by 2023, according to the law enacted by Congress. It approved \$600 million for the reimbursement of LPTV, TV translators and FM radio stations in FY2018, with not more than \$50 million being used for radio. Another \$400 million was allotted for FY2019 but places no cap on how much could be used for FM stations.

NAB says the REA provides the FCC flexibility to determine how to allocate FY2019 funds. Yet observers told Radio World they are anxious to see if the FCC caps the FM radio allotment for FY2019.

“It’s possible the FCC could run short on dollars for FM radio. That is why it’s important the FCC adopts an approach that could streamline the process and minimize expenses,” said a person familiar with the proposed rulemaking.

The National Translator Association pitched a fast-track idea for TV translators that would streamline filing requirements for small entities and possibly cap reimbursement at a reasonable level. The group’s proposal, which limits repack expenses to \$31,000, would not require stations to submit preliminary proposals or estimates. The NAB is supportive of the NTA’s suggestion.

“I think the FCC could find a path to expand such an idea to LPFM or other small FM entities. I think conceptually that type of proposal would work,” said an NAB official familiar with the NTA proposal.

Potential expenses involved are esti-

mated in a 20-page “catalog” that the FCC released in October. It worked with broadcast equipment manufacturers and tower companies to establish a price range for these equipment and services.

The Reimbursement Expansion NPRM and Order proposes to reimburse FM stations for both “hard” expenses, such as new equipment and tower rigging, and “soft” expenses, such as legal and engineering services.

For example, the range of estimated costs for a 7 to 10 kW air-cooled solid-state FM transmitter is \$41,000 to \$75,350 (not including installation). A 7 to 10 kW liquid-cooled solid-state FM transmitter has an estimated cost of \$66,850 to \$139,850 (not including installation). Transmitter installation estimates vary widely from \$11,000 to \$130,000, according to the list.

The FCC’s catalog also includes a FM section with transmission line and antennas priced per bay plus other costs FM stations could incur.

“The LPTV/Translator/FM Cost Catalog also includes a category for ‘Other Expenses’ including FCC filing fees and point-to-point microwave systems, with corresponding cost ranges,” according to the FCC public notice of the catalog’s existence.

But the commission emphasized that the categories and costs “are intended to serve as a reference guide, and are not intended to identify the particular expenses” for which stations would be eligible for reimbursement. Read the document at <https://tinyurl.com/rw-fcc-repack>.

When contacted by Radio World for this story, the FCC said it does not comment on pending rulemaking.

CAREFUL RECORD-KEEPING

Lee Petro, special counsel at Pillsbury Winthrop Shaw Pittman in Washington, has been tracking developments and said some of his radio clients have already been affected by TV repack tower work. He advises FM broadcasters facing service disruption to keep track of expenses and keep a timeline of events.

“FM broadcasters will need to categorize the number of work hours for staff, attorney, engineering consultants and any items that would fall under reimbursable expenses,” Petro said. “There is no reason not to sit down and work your way through best- and worst-case scenarios no matter what phase of TV repack work will impact their operations. Be as proactive as possible.”

Petro said if previous experience with his clients is any indication, the reimbursement process will be a fairly detailed process.

“FM stations will need to submit an initial estimation of costs and then you can likely expect a series of questions back from the administrator managing the process,” Petro said. “I would expect there will be some form of graduated reimbursement scale regardless of the NAB’s complaints.”

NAB said in FCC filings that it envisions a reimbursement system that is “more than just submitting invoices and

(continued on page 12)

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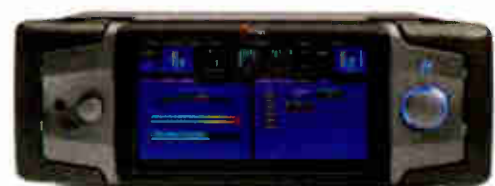
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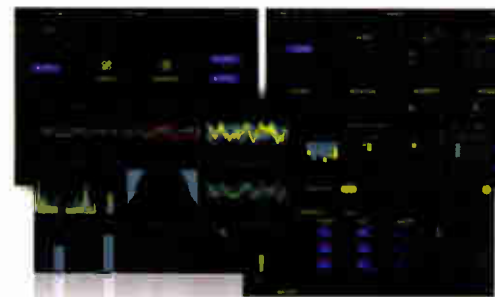
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MEASUREMENT

(continued from page 1)

was listening to what, within whatever geographic radio market a measurement agency is interested in. Theoretically, if the drivers being surveyed also volunteered their ages and other demographic information to the researchers, the results could provide broadcasters and advertisers with truly meaningful audience insights.

General Motors recently tested this approach (without asking for ages and other personal information) by conducting what it called a “proof of concept” in-car radio measurement study in Chicago and Los Angeles. Around 90,000 GM drivers agreed to have their in-car listening habits monitored between November 2017 and January 2018, so that the automaker could test the validity of in-car audience measurement.

The study’s results were subsequently presented by GM Director of Global Digital Transformation Saejin Park at the Association of National Advertisers’ 2018 Data & Measurement Conference. It was held in Orlando, Fla. in September.

“The focus of the presentation was to show how connected vehicle data can be used to help develop more robust ways to measure radio listenership,” said Jim Cain, GM’s senior manager of sales & executive communications. “Current ratings system that rely on diaries or Personal People Meters have many limitations, including small sample sizes. The idea here is that the millions of connected radios generate data that could allow for more radio markets to be measured very accurately.

“For example, one can measure which station was tuned in, when and how long the driver listened and at what volume,” Cain said. “You also could generate insights that would allow for more relevant/targeted content to be delivered through the medium.”

This last point is of particular interest to GM. The company wanted to see if there is a correlation between consumer listening habits and their buying preferences. For instance, which restaurants does a driver who listens to country music format stations prefer, and is there a difference between the places they eat and those chosen by rock station listeners?

If there is, could such data help advertisers better target their pitches

to the most receptive consumers? If so, GM could make money collecting audience data for radio stations, adding another revenue stream to its portfolio.

As for those who worry that GM violated the privacy of the 90,000-plus drivers who took part in the survey, by sharing the results of their listening behaviors?

“Customers who use connected services must first opt in by accepting our terms of use and privacy statement describing how we use connected vehicle data,” replied Cain. “For customers



The radio measurement proof of concept described in this story is part of a larger move by General Motors to explore nontraditional business opportunities in the connected car. Shown is GM’s Marketplace app, a free opt-in service that lets drivers buy products from companies that pay to participate.

answer is. But GM is really interested in finding out what the potential path could be.”

THE ROAD AHEAD

All of this, of course, could have implications for the existing radio ratings infrastructure; Nielsen surely is paying close attention. But GM professes to having no immediate plans to go any further with in-car radio audience measurement.

“Our proof of concept has generated interest in the advertising and broadcast communities,” said Cain. “But we don’t have any new projects to announce at this time. [And] if we were to license data, it would be for very specific use cases that would be thoroughly vetted by us.”

This said, GM has thrown down a gauntlet, by showing how useful in-car radio listening measurement could be as an audience detection and advertising refinement tool. What remains to be seen is whether or not someone picks up this gauntlet, and develops in-car listening measurement as a viable tool.

who opt in, the data is aggregated and anonymized and would represent the results over a very large sample size and would not include any personally identifiable information.”

WHAT GM LEARNED

According to an online news report prepared by WARC (www.warc.com), a global consultancy that sells advertising best practices advice, Saejin Park shared the following results with her Association of National Advertisers audience. (Radio World verified the accuracy of the report with GM prior to publication; Park herself was not made available for an interview. WARC shared its full subscription report with the Detroit Free Press, which also cited quotations from Park’s presentation, again verified with GM.)

According to Park, the brands and models that GM owners drive appear to be correlated with their listening preferences. For instance, someone who drives a Cadillac Escalade “might be more likely to listen to 101.5. But someone else ... driving a GMC Yukon — same-sized vehicle, but a different brand — would be more likely to listen to 101.1.”

“Even in this world of crude radio-station entertainment, different types of people listen to different stations in different kinds of vehicles,” she reportedly told the ANA audience. “And you can start testing [that] by sending them different kinds of advertising to see some kind of behavior in the [listening] patterns.”

Being able to correlate drivers’ buying preferences with their radio listening

choices could make it easier for advertisers to create more effective targeted commercials. For instance, GM noticed that one driver listened to a country and western station, and frequented a Tim Horton’s coffee shop regularly. Could another restaurant such as McDonald’s reach this listener by running coffee-targeted ads on the same radio station?

On a larger scale, GM could use this data to drive purchases through its in-car Marketplace, using the car’s LCD display to promote deals at participating GM advertisers such as Applebee’s, Dunkin’ Donuts and ExxonMobil. It could also sell this data directly to advertising agencies and third-party advertisers.

“We’re looking for ways to use these kinds of datasets,” said Park at the ANA conference. “It’s a complicated, complex problem, and I don’t know what the

REPACK

(continued from page 10)

probably will include cost estimates from vendors.”

Petro recommends radio stations do their best to limit expenses and therefore limit the hassles of seeking reimbursement.

Since TV repack construction will affect commercial and noncommercial FM operations, National Public Radio filed a comment that “encourages the FCC to maximize reimbursement so the stations can minimize service disruptions.” NPR also expressed

opposition to the FCC’s graduated reimbursement proposal.

NAB in its comments also asked the FCC to be sensitive to the implications of the TV repack on bystander stations that have nothing to do with the broadcast spectrum incentive auction. “The repack is not an Act of God. It’s the result of policy choices made by the commission.”

The Reimbursement Expansion Act adopted by Congress earlier this year set a March 23, 2019, deadline for the FCC to issue final rules for repack reimbursement. The FCC cannot disburse any funds until those final rules are released.



“We Are Stronger Together Than Apart”

BY EMILY M. REIGART

The expansion of voice-enabled devices is big news these days. On Dec. 11, the NAB's technology initiative Pilot will partner with the Local Media Association to put on an event in Washington called the Voice Summit to examine opportunities for media organizations to capitalize on the growth of these platforms. The summit will include case studies and discuss how media companies can use voice platforms to attract and retain audiences and grow revenue.

Readers may not be familiar with the Local Media Association. We contacted President Nancy Cawley Lane to learn more.

Radio World: Please explain what the Local Media Association is.

Nancy Cawley Lane: Local Media Association is an umbrella organization that brings together more than 2,500 newspapers, TV stations, radio stations, digital news sites and R&D partners for the purpose of collaborating, networking and learning. LMA is intensely focused on helping local media companies discover sustainable business models. We work in partnership with the other industry trade organizations that represent different portions of the local media ecosystem along with key partners, such as Google, Facebook and Amazon.

RW: Why should radio broadcasters be aware of your organization?

Lane: LMA is solely focused on future business models. Radio broadcasters are being disrupted like the rest of the local media ecosystem, so it's important to engage with an organization that is future-focused. By joining forces with LMA and other media, radio executives will be exposed to new ideas, research and best practices. We are stronger together than apart.

RW: How did LMA come to team up with the NAB to host the Voice Summit? What do you hope to achieve?

Lane: NAB is a valued partner; this will be the third event that we have hosted together (OTT Summit and Video Summit). Voice is a natural topic for us to tackle. There is a lot of experimentation going on with podcasts, smart speakers, search and more. Our goal is to figure out the monetization strategies and learn what is working. I'm especially excited for the local media case studies featuring executives from Hubbard Radio, E.W. Scripps Co. and The Washington Post.

RW: Can you give us a preview of the event by sharing an example of how radio broadcasters have taken advan-

tage of new voice platforms?

Lane: Radio broadcasters are doing great work with new voice platforms. NPR, iHeartRadio and Hubbard Radio are all ahead in this space. We'll hear about their success with podcasts, smart speakers, apps and more.

RW: Who should attend the summit?

Lane: This summit is perfect for anyone charged with growing voice initiatives at their company. For large media

companies, this could be the director of audio. For most, it will be the chief digital officer or VP of digital. Product directors will also find great value in attending this summit. We also have station GMs signed up for this event and sales managers. It really depends on the size of the company.



RW: Anything else readers should know?

Lane: We are about to embark on a new strategic plan at LMA. Our board and staff spent the last 14 months working on a strategy that would help local media companies go beyond discovering new business models to helping them vet, test and execute new business models. Soon we will be announcing the creation of a local media business model accelerator. We want and need radio broadcasters to be involved with this effort. Stay tuned for more details.

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A Simple Solution to Mounting Heavy Equipment

Also, here's a creative way to keep your caffeine flowing in a pinch

WORKBENCH

by John Bisset

Email Workbench tips to johnpbisset@gmail.com

Projects Engineer Edwin Bukont was mounting a couple of Asterisk computers (Fig. 1) for use with a new Telos phone hybrid. He came up with a great idea.

When you are forced to mount any heavy computer by yourself, holding and balancing the computer while you try to get rack screws started can be more than frustrating. Ed's solution was to invert a Middle Atlantic rack shelf and use it as a support for the heavy computers.

Fig. 2 shows a side view of the shelf support, and Fig. 3 is the rear view. The computer slides easily onto the shelf, where it can be secured with rack screws, if desired.

If rack shelves are not available, use a hacksaw to cut the heads off a couple of long rack screws (1 to 1-1/2 inches long). Using the edge of a file (or the hacksaw), cut a slot in the end where you just removed the screw head. This slot will permit a screwdriver to screw this bolt part way into a rack. Screw these bolts where the upper rack mounting screws would be located. Once the bolts are installed in the rack, slide the equipment in place. The protruding prongs of your modified bolts will serve to support the equipment, while you screw in the lower rack screws.

K.M. Richards writes that he's not much of an engineer (beyond keeping a few low-wattage Class A FMs on the air in the 1980s and a lot of studio audio work during the analog era), but he does keep up by reading Radio World, even when it takes him a few weeks to get to a specific issue.

He says he does this so that, when he consults stations on programming, he can have intelligent conversations with his clients' engineers. Well, K.M. says this knowledge keeps the engineers from thinking the programming

consultant is some kind of uninformed doofus who doesn't know or care what's happening at the station, technically.

One of K.M.'s traits that endears him to most engineers is his good organizational skills. K.M. read the May 23

Workbench column, which suggested taking a set of normal readings at the transmitter site. One can certainly record "normal" equipment readings in a book, but K.M. recommends using a label maker to put those readings somewhere

near the equipment itself. This enables you to refer to the parameters right on — or close to — the equipment. You don't have to remember where you put the paper logs or smartphone pictures.

If that's not practical for any reason, K.M. suggests adding a page to the binder, discussed in the May 23 column, showing the signal paths and listing every piece of equipment with its normal readings. Adding this on the page opposite your rack path diagram simplifies troubleshooting too.

Being prepared is good, writes K.M. Making sure the preparations are nearby so you don't have to panic to find and use them is even better.

Radio America's Alan Peterson writes that during demolition and construction of a new kitchen area at its headquarters in Arlington, Va., one of the essentials that vanished was the coffee-maker. It was one of those models that tapped the cold freshwater plumbing under the sink.

When the kitchen disappeared, so did the trickle of black gold that fueled the network's engineers. An old refillable Bunn-o-Matic was located and set up, but the filter basket was MIA. Rather than see his staff suffer without that mandatory cuppa morning mud, Chief Engineer Curt Flick came up with an inventive solution as shown in Fig. 4.

(continued on page 16)

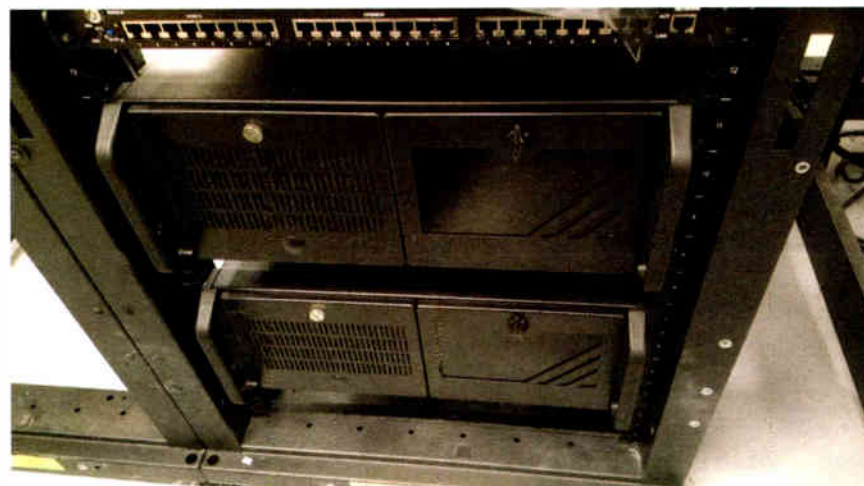


Fig. 1: Ed Bukont came up with a novel way to mount heavy computers like these Asterisks.



Fig. 2: A side view of the rack shelf Ed used.



Fig. 3 The rear of the computers and shelf.



Fig. 4: A plastic cover from a spindle stack of DVDs keeps the coffee flowing.

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Making Sense of Component-Level Troubleshooting

Dig inside those devices and figure out what's going on to save time and money

TECHTIPS

BY MARK PERSONS

It's important to learn and use component-level troubleshooting skills to diagnose and repair electronic problems, even in today's world.

The process involves digging into an electronic device, usually analog, to find and replace a failed component. Sometimes this means tuning and/or calibrating the equipment to manufacturer's specifications before returning it to service.

This has been a part of broadcast engineering since the beginning, when every piece of gear was hand-crafted. (I described that in a story in November titled "Yes, You Can Build Your Own.")

New transmitter designs make troubleshooting easier, with displays and lights indicating which module has failed. But that only goes so far. What if the front-panel push-buttons fail to work? Do you assume the button is bad and should be replaced? You might find a new button won't get the transmitter up and running again.

Imagine that — ordering and waiting for a replacement pushbutton switch to be delivered while a transmitter is off the air. That assumes a lot. Don't laugh — I've heard of it happening!

Test with a multimeter to see if normally open push-button switch contacts have voltage across them, which goes to zero when the button is depressed. You might even use a clip-lead jumper to see if the transmitter might be restarted without the switch ... assuming you can do it safely.

First, read the schematic diagram to

confirm the switch is normally open and determine what the expected voltage is across it. I know this sounds elementary to many broadcast engineers, but it illustrates how troubleshooting can be simple yet still solve a big problem.

Guessing is a bad troubleshooting technique. It's best to visualize what the circuit should be doing and determine likely reasons it is not performing as expected. Measure voltages to see what isn't working as designed.

My self-education started by reading

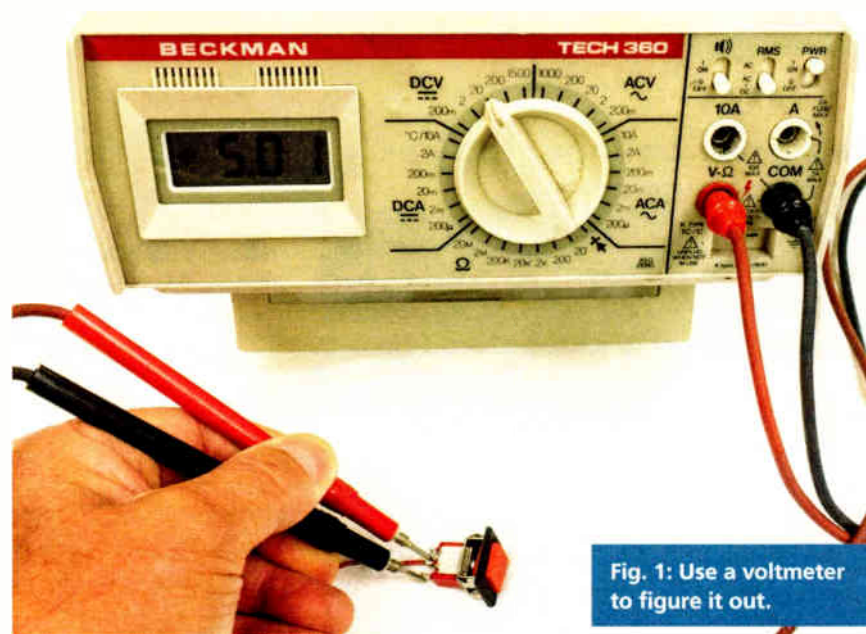


Fig. 1: Use a voltmeter to figure it out.

Photos by Mark Persons

books that showed simple circuits with switches and lights, much as you'd find in a home electrical system. Learning progressed from there, one step at a time.

One standard troubleshooting procedure is called "divide and conquer." You use that now when a station goes

off the air due to an STL failure. The equipment is in series, so it is relatively easy to diagnose where the audio stops. Analog audio consoles are similar in that the audio goes in and may stop along the way before it can come out. It's nothing difficult, just think it through.

Old-time engineers often built equipment to solve problems around their stations. An example is a microphone cough switch. It might be as simple as a box that intercepts a microphone cable with a normally open pushbutton switch to short the two wires of microphone audio when depressed.

It's not magic, just common sense.

FAILED COMPONENTS

Electronic components can look perfectly good on the outside and be bad on the inside.

Fig. 2 is a case in point. The part in the upper left of the photo is a carbon composition 2000 ohm resistor. It shows no sign of heating or cracking. I found this one in an FM exciter causing trouble. It measured in at about 20,000 ohms — some 10 times its rated value. The resistor below it is of a carbon film design, which made an excellent replacement. Carbon film resistors are much more reliable but have some inductance, which could be a problem in a very high frequency RF circuit.

The diode in the center of the photo came from a 1960s vintage Collins 5 kW AM transmitter. Its job was to steer DC logic to turn the transmitter on. The diode opened and disabled the start function. We normally think of diodes as failing shorted. Not in this case, it went open! Diodes are easy to check using the diode function on most multimeters. They should show about 0.6 volts drop in one direction and open in the other.

The transistor in the right side is a 2N2222A. I found this one going open in a Continental 802 series FM exciters. It is used in the RF mute circuit. Without it working properly, I couldn't get the exciter's RF to turn off.

It took component level troubleshooting to find all three of these. Learning and using that skill is still important in today's plug'n'play throw-away world.

(continued on page 18)

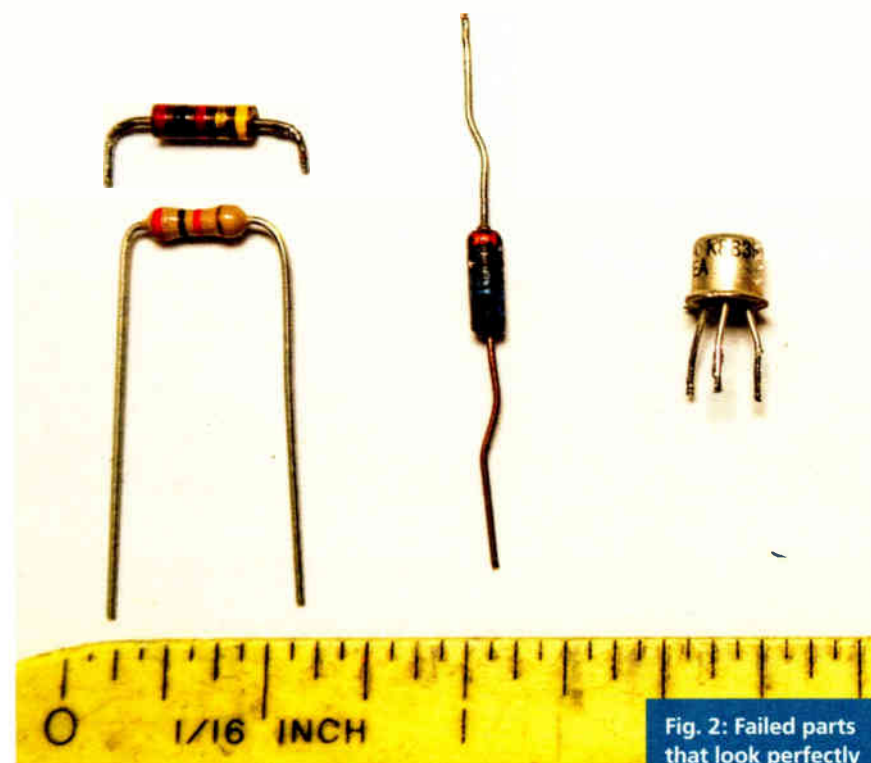


Fig. 2: Failed parts that look perfectly good on the outside.

WORKBENCH

(continued from page 14)

The plastic cover — stolen from a spindle stack of DVDs — had a drip hole drilled into it and went into service as the filter basket. A plain paper coffee filter was loaded and dropped into the basket, floating off the bottom by a pair of rack ears "borrowed" from a Cisco router. The whole assembly was fastened to the machine above the pot by a hank of wire, normally used to hang suspended ceiling grids. Once in place, it provided coffee for all.

While Alan says he can't exactly endorse the method to anyone in gen-

eral — plastic covers and Cisco router ears are not exactly "food-grade" and could prove hazardous — you have to admit, it's a pretty slick fixit!

Contribute to Workbench. You'll help fellow engineers and qualify for SBE recertification credit. Send Workbench tips and high-resolution photos to johnpbisset@gmail.com. Fax to (603) 472-4944.

Author John Bisset has spent 48 years in the broadcasting industry and is still learning. He handles western U.S. radio sales for the Telos Alliance. He is SBE certified and is a past recipient of the SBE's Educator of the Year Award.



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WHEATNET-IP INTELLIGENT NETWORK

Build Your Own. It's All in WheatNet-IP.

World Radio History

TROUBLESHOOTING

(continued from page 16)

What is the sense of trashing a \$5,000 FM exciter when a \$2 part might make it run again?

ELECTROLYTIC CAPACITORS

When you find one aluminum electrolytic capacitor has failed, the best approach is to replace *all* electrolytic capacitors in that unit. It's called the "shotgun" method. I've done that many times while servicing equipment on the bench. The reasoning is that other electrolytic capacitors, of the same age, will fail soon too. I wasn't going to send a piece of equipment back into the field and then have an unhappy customer complain of yet another failure.

Electrolytic capacitors are something like batteries. They are charged with energy and then they release it, as planned in a circuit design. A good example is capacitors in a power supply. If they are preceded by a full-wave rectifier system, the capacitors will charge and then discharge at a 120 Hz rate to keep the DC level constant. They do this while circuits in the equipment are drawing current from them. That is a hard job and they get tired after 10 years or so of continuous use. They lose their capacity to do the work and are often referred to as "dried out." In an analog piece of gear, the first symptom is usually hum or no bass in the audio. As I said, save time and trouble by replacing them all. You'll be glad you did.

Have spare capacitors on hand. In my business I stocked almost all values so they were available immediately when a piece of equipment came in for service. The downside is that the stock will go bad with time. It

must be rotated to make sure all capacitors are fresh.

The good side is that electrolytic capacitors are inexpensive. You might purchase a 470 mfd/50 VDC capacitor for just \$0.68 from Digi-Key or Mouser. I usually ordered at least 10 at a time.

Let me warn you that not all electrolytic capacitors are the same. They are rated for current handling, temperature and reliability. If you don't feel comfortable making buying decisions, let a more experienced technician do the work. Or order directly from the manufacturer of the equipment you are repairing. They will know exactly what is needed, and will charge accordingly. Usually you won't go wrong when replacing capacitors, but some circuits require capacitors that are heavy duty or have low ESR (Equivalent Series Resistance) found in tantalum or more exotic capacitors. You don't want to mix those.

You are safe when using a 50 volt capacitor in a lower voltage circuit where only say 25 volts will be across it. Don't do it the other way around. Capacitor voltage ratings should not be exceeded.

Fig. 3 shows 1-inch-long capacitors of the same electrical value. What is the difference — and isn't cheaper better? Well, the larger one, 0.866 inch diameter, is used in a power supply where it needs to work hard to take pulsating DC and turn it into steady DC. The smaller one, 0.492 inch diameter, might just stabilize a circuit with little or no voltage ripple.

Using the smaller one where the larger one belongs

Fig. 3: Two capacitors of the same value for different jobs.

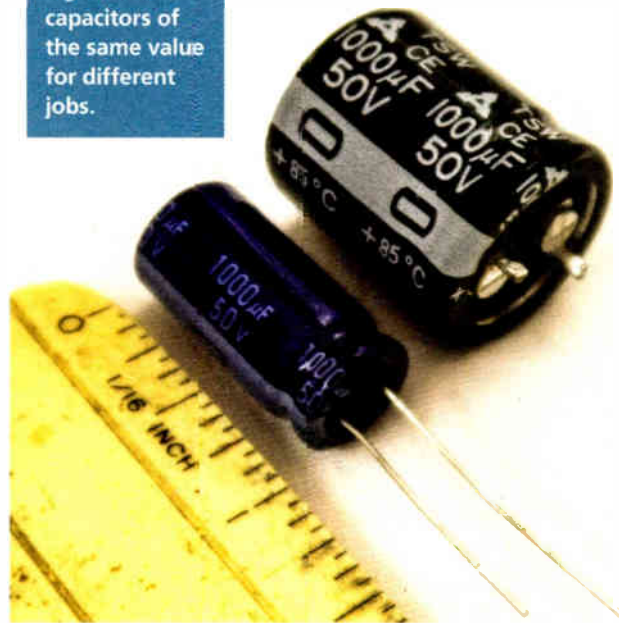


Photo by Mark Persons

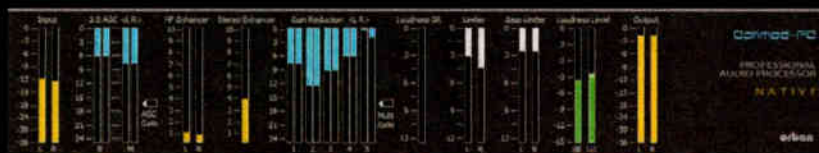
will likely work for only a while. You'll probably be back working on the equipment less than a year down the road. Not a good choice!

Think the job through to save yourself time and trouble. It makes perfect sense.

Comment on this or any article. Write to radioworld@futurenet.com.

Mark Persons, W0MH, is an SBE Certified Professional Broadcast Engineer. He recently retired after more than 40 years in business. His website is www.mwpersons.com.

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World Radio History

StreamGuys Makes Podcasts Dynamic

DNR recreates live broadcast flavor for podcasts

USERREPORT

BY DEREK HARTLEY AND
ROMAINE PATTERSON
Co-Owners
DNR Events

NEW YORK — DNR Events provides one-of-a-kind entertainment and travel experiences while fostering diversity and equality. Our mission is to offer a flexible platform for dynamic expression that engages, entertains and informs. The cornerstone of this endeavor is DNR 2.0, a live streaming digital channel and audio archive featuring “Derek and Romaine,” a two-hour daily broadcast that the two of us host.

We got started as a duo in satellite radio back in 2003 and after more than 12 years, our show ended its run there in the summer of 2015. We had an established following and an audience of commuters and truckers that depended on us for entertainment every day. We just needed to find a way to keep doing our show, our way.

We explored doing a podcast, but after so many years in the dynamic world of live radio, it didn't feel like a fit for us. Our audience expects to hear us every day on their way to or from work, and the off-the-cuff nature of our show and the ability to take live phone calls are really important to us. We met with lots of great people who are creating terrific content in the world of podcasts, but none of them had the technology or business structure to help us deliver the

kind of show we wanted to do. That's when we knew we needed to strike out on our own.

Our research led us to StreamGuys' content delivery and podcasting network and their cloud-based SGrecast live stream recording and repurposing platform. StreamGuys' technology fit the bill perfectly, letting us recreate the experience of our previous show as much as possible while giving us the flexibility to rebroadcast our shows 24/7 and do additional programming like standard podcasts.

Even small broadcasters who start streaming usually have broadcast engineers and audio professionals on staff, but we're a mom-and-pop shop — just the two of us, and most of our experience is just being hosts. Romaine had a recording engineering background, which was essential in building a world-class studio to broadcast from, but every aspect of streaming technology was brand new to us.

STREAMING

StreamGuys was perfect for us — their solution was turnkey enough that we were able to make it work for us really effectively, and StreamGuys' staff walked us through every step. We had no idea what we were doing and very little time to learn it, but they were very patient and kind with us. We know we aren't their biggest client, but from Day

One, they have always made us feel like our business is important to them.

Our show is streamed as a live broadcast each weekday. A Barix Exstreamer encoder sends our live audio to the StreamGuys network, where SGrecast also records it. As soon as the show is



Derek Hartley and Romaine Patterson

over, SGrecast rebroadcasts the recording in a loop until the next day's live broadcast. We also post the recording in our online archive and podcast feeds. Our listeners love the looping replay, as they can tune to the show any time they want.

We absolutely love the immediacy that SGrecast gives us. On satellite, our show was limited to our broadcast time slot and when it ended, another show would play. For our listeners who wanted to hear the show after our time slot ended, it took a while for the recording to become available within their app. Now, the second the show is over, it's

immediately available to listeners anytime, anywhere through streaming on a dedicated channel and more quickly as a download than was possible before.

As a recording engineer, Romaine really loves the quality of the sound. We often get listener feedback that the sound quality we provide now is as good or better than when we were on satellite radio. That's super-important to us, and a huge complement to how we've built our company and to StreamGuys' services.

We are integrating additional StreamGuys services as we grow and expand. We recently launched an Alexa Skill, and we're about to start using the blu Live cloud-based contribution service that StreamGuys offers in partnership with Digigram to allow ourselves and others to virtually host high-quality shows from outside our main studio.

StreamGuys' technology has also given us the flexibility to help other radio hosts recreate their shows on the Internet the way they want. Through our

DNR Studios brand, we offer additional programming ranging from live streams to on-demand podcasts and hybrid models like ours — helping others relaunch their shows the way we wish someone had been there for us. For hosts wanting to bring their broadcasts to podcasts or displaced radio professionals who want to continue to do radio their own way, StreamGuys' technology is the right way to go.

For information, contact Jonathan Speaker at StreamGuys in California at +1-707-667-9479 or visit www.streamguys.com.

TECHUPDATE

WHEATSTONE OFFERS PROCESSING FOR STREAMING

Wheatstone provides several options for processing the different types of deliverables these days. Its I/O Blade-3s that make up the WheatNet-IP audio network include multiband processors useful for processing web streams — or incoming audio from callers, remotes, codecs, satellite feeds and microphones. This is a routable processor built into the AoIP itself that has a 4-band parametric equalizer, three-way crossover, three compressors, three limiters, and final lookahead limiter.

Wheatstone also has a separate Blade unit, the Aura8IP-3 multimode, that can be added to the network for eight independent multiband stereo audio processors. Each processor includes

AGC, compression and limiting functions for web streaming and podcasting streams along with standard audio or HD Radio. Each processing chain consists of a four-band parametric equalizer followed by a crossover and three bands of compression. The compressors each feed their own limiters, whose outputs are then fed to a broadband lookahead limiter for tight peak control. The Aura8IP-3 has its own local I/O, with four stereo pairs of AES digital audio and four stereo pairs of analog line level audio in and out, and can function as a standalone processing engine. Because it's a Blade-3, it can also instantly configure itself as part of a new or existing WheatNet-IP audio network, making its processing power

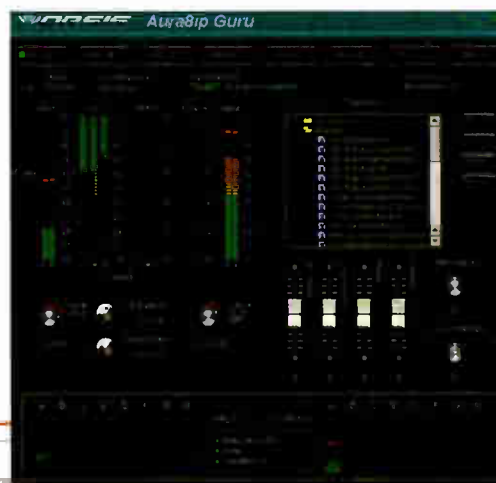
available throughout that network.

Like all Blade-3 access units, the Aura8IP-3 is AES67-compatible.

The Aura8IP-3 is configured and controlled over Ethernet using a laptop or desktop computer. Included with the unit is Wheatstone's "Guru" GUI software, which allows easy setup of the processing using familiar,

straightforward controls. Also available is a more sophisticated control interface called "GUI Pro," which provides access to every individual processing parameter for expert-level adjustments.

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



Streaming Radio, Podcasting, Online Content Delivery

TECHUPDATES



INOVOONICS 610 MONITORS THE INTERNET

The Inovonics 610 Internet Radio Monitor is a hardware solution providing uninterrupted monitoring for quality and performance of your online internet radio stream.

Unlike a consumer-grade "Internet radio," the 610 provides balanced analog and AES digital outputs, self-logging alarms that constantly check for audio loss, stream loss and Internet loss. A tuner decodes audio and displays live metadata for MP3, Ogg Vorbis and AAC formats.

The front panel displays left and right audio metering, local LED alarms and an OLED screen with jog wheel for advanced control and editing of tuning and monitoring parameters. Rear-panel alarm tallies provide local alarms, and online notifications alert personnel with email or text messages when any of the three alarms occurs.

The 610's web interface allows setup and control of the unit from your PC, tablet or smartphone, and reliable two-way connectivity is ensured with a built-in Dynamic DNS utility.

For information, contact Inovonics in California at 1-831-458-0552 or visit www.inovonicsbroadcast.com.

FUTURI ADDS LOGGER CAPABILITIES TO POST

Futuri Media's Post is a system for instantly converting broadcast content into podcast and on-demand content and distributing across multiple platforms. The company has announced the addition of logger capabilities to its feature set.

The company says that unique among podcasting and on-demand solutions, Post's patented technology can be fully integrated into a station's audio-chain and board. Using machine learning, Post automatically processes and parses audio from broadcast into segments that talent or producers can quickly bookmark using an in-studio touchscreen.



Then, team members can edit the audio if they so choose, add a fully-licensed image from Post's library (which drives audio consumption by using compelling visuals without expensive copyright violation fines), and push out to a station's website, socials, and other distribution.

Stations can also use Post to manage and distribute original, nonbroadcast audio, like long-form interviews and custom content.

With the addition of logger capabilities, Post users can now log in from anywhere to aircheck talent. Programmers and executives who oversee multiple stations, markets, and/or formats can access all their Post stations with a single login. A streamlined admin now makes pulling sales proof of performance assets easier.

For information, contact Futuri Media in Ohio at 1-877-221-7979 or visit <http://futurimedia.com/post>.

DJB HAS INTERNET RADIO FOR RADIO PROS



DJB Radio feels that most internet radio broadcasting software was created by computer geeks — and it shows.

The program can be tinkered with and everything can be adjusted. Buttons and lights and extra widgets are everywhere.

But radio pros know that's all a distraction. Most radio stations have two buttons the announcers use while they are live: The one that turns on the mic, and the one that starts the next song. After the break, the software needs to help you get the next song or commercial ready. Everything else just gets in the way.

The DJB's Button Box system is designed to be different — to be radio-friendly. It may look simple, but there's a lot of power inside. Like an advanced library database that's all drag and drop. Built in auto scheduling if you want. An autoplay system that can segue between cuts automatically so users can start it and walk away.

And it's touchscreen ready. Use your mouse, map your keyboard for keyboard start/stop or simply use a finger!

The Button Box Cart Player is designed for live assist, giving users instant access to the audio library. It's a great internet radio software starter system. Button Broadcaster Pro is the full-featured package for the internet broadcaster. It has a program scheduler, waveform editor and now voice-tracking has been added. Add a USB mic and go to work.

For information, contact DJB Radio in Nevada at 1-702-487-3336 or visit <https://djbradio.com>.

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Streaming Radio, Podcasting, Online Content Delivery

KNMJ Simply Streams With StreamS

Newly acquired college station gets an online stream with StreamS 3111



USERREPORT

BY DAVID STEWART

Moving Target Consulting Works

HOBBS, NEW MEXICO — New Mexico Junior College is a community college in Hobbs, N.M. It is heavily involved in career paths and continuing education. While NMJC had programs in media preparation and publishing, it did not have a broadcast segment. A change in ownership of a crosstown broadcast group put them one station over the ownership limit, so they donated their Class C2 100.9 MHz FM signal to the school. This made them operators of 50,000 watt KNMJ but they had little familiarity with broadcasting — that's where I came in as a facility designer, contractor and coach for the young staff.

HITS

Format is hit songs from the '80s, '90s and 2000s plus locally produced talk and interview programs and signature coverage of NMJC Thunderbirds basketball. KNMJ serves a lot of rural New Mexico and west Texas. Mobile coverage is spotty in many of the square miles, sometimes even on the highways through the area. Staff, students and officials live throughout a vast area, sometime on large ranches or farms. We needed something that would hold together with iffy bitstreams.

Processing needed to handle a wide

range of styles of music (dawn of compact discs to the age of downloads) and our talk shows and play by play games. We wanted low bitrates to make the most of our listeners' data connections, yet good sound at low bitrates.

I have used HTML5 Live Streams elsewhere and feel it is the best way to deliver a stream over challenging networks. AAC+ is a remarkably good sounding codec down to the 48K rate we use. We saw John Schaab and Greg Ogonowski at the Texas Association of

Broadcasters trade show. They talked to us about their family of processors/encoders/streaming servers. They also had experience in streaming using internet "cloud" services like Microsoft Azure, Amazon AWS, etc.

CONNECTIONS

KNMJ equipment studio equipment includes BSI Simian automation, Axia and Livewire drivers and hardware console, Comrex Bric-Link and Access codecs. We feed the StreamS 3111 using

an AES output of the Axia console and send our stream out to a simple Amazon AWS-3 account. It worked without burdening our IT department. We have not yet been able to overload the system, and it is cheap, cheap, cheap.

It works in places where cell calls are not stable.

Two examples: one hour drive from Lamesa, Texas, to Midland, Texas, has no drops at all. The 75 minute Lamesa to Hobbs run has a pair of two minute outages on Hwy 180 between Lamesa and Seminole. This contrasts with 10- or 15-minute gaps in good cell coverage.

Our 3111 is an integrated processor, encoder and HLS streaming server. It uses the Orban PCn1600 processor with Greg presets. I never thought a software-based processor was the way to be Nth degree but experience with this unit makes me rethink that. The same size unit could handle up to four stations. Our device includes digital I/O, a processor, encoder and stream server in an industrial one rack unit computer. It runs Windows, with most of the auto update routines disabled or otherwise managed. An analytics routine is in the works and expected from StreamS soon.

For information, contact **John Schaab at StreamS in Texas at 1-940-206-7702 or visit www.streamindex.com.**

TECHUPDATE

OMNIA AUDIO AND TELOS Z/IPSTREAM PROCESSING FOR SMART SPEAKERS

The Telos Alliance says that 43 million Americans own at least one smart speaker, and first adopters of smart speakers say these devices are now their primary way of listening to audio. Therefore there should be no doubt that radio broadcasters need to be available on these devices — and they need to sound good. For streaming, audio needs to be processed to best suit the transmission medium so it needs as much consideration as the on-air sound.

"As broadcasters, we're accustomed to a maxed-out sound. Streaming audio doesn't have to be that way. Give the audio 'lift' and low-level support, plus some multiband energy, but don't lay into the look-ahead limiters. Just let them hit the loudest peaks. If you're into the limiters all the time you'll produce a fatiguing long-term sound. We'd like for people to listen all day!" says Cornelius Gould, chief algorithm developer at Omnia Audio.

Streaming features are built-in to Omnia processors — such as input conditioning and "Undo" on the Omnia.7 and Omnia.9 — and the Perfect Declipper available in the Omnia.11 processor. All Omnia processors use intelligent look-ahead limiting for HD Radio and stream processing for loudness without any audio clipping. The new Omnia VOLT with HD Studio Pro software is another choice for a dedicated streaming audio processor. Three-band Omnia processing in the Z/IPStream encoders is also useful for both music and voice on your streams.

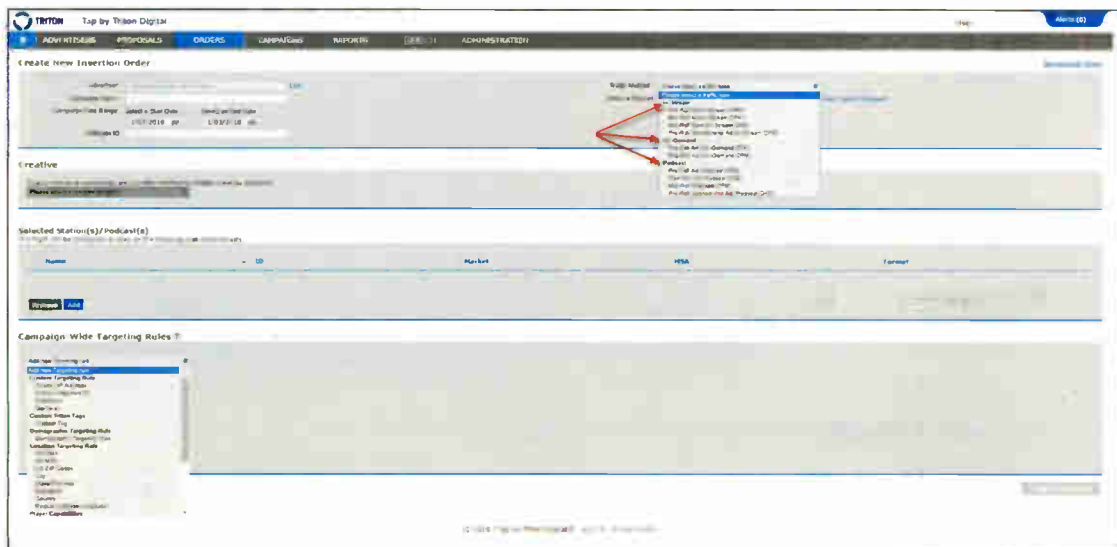
"If your stream isn't sounding better than your over-the-air transmission, you're doing something wrong. Try processing a bit less, but use the great tools that Omnia processors provide. Condition and clean up the audio providing long-term consistency and loudness while giving a very dynamic feel to the audio moment by moment," says Leif Claesson, audio processing designer at Omnia.

For information, contact The Telos Alliance in Ohio 1-216-241-7225 or visit www.telosalliance.com.



Streaming Radio, Podcasting, Online Content Delivery

TECHUPDATE



TRITON DIGITAL TAPS INTO ONLINE AUDIO ADS

Developed in 2014 by Triton Digital, the Triton Advertising Platform (Tap) enables radio broadcasters, podcasters, and online music services around the world to monetize their online audio content through the dynamic, server-side insertion of intelligently targeted advertisements into both live and pre-recorded audio streams and podcasts.

Ads can be targeted to each listener in real-time, ensuring a relevant and engaging experience for listeners and an optimized revenue opportunity for advertisers. The Tap advertising server can insert or replace content as preroll, mid-roll and post-roll audio ads, each of which can be targeted based on a listener's location, gender, age, behavior propensities and more to maintain a high quality and relevant listening experience.

The company says that a key benefit of dynamic, server-side ad insertion is the ability to expose listeners to advertisements on a wide range of players, including those owned and operated by audio publishers, aggregators, embedded players, and even smart speakers.

It adds that there are a number of reasons why audio publishers around the world are leveraging Tap to dynamically replace ads. First, replacing ads creates a supplemental revenue opportunity, providing new inventory for publishers to sell, either on its own or as a value-add to over-the-air advertising packages, such as synchronizing a banner to a spot. Second, in addition to paid ads, ad servers like Tap can be used to schedule filler, sweeper, promos, and music to avoid dead air and reduce ad load. In addition, dynamic ad insertion makes it possible to replace from a single spot to all spots. Spots can also be replaced outside of a radio geography or country only, providing an opportunity to earn revenue from international listenership.

For information, contact Triton Digital at Solutions@TritonDigital.com or visit www.tritondigital.com.

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BUYER'S GUIDE

Streaming Radio, Podcasting, Online Content Delivery

Comrex BRIC-Link II Provides Streaming Control

Codec handles multiple applications

USERREPORT

BY NICK STRAKA
Independent Engineer
NS Engineering

NEW YORK — I'm an engineer that has been working in the field for over 23 years. For nine years, I've been running my own engineering company, NS Engineering. I work with clients of all sizes. Everything from large Class B New York stations, to little LPFMs situated almost 150 miles out of the city — I find solutions for them all.

As of right now, I have more than 70 Comrex units in the field, employed as everything from STLs to remote ENG. BRIC-Link II codecs make up a big portion of that number. I find that they make for a budget-friendly reliable STL for stations of all sizes.

WQPH is a Catholic radio station

serving the area of Fitchburg, Mass. It's a 3,000 watt nonprofit station with a limited budget. They wanted to create an avenue to stream their station online. From my experience with BRIC-Link II, I know it's very easy to configure it as a streaming server. It didn't take me

BRIC-Link II has saved me many trips to transmitter sites and makes it easier to find problems before they become big issues.

long to set-up, and they've been using it with no issue for several years now.

I also use BRIC-Link II as a private streaming server for confidence monitoring. For customers who already own BRIC-Link IIs, it's easy for me to

configure it such that station staff and myself can listen to a private stream and determine whether everything is working correctly. It's saved me many trips to transmitter sites, and it makes it much easier to find problems before

they become big issues.

I believe the ideal user for BRIC-Link II as a streaming server would be someone who wanted to have complete control over their stream, and just wanted a simple, easy-to-use box that you plug in and use. There are many inexpensive streaming services, but BRIC-Link II just works. I know that once I install a BRIC-Link II, it'll sit there and run for the foreseeable future, and I won't have to worry about it.

For information, contact Chris Crump at Comrex in Massachusetts at 1-978-784-1776 or visit www.comrex.com.



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Virtualization Technology Matures

Will it revolutionize the broadcast facility or is it a solution in search of a problem?

BY DOUG IRWIN

This is the first part in a series.

Virtualization is an important, well-known and mature technology in the IT realm. By virtualization, I mean the creation of a virtual — rather than physical — version of a server, storage device or network resources. Operating systems can be virtualized as well.

“Operating system virtualization is the use of software to allow a piece of hardware to run multiple operating system images at the same time,” according to WhatIs.

A common use of virtualization is for servers. A software layer called a Hypervisor is used to emulate the underlying hardware — including CPU memory, I/O functions and network traffic. An operating system, which normally interacts with hardware, now interacts with a Hypervisor instead.

“The main goal of virtualization is to manage workloads by radically transforming traditional computing to make it more scalable,” according to Techopedia. “However, deploying virtualization technology requires careful planning and skilled technical experts. Since the virtual machines use the same resources

to run, it may lead to slow performance.”

There are four types of virtualization that are germane to broadcast applications: server virtualization, as noted; storage virtualization; desktop virtualization; and application virtualization.

One in a series of articles exploring the concept of virtualization in the radio broadcast context.

Storage virtualization is the combining of physical storage from multiple network devices in to what looks like a single storage device. This is common in storage area networks.

Desktop virtualization is straightforward. A user sits down to a monitor, mouse and keyboard, but the host computer that used to sit on top or under the desk is now virtualized. Communications from that desk back to the virtual server

is done via a thin client (which is a terminal or a network workstation with a few resident programs that accesses most programs residing on a connected server).

Application virtualization refers to the running an application on a thin client. “The thin client runs in an environment separate from, sometimes referred to as being encapsulated from, the operating system where the application is located,” according to Techopedia.

VIRTUAL AUDIO SYSTEMS

I spoke with several industry people who have extensive virtualization experience during my research for these articles. I’ll start here by sharing my discussion with Mike Dosch, senior product manager, Radio OnAir, Lawo.

“Virtualization could mean making software versions of products, i.e., the compass app on your phone replaces the thing with the magnetic needle you used to play with in the Boy Scouts — or it could mean the use of virtual machines and Hypervisors within an IT context,” said Dosch. “The compass app can run on a virtual machine, the physical compass cannot. We refer to the process of things becoming apps as ‘dematerialization,’ and it is an essential first step before we can talk about more exotic abstractions.”

Dosch asks us to consider audio processing.

“We still use boxes to perform this



Mike Dosch

function and there is no benefit to virtualization in the case of a hardware processor,” he said. “It is a purpose-built device running in a proprietary platform. It must become software capable of running on a COTS [commercial off-the-shelf] platform before we can experience any of the benefits of virtualization.

“Consider Stereo Tool — this product runs under Windows. It’s an example of a dematerialized radio program processor. It has most of the same features as the hardware boxes and many say it performs on par with the very best of them, but since it is pure software running on a COTS computer under a COTS OS, it offers the benefit of a lower cost. Why is that? It is simple scale — computers are commodities and are manufactured in very large volumes. Purpose-built hard-

(continued on page 26)

PRODUCTS & SERVICES SHOWCASE



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VIRTUALIZATION

(continued from page 25)

ware made for radio is produced in much smaller quantity and will carry a correspondingly higher price,” Dosch said.

“So here we see the first important benefit to virtualization: cost. The second might be ease of repair, upgrade or replacement. Again, since we are running this on a COTS platform, any activity requiring us to touch that platform will be cheaper than doing so with a proprietary device.”

Dosch said some users might not be comfortable with this.

“Some might prefer the idea of a box with ins and outs and it just does what it does and nothing more. That’s fine. If the only advantage was cost, I could imagine many would choose the simplicity of the box and eschew a computer-based product with its own unique annoyances — such as Windows security updates.”

VMware is a well-known virtualization software provider based in Palo Alto, Calif. In my research VMware is the only company mentioned by users, though there are others.

Dosch continued. “Now that we’ve crossed over into software, we can begin to imagine the second type of virtualization: Rather than running my software audio processor on a Dell CPU tower computer, what if I ran it in a virtual machine (VM) running under a Hypervisor such as VMware on an industrial server running on multiple blades? In other words, what if I am running my software on an on-premises cloud?”

He said this idea brings with it interesting benefits, mostly with the idea of scaling your infrastructure — building a second air chain, for example, is as simple as copying an environment — as well as redundancy.

“Redundancy is especially interesting to me,” Dosch said. “The idea of the Hypervisor running multiple VMs is that it is aware of the status of both VMs and hardware and can take action in the event of a problem. A server blade fails? No problem. The Hypervisor runs your processes on a different blade and sends a notification to you about the server in need of attention. You stay on the air even though a catastrophic failure has occurred.”

Dosch suggested that the broadcast



Thinkstock/Chad Baker

plant will look more and more like a data center. A further implication is that, perhaps, certain functions can be pushed out to “the cloud.”

“If our listeners are using the internet to receive our streams, why can’t we originate our streams in AWS (Amazon Web Services) or other datacenter? We could run our processing and encoding in that cloud so we only need to send our unprocessed program signal to the datacenter where it is sweetened, encoded and replicated for our zillions of happy listeners,” he said.

THOUGHTS FROM A SKEPTIC

I don’t want to portray myself as “too much of an old guy,” though when I started in the business, we were still using a vacuum tube console at one of our stations; the Orban 8000 was a new product. I’ve seen a lot of the evolution in broadcast technology in my 35+ years.

Not surprisingly, I’m a skeptic when it comes to the application of this technology to radio studios. I wrote this back to Dosch:

“Granted that day-to-day broadcast is not a life-or-death situation — but I’m not sure I consider Hypervisor running VMware on two server blades to really be that redundant. How long does it take Hypervisor to note a problem and to move from one blade to the other? To what level can a “problem” be defined? Can I work on the issue while the other blade is operating? If they are physically located in the same container, can I work in that container while the system is hot?”

Dosch responded that this is why he thinks it is so interesting.

“These VM environments are designed for datacenters which are to have 100 percent uptime; a very wide range of redundancy is supported along with capacity scaling, alarming, load balancing, etc.,” he replied.

“I agree with you, for one or two blades and one or two VM instances, we might not be exercising all of the capabilities. But once you turn everything things differently. For a single studio, I’d go with current tech. For a plant, I’d start to think about how this might help me.”

I also told him that for me personally, the issue here is one of responsibility.

“Once the infrastructure is moved to the cloud, which is really just a hyped name for a data center anyway, or a CO — telephones have been done this way since day one — I lose the ability to respond rapidly,” I noted. “If it weren’t for the well-publicized failings of AWS, I might have more confidence in the idea. I can’t really tell my PD or GM that the station is off the air till AWS fixes a network issue. Not going to fly.”

Dosch replied, “One approach would be to exclude the datacenter for now — build an on-premises datacenter. It would not make a lot of sense for a single studio station, but for a plant with multiple studios, it could be justified. Or, maybe I use the public cloud in a new and interesting way — such as a backup source? Chances of a local failure and an AWS outage happening at the same exact time

are quite small.

“And I understand your point. This is very common with new technology,” he continued. “The first reaction is resistance because of this and that current failing. When we introduced Ethernet to replace audio routers, oh, my gosh! My favorite objection was: ‘I can’t even get my computer to connect reliably to the printer down the hall. You want me to put my audio on a computer network?’ And again, time and progress solves problems and the benefits don’t seem so risky.”

He continued, “The idea of software to replace those devices with which we are comfortable makes us uncomfortable. I’m with you really ... but, software applications that replace all the purpose-built devices make sense for a number of reasons. It is disruptive and always disruption must be approached with caution.”

I don’t think anyone would disagree that the use of a virtualized system of “routers” and associated control (done with thin clients) could be cheaper than the systems we are accustomed to in 2018. However, I would like to point out that new studio builds will still need space — often to accommodate a half-dozen people — along with associated furniture, lighting, air conditioning, audio monitoring (speakers and headphones), mic processing and the keyboard/mouse/monitor combo that uses the thin client to talk to the VM server(s). None of those things can be avoided as long as people are sitting in a studio talking on the radio.



REALITY CHECK

So far we've painted a rosy picture of the idea of virtualization of audio systems. Now I would like to introduce another skeptical broadcaster in to the conversation. He will remain unnamed; suffice it to say that he's a well-known, major-market VP of engineering and IT with a dozen or so years of experience with virtualization.

What makes him particularly valuable in this context is that he is well-versed in the normal "engineering" aspects of radio as well. With respect to the idea of virtualization of audio control systems, he asked: "If audio control and routing transition to a software application, manufacturers will need to constantly update their code — *not* to add new features — but to maintain compatibility with the ever-updated OS. With this being such a niche product and not one with a ton of money at stake (i.e., radio), how do vendors intend to keep up cash flow and maintain their products?"

He said he is not against the technical concept, and in fact suspects there are few that get as excited about it and experiment with it as much as he does;

but he questions business case: How will this save operators money?

Dosch responded: "That's a fair comment, but it perhaps ignores the reality that all apps will eventually run on the same COTS hardware and virtualization hosts, there is really only one infrastructure to maintain.

I asked our skeptical engineer specifically how he would feel about using virtualization for an audio system for broadcast.

"What makes me nervous," he replied, "is that, in doing audio the way we currently do it, it's very sensitive to latency. The hardware you would need

get some lag, as some machines won't respond quite as fast.

"There are a lot of aspects to virtualization that need to be managed," he said. "You're talking about, for your typical radio station engineer, a whole different skills set than what they're used to. You're talking a hardcore IT guy — somebody that understands virtualization, which is one specialty; somebody that understands storage, which is another specialty. So I get a little concerned. When this stuff works, it works great. But when it stops working, finding the problem can be very difficult and time consuming and that's not something we have a lot of in the (radio station) environment."

But for any technology advancement to work, said Dosch, requires a combination of innovation and pragmatism to achieve the desired results.

"Think of it this way: Every objection raised is a problem to be solved. And if we solve those problems, we make a better product and the technology advances. It always works this way."

In our next article, we dig deeper into the topic with several expert observers.

You're talking about, for your typical radio station engineer, a whole different skills set ... You're talking a hard-core IT guy.

— *One cautious industry observer*

"For example, does the station run business, playout, scheduling, traffic apps? Those can certainly run in the virtual environment. So stations will already be dealing with this in some sense. Extending the infrastructure capacity to also include a few more apps might not be as burdensome as you imagine."

to handle this would be beefy," he said. "I would just be really wary of stuff that I consider mission critical, personally. I've been experimenting with virtualized work stations for a good amount of time and unless you have some very big hardware and a very fast storage network, there could be problems. Because, remember, the disks are shared. You can

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READER'S FORUM

Keep NRSC Proofs, Please

Larry Langford started the debate in a commentary saying that the seemingly obsolete NRSC mask measurement for AMs is a waste of time and resources. The following are a few responses challenging his assertion.

I just finished reading Larry Langford's guest commentary on tossing out the yearly NRSC proof for AM stations. Here is my reply.

Larry, I will agree with you on one point, and one point only: Most AM audio processors of recent vintage have the 10 kHz low-pass filter and meet the requirements (at the time of manufacture) of FCC Rule 73.44. But that doesn't mean that these processors will continue to properly do their jobs forever, and some of them are already pretty long in the tooth. There is a lot of "stuff" downstream from the processor that can and does fail. The NRSC proof is not just about the mask limits, but if done properly takes into account harmonic amplitude, spurious signals and intermodulation products.

Yes, newer, high-efficiency transmitters are much different than older tube-type transmitters. They have switching power supplies, new methods of modulation such as PDM, PWM and a myriad of other modulations schemes. We no longer have to change expensive tubes in transmitters, instead, we now have to periodically change electrolytic capacitors and solid-state devices. Any of the above can and will eventually fail, often causing excessive occupied bandwidth, spurious signals and high harmonic content. Quite often these failures go unnoticed by the station's staff.

I've been doing "NRSC proofs" since they were first required back in the early 1990s. Since then, I have

seen many instances of transmission equipment failures resulting in RF spectral problems that station staff, including their engineers, were unaware of.

To cite a few actual cases ...

In the high desert there was a problem with high noise levels across most of the AM band. This had been going on for a few years and was attributed to power lines. A station in that area called me to do their annual NRSC proof. What I found was that their high-efficiency, solid-state transmitter was spewing garbage across most of the AM band. The

edges of the 10 kHz audio filter could not be seen on the spectrum analyzer. The problem turned out to be a blown capacitor in their transmitter's PWM filter circuitry. Once this was repaired the station became a great example of what a good NRSC proof mask should look like. Coincidentally, the noise across the AM band disappeared.

A station that was in the process of commissioning a new 5 kW AM transmitter from a well-known transmitter manufacturer asked me to do a RF proof of the transmitter. One of the first things we noticed were symmetrical spurs each side of the carrier and only down about -14 dBc. This turned out to be caused by a lead in the PDM filter circuitry that had apparently come loose in shipping.

There was another station who for years had gone through their annual NRSC proofs with no problems. During a regularly scheduled NRSC proof for this station we discovered they had a mix product that was being generated in their transmitter that was only -27 dBc and on top of another station about 15 miles away. This was the result of a station that had lost its land lease and in order to diplex with an existing station, had relocated to a site about six miles away from my client's station.

The above stories are only a very few examples of what I have seen over the years. They were not the fault of the processors, but things downstream from the processor. Although, there have been situations where processors have failed, causing problems. These are not rare or unique situations.

I have discussed the value of the current NRSC proofs with many knowledgeable engineers. All agree that the yearly NRSC proofs serve a very useful function in reducing man made interference to the AM band.

Let me also add that in my opinion a yearly proof should also be required for FM broadcast stations. Is FM somehow magically immune from having transmission problems? I have documented proof that FM's also have stuff fail or inadvertently misadjusted transmission equipment resulting in serious interference to stations several channels away.

So, in conclusion, I must say that I strongly disagree with your reasoning to dump the required annual NRSC Proofs for AM. It would be a foolish move. Regular checking of your RF transmission equipment and spectral emission as described in the rules under 73.1590 and 73.44 is good engineering and the right thing to do. It's a small part of the cost of doing business.

Burt Weiner
Burt I. Weiner Associates
Glendale, Calif.

~ ~ ~

I just finished reading Burt's article regarding NRSC measurements ("FCC-Required NRSC Proofs Are Important," posted online Oct. 25). I couldn't agree more with his assessment.

Even though I've been involved in engineering for at least four decades, I still encounter situations where problems with conformance exist, even today with contemporary equipment.

Ironically, most of these interference problems are not related to the audio processing at all. It has been my experience that many times determining the cause and repairing the problem early not only makes the station sound better, but also avoids more headaches and expense down the line.

Yes, AM stations are more likely to have problems; however, FM transmitters that occasionally go astray usually get noticed and reported quickly.

Perhaps rather than a full NRSC measurement report, it might be good engineering practice to at least take a quick look with an analyzer at least every six months or so.

Jim Petrucci
Chief Engineer, KRZZ San Francisco
Spanish Broadcasting System, Inc.
San Jose, Calif.

~ ~ ~

I just wanted to give you a heads-up: The guest commentary by Ray Uberecken entitled "Larry's Right! NRSC Measurements Are Unneeded" (radioworld.com), in my view, contains an error.

(continued on page 30)

HOME > COLUMNS AND VIEWS > GUEST COMMENTARIES


Let's Toss Another Expensive and Useless Rule!

The seemingly obsolete NRSC mask measurement for AMs is a waste of time and resources

LARRY LANGFORD · OCT 15, 2018

f t p


Larry Langford is owner of WGTO(AM) and W244ds in Cassopolis, Mich. He has been in radio since 1965. His commentaries on radio issues such as those facing AM owners are a recurring feature. Read his past articles by searching for "Langford"



OK going back into the memory archives ... When I got in this business in the early '60s (the days before unattended operation) we had to fill out a transmitter reading log every 30 minutes.

The FCC required you to write down parameters of the transmitter oscillator and final power amplifier (PA) such as plate current, plate voltage, computed power output in watts, RF line current and frequency tolerance. You had to trim the values if they were out of limits. If you had a directional you had to take phase and ratio readings as well for each tower and common point RF current. It took a few minutes especially if you were on remote control and had to listen to the chunk-chunk as the two-wire remote system counted through the steps as the system responded to the phone dial that you had to use to read different stages.

Read the controversial commentary sparked this NRSC proof debate online at <https://tinyurl.com/yc3vs2sj>.



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NRSC

(continued from page 29)

The author states that the annual test for AM stations "is an occupied bandwidth measurement only and does not require measurement of harmonics, intermod or spurious emissions."

That is not correct. For more than 20 years, FCC rules 73.44 and 73.1590 have specifically called for annual harmonic and spurious measurements. Occupied bandwidth is everything that comes out of the transmitter — not just the modulation sidebands near the center frequency, as Mr. Uberecken writes.

73.1590 covers when and why the measurements need to be made, and 73.44 describes the specifications for AM stations to meet or exceed in these measurements.

Here are a couple excerpts from those rules that are pertinent to this point:

73.1590 (b) Measurements for spurious and harmonic emissions must be made to show compliance with the transmission system requirements of 73.44 for AM stations.

It doesn't get much clearer than that! And...

73.44 (b) Emissions 10.2 kHz to 20 kHz removed from the carrier must be attenuated at least 25 dB below the unmodulated carrier level, emissions 20 kHz to 30 kHz removed from the carrier must be attenuated at least 35 dB below the unmodulated carrier level, emissions 30 kHz to 60 kHz removed from the carrier must be attenuated at least [5 + 1 dB/kHz] below the unmodulated carrier level, and emissions between 60 kHz and 75 kHz of the carrier frequency must be attenuated at least 65 dB below the unmodulated carrier level. Emissions removed by more than 75 kHz must be attenuat-

Larry's Right! NRSC Measurements Are Unneeded
More on NRSC: Uberecken says the practice is outdated and not needed for most AM stations
RAY UBERECKEN, CSRE, AAEL, NOV 2, 2018

f t p

The debate on the efficacy of the required NRSC measurement continues. The author is chief engineer for the Cumulus Radio Station Group in Colorado Springs, Colo.

The NRSC-2 required yearly measurement should not have been instituted in the first place. It was made mandatory to add the filter to the air chain ahead of the transmitter to limit the audio modulation bandwidth in the 1980s. But since it was required, it should have had a sunset date of five years. I totally agree with Larry Langford's premise.

(Read: Let's Toss Another Expensive and Unlax Rule!)

The NRSC-2 is an "Occupied Bandwidth" measurement only and does not require measurement of harmonics, intermod or spurious emissions. All AM stations are required to make this measurement yearly and only a few do not pass causing unnecessary burden to nearly all. I made these measurements as part of a contract engineering business for many years. The NRSC-2 measurement is not a good measure of a stations performance, it was intended to eliminate interference. We as engineers are responsible for all operating parameters at our stations and the occupied bandwidth is only a very small part.

Nowadays, the occupied bandwidth rules have been changed to accommodate the IBOC digital sidebands and the transmitters that transmit IBOC further limit the analog audio bandwidth to 5-8 kHz.

For what it is worth, two of us in the Colorado Springs market have Audemart GoldenEagle monitors and we check all stations in this market for things like occupied bandwidth every week. We notify the appropriate engineer if anything is amiss. Anyone can buy a very good quality HP spectrum analyzer with the required 300 Hz resolution to do this type of measurement for under \$1,000 on eBay. Several manufacturers make new spectrum analyzers that can do this measurement for about the same price.

I am not saying "do away with the requirement," just the required measurement for all stations each year. There simply is no justification for it.

Radio World invites industry-oriented commentaries and responses. Send to RadioWorld@futurenet.com

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TAGS: LARRY LANGFORD - NRSC PROOF - AM NRSC MASK RULE - RAY UBERECKEN

BY RAY UBERECKEN, CSRE, AAEL

Ray Uberecken expressed agreement with Langford's idea (<https://tinyurl.com/y8mtxvna>), but many others have pushed back. We've compiled the commentaries on this subject: www.radioworld.com/columns-and-views/should-required-nrsc-measurements-for-am-stations-continue.

ed at least 43 + 10 Log (power in watts) or 80 dB below the unmodulated carrier level, whichever is the lesser attenuation, except for transmitters having power less than 158 watts, where the attenuation must be at least 65 dB below carrier level.

That final clause covering emissions more than 75 kHz from the carrier frequency refers to the rest of the radio spectrum! That's the "harmonic and spurious" part of the measurement.

For the annual equipment performance measurements on AM stations, it has been my practice to use a spectrum analyzer or splatter monitor to measure the signals within 100 kHz of the carrier, a field intensity meter to measure the strength of the second, third and fourth harmonics, and a general coverage receiver to tune the range 500 kHz to 30 MHz checking for any spurious signals that might be related to the station under test.

The purpose of these tests is to ensure that the station is only putting its energy into the licensed slice of bandwidth and not elsewhere in the spectrum where it could interfere with other stations and services. In my view these are important checks that need to be made at least annually.

I'd go further: The same interference concerns apply to FM stations, and I feel they should be required to make annual measurements as well. But the FCC rules do not call for FM equipment performance measurements on a periodic basis — only when a transmitter is replaced or modified.

I understand this was a commentary, but misleading information regarding the commission rules could lead stations to make a serious compliance mistake.

Steve Johnston
Consulting Broadcast Engineer
Madison, Wis.

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THE SS32 LIVES ON

Thank you for your mention of SS32 in the Nov. 7 article ("AGM Rebuilds in Bakersfield") about American General Media's new facility in Bakersfield. I am glad to see that SS32 continues to provide reliable service so many years after its installation.

However, I noticed that the article indicates that SS32 has not been supported since 2005. As many of your readers likely know, WideOrbit owns the SS32 product and we do continue to offer support for SS32. For example, we have updated the product to work correctly under Windows 10, and we are currently updating SS32 to work correctly with newer-generation audio hardware.

Finally, I would like to mention that we still have four employees in our support department who have been with us since the Scott Studios era, so I feel that any SS32 user will likely find WideOrbit to be uniquely qualified to assist with any SS32 issues.

William "Dub" Irvin
Vice President of Radio Automation
WideOrbit
San Francisco

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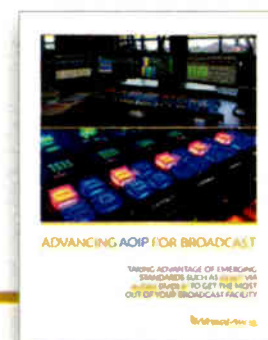
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