RADIOWORLD

Your guide to radio technology

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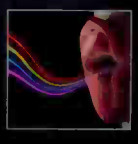
FUTURE

Radio tech is hit by the dip in chips

Broadcast suppliers feel the crunch of the global semiconductor crisis.

Readers sound off
Translators, grounding and virtue signaling.
In Opinion



Debating WMAS
Proponents say the technology would help the wireless microphone industry meet continued growth in demand.

Workbench: A DIY noise-canceling trick
Suppress unwanted crowd noise on sports remotes.

SBE salutes Chris Tobin
A posthumous honor for the late engineer.

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Remembering Chris Tobin

SBE honors the late engineer

Paul McLane
Editor in chief

The loss of a colleague is always sad but especially so when it is sudden. Such was the case when Chris Tobin passed away at age 59 in December.

The veteran engineer, well-known and well-liked, suffered a heart attack while doing HVAC work for WBGO in Newark, N.J.

The Society of Broadcast Engineers will honor Tobin with the Robert W. Flanders SBE Engineer of the Year award. He was a society member for 22 years and active in Chapter 15, New York City.

"As a small tot, I enjoyed the magic of the box on the kitchen table in my house," Tobin once said in a YouTube interview. He worked at Radio Shack in his teens and became involved in broadcasting through a school station.

Tobin went on to work at ABC Radio Network, CBS Radio and Westwood One.

In 2015 he became chief at WBGO and later was promoted to CTO. He helped the station streamline operations, manage the pandemic lockdown and expand its video capabilities, becoming a "prolific" videographer and photographer who filmed "some of the greatest jazz artists of our time," according to his obituary.

Tobin also was known for his work as co-host of "This Week in Radio Tech" or TWiRT, bantering and trading expertise online with host Kirk Harnack.

WBGO Interim President/CEO Robert Ottenhoff told me in January that Tobin was not only a "spectacular engineer" but also a positive presence in the workplace. "Optimistic and friendly. Everyone loved Chris, he did so much for so many people."

Chris Tobin is a deserving posthumous recipient of the Robert W. Flanders SBE Engineer of the Year award.

NEWS

FEATURES

OPINION

NAB Lists "COVID Protocols" for Fall Shows

When the National Association of Broadcasters returns to Las Vegas for its first face-to-face conferences since the pandemic began, attendees will be asked to follow health guidelines and allow for physical distancing.

Information is at *https://nabshow.com/2021/attend/health-and-safety/*.

In late July NAB said it will recommend that all attendees wear masks onsite. (And as of early August, Clark County, Nev., was under a state mandate to wear masks in indoor public places.) It also said it was monitoring protocols outlined by the CDC and local health officials and would adjust its approach as needed.

This year will feature a touchless registration process. The show site asks attendees to register at one of several satellite locations prior to arriving at LVCC. Meeting rooms and floor theaters will be capped at 75% capacity. Visitors may be required to undergo screenings such as temperature checks.

Organizers also asked that attendees refrain from physical contact. Hand sanitizers will be placed in public areas. Exhibitors will have the opportunity to order enhanced cleaning and disinfection services.

Attendees can access an app download at the NAB website called COVID Trace that notifies users of potential exposures to COVID-19.

Procedures Published for NCE Auction

If you plan to seek a noncom educational FM construction permit in the upcoming filing window, be aware that the FCC has released procedures and requirements.

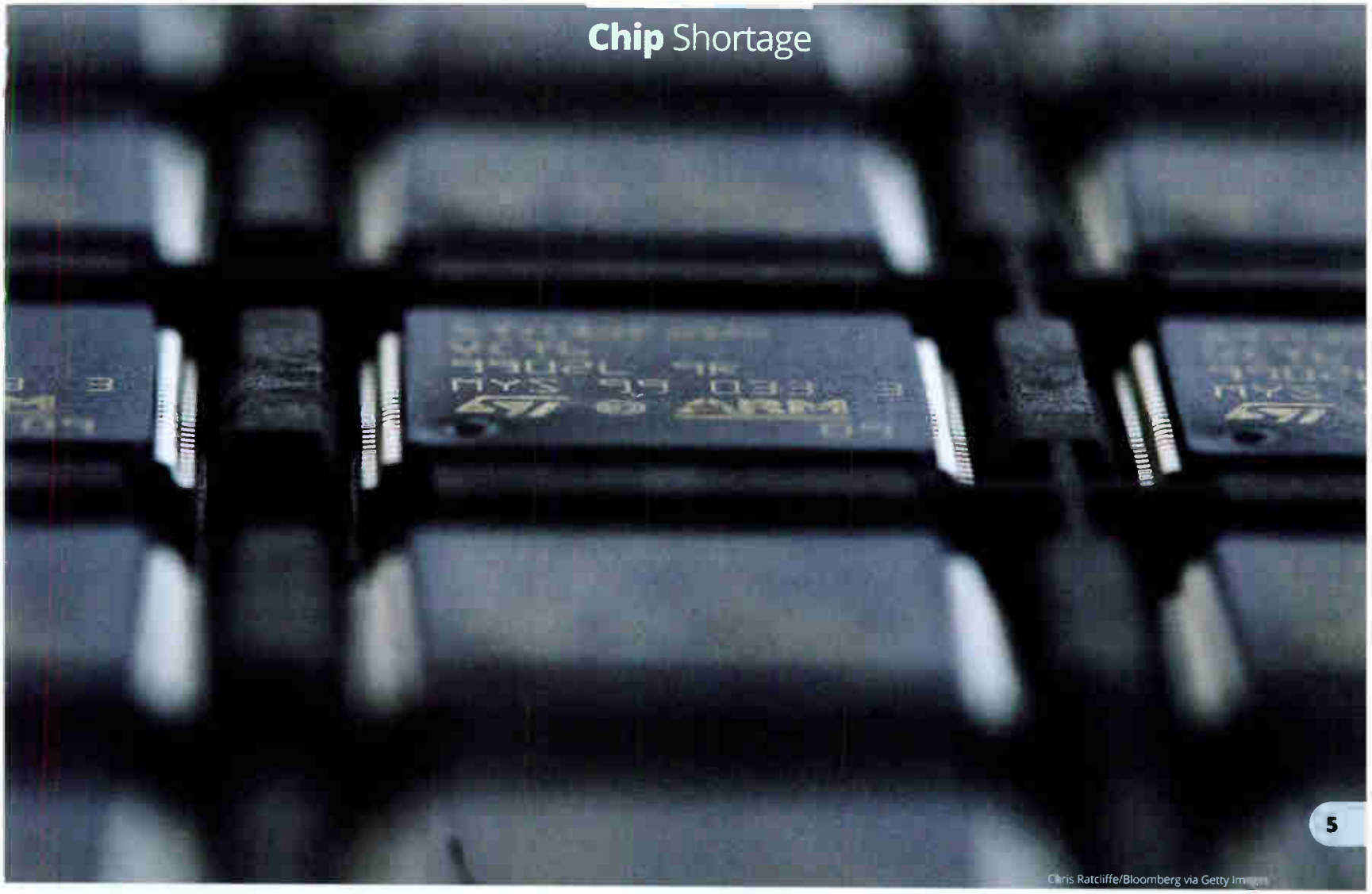
The Media Bureau also will put a freeze into effect for certain FM applications from Oct. 5 to Nov. 9.

This opportunity is for proposals for the reserved band, 88.1 to 91.9 MHz, and you can file no more than 10.

The commission reminded first-timers that NCE stations are licensed only to non-profit educational organizations, not individuals; that new station opportunities are more readily available in rural or small communities; and that the FCC doesn't publish a list of "available" frequencies or provide a "channel finder tool." It said applicants usually hire legal and engineering consultants to assist.

The notice also lays out the system that the FCC uses to analyze "mutually exclusive," i.e. competing, applications.

Instructions on using the electronic filing system are on the Media Bureau's LMS Help Center page at *www.fcc.gov/media/radio/lms-help-center*.



Chris Ratcliffe/Bloomberg via Getty Images

Writer
Randy J. Stine
RW's longtime correspondent wrote about proposed changes in radio technical rules in the Aug. 4 issue.

Chip shortage hits radio technology marketplace

Broadcast equipment vendors react to ongoing semiconductor crisis

The severity of the global computer chip shortage has broadcast equipment manufacturers finding creative ways to manage supply channels while trying to meet product demand.

Despite the semiconductor shortages, people in the radio technology marketplace who spoke with Radio World say products are still being shipped, with mostly minor delays, thanks to prior planning. Equipment suppliers said they hope the semiconductor shortage will ease soon, perhaps by early 2022.

The pandemic has disrupted global supply chains for integrated circuits since early 2020, as factories closed and transportation was delayed. Surging demand for motor vehicles and other consumer electronic products, prompted in part by economic stimulus measures, have exacerbated the situation.

While some suppliers were reluctant to discuss workflow issues for this story, others confirmed that their difficulty in sourcing components has worsened in recent months. Broadcasters are primarily seeing delays on computers and computer-based audio gear, sources said, but even transmitter delivery dates are being affected in some instances.

The scarcity of chips has had an impact on HD Radio. General Motors this summer decided to exclude HD Radio on certain pickup truck models in the 2021 and 2022 model years.

HD Radio partent Xperi Corp. acknowledged there could be some "feature reductions in radios" in some cars

Above
STMicroelectronics IC microchips designed by ARM Ltd. are shown in a storage tray at CSI Electronic Manufacturing Services Ltd. in April.

but expressed confidence that HD Radio deployment in vehicles will continue to progress.

Global logistics

Scott Stiefel, COO of Telos Alliance, said a series of unplanned events — including fires at two chip factories in Japan — combined with the pandemic to contribute to the shortage.

"The same challenges affecting the auto, computer or household electronics industry are there for us," he said. "Chip shortages, end-of-life issues for low-volume components, as well as global logistics problems. But without question, the factory fires at the AKM and Renesas Fabrication facilities have impacted the electronics industry, already taxed by the COVID-related shortages. The mass buying and stockpiling over and above the normal demand have also created shortages in both supply as well as in logistics. Again not directly attributable to COVID, but a side effect of consumer behavior."

Inovonics President/CEO Ben Barber said chips and virtually all components have been affected.

"Earlier this year we made the decision to ramp up our purchasing in order to get ahead of the delays. Making this type of investment has been expensive, but at the same time we have the raw inventory to continue to manufacture all of our product lines without being backordered," Barber said.

Prices for chips are up. One microprocessor for which Inovonics normally pays $14 is now $60. "And lead times have also been extended in many cases to 42 weeks plus," he said.

In fact, he said, recent shortages have affected virtually all parts including ICs, SMD parts, power supplies and even metal chassis, Barber said.

Tony Peterle, manager in the Americas for WorldCast Systems Broadcast, said the radio technology sector has been affected by the semiconductor shortage like every other area of industry.

"Broadcast equipment is certainly no exception, but thanks to all our partners all over the world we have found immediate solutions and we continue to deliver," he said.

Peterle said most of WorldCast's broadcast customers are thinking far enough ahead to give his company solid estimates on lead times.

"Most broadcasters are obviously aware of the component crisis and they are planning their project timelines accordingly."

Another observer who asked not to be named said there are only a handful of companies that make the analog-to-digital and digital-to-analog components used in phones,

Steel, too, is harder to come by

Steel prices in July were up 215% from 16 months prior, according to Fortune.

A worsening shortage may scramble supply chains and increase the cost of broadcast towers.


Courtesy ERI

Tom Silliman, president of Electronics Research Inc., told Radio World in July that material for current projects was largely on hand and that work was continuing. However, he said, ERI's supplier of steel for broadcast towers, O'Neal Steel, was unable to order additional material from steel mills other than what was already in the pipeline..

"Rollings are closed at this time and there is not a date on when they will open them again. Definitely no additional orders for 2021," Silliman said.

Prices for the material that goes into tower members are going up terribly, Silliman said.

"Some of the suppliers don't want to sell any more solid rod tower material now because the cost of the material is so high. They would rather sell other material," he said.

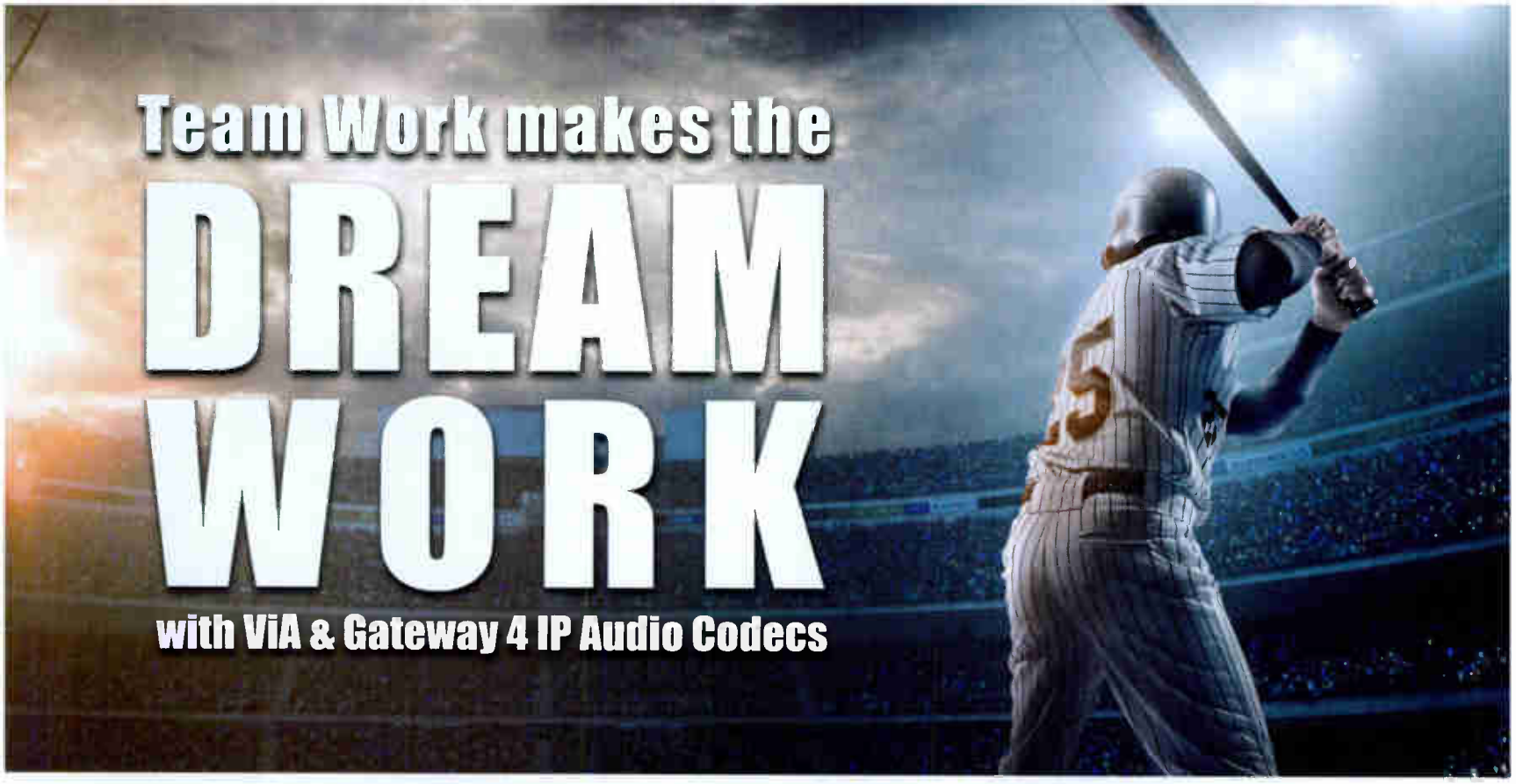
ERI designs, fabricates and installs self-supporting towers, guyed towers and antenna mounts used by the broadcast industry, among other products. As of mid-summer it was experiencing only minor project delays, due mostly to a shortage of guy wire insulators for AM towers.

"This causes a problem because it pushes our crews into late fall, causing higher numbers of weather days," Silliman said.

For new tower orders, Silliman said broadcasters should expect higher material costs and long delays in receiving tower steel.

"Material delivery time is way out. In 2020, O'Neal Steal was quoting us six-week delivery of tower steel, and now they are quoting six-month deliveries. And since prices for material has gone way up, tower prices will have to go up, too."

> **"For some components, average lead times of 26 weeks or less have extended out to 52 weeks or more. And in one case, as far out to 2024."**



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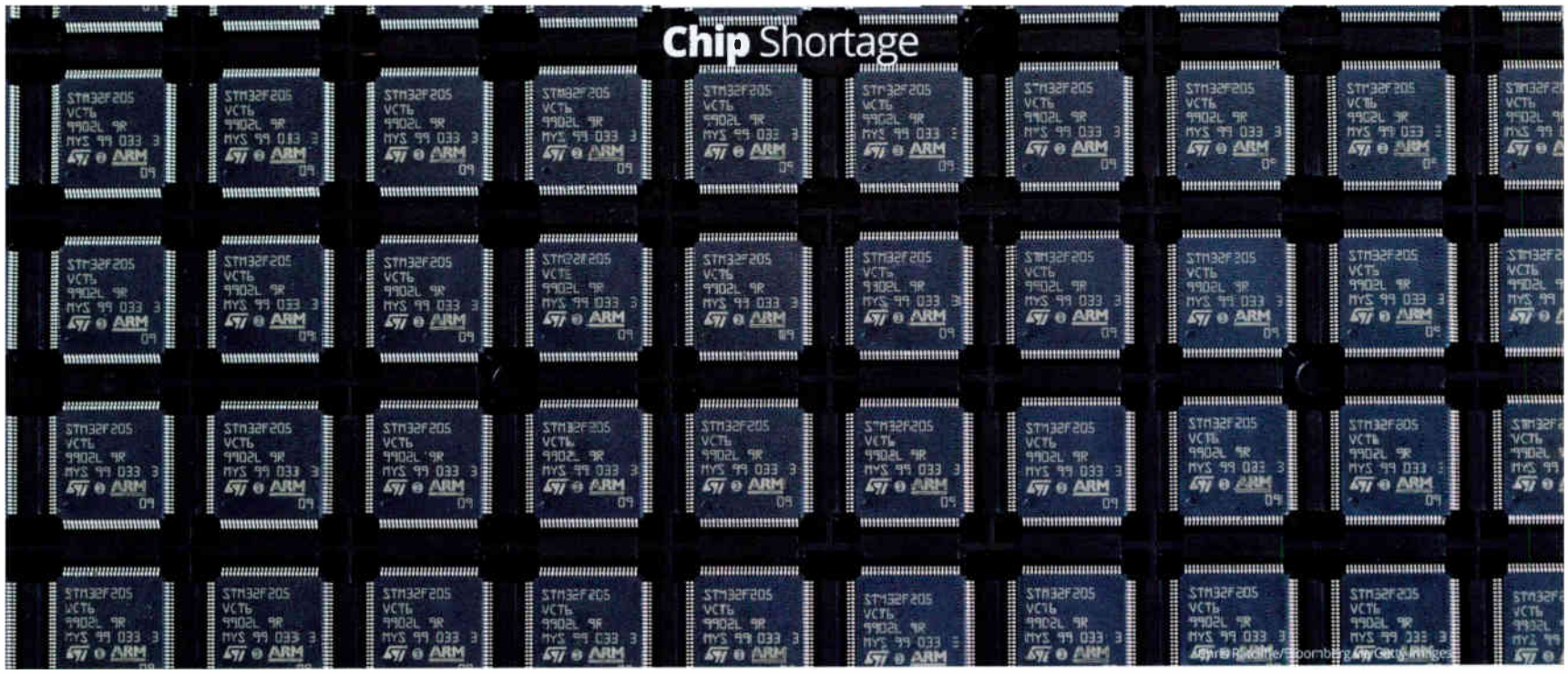

cameras and just about anything that converts audio between analog and digital. And of those, only two major chip makers, Cirrus Logic and AKM, produce the kind used in most pro audio and broadcast products.

To make matters more difficult, the observer continued, AKM ADC ICs pinouts are different than Cirrus Technology's equivalent ADC/DAC ICs, which makes it impossible to substitute one for the other without some redesign.

"A year or more out"

The good news for broadcasters is that supply chain disruptions caused by the chip shortage haven't necessarily resulted in immediate price increases for products.

"For now, we're pricing our products based on our reserve inventories of components and materials, and re-evaluating by the month," said Dee McVicker, a representative of Wheatstone. "We've been through volatile supply situations in the past — never this severe though."

She described lead times on important components as "insane." Nevertheless, McVicker said, Wheatstone's manufacturing runs haven't been compromised.

"We do both production runs of some products and customized runs of others, and that hasn't changed any. But since we're our own plant, we can scale our production according to our own needs," McVicker said. "If we had to rely on third parties to manufacture our products, we'd probably be in a situation where we'd have to batch our runs or, worse, have long wait times competing for component availability."

Several equipment manufacturers described extra steps taken to limit the effects of the shortage and control supply chain volatility.

"We are meeting daily with our vendors to make sure we can source chips and materials a year or more out. That takes a little bit of planning on our part and also close communication with our customers on their project time lines," McVicker said.

IP audio codec maker Tieline said it manufactures its codecs in-house, which ensures as much control over the supply of critical components as possible; still, lead times have become exaggerated because of the chip shortage.

"We are definitely seeing lead times for components blow out, and it's not always semiconductors that seem to have been affected," said Charlie Gawley, vice president of sales for Tieline.

"For some components, average lead times of 26 weeks or less have extended out to 52 weeks or more. And in one case, as far out to 2024. As you can imagine, this adds an additional layer of complexity to ensure the bill of materials for each product is available for manufacturing when required."

Tieline believes the chip shortage will extend at least into early 2022, Gawley said. "However, we do not expect to be impacted given our order placements for components already placed."

Gawley said Tieline has been able to absorb any extra costs and has not adjusted prices.

Several equipment vendors told Radio World that the chip shortage is affecting their research and development efforts and work on new products.

Possibly softening the impact of the shortage is that more broadcast products now are based on software. However, "Our experience has shown us that not all products can be replaced by software," said Todor Ivanov, CEO and owner of DEVA Broadcast. "Many of our devices are intended for use in the field and at transmitter sites where using PC-based solutions is not reliable enough. For all of those products, we have taken the necessary measures to make sure that no hardware shortages are experienced and that our customers can rely on our products at any given time."

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New PTZ Cameras From JVC Pro Video

JVC Professional Video announced a line of PTZ remote operated cameras, the 4K KY-PZ400NW/NB (pictured) and HD KY-PZ200NW/NB.

Both provide streaming image quality and performance suitable for remote production over the internet, according to JVC.

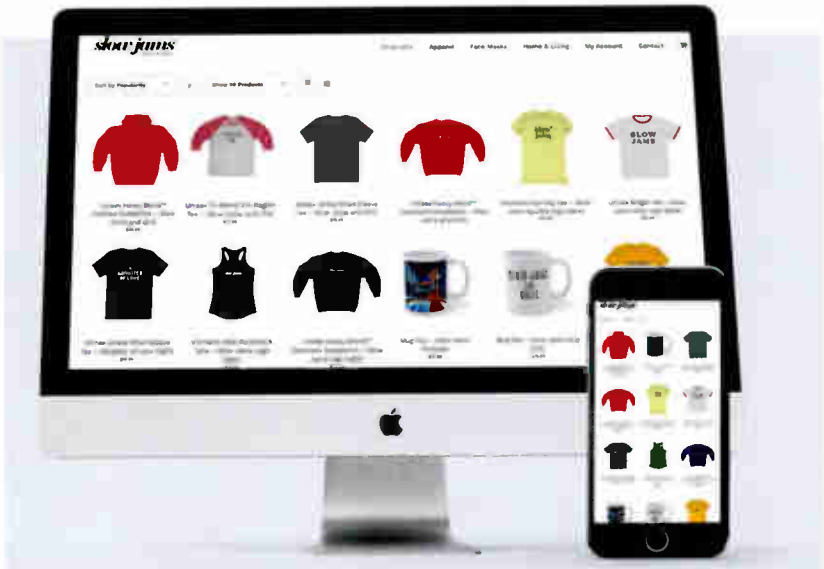
They are equipped with NDI|HX and SRT streaming, H.265/H.264/MJPEG encoding and VITC (vertical interval timecode) multi-camera synchronization technologies.

Vice President Joe D'Amico said these cameras "offer a high-quality, low-latency IP video transmission standard that is ideal for streaming in an ever-evolving media landscape."

A third, HD KY-PZ200W/B, provides a more affordable option for those without the need for NDI|HX.

MSRP ranges from $1,899 to $2,599.

Info: http://pro.jvc.com



Benztown: We've Got Your Merch

Radio imaging company Benztown introduced a venture called Radio Merch Shop that it says can help stations promote their brands and make money or improve fundraising.

The service creates and operates customized "pop-up" stores where listeners can buy station-branded products online. Offerings include face masks, T-shirts, hoodies and coffee mugs.

Benztown says that for each product sold, a station earns $5 or more.

"Radio Merch Shop builds a customized, branded online merch shop and landing page for each participating station and handles order fulfillment and inventory from start to finish," it states.

Stations provide their logo or artwork and promote their shop on-air, on the station website and via social media.

Info: benztown.com/program/radio-merch-shop/

Telos Offers a High-Density Version of iPort

Telos Alliance rolled out a high-density version of its iPort. It is a multi-codec gateway that lets broadcasters license up to 64 codecs in one rack space.

"Worldwide networks use iPort for both distribution and contribution, spanning multiple time zones," the company explained in its announcement.

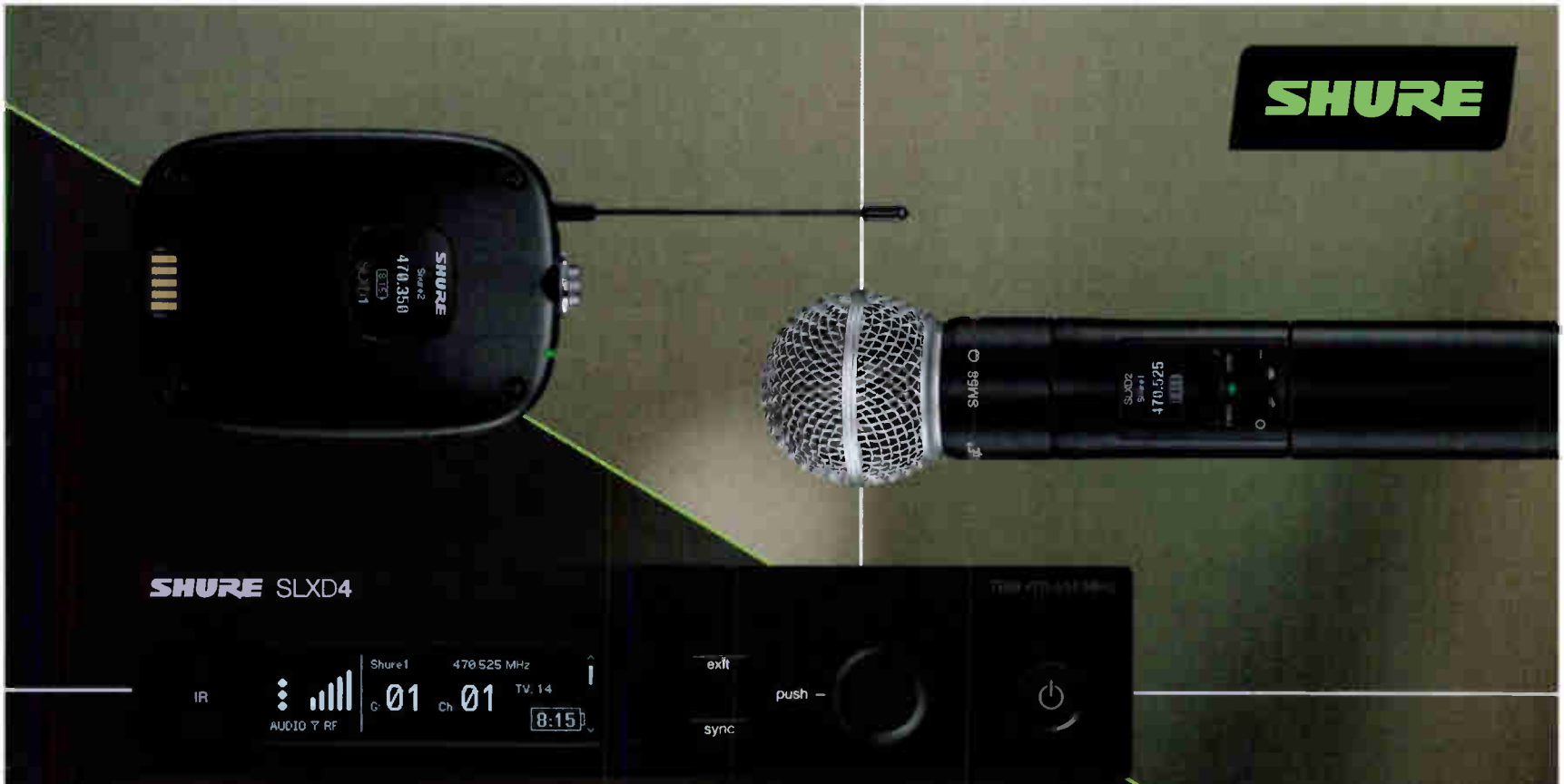
"Now, the iPort legacy continues with the more powerful iPort High Density, which transports multiple channels of stereo, mono and dual-mono audio across IP networks, including private WANs, IP-radio links and over good quality public internet connections, perfect for large-scale distribution of audio to single or multiple locations."

The iPort High Density comes with eight bidirectional stereo codecs, configurable to run in MPEG or Linear PCM mode.

"Broadcasters can license additional codecs up to a maximum of 64, as well as add Enhanced aptX encoding."

The box connects to existing Livewire networks using one ethernet cable (CAT-6 recommended) for all I/O. It can also pair with Telos Alliance xNodes via an adequately configured ethernet switch for use as a standalone multi-stream codec.

Info: telosalliance.com



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John Bisset
CPBE
Radio World's Workbench columnist has more than 50 years of broadcast engineering experience. He handles western U.S. radio sales for the Telos Alliance and is a past recipient of the SBE's Educator of the Year Award.

Ideas please!

Workbench submissions are encouraged and qualify toward SBE recertification. Email johnpbisset@gmail.com.

A noise-canceling mic for sports remotes

Try this simple solution to suppress unwanted crowd noise

For our readers in the northern hemisphere, fall community sporting events are about to find their way onto many stations.

Here's a neat project put together by Frank Hertel, principal with Newman-Kees RF Measurements and Engineering, ideal for your remote broadcasts.

When you are broadcasting from a crowded playing field or stadium, crowd noise may make it hard for your listeners to hear the announcer. What you need is an inexpensive and easy way to attenuate the crowd noise.

Frank's noise-canceling mic is a good solution. By connecting two mics out of phase and using a modified mating connector, you cancel out crowd noise picked up by both mics, which are 180 degrees opposed. The talent mic is clear, with the crowd noise greatly attenuated.

Frank's idea was the result of a conversation with fellow engineer Phil Bailey around their workbench, preparing for the Evansville Fall Festival Parade, rumored to be only second in size and attendance to Mardi Gras.

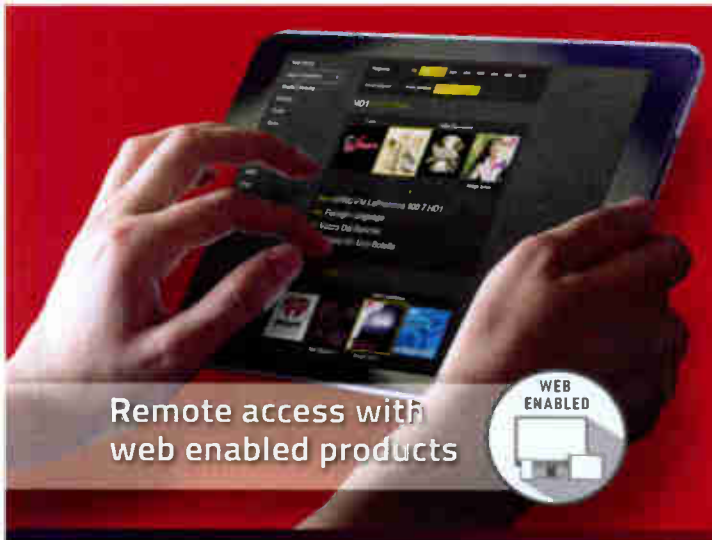
The parade was less than a week away and the engineers needed a fix to control the crowd noise.

PARTS

Although they had tried several "noise canceling" microphones, the noise was still distracting.

As they talked, Phil recalled an incident that happened during the taping of a TV show. An intern had wired up a new microphone cable out of phase, with Pins 2 and 3 reversed on one end of the new cable.

Three guests were sitting alongside one another. A microphone, properly phased, was placed between the first and second guest. The out-of-phase mic was placed between the second and third guests.



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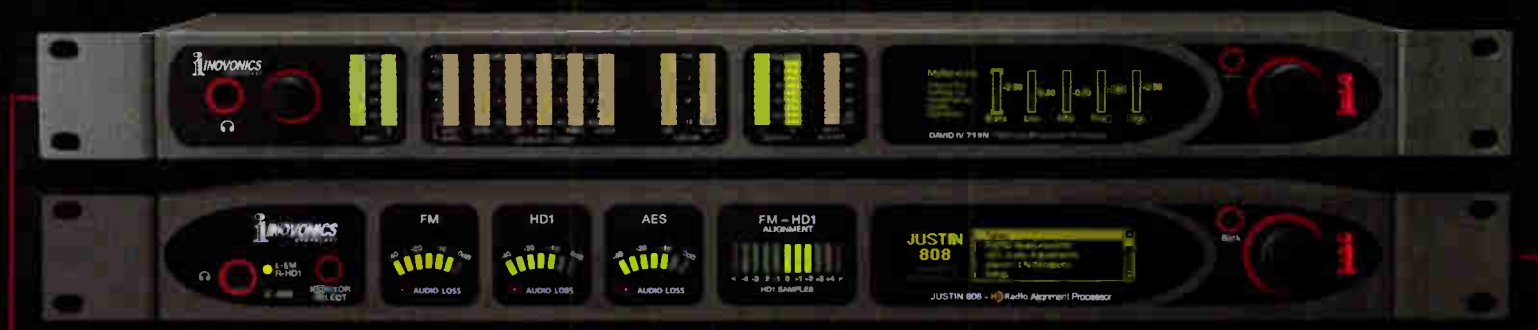

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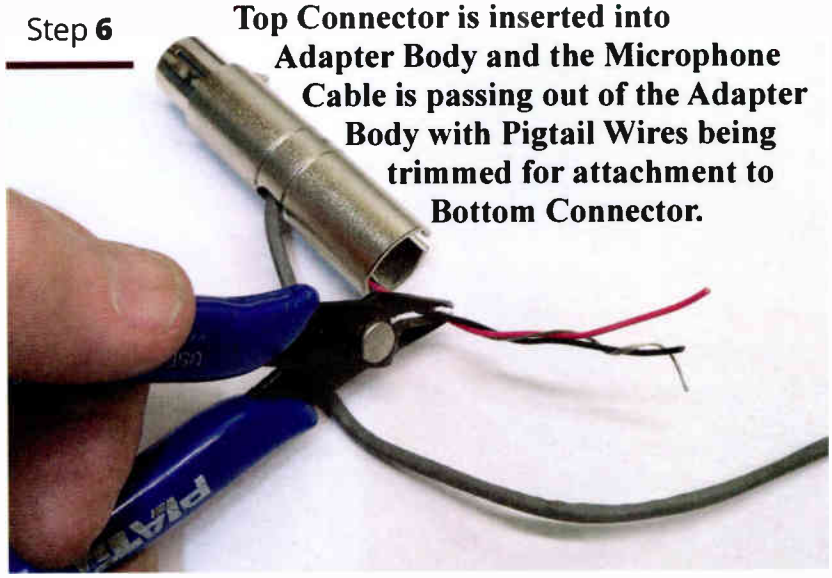
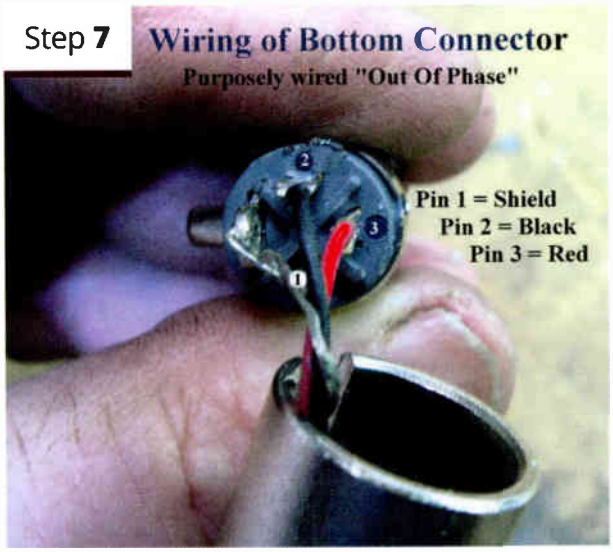


As a result, the guest in the middle was picked up by both mics.

But with one of them out of phase, the audio of the middle guest was subtracted from the combined mix. In this situation, noise cancellation was undesired, so they had to stop taping to fix the problem.

But the TV show's wiring mistake became the fall festival's crowd noise solution.

In use, Frank selected two Electro-Voice 635A omnidirectional mics. Imagine your reporter holding the top microphone within about 2 or 3 inches of their mouth, while the bottom microphone is pointing away from the mouth. Crowd noise is picked up equally by each 635A mic, thus the crowd noise is suppressed — virtually canceled!



You can experiment with pattern types; Frank finds that it works best with identical omnidirectionals, and the 635As are inexpensive, under $150 each.

The first photo shows the parts you'll need to construct this project. Once you've gathered them, follow Frank's step-by-step instructions.

Email me to let our readers know how well this works out for you during the upcoming sports season.

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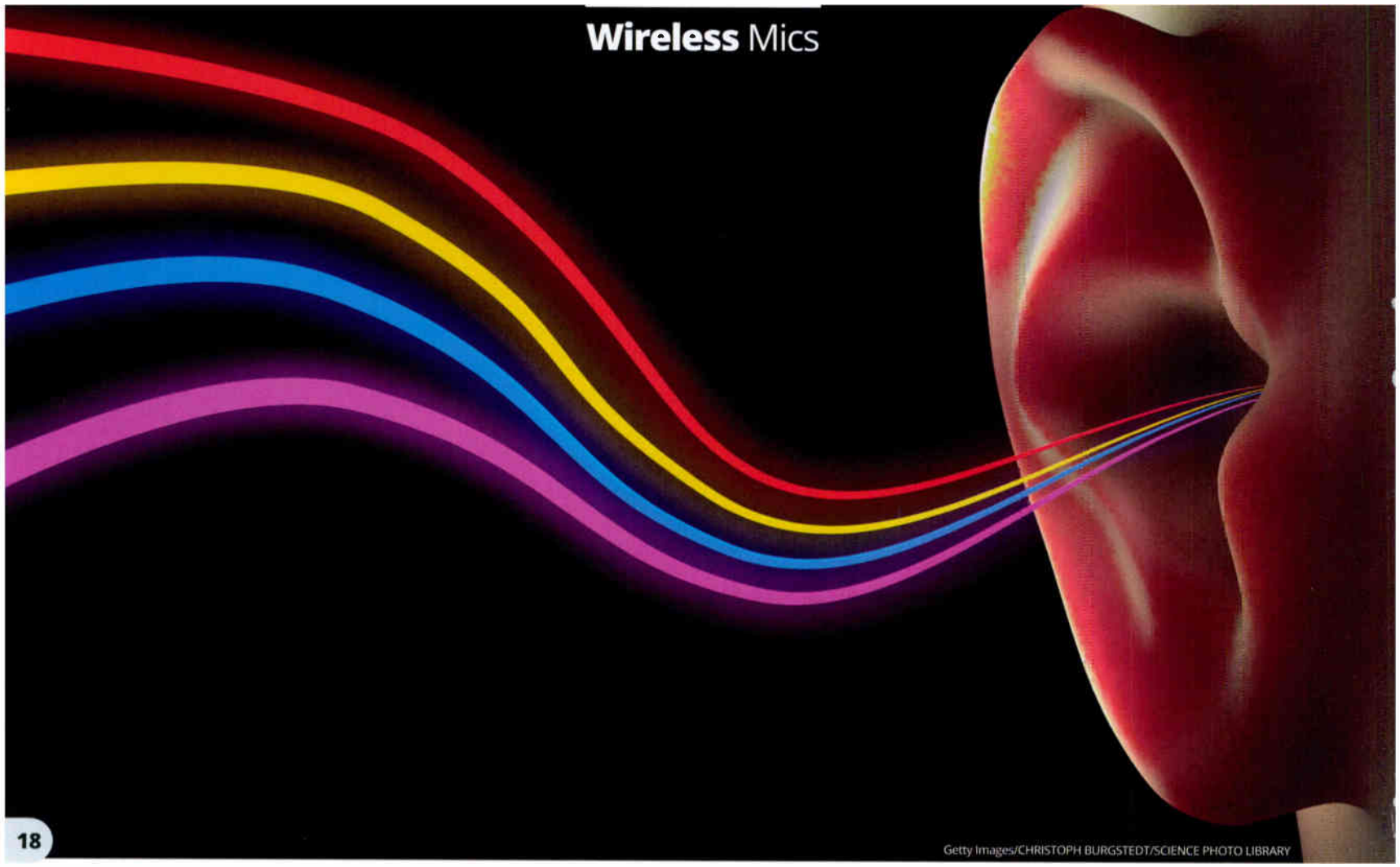


Getty Images/CHRISTOPH BURGSTEDT/SCIENCE PHOTO LIBRARY

Writer
Tom Vernon

The author is a longtime RW contributor. You can read his profile of audio innovator Arno Meyer at *radioworld.com*, enter Meyer in the Search field.

Read the NPRM

You can open a PDF of the full FCC notice at *https://tinyurl.com/rw-wmas*.

Wireless mic industry debates WMAS technology

NAB and SBE express cautious approval, with caveats

A technology called Wireless Multi-Channel Audio Systems, promoted by companies like Sennheiser and Shure, promises to help meet demand for more wireless mics, especially during large events.

Its supporters say increased demand combined with FCC actions have significantly reduced the spectrum available for wireless, principally in UHF frequencies within the TV bands.

The NAB and the SBE do not oppose the concept but they want restrictions put on the service if it is approved.

Such systems allow mics to operate using wider bandwidth channels than currently allowed, by digitally combining multiple signals. The technology also uses a more efficient operating protocol, so more mics can operate in the available spectrum. Similar technology has been adopted in Europe under European Telecommunications Standards Institute standards.

The Federal Communications Commission, in a notice of proposed rulemaking, is taking a good look.

The initial proposal

In 2018 Sennheiser asked the commission to formally define WMAS as a new class of wireless mics. It asked that WMAS be allowed to occupy up to a 6 MHz channel bandwidth — the size of an entire TV channel — rather than the 200 kHz channels allocated for low-power auxiliary stations (LPAS) in the TV bands, and it asked that WMAS be permitted to operate in several bands already available for licensed LPAS operations.

By digitally combining signals from multiple devices into a 6 MHz channel, it said, intermodulation issues would be eliminated while permitting denser use of the spectrum and reducing power density across the channel.

Sennheiser differentiates between two groups of devices. Microphones and in-ear monitors require the highest possible audio quality and lowest latency; these devices, according to Sennheiser, currently require a 200 kHz channel. Intercom and IFB systems, on the other hand, can tolerate limited frequency response and dynamic range as well as some distortion and latency. Sennheiser says these devices can operate in a 25 kHz bandwidth. Most events require a mix of both types.

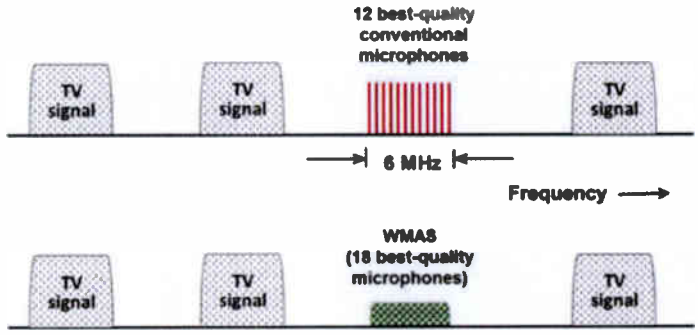
The company noted that the proposed 6 MHz channel could be configured for many combinations, such as 18 high-quality devices; four high-quality devices and 20 intercom channels; or two high-quality devices, 12 mid-quality links and 16 intercom channels.

To assure efficient use of spectrum, Sennheiser originally suggested that WMAS devices be required to operate with a minimum of 12 wireless mics in the 6 MHz channel, but now supports adoption of the standard found in ETSI 300-422.

First reactions

Early responses came from wireless manufacturers Alteros and Shure, as well as Microsoft, and the Aerospace and Flight Test Radio Coordinating Council, which must approve LPAS operations in one of the proposed bands.

All were generally supportive. Shure in particular has been expressing support and calling WMAS "a robust opportunity for boosting spectral efficiency" that could meet demand from broadcasters, music, theater, sports and many other applications.



Above
Sennheiser says WMAS can provide dozens of high-quality audio channels, or even 64 with quality similar to conventional mics, if extended range is not required. It says the number of audio channels and their "quality" depend on how the operator tweaks parameters as well as the noise level of the RF channel being used.

However, Alteros, Shure and Microsoft all said the minimum number of mics should be higher than the 12 suggested by Sennheiser. Also, Microsoft opposed operations in the unlicensed 6-megahertz portion of the 600 MHz duplex gap, which it views as critical for white space devices.

Alteros argued that the FCC should require a method that allows synchronization across multiple manufacturers' systems within the single frequency band. Microsoft agreed. "In particular, the ability of microphones from different vendors to plug into a single WMAS at a venue will lead to more efficient use of the limited UHF spectrum. Otherwise, venue operators conceivably might need to request multiple 6 MHz channels," it said.

Above
In this image from Shure, the blue line is the four analog signals, and the yellow is a WMAS "multiplex."

Sennheiser opposes that, saying that designing to accommodate the lowest common denominator may underutilize the spectral efficiency benefits of WMAS.

(Note, Alteros was a subsidiary of Audio-Technica, which closed Alteros in 2019 and stopped manufacturing that line of products. Audio-Technica has not filed comments since then. Contacted by Radio World, it declined comment.)

Summary of FCC proposals

Then this spring, the FCC issued its notice of proposed rulemaking. Comments were due in early August.

It asked for comment on allowing WMAS on a licensed basis in most of the bands where Part 74 wireless mics are permitted, including the TV bands, 600 MHz duplex gap and portions of the 900 MHz, 1.4 GHz and 6/7 GHz bands.

Also it proposes to allow WMAS to use a 6-megahertz maximum bandwidth, though the bandwidth of a device could be smaller if necessary.

But as suggested by Shure, the FCC proposed that WMAS devices comply with a spectral efficiency requirement of at least three audio channels per megahertz, which translates to 18 audio channels per 6 megahertz.

Shure believes that "top tier" pro systems currently supporting 14 to 17 channels per 6 MHz could expand to double or more to support 30+ channels. In-ear monitoring using OFDMA technology could triple the channels available in a continuous 2 MHz spectrum band.

(The FCC thought that Sennheiser's 12 channels per 6 megahertz would not represent an improvement over existing technology, and it said Alteros' suggestion of 24 channels might not be achievable in some cases.)

Regarding output power, the FCC proposed to allow WMAS to operate at the same maximum levels as other Part 74 LPAS devices, though Shure laid out arguments for higher power levels.

The commission proposed to conform its rules to a recently updated European standard for WMAS.

And though not prompted to do so, it asked whether WMAS should be permitted under Part 15 for unlicensed wireless operations in the TV bands, 600 MHz guard band or 600 MHz duplex gap. It asked about the impact of that on white space devices that share spectrum with unlicensed wireless.

Seeking flexibility

Excited about the rulemaking, Sennheiser came back with suggested tweaks.

It said the proposed minimum of three audio channels per megahertz would be counterproductive; it now recommends that the commission adopt an ETSI standard which states that WMAS must have a mode that supports (i.e., have the ability for) three audio channels per MHz, rather than a mandate for operation with a minimum number of mics.

"Adopting the ETSI standard would allow the commission to ensure that its spectrum efficiency goals are achieved, while simultaneously futureproofing its rules by granting users the flexibility to operate the system in other modes as required by new applications or workflows during operation."

Sennheiser now thinks that in most cases, WMAS will be operated using 24 or even more channels within a 6 MHz TV channel, where today eight conventional narrowband wireless mics generally fit into that channel. And it said WMAS could become even more efficient thanks to immersive audio and object-oriented audio mixing. So it thinks that codifying a minimum number of channels may be counterproductive.

Regarding Part 15, Sennheiser noted that WMAS is targeted for "challenging professional applications faced by licensed engineers," but said unlicensed operation could benefit all spectrum users. Shure too now says the FCC should authorize both.

And Sennheiser and Shure both emphasized that WMAS is not a solution to the crunch created by the FCC's reallocations in the 600 and 700 MHz bands. Both say the FCC should not have terminated another proposal that would have set aside a vacant low-band UHF channel in each market for wireless mics; they asked the FCC to "reverse course" on that.

Broadcasters are cautious

Other stakeholders weighed in.

The National Association of Broadcasters supports WMAS on a "secondary basis" with "prudent restrictions," given that WMAS "has a greater potential for interference" and is not compatible with legacy narrowband wireless deployments.

It said WMAS occupies more spectrum than traditional systems. "If there is only a single 6 MHz TV channel available for use at a breaking news event, one news crew using a WMAS system could occupy the entire channel and prevent coverage by other news organizations."

So NAB thinks the FCC should limit WMAS to situations where a large number of channels are needed and will be under control of one entity, such as big concerts and sporting events; and it suggested that a threshold of 10 channels in use by a single entity. It also said the FCC should only authorize base stations that prevent transmission when fewer than 10 paired audio devices are detected.

> **"NAB would limit WMAS to specific applications requiring many mics. SBE thinks it should be subject to frequency coordination."**

NAB thinks the FCC should require minimum efficiency of six audio channels per megahertz, equivalent to 36 in 6 MHz, because a minimum of three would be no meaningful improvement. It asked the commission to restrict WMAS to Part 74 licensees, and to limit the systems to 6 MHz bandwidth. And it agreed with an FCC proposal to limit power to 250 mW EIRP in the UHF TV bands, regardless of the bandwidth of the WMAS operation.

Meanwhile the Society of Broadcast Engineers said the use of WMAS should be subject to coordination with SBE local frequency coordinators, and said these systems should be operated only on a non-interference basis to incumbent wireless technologies.

The society, like the mic manufacturers, said the FCC should not view WMAS as a sufficient response to the "critical shortage" in spectrum for wireless.

Another question asked by the FCC is about the 6875–6900 MHz and the 7100–7125 MHz bands. The commission recently made the whole 6 GHz band available for unlicensed use to encourage next-gen Wi-Fi and the Internet of Things. So it asked whether WMAS should be authorized there and whether Part 74 wireless mics should even be permitted in those bands any longer.

Cisco Systems, Facebook, Microsoft and the Wi-Fi Alliance all told the FCC it should not permit WMAS in those bands, and some said the FCC should not allow Part 74 operations at all. But Shure disagreed strongly with any suggestion

that efficiency gains from WMAS opens the door to eliminating wireless access to the "6/7 GHz" bands, saying WMAS should not be viewed as a "cure all."

Reply comments in the NPRM are due Aug. 30.

Implications

If WMAS is approved, what next?

Joe Ciaudelli, director, spectrum & innovation at Sennheiser, told Radio World, "We plan to conduct extensive field demonstrations with industry veterans. This is not only a revolutionary technology. It also provides a highly flexible alternative workflow. Even though it is simple to use, we want ample opportunity to hear the feedback from the field. Systems will be is use well before the official public launch."

Ahren Hartman, VP of quality at Shure, urged interested parties to be vocal. And he hopes the FCC will allow unlicensed operation. "If unlicensed microphone users are not authorized to operate WMAS devices, that severely limits the available market for these products, which could jeopardize the technology commercialization," he said.

"If the FCC grants WMAS access to all wireless microphone users, licensed and unlicensed, and aligns the technical rules with the European ETSI version, the groundwork will be laid for manufacturers to produce WMAS products as soon as technically possible."

Both are enthusiastic about how WMAS will help engineers and frequency coordinators at very large events.

"The impact will be radical," Ciaudelli said. "First and foremost, the engineer can pack far more wireless links within a 6 MHz TV channel, using a single RF carrier — typically four or five times more, depending on how the operator sets parameters such as latency, link robustness and audio quality. It's also much easier to configure, plan and operate large multi-channel systems.

"Plus, the operator can essentially reuse spectrum resources," he continued. "You can set the mics that are being broadcast live at a given moment to have the majority of the resources, while the mics that will be used in the next segment of the event can be turned on and tested using minimal spectrum resources. When it's time for the next segment to go live, the associated mics will take over the majority of the resources.

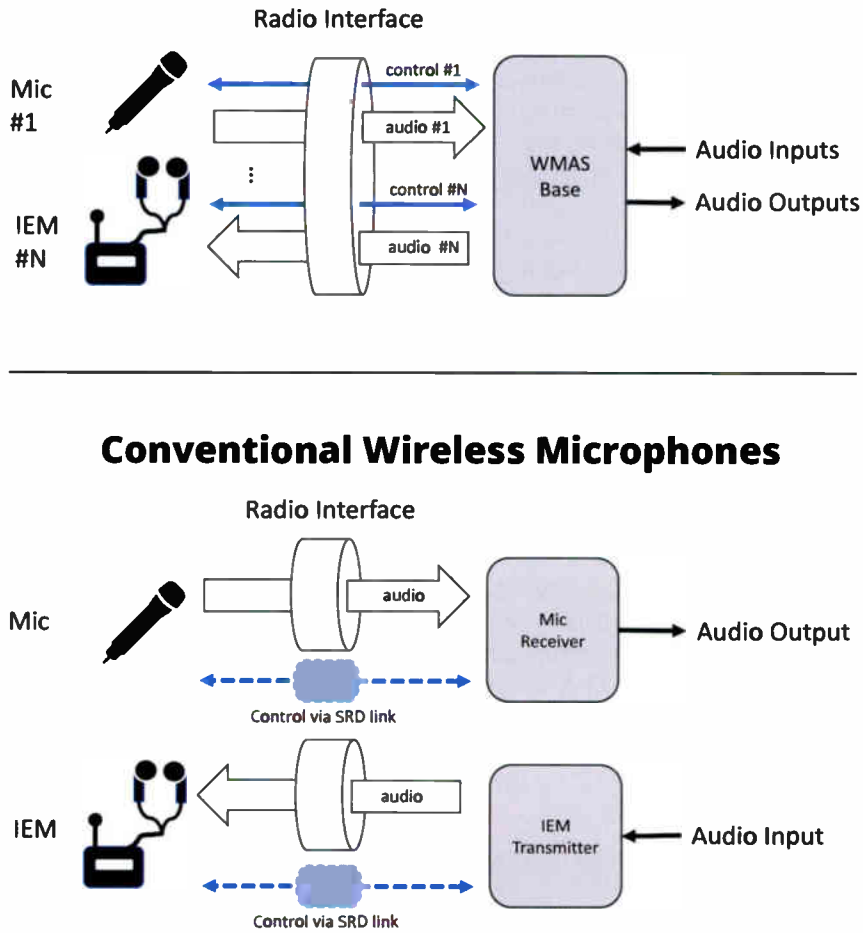
"It's different than the conventional approach that would use different channels for each set of mics. WMAS really shines for any multi-act mega-event like the Super Bowl, as well as for major music festivals or award shows."

Hartman said the impact will depend on the final rules. "If the FCC adopts the technical parameters proposed by Shure, WMAS will have the ability to dramatically simplify frequency coordination for any size events, including large ones like the Super Bowl. Since WMAS is more spectrally efficient than conventional narrowband transmission, it allows users to pack more microphone/IEM channels in the same spectrum, making even planning easier in congested cities," Hartman said.

"WMAS also manages intermodulation distortion (IMD) differently than narrowband transmission, essentially removing IMD from the planning, and therefore, simplifying frequency coordination. And finally, since WMAS can be designed to be bidirectional, both microphones and IEM channels can be packed into the same WMAS system, which makes spectrum planning simpler."

A question that surfaced early is whether WMAS may cause interference to services in adjacent channels.

"No, in fact, it's the opposite," Ciaudelli said. "WMAS transmits multiple wireless audio links on a single carrier at the same power output as one conventional narrowband wireless microphone. Because WMAS spreads its power over an entire 6 MHz TV channel instead of 200 kHz like a narrowband wireless microphone, the power spectral density is significantly lower, reducing risk to adjacent services."



Above
WMAS, top, offers a spectrally efficient alternative to the conventional link-based approach as shown at bottom. IEM refers to in-ear monitor.

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Pipe Dream Theatre produces immersive podcasts

Producers find new ways to bring audio productions to life

Writer

Ian Cohen

Covers pro audio, immersive audio, storytelling and music creation. Producer/host for Malibu's 99.1 FM KBUU.

During the global pandemic and under lockdown, theatrical stage director and performer Liz Muller had to find a fresh medium to express her creative vision. In starting this new chapter, she co-produced four immersive audio podcasts — "Three Ghosts" and the trilogy "AFTERWORDS."

"Three Ghosts" is a musical based on Charles Dickens' "A Christmas Carol." The cast included 46 people worldwide, and they all recorded independently during the height of the pandemic. It was released Dec. 20, 2020.

"AFTERWORDS" is described as "emotional, hilarious, scary, sad and totally vulgar stories." Episode 1, The Mouse & The Cat, was released on May 31, 2021.

No stranger to immersive productions in a theatrical setting, it wasn't a stretch for Muller to take the leap into audio storytelling. She already had the basis with Pipe Dream Theatre, the production company she co-founded with collaborator, partner, and composer C. E. Simon.

Live theater, immersive audio

However, it was a distinct challenge to be able to take live theatrical productions and adapt them to immersive podcasts.

Theatrical productions often involve 40 to 50 actors speaking their lines, vocalists, musicians, as well as a composer and sound designer.

As Muller explained, it was no small feat to be able to corral all of that talent, remotely, let alone secure recordings.

"To jump into 3D sound and decide to create immersive podcasts of that nature was an undertaking for certain," said Muller. "Everyone's got GarageBand, but a lot of people have never touched it, or they don't have a microphone, or they're recording on their iPhones, which is wild."

She added, "Nobody is ever in a studio with me. I record the entire show, all parts, all voices, everything. And then I chunk it up into phrases, and I send it out to all of the cast members. And then they record themselves independently. Then I receive massive amounts of dialogue, and then compile it."

Harnessing ambience

Muller said that because studio sessions weren't possible, all of the voiceover work is recorded by the talent on readily available USB microphones and other devices. Studio treatments are encouraged, and audio is cleaned up afterwards.

"Most of our cast use their own USB microphones, since they are all over the world," said Muller. "Some people are on their iPhones, and I've got them hanging a blanket up in a corner just to dampen the sound. And then we use effects and plugins, and get rid of gurgles, crackles, and whatever else is going on."

Muller explained that there are a lot of variables when talent record their parts remotely.

Right
Liz Muller and C. E. Simon

"We still get these files with this crazy ambient noise and we're like, 'Are you at the airport?'" said Muller. "And it's just like cleaning and mending, so that we can create the best product possible."

Muller said that there's also a challenge when you have so many recordings supplied from talent, all with different ambiences to contend with.

"Dealing with 50 different room ambiences is bonkers, and then getting that to sound like it's even remotely in the same place. Sometimes it's just trickery," said Muller.

Theater informs storytelling

Muller said that C. E. Simon is involved in all aspects of the production. This includes writing, score, podcast sound design, Foley and mixing.

"He is the composer, he writes the script, he does all of the final podcast sound design," said Muller. "He does all the Foley work and it comes from either libraries or subscription-based stuff. Or literally it's us with a digital Tascam DR40, running around making noises and slamming doors and going up stairs, recording all of that."

> **"As Simon and I are working on the audio telling of a story, we look at each scene as we might as stage directors."**

Muller and Simon both approach immersive audio storytelling much like they would approach a theatrical stage production or a musical.

"As a stage director, whenever I see words or hear music, I inevitably see the pictures of what people are doing," said Muller.

"As Simon and I are working on the audio telling of a story, we look at each scene as we might as stage directors. Such as when there are two people in a room. They're sitting down at a table and then they have to get up. There has to be movement. And now we're just doing it with sound instead of visual."

She added: "What we've learned is that it's very hard to put a sound right in front of you. If there's a human being in real life, right in front of you, you don't hear sound like this. You hear sound globally, like it's around you. A lot of times it's more effective to pan it to the side or put it behind you because it's a surprise."

Some nuts and bolts

In terms of recording her own voiceovers, Muller uses a Shure Beta 58A mic through a Focusrite Scarlett Solo inteface. The primary audio work is done in Logic Pro X. All of the assets from the remote talent are merged into Logic Pro by Muller. Muller then performs the pre-mixes for each scene, which includes the "comping" of the takes from the talent.

She puts together a first pass for timing, for tempo, and to capture the rhythm of scenes. Then she hands it off to Simon for further mixing and scoring. Simon uses the Accusonus ERA Bundle Standard for most of the audio repair. Once in the closing stages, Muller and Simon dial in the final mix of the podcast.

Muller said that if someone is planning to do immersive audio podcasts, especially on this scale, it's a good idea to have others to help.

"Anybody jumping into 3D audio podcasts, get yourself a team," said Muller. "It is not easy, and it's time-consuming. It's definitely different from working in stereo sound. But it's so worth it."

Mark Lapidus

is a veteran multi-platform media and marketing executive.

Getty Images/Thomas Barwick

Invest the time to renew your important relationships

It's too easy to neglect personal and professional development and growth

Above
Reach out to the people you care about, especially now after the experiences of the past 17 months.

It was the combination of pandemic isolation and the sound of cicadas that made me do it. I called a globe-trotting friend to whom I had not spoken since he and I dodged cicadas together in 2004.

I began with a question: "Quick! Where were you living 17 years ago?" He replied, "Can you give me a Zip code?"

It sure was fun catching up — and the success of that call led me to another, and another and another.

While it hasn't been 17 years since I'd spoken to other friends, I must admit I wasn't the best during the pandemic at calling people.

Fifteen months is a long time to be silent. Coming out of home isolation can be especially challenging for the introverts among us who gain energy from solitude and may have anxiety just thinking about returning to offices and in-person meetings.

Most of my calls have been returned by now, and it's been highly rewarding. That's why I'm telling you. Life is all about relationships; and while you may see what somebody is up to on social media or can find out some facts with an email, it's not the same as a real conversation via phone or a face-to face get-together.

What has this got to do with radio?

People to lean on

We are all so busy at our stations that too many of us neglect personal and professional development and growth.

From a personal perspective, our friends ground us, they help us navigate the long winding road of life. If you've got pals who will tell you the truth — especially about yourself — admit your good fortune and take advantage of this resource that's worth more than money. Living in your own echo chamber can lead to self-deception, loneliness and depression.

From a career perspective, it's your network of former workmates, acquaintances, advisors and true radio friends who will be there — when you need professional guidance and assistance, when you are ready to grow your career in your next job.

Choosing the next career move in radio has always been challenging. Worse, terminations can be unexpected, swift and merciless. Gone are the days of long severance payouts. Even what we believe are solid contracts can be challenged, sometimes ending in reduced settlement payments.

Keep up your business relationships — not just with your peers at your station or office, but with consultants, vendors, concert/music promoters, and the people in other departments of your company. If you don't, you can't expect much when you're in need. Relationships require active participation.

Career counselors will unanimously inform you that your network is the most important aspect of a successful job search.

> **"Living in your own echo chamber can lead to self-deception, loneliness and depression. Yet it's very easy to neglect personal and professional connections and growth."**

As it happens, I've lost a number of friends in the last two years. There's nothing like a few funerals to remind a person of their own mortality. It also dawned on me that I had not recently thanked people who have meant so much to me in my own career. Without being hired, mentored and remembered, I would not have gone far.

Over the years I've found that the folks who've had a positive impact on my life and career appreciate hearing from me. And there's nothing like a personal phone call or an in-person visit to renew that connection.

BROADCAST EQUIPMENT EXCHANGE

Radio, stick to your knitting

Author believes "woke smoke" from "woke capitalism" can put off listeners

Writer

Michael Saffrant

Communication lecturer and faculty director, WGSU(FM) at SUNY Geneseo, Rochester, N.Y.

Other viewpoints

Radio World welcomes comments on this or any article. Email *radioworld@futurenet.com.*

Many years ago, more than I care to remember, I heard a radio interview with a major rock artist of the time. I think it was the late Tom Petty. As I recall, the interviewer asked about his politics. His response was something along the lines of, "Man, I'm for everybody."

It was an astute reply by a savvy public figure recognizing: a.) He was a music artist, not a politician or expert on all things; b.) He had fans of, undoubtedly, many political stripes; and c.) He didn't want to alienate any of those fans, which was smart — if in a purely financial sense.

Four decades later, celebrities, corporations and, yes, even radio stations big and small seem to glom onto the latest social fad, fancy or frenzy by posting symbols such as colorful flags or raised fists.

Is it wise for radio stations?

Getty Images/Drone | Adobe Stock

> **"Think about your own motivation: Is it genuine? Or could it be seen as jumping on the bandwagon and pandering?"**

Signaling virtue?

The marketers might say so. After all, what's more important than connecting with the "youth audience" no matter the cause, wrongly viewing "youth" as a monolithic group.

I think they're wrong — and that Tom Petty was right.

Customizing social-media logos, for instance, to conform with the latest cultural or social fad often represents, at best, virtue signaling — potentially alienating up to half a station's listeners or more, if many — including those supporting a particular cause — view it as disingenuous corporate pandering, which, let's be honest, it frequently is.

Consider the reactions to some of the most inane virtue-signaling social-media posts by big corporations. When followers asked Oreo, for instance, "But what does this have to do with cookies?!" ... it's a really good question. And how many radio stations shared rainbow-flag images in June but were too afraid to post the U.S. flag on Memorial Day, Flag Day and Independence Day, even though most of their listeners are Americans ... living in America?

This isn't to suggest that radio stations should avoid ever taking a stand on anything, which would be rather bland — especially for formats, such as talk, with consistent political slants.

But, for others, especially music-formatted stations, first know your audience, and ask yourself beforehand: Is it worth it? Do I really want to potentially alienate up to half — or more — of my listeners? Then think about your own motivation: Is it genuine? Or could it be seen as "jumping on the bandwagon" and pandering, if, deep down, there's a good chance it is?

For many consumers, virtue signaling ("woke smoke" from "woke capitalism") is growing wearying and off-putting, with a strong chance of backlash. So whether selling Oreo cookies or trying to reach radio audiences in especially challenging times for legacy media, why make the effort even harder by potentially alienating half your customer base? Instead, consider adhering to the venerable business-school advice: "Stick to the knitting" — with what you know.

Tom Petty had it right: Just be "for everybody." RW

Good ground was all around

Mario Hieb's article about grounding in the Rocky Mountains (March 31 issue) brings to mind a moment dating back to the early 1960s, when I was ham radio operator K7VPK and attending ASU/Tempe's radio and TV program.

One of my experiences at that early age was meeting members of the "Mummy Mountain Radio Club." Among them was Arizona Sen. Barry Goldwater, ham radio call sign K7UGA.

I was invited to visit the club up in Scottsdale north of Tempe; when I did I was amazed at what I saw. All high-frequency operating bands had their own operating rooms/positions in a custom-built "clubhouse," the members of which included Goldwater, the CEO of the Donnelley Press in Chicago and other heavy hitters.

The estimated cost invested in building the clubhouse and obtaining equipment was north of $100,000, equivalent to nearly a million dollars today. Each ham band (80 meters, 40 meters, 20 meters, etc.) had its own operating room and complete Collins Kilowatt console. Simply the best of the best!

Now to the relevant part.

Since grounding was such a problem in mountainous Scottsdale, the question was how to be grounded effectively. Each operating position and custom antenna for each band to be worked needed to be grounded well for operating efficiency and safety.

The engineers installing the antennas suggested that the club members simply tap into a copper vein there on Mummy Mountain.

I was told that this took a bit of digging but it was done. The resulting electrical ground turned out, I was told, to be the best possible solution to the problem ... in fact, an exceptional one.

Ham radio? Sen. Goldwater and his friends made sure they had nothing but the best; and they produced signals from the MMRC that were heard around the world. As a matter of fact, the MMRC facility was used to run phone patches for GIs in Vietnam as well as Goldwater's home station on Camelback Mountain in Scottsdale for several years.

Don Watson, W5TNA
NewsTalkRadio.com
Pensacola, Fla.

How to submit
Comment on any Radio World content by emailing *radioworld@futurenet.com* with "Letter to the Editor" in the subject field.

Translators: A bridge to ... what?

This is in response to Michelle Bradley's commentary about digital on the AM band [at *radioworld.com*, type "Even More to All-Digital AM" in the search field].

Ms. Bradley's observations were right on the money. The problem is not knowing the end game for the AM revitalization initiative. If Chairman Pai saw FM translators as part of a transition or "bridge" rather than permanent, as he told a Kansas Association of Broadcasters gathering in 2016, when do AM broadcasters flash cut to digital and turn their translator licenses in? What is the sunset date for analog AM?

Michi made the point that, "The automotive and radio receiver industries need to make HD Radio standard equipment, not a 'luxury option,' like with some manufacturers." So when is the FCC going to step in and mandate HD Radio in all cars? It's the only way this will happen.

She indicated that moving a translator 250 miles is only going to harm the opportunity for more, new LPFM stations, and I agree.

Repurposing Lo-VHF for other uses is an idea whose time has come. The majority of TV broadcasters don't want the band. Existing Channel 6 TV stations can keep their channel or change it, but the FCC should not license any more TV stations on Channel 6, particularly to LDTV, nor give it away free as white space to parasites like Microsoft.

Let AM broadcasters migrate to an expanded FM band, formerly Channel 6, if they don't want to stay on AM, and forgo their translators and open the channels up to LPFM.

The truth is that the AM revitalization initiative was an Ajit Pai pet project. I don't think the Democrats are on board with giving more translators to AM broadcasters or letting these broadcasters keep their translators indefinitely. In fact, the AM revitalization Initiative might look entirely different once Jessica Rosenworcel is made permanent chairwoman and another Democratic commissioner is installed. That may be a good thing for the future of FM broadcasting.

Daniel Brown
Retired TV station owner

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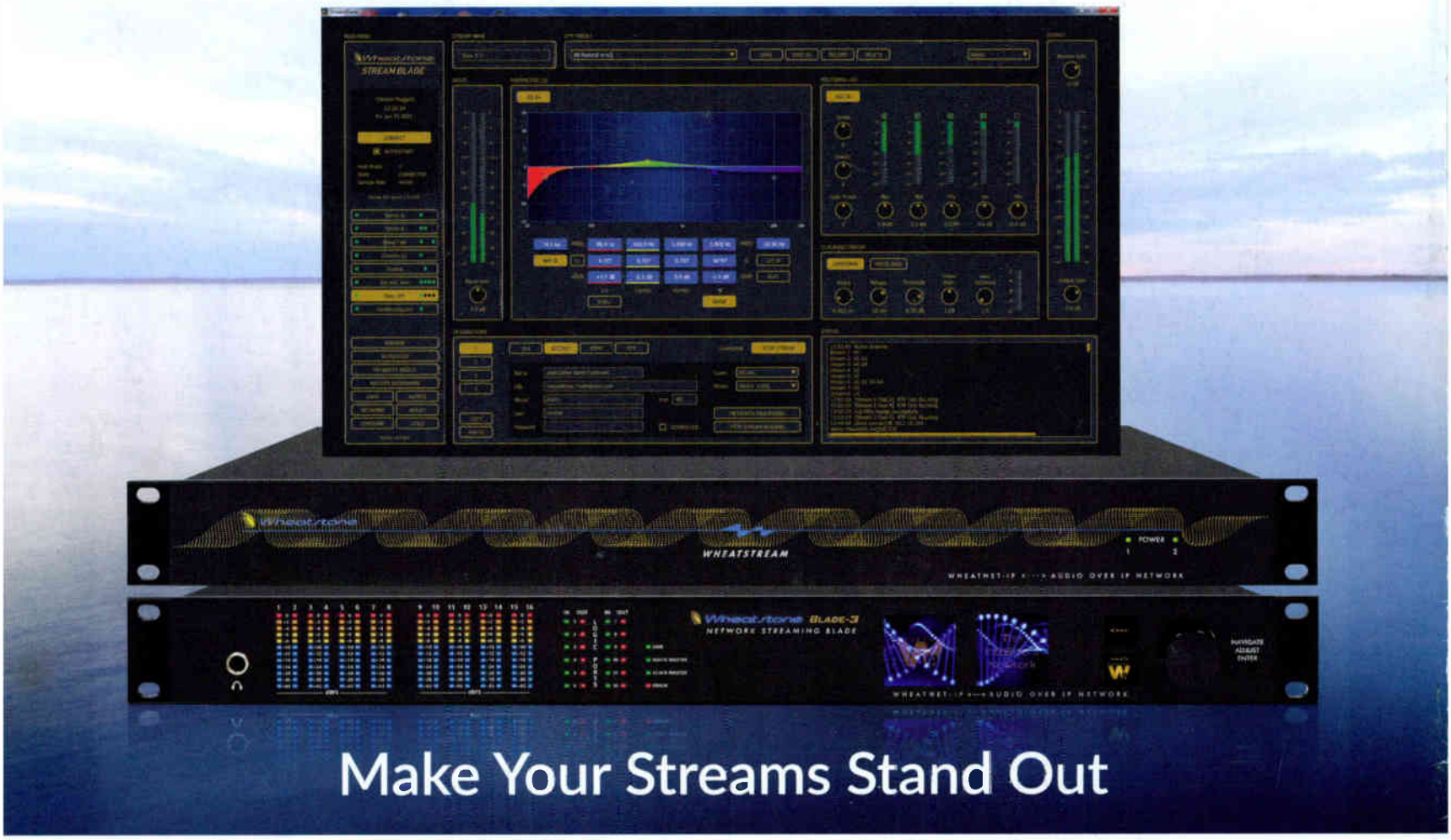

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