



RADIO WORLD

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Foreign Ownership Caps Under Scrutiny

NAB says FCC should modernize procedures used in evaluations of foreign ownership of radio and TV stations

The question of increased foreign ownership of U.S. broadcast properties has long been a sticky one. The rules on this have their roots in national security concerns about editorial control over broadcast transmissions during wartime. Broadcasters and regulators now are debating how to make it easier for radio and TV licensees to secure government OK in cases where indirect foreign ownership would exceed the statutory 25 percent benchmark that currently triggers FCC review.

In October the FCC proposed to streamline the process with rules similar to those that now apply to wireless licenses. Below we publish excerpts of comments filed by the National Association of Broadcasters in late December.

Note that rules about foreign ownership are complicated and the language can be arcane. Further, it's important to understand what is not being considered



for change; rules about direct ownership would not be affected. For more on that and further background, including observations by legal observer John Garziglia, see the box on page 8.

A link to NAB's full comments, including footnotes and source refer-

ences, appears at the end of the article. Excerpts of what NAB wrote:

NAB supports the commission's stated goal and applauds the commission's proposal to ease burdens faced

(continued on page 8)

Emergency Alert Text Messages via Radio

WPR adds EAS messages to metadata transmitted via PAD for display on HD and FM-RDS receivers

PROGRAM-ASSOCIATED DATA

BY STEVE JOHNSTON

The author is director of engineering and operations for Wisconsin Public Radio; this article is based on his presentation at last year's NAB Show.

Wisconsin Public Radio is a statewide radio service with three networks airing on 34 stations. WPR successfully has been transmitting Program Associated Data text to HD

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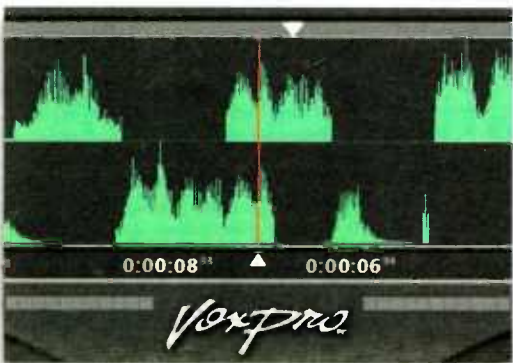
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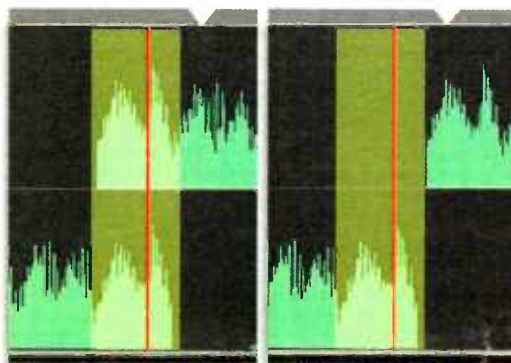
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Website: www.radioworld.com
 Email: radioworld@nbmedia.com | Telephone: (703) 852-4600
 Business Fax: (703) 852-4582 | Editorial Fax: (703) 852-4585

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EDITORIAL CONTRIBUTORS

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CIRCULATION

GROUP DIRECTOR, AUDIENCE DEVELOPMENT Meg Estevez
 CIRCULATION MANAGER Kwentin Keenan
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SUBSCRIPTIONS

Radio World, P.O. Box 282, Lowell, MA 01853
 TELEPHONE: 888-266-5828 (USA only 8:30 a.m.–5 p.m. EST)
 78-667-0352 (Outside the US) FAX: 978-671-0460
 WEBSITE: www.myRWNews.com
 EMAIL: newbay@computerfulfillment.com

CORPORATE

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ADVERTISING SALES REPRESENTATIVES

U.S. REGIONAL & CANADA: John Casey, jcasey@nbmedia.com
 T: 212-378-0400, ext. 512 | F: 330-247-1288
 U.S. REGIONAL: Michele Inderrieden, minderrieden@nbmedia.com
 T: 212-378-0400, ext. 523 | F: 301-234-6303
 EUROPE, AFRICA & MIDDLE EAST:
 Raffaella Calabrese, rcalabrese@nbmedia.com
 T: +39-320-891-1938 | F: +39-02-700-436-999
 LATIN AMERICA: Susana Saibene, susana.saibene@gmail.com
 T: +34-607-31-40-71
 APAN: Eiji Yoshikawa, callem@world.odn.ne.jp
 T: +81-3-3327-5759 | F: +81-3-3322-7933
 ASIA-PACIFIC: Wengong Wang, wwg@imaschina.com
 T: +86-755-83862930/40/50 | F: +86-755-83862920
 CLASSIFIEDS: Michele Inderrieden, minderrieden@nbmedia.com
 T: 212-378-0400, ext. 523 | F: 301-234-6303
 LIST RENTAL: 914-925-2449, danny.grubert@lakegroupmedia.com

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NEWS

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Special Translator Window Set to Open

Here are dates and frequently asked questions about the 250-mile windows

BY SUSAN ASHWORTH

On your marks ... get set ... for the next chapter in "The Great Translator Rush."

At the tail end of 2015, the FCC announced dates for two windows during which AM stations in the United States can apply to modify or relocate FM translators.

As specified in its AM Radio Order in October, the commission directed its Media Bureau to create the windows. The first will last six months, starting Jan. 29, 2016, and closing July 28 at 11:59 p.m. (EDT). The second is half as long; it will open July 29 and close Oct. 31.

The first window is for Class C and D AM licensees; the second is for AMs

of any class.

Applications will be processed on a first-come, first-served basis, and applications from the first window will have "cut-off" protection from filings in the second window.

NON-RESERVED

In its public notice, the FCC reiterated that the windows are intended to provide AM stations or permittees the opportunity to acquire and relocate one authorized FM translator station in the non-reserved band — 92.1 MHz and above — by up to 250 miles. Applications for translators now authorized to operate below that frequency will not be accepted.

The Media Bureau clarified that only one application may be filed by or on

behalf of each AM station; an AM may be listed as the primary station on only one application filed in one (but not both) of the windows.

To participate in either window, applicants are required to file FCC Form 349 electronically as a minor mod application. To distinguish these unique applications from typical minor mods, you must indicate in your Exhibit I that the proposal is a "250-mile window application."

In addition, a modification window applicant that is not currently the licensee of the AM must state that it has entered into a rebroadcast agreement with the primary station licensee.

The Media Bureau also laid out specific guidelines and no-nos:

It will dismiss as premature any application proposing a major site change before the modification windows open. It will dismiss any that are

(continued on page 6)

More Radio, More Voices

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"MMTC's Keenan Believes in Radio's Potential" — Kim M. Keenan is president/CEO of the Multicultural Media, Telecom and Internet Council. Late in 2015 Radio World checked in on MMTC's activities, including its advocacy work at the FCC. It's at radioworld.com/keenan

"NATE Expects Exciting Year in Store for 2016" — Todd Schlekeway, executive director of the National Association of Tower Erectors, lays out the agenda including a new series of grant-enabled training courses throughout the country. See radioworld.com/nate-2016



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"Japan Offers Long-Term Model for AM" — The U.S. radio industry continues to digest the impact of the recent AM revitalization order. Radio World asked REC Networks founder Michelle Bradley to discuss her observations, particularly regarding the FCC's multi-step plan involving translators. See radioworld.com/japan-am



"Repack Faces Tower Crew Shortage" — It's a TV story, yes; but if you rely on tower crews, you should be aware of what's going on that might affect their availability. Visit radioworld.com/shortage

Public Media as Critical Services

Pubcasters can seek help from FEMA after emergencies or natural disasters

Score one on Capitol Hill for public radio for highlighting its importance in times of emergency.

President Obama in December signed legislation clarifying that not-for-profit radio and TV stations are eligible for federal emergency support.

The purpose of the Emergency Information Improvement Act of 2015, according to a Senate committee summary, is to make clear that a current law authorizing assistance to nonprofits that provide critical services to communities may include such stations.

"While nonprofit broadcast facilities currently may meet the statutory criteria for eligibility for this assistance, the law does not specifically identify them as eligible and some such facilities have faced significant delays in receiving assistance in the past," the summary states.

"This bill would eliminate any potential ambiguity by explicitly listing broadcast facilities as an eligible provider of critical services."

NPR helped push for this in its role as a membership organization for the public radio system. It researched the issue and proposed a solution to members of

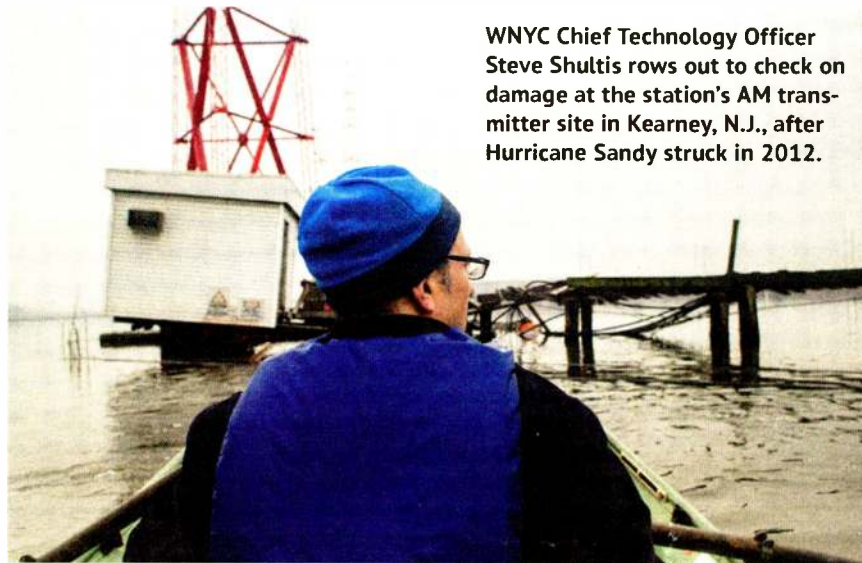
Congress.

Vice President of Policy and Representation Mike Riksen noted that more than 98 percent of Americans have access to a public radio or TV signal. "Whether it's remote, rural areas of our nation or densely populated cities, public media has become an essential and reliable source for timely and accurate

information often related directly from emergency management officials and first responders."

While NPR made its push on behalf of public broadcasting, Riksen said the legislation benefits all non-profit licensed broadcasters.

The legislation was bipartisan and enjoyed the backing of at least one GOP



WNYC Chief Technology Officer Steve Shultis rows out to check on damage at the station's AM transmitter site in Kearney, N.J., after Hurricane Sandy struck in 2012.

FROM THE EDITOR



Paul McLane

candidate for president. It was sponsored in the upper chamber by Sens. Cory Booker, D-N.J., and Ted Cruz, R-Texas, and brought up in the House by Reps. Steven Palazzo, R-Miss., and Brian Higgins, D-N.Y.

The underlying law in question is the Robert T. Stafford Disaster Relief and Emergency Assistance Act, which took effect in 1988. Under that law, the Federal Emergency Management Agency provides disaster assistance to eligible state, tribal and local governments as well as to certain types of private nonprofits through a Public Assistance Grant Program.

In the event of disaster, the program helps governments and organizations cover cost of things like debris removal, protective measures and repair, and replacement or restoration of facilities owned by private nonprofits that provide critical services.

But what is a "critical service"? Power and water, certainly; education and communications, too; but what about radio broadcasting?

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"In recent years, several private non-profit broadcast stations have sought financial assistance through this FEMA program, including in the aftermath of Hurricanes Sandy, Katrina and Isaac," the committee report explained. "However, some of these entities have encountered difficulties in receiving timely assistance, despite the critical emergency services that those broadcasters provided to their communities."

It noted that when Hurricane Sandy struck in 2012, New York Public Radio, which has seven radio facilities in New York and New Jersey, sustained significant damage. It applied for repair funding under the assistance program but was denied at first because it didn't qualify as an eligible non-profit "communications utility/facility."

Ultimately FEMA found the broadcaster to be eligible, "given the critical nature of the services provided by the facility and the impact to the health and safety of the general public," the report states. "Until the facility was fixed, NYPR was forced to operate on low power, significantly reducing its audience reach."

Riksen said this experience — at WNYC(AM) in particular — revealed the ambiguity of the statute. "It took an initial rejection and lengthy appeal to put the station in the position to recover. We used the experience of WNYC as a rationale to clarify the law so that any station that in the future experiences damaged facilities or equipment during a national disaster will be better situated to recover."

And it's not just big-market signals that are affected. In a similar case, FEMA initially denied a request from the Hancock County Amateur Radio

NEWS

Association for funding to repair its low-power FM station in Kiln, Miss., after Hurricane Isaac in 2012.

The bill's backers note that local stations can provide critically important public emergency communication services before and after disasters.

"According to a media report, during Hurricane Sandy, some radio stations in coastal areas experienced audience number increases of up to 367 percent.

include them as critical services deserving of FEMA help? It seems doubtful to me. I'm not aware of any push for such a change; but past efforts to grant radio/TV stations "first responder" status have failed on the Hill. Such a bill would help stations obtain priority access to equipment, fuel and electricity after disasters; but the idea came up against resistance from police, fire and other emergency service interests. That's a topic for another

The legislation clarifies that public and other non-profit radio stations can indeed seek federal support in certain emergency circumstances.

as the loss of power in many areas forced listeners to turn to radio to receive key information about the storm. At the same time, broadcast facilities can suffer extensive damage during major disasters."

The report noted that Hurricane Katrina, for example, "severely damaged broadcasting infrastructure in the Gulf Coast region, including 50 percent of area radio stations and 44 percent of area television stations. Given the important role these facilities can play in a disaster, it is important that these facilities are repaired as quickly as possible after a disaster."

(If you work in commercial radio, you may be asking, "What about us?" But the Stafford Act is about assistance to non-profits, and commercial broadcasters are not part of the designation. The revision simply clarifies that non-profit broadcasters are covered. Could commercial broadcasters someday convince lawmakers to

day, but it's one reason I encourage broadcasters to avoid claiming for themselves the label of "first responders," preferring "first informers" instead.)

I asked Riksen what form "federal emergency support" to pubcasters might take. "We're not exactly certain at this point," he said, "but we believe stations that experienced building or equipment damage resulting from an incident that was declared a national disaster will be able to recover all or some of the expense in repairing that damage."

Riksen said broadcasters will learn about how to take advantage of the statutory change as stations and the public radio system gain experience in working with FEMA. "But initially, with the president's action to sign this legislation into law on Dec. 18, stations should be aware that FEMA disaster relief is now a part of a disaster recovery plan."

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TRANSLATORS

(continued from page 3)

filed during the first window proposing to rebroadcast a Class A or Class B AM station. It will dismiss any application that proposes to rebroadcast an AM that has already been listed in a prior modification window application as primary station. And it will dismiss any that seeks to modify an FM translator station currently authorized in the reserved band.

The bureau also released a series of tools to help stations locate eligible FM translators and identify rule-compliant translator channels. These tools — which include a translator search tool and channel finder — are available on the FCC website at www.fcc.gov/media/radio/amrevitalization.

The translator search tool will allow an AM licensee to enter preferred relocation sites at or near its AM transmitter site, and will identify translator stations authorized at locations up to 250 miles away. The second tool, the translator channel finder, identifies channels that are tentatively available for use by FM translators at any location.

FCC FAQ

The bureau also addressed a series of oft-answered questions in an FAQ. Radio World republishes it below. The commission reminded applicants to refer first to its Oct. 26 public notice for additional information regarding eligibility requirements, application processing standards, construction recruitments and operational requirements. Read that at <http://tinyurl.com/fcc-trans>.

Q Is an AM station that already owns or leases one or more translators eligible to file an application in a Modification Window?

A Yes. AM stations that currently rebroadcast on one or more FM translators are permitted to participate in one of the modification windows.

Q The modification windows allow AM licensees to relocate one non-reserved band FM translator station up to 250 miles. How is the 250-mile limit measured?

A The 250-mile limit will be measured from the existing translator transmitter site to the proposed transla-

tor site; the 250-mile limit is not measured from the translator site to the AM station's transmitter site.

Q Can an AM station relocate a translator during the modification windows to any channel or must the translator stay on the original or adjacent channel?

A The FM translator modification application may specify any non-reserved band FM channel (221–300). However, the proposed facilities must comply with the commission's translators technical rules, 47 C.F.R. § 74.1201–74.1290.

Q Can a translator, once obtained and relocated, be changed to rebroadcast another AM or FM station?

A Not for the first four years of operation. Any FM translator station modified and/or relocated under the modification windows must rebroadcast the specified primary AM station for at least four years, not counting any periods of silence by the primary station.

Q Can an AM station file an application in one of the modification windows while the AM station itself has a modification application pending, and subsequently use the translator at the AM station's future site?

A The proposed FM translator facilities must satisfy the "fill-in" restrictions applicable to AM/FM translator rebroadcasting. The AM station may rely on either its licensed or permitted facilities to satisfy these restrictions. However, a relocated FM translator may be modified subsequently to use an AM station's future authorized transmitter site.

Q If a reserved-band translator has an application pending to move to the non-reserved band, can it participate in the modification windows?

A Only translators authorized to operate in the non-reserved band as of the date of modification application filing are eligible for the modification windows. New unbuilt translator stations are eligible for the modification windows, i.e., eligibility is not limited to translator stations that are licensed and operating.

Q What if two or more applicants file for the same channel on the same day?

A Pursuant to 47 C.F.R. §74.1233, applications filed for the same channel on the same day are considered mutually exclusive.

Q How will the bureau resolve applications that are mutually exclusive?

A Pursuant to 47 C.F.R. §74.1233(d)(1), mutually exclusive applications must be resolved through settlement or technical amendments.

Q Can a mutually exclusive applicant file an amendment to move to a different non-reserved band channel to resolve a conflict with a mutually exclusive proposal?

A Yes. Amendments to move to any rule-compliant channel will be accepted.

Q If an AM station files a modification application and the transaction to acquire the proposed FM translator fails for any reason, can the AM station dismiss the original application and re-file a second modification application specifying a different translator station, provided the modification window has not closed? Similarly, if the staff dismisses or rejects an application for any reason, can the AM station re-file its application?

A No. Only one application may be filed by/on behalf of each AM station in either of the modification windows; applicants will not be given an opportunity to re-file under any circumstance.

Q In the AMR Order, the Commission has proposed that an AM station may use a FM cross-service fill-in translator where the FM translator's coverage contour is contained within

the greater of the 2 mV/m daytime contour of the AM station or a 25-mile radius centered at the AM transmitter site. May applicants rely on the proposed "fill-in" rule change in selecting an FM transmitter site?

A No. As stated in the October public notice, to participate in the modification windows, the FM translator station's proposed 60 dBu contour must be contained within the AM station's 2 mV/m daytime contour and may not extend more than 25 miles from the AM transmitter site.

Q In the AMR Order, the commission modified the minimum efficiency rules and redefined Class D stations as those operating with a nighttime RMS less than 107.5 mV/m at 1 kilometer. Based on the change, are existing Class D stations, which did not meet the former minimum of 141.0 in Vm/km, but which exceed the new minimum of 107.5 mV/m at 1 kilometer, automatically reclassified as Class B stations?

A No. The newly adopted rules will not be applied retroactively to existing stations. Thus, an AM station currently classified as a Class D station, including those that operate with a nighttime RMS exceeding 107.5 mV/m at 1 kilometer, may file an application in the first modification window. A station seeking re-classification as a Class B station must file a minor change application demonstrating compliance with all applicable rules.

NEWSROUNDUP

IPAWS: The next IPAWS/EAS regional test is set for Feb. 24 and involves 22 states, two territories and the District of Columbia. It will take place while many broadcasters are in the nation's capital for an NAB State Leadership Conference. The area affected includes not only much of the populous New York/New Jersey metroplex but also "Tornado Alley" states in the mid-west and Gulf Coast hurricane states. The group is Alabama, Arkansas, Delaware, D.C., Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Louisiana, Maryland, Mississippi, Missouri, Nebraska, New Jersey, New York, North Carolina, Oklahoma, Pennsylvania, Puerto Rico, South Carolina, Texas, the U.S. Virgin Islands and Virginia. The test is Wednesday, Feb. 24 at 2:20 p.m. (ET)/1:20 p.m. (CT). The message will use the National Periodic Test event code with an audio message that sounds much like a typical Required Monthly Test text. The next national IPAWS/EAS test is planned for December.

PANDORA: The company closed on its acquisition of key assets from Rdio and brought approximately 100 former employees of the audio service on board. The publicly traded firm completed its \$75 million acquisition of technology and intellectual property from Rdio, which closed service in December. A bankruptcy court approved Pandora's acquisition the same day. "This move will accelerate Pandora's plan to substantially broaden its subscription business and roll out a multi-tier product offering by late 2016," it stated. Separately, the company ended 2016 by dropping a legal fight against BMI, signed performance rights deals with BMI and ASCAP, and learned, along with other webcasters, its new streaming rates.



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FOREIGN

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by broadcasters. There is no legal or policy basis for broadcasters to be subject to disparate regulations that impede their ability to attract foreign investment.

Approximately 70 to 80 percent of publicly traded shares are held in "street name," which, under the commission's current broadcast radio and TV foreign ownership rules, puts that sizeable capital off limits to broadcasters. Modernizing the foreign ownership rules will better account for this reality and its impact on today's communications marketplace, enhancing the ability of broadcasters to attract investment capital and compete in the marketplace, and encouraging diversity of ownership and greater innovation. ...

A more clearly defined review and approval process will provide licensees greater transparency and predictability. As the commission has previously stated, providing a clearer statement about foreign ownership policies has "the potential to spur new and increased opportunities for capitalization for broadcasters, and particularly for minority, female and small business entities and new entrants." Uncertainty in the commission's approach to reviewing broadcasters' foreign ownership petitions leads to risks that deter investments in broadcast companies.

[Under the heading, "Revising the current foreign ownership rules and policies will encourage competition in the communications marketplace, increase investment in the broadcast industry and enhance diversity of services and ownership," NAB wrote:]

Though the commission's current rules ... provide that the commission will consider indirect foreign investment in broadcasters above the 25 percent threshold, practice has demonstrated that in today's economy the rules unduly restrict broadcasters' ability to compete in the communications marketplace and obtain needed investment.

A: Modernizing the Restrictions on Foreign Ownership Will Allow Broadcasters to Better Compete in Today's Marketplace

When the commission amended the foreign ownership rules in 2013 for wireless licensees, it recognized that "foreign investment has been and will continue to be an important source of financing for U.S. telecommunications companies, fostering technical innovation, economic growth and job creation." The same rings true for broadcast TV and radio companies. Providing broadcast companies with the same opportunity as other commission regulatees for new sources of financing is not only fair, but also it will promote robust competition in the communications marketplace, affording broadcasters needed resources to invest more in their existing program services and to finance new diverse offerings.

Modernizing the commission's foreign ownership rules also has the potential to promote increased diversity of ownership. Women and racial and ethnic minorities continue to be underrepresented in the ownership of broadcast-

ers, and as NAB, minority organizations, the commission and Congress have all recognized, access to capital is a leading — if not the leading — barrier to business ownership for women and minorities, in broadcasting and small businesses more generally. ...

Amending foreign ownership limitations will also help foster reciprocal opportunities for American broadcasters to invest in foreign radio and television markets. The limitations on foreign ownership of American broadcasters ... "[have] been used over the years as an excuse by other nations to retain indefensible trade barriers that harm U.S. companies." NAB, and the more than 30 national minority and civil rights organizations that have previously commented, echo the commission's goal that by amending domestic restrictions on foreign investment, "other countries ... will liberalize restrictions on investment in their media market" so that domestic entities may invest abroad.

B: NAB Applauds the Commission for Recognizing that Broadcasters Are Unduly Burdened Under the Current Broadcast Foreign Ownership Standards

... [O]ther media outlets offer content to consumers without any foreign ownership limitations, and other telecommunications companies, such as wireless providers, operate under the more flexible 2013 standard. As the commission recognized in its 2013 Second Report and Order, the 25 percent threshold, for instance, limits the flexibility of companies to sell their equity securities, unnecessarily impedes foreign investment and "may be unnecessary to protect against potential harms to competition or other relevant public interest concerns."

The commission was correct to amend the rules in 2013, and there is no rational basis for broadcasters to be subject to disparate regulations. ...

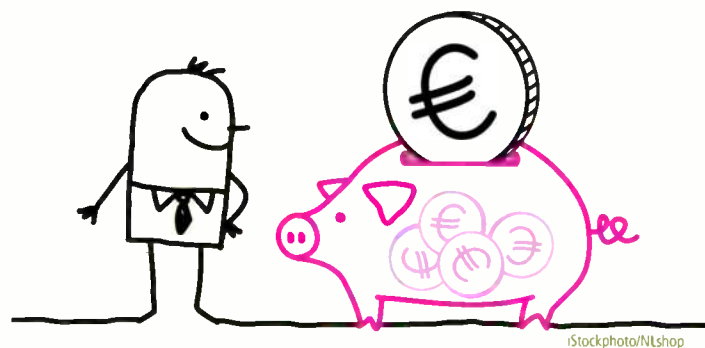
C: Under Revised Foreign Ownership Rules, the Commission and Executive Branch Agencies Will Retain the Ability to Determine Whether Investments Pose Any Security Risk

The commission has asserted that there are unique public policy and national security concerns in the broadcast context, and has used this rationale as justification for maintaining stricter foreign ownership policies for broadcast companies.

This concern is misplaced for at least two reasons. First, the proposals in the notice address standards for indirect foreign ownership under Section 310(b)(4) [of the Communications Act], not direct ownership under Section 310(b)(3). Second, the revised rules will encourage investment by publicly-traded corporate investors, many of whom are domestic, and few of whom have a large enough share in any given company to exercise real power to influence content or operations decisions.

Ultimately, even in the context of revised foreign ownership rules, the commission and executive branch agencies will retain the ability to evaluate transactions and protect against security threats. Broadcasters will still need to certify compliance. As Commissioner

(continued on page 10)



istockphoto/NLshop

MONEY MATTERS

Many U.S. broadcast advocates feel that easier access to foreign capital would help the industry grow and also benefit smaller and minority-owned organizations.

Rules about this are complicated. Further, it's important to understand what is not being considered for change; direct ownership would not be affected. Communications lawyer John Garziglia of Womble Carlyle Sandridge & Rice emphasizes that only a U.S. citizen can directly own a broadcast station and that for corporations and other licensee entities, there is a 20 percent limit on direct ownership by non-U.S. citizens.

Those parameters would not change; discussion in the accompanying article involves a more flexible 25 percent limit on indirect ownership of parent entities. Broadcasters feel the commission's rigid application of this cap has been too hard and fast, essentially creating an unintended ceiling on beneficial investment, though the FCC in 2013 emphasized that it considers its benchmark merely a "trigger" for closer review.

The process of approving exceptions also came under scrutiny when Pandora asked the commission to OK its acquisition of an FM station in South Dakota; Pandora could not verify that its parent met the 25 percent limit. The commission approved an exception in the case, which helped raise awareness of the foreign ownership waiver process (though news coverage focused on Pandora's strategy to seek music royalty rate relief).

In October 2015 the FCC proposed to simplify things by proposing streamlined rules for radio and TV that are similar to those for common carrier licenses. NAB's comments in the accompanying article were filed in response.

Among other things, NAB says "nonattributable" foreign ownership should be allowed up to 49.99 percent without FCC approval; these interests are generally non-voting stock or certain "insulated" limited partnership interests that don't carry a vote or other indicia of control.

The changes also set out procedures under which a broadcaster could ask for approval up to 100 percent indirect foreign ownership in the licensee entity. But it's unclear what the implications of this might be or whether the commission would seriously consider such a request.

The commission also is studying the methodology licensees use to assess compliance with the 25 percent benchmark; and it made several other proposals.

Overall, Garziglia told Radio World the actions being discussed are "unlikely to open the floodgates" to broader foreign station ownership, as the FCC will continue to consider national security, law enforcement, foreign policy and trade policy issues that may be raised by proposed foreign ownership. The revised foreign ownership review procedures are likely, however, to open lucrative new sources of investment capital for the U.S. broadcasting industry, he said.

Read the FCC NPRM at <http://tinyurl.com/rw-fcc-foreign>. Read NAB's comments in full at <http://tinyurl.com/rw-nab-foreign>.

— Paul McLane

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FOREIGN*(continued from page 8)*

Rosenworcel noted, “just as horses and bayonets are not the tools of modern warfare, the cyber threats we face today are not especially well-guarded by this prohibition. Moreover, as scores of civil rights groups have acknowledged, this historical anomaly may have the effect of diminishing investment in small and minority-owned broadcasters.” ...

[From the section “NAB supports the FCC’s stated intent to harmonize broadcast foreign ownership policies with common carrier and aeronautical radio licensee policies”:]

A: Broadcasters Should be Permitted to Seek Commission Approval for up to 100 Percent Aggregate Foreign Ownership and for Approved Investors to Later Acquire a 100 Percent Controlling Interest

Specifically, the commission should harmonize its petition requirements, subject to the exceptions described herein and set forth in the notice, by enabling broadcasters to file petitions seeking commission approval for (i) up to 100 percent aggregate foreign ownership by unnamed and future, nonattributable foreign investors in the controlling U.S. parent of a broadcaster and (ii) any named foreign investor that proposes to acquire a less than 100 percent controlling interest to increase the interest to 100 percent at some time in the future.

B: The Commission Should Adopt a New Presumption Permitting Nonattributable Foreign Ownership in Broadcasters of up to 49.99 Percent Without Prior Commission Approval

... On its face, Section 310(b)(4) provides the commission with a means of fundamentally reducing the regulatory burden imposed by the statute while fully achieving its public policy objectives.

As a result of the multitude of disparate media resources available to U.S. consumers today, Section 310(b)(4)’s foreign ownership limitations do not meaningfully limit the ability of foreign entities to make programming and information available to the American public.

In addition to television and radio, which are subject to foreign ownership limitations under Section 310(b), U.S. consumers also regularly access programming, news and other information via cable and satellite television, satellite radio, and an ever increasing variety of Internet audio and video streaming and download services, including smartphone and smart TV apps. None of these alternative media are subject to foreign ownership restrictions.

Accordingly, any role that Section 310(b) may once have had in enabling the

commission to control the ability of foreign entities to disseminate programming in the United States has been extremely diluted by past (cable and satellite television and radio) and more recent (Internet) technological advances. Moreover ... Section 310(b)’s foreign ownership restrictions competitively disadvantage broadcasters by restricting their access to foreign capital relative to these competitors.

Section 310(b)(4) provides the commission with ample authority to take into account the evolution of the media

Even if the commission maintains that it has a continuing obligation ... to protect the public interest by regulating the ability of foreign entities to influence the programming decisions of broadcasters, the proposed blanket presumption does not undermine this objective because it only would be applicable to nonattributable interests. The commission repeatedly has held that its broadcast attribution rules “seek to identify those interests in or relationships to licensees that confer on their holders a degree of

frequency with which broadcasters are required to file petitions, thus reducing unnecessary regulatory burdens on broadcasters and agency staff.

Second, this approach will provide broadcasters with additional “headroom” when determining their compliance with Section 310(b)(4). Once a broadcaster has determined that it has no attributable ownership, which ... can be accomplished through publicly available Securities and Exchange Commission filings, and that it is more than 50 percent domestically owned and controlled (rather than the current 75 percent), the broadcaster will not need to continue to expend resources in an attempt to determine the identity and citizenship of any additional interest holders.

NAB also argued that the commission should extend to broadcasters certain petition procedures that are now applicable to wireless licensees. The section deals with attributable interest disclosures, retroactive filings, calculation of voting interests of “uninsulated limited partners” and other rule details. Also, in discussing methodologies for certifying foreign ownership levels, NAB said the FCC should adopt a “practical, workable and realistic mechanism” to determine compliance: “As the commission recognized in the 2015 Pandora Radio LLC proceeding, the procedures currently required of broadcasters are unduly burdensome and unnecessary,” it wrote. And NAB said the FCC should provide guidance about how often broadcasters are required to conduct foreign ownership studies.

Read NAB’s comments at <http://tinyurl.com/rw-nab-foreign>.

“There is no legal or policy basis for broadcasters to be subject to disparate regulations that impede their ability to attract foreign investment.”

landscape when implementing the statute. Rather than imposing a 25 percent cap on foreign ownership absent a commission waiver of the cap, Section 310(b)(4) instead requires the commission to affirmatively determine that the public interest would be served by the refusal or revocation of a license if the licensee has indirect controlling foreign ownership in excess of 25 percent. Absent such a determination by the commission, licensees presumptively may exceed the 25 percent indirect foreign ownership threshold set forth in the statute. Thus, the commission should promulgate the proposed rule that, on a generally applicable, blanket basis, nonattributable foreign ownership in a broadcast licensee of up to 49.99 percent is not contrary to the public interest.

influence or control such that the holders have a realistic potential to affect the programming decisions of licensees or other core operating functions.” Accordingly, none of the nonattributable foreign interest holders in a broadcaster that would be newly permitted without prior commission approval under this approach will have the capability to influence programming decisions. Therefore, this additional liberalization of the commission’s implementation of Section 310(b)(4) does not pose any potential public interest harms.

In addition to not impeding the commission’s policy objectives under Section 310(b)(4), such a blanket presumption would provide affirmative and practical benefits to broadcasters.

First, it would clearly decrease the

technology officer.

NEWSROUNDUP

CEI JOINS HODGE: Ernie Jones is gone but Consolidated Engineering Inc., the business he helped to lead, will continue in a new incarnation. Hodge Structural



Engineers will merge with CEI. Terms were not public. HSE is a structural engineering consulting firm that offers engineering services for buildings, towers and tanks, among others. Jones died in an accident atop a tower in Oklahoma City, as RW has reported. Dave Davies and Keith Barnett will remain with the firm. HSE and CEI are based in Indiana.

NAB LABS: A technology arm of the National Association of Broadcasters invested in Yet Analytics. NAB Labs says the Baltimore-based company, founded in 2014, uses open source technologies to provide platforms for multisource collection and analysis of human and machine performance data in Fortune 500 companies and other organizations. “The technology has the potential to help broadcasters identify workflow efficiencies and provide audience measurement enhancements that detect viewer preferences and facilitate target advertising,” stated Sam Matheny, NAB chief

SATELLITE: SiriusXM trumpeted its results, saying it ended 2015 with 29.6 million subscribers, a net growth of 2.3 million, more than it had projected. CEO Jim Meyer hailed the performance. “We are rapidly approaching 30 million subscribers and will continue making key investments in content, new marketing capabilities, our connected vehicle business, new satellites and a next-generation wideband chipset, all of which will drive the long-term growth of our dynamic business.” In 2016 SiriusXM expects 1.4 million net subscriber additions and revenue of about \$4.9 billion.

AM RADIO: The beginning of 2016 marked the end to various medium-wave (526.5–1606.5 kHz) services in Europe. Radio services on these frequencies transmit using amplitude modulation; thus these cuts are being seen as a setback for AM radio in general. Radio France ceased MW broadcasts of France Info, France Blue and France Blue Elsass, Deutschlandradio silenced its seven medium-wave transmitters, and RTL said goodbye to Radio Luxembourg 208 on 1440 kHz. Radio France and Deutschlandradio said dwindling MW listener figures justify their decisions but that affected services will be available via FM, digital and Internet broadcasts.

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WORKBENCH

by John Bisset

Read more Workbench articles online at radioworld.com

The reach of Radio World amazes me sometimes.

Chuck Cooper is a project engineer with Pinnacle Communications Ltd. Based in Abuja, Nigeria, in west Africa, Chuck writes he has been a Workbench fan for years, using many of the tips at the stations he maintains. Pinnacle does planning, implementing, procuring, installing, maintaining and repair of broadcast stations — both TV and radio, including studios. Most of their sites are located in rural, isolated areas.

Chuck read about Ron Wilken's experience dealing with mice in his generators (Jan. 6 issue). As we know, rodents will get into all kinds of different equipment. Chuck says Ron was lucky that the mice were only nesting. Nigerian mice have a tendency to eat cables that are lying around for lunch and dinner. When they get into the middle of a transmitter, usually with lots of ribbon cables, they can cause real havoc and put the equipment off the air quickly.

It can sometimes take hours or days to find these chewed up cables because the mice have a tendency to chew on the cables that are tied down and normally unobservable, like in a deep dark corner of the cabinetry. And African rats, mice

and even lizards are really hungry. They seem to prefer colored ribbon cables, although they'll chew up the grey ones, too.

Worse yet, their presence brings in the snakes, most of which are poisonous, like the black mamba. It can be a real rush to open a cabinet door and find a well-fed snake looking at you.

Chuck and his team have tried a variety of methods to keep these little devils out, and the best thing that Chuck has come up with is charcoal ... yes, charcoal.

The solution is easy. They simply put some in an old sock or two and place them strategically around the equipment rooms and inside racks, cabinets and generator shacks. Chuck writes that the little devils smell the charcoal and think that the building is on fire or burnt down, so they run for their worthless little lives, far away from the buildings. Now the challenge! You don't believe Chuck? Try it.

Chuck's company oversees 36 sites in west Africa and has eliminated rodent problems since doing this. The locals use the same trick to keep rodents out of their homes and have been doing so for years.

It pays to keep one's eyes and ears open when in a country with unfamiliar situations and customs — you might learn something. Give it a try and let me know your results.

Salem Media's Twin Cities cluster is chiefed by Steve Smit. Steve has taken advantage of Ring.com's Video Doorbell.

The doorbell, pictured in Fig. 1, provides wide-angle HD video and includes motion detection and cloud recording.



Fig. 1: Add a video doorbell to the back door of the studio.

For late-night and weekend operators, this camera provides peace of mind. The video doorbell lists for \$199.

Not only does the video doorbell assist operators inside the station, the system can trigger instant mobile alerts on your smartphone. Find out more at www.ring.com.

In our Dec. 16 column, Reid Fletcher at the University of Wyoming told about his use of the DVB-T TV Software-Defined Radio dongle. The RTL-SDR is a cheap software-defined radio that uses a DVB-T TV tuner dongle. Because signal I/Q data can be accessed, the DVB-T TV tuner can be used as a wideband software defined radio, using a software driver.

For broadcast engineers, this means a cheap \$20 TV tuner USB dongle can

be used as a computer-based radio scanner. You can find a variety of software-defined radios, but they cost more.

New Hampshire Public Radio's Steven Donnell loves his R820T dongle and keeps one in his laptop bag, as well as one at home. Steven writes that besides using the dongle as a simple spectrum analyzer, it is a quick way to check basic ID on an FM RDS signal.

There are RF up-converters available that you can build or purchase that extend the frequency range down to HF. Here are two handy links to get you started with books on the subject. Both are available on Amazon. In the search block, enter "Radio on a Tight Budget" for an e-book by Akos Czermann. It costs just \$4. For a soft-bound reference, search "The Hobbyist's Guide to RTL SDR" by Carl Laufer at the same site. This book is under \$20.

Broadcast engineer Art Hadley writes that although there are cheap Chinese inspection cameras, he's found several that are cheaper and better. Search for "Android endoscope" at www.banggood.com. You'll see a 6-LED endoscope with a 7 mm lens for around \$20. The waterproof bore scope camera comes in 1 m and 3.5 m lengths.

Fifty-eight percent of the reviewers gave it five stars; one reviewer couldn't

(continued on page 14)

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How FM Stereo Came to Life

FCC did not settle for the industry's ad hoc standardization

MILESTONES

BY CHARLES S. FITCH

"Milestones" is a series of reminiscences about notable radio technological developments.

Some of us remember when the Federal Communications Commission would choose standards based on consensus and technical performance evaluations rather than marketplace choices. FM stereo was among the products of this period.

The quest for a workable broadcast system to deliver high-fidelity stereo began in the late 1940s and received impetus when serious audiophiles began buying stereo reel-to-reel tapes of live recordings in a big way around 1955. Tape listeners enjoyed the aural presence and spatial relationship of performances in a variety of formats: classical, jazz and big band music. If the playback device reproduced without color and could generate comparable audio levels, you almost felt that you were there.

The tape medium was awkward for consumers, though, and several stereo record systems appeared in response. The RIAA finally settled on the CBS micro-grooved, long-play record format, and stereo sound appeared industry-wide in late 1957, reaching consumers in early 1958.

Stereo audio settled into the consciousness of America. The original CinemaScope wide-screen theatre display system inculcated stereo sound on hi-fidelity magnetic tape tracks on the edge of 35 mm film. In broadcast, NBC tried to generate interest in TV stereo with a 1958 demonstration during "The George Gobel Show" that was carried in color; the next February, "The Perry Como Show" demoed stereo featuring a bouncing ball that was supposed to go from left to right and back; the second audio channel was provided by cooperating NBC network radio affiliates. Unfortunately, the effect suffered from poor audio isolation and aggressive level



changes of the modulation control packages at these stations.

AD HOC STANDARD

A friend of mine in the computer world used to joke that the great thing about standards is that there are so many from which to choose.

Although the United States has only one stereo FM broadcasting technology today, there was an earlier half-step, ad hoc standard.

WORKBENCH

(continued from page 12)

read the QR code to get the app, but found a compatible app at the Google Play Store called "Wirecam" by Netween.

Just plug the camera into the micro USB socket and the six LEDs illuminate. Start up the app, search for the camera and the image appears on the smartphone screen. For the price, it could be a neat diagnostic tool.

Art says he loves this site, and he suggests you search for laser fog lights while you're there.

And we'll wrap up this column with a gift for the engineer who has everything.

Gregory Muir of Wolfram Engineering in Great Falls, Mont., sends a note about a vendor of shirts that allow engineers to advertise their value to management. A typical one reads: "Never, but Never Question the Engineer's Judgement" and "Chief Engineer: Because Badass Miracle Worker Is Not an Official Job Title." You can find a wide selection of engineering-related shirts by searching that term at www.sunfrog.com and www.redbubble.com.

the audio response on AM was notably better. Vendors offered better receivers to the connoisseur; and the reception environment was far friendlier than today, with less electrification, less band noise and fewer stations. AMs could sound pretty good; all FM signals were hi-fi mono.

Several receiver manufacturers sold units capable of receiving the AM-FM stereo system. Consoles were the most popular version; the selector switch inside had settings for AM or FM and AM-FM stereo.

Although I cannot identify any stations that were full-time dual stereo, AM-FM station pairs that cleared limited air time for AM-FM stereo broadcast included WFIL and WFLN in Philadelphia, WABC in New York, WPEL in Montrose, Pa., and WTIC in Hartford, among others. For example, WBZ Boston would break format on Sundays at 7 p.m. for the "Stereo Hour," during which one program would be broadcast in AM-FM stereo.

The Achilles heel of this scheme was that when you listened to just one or the other of the paired stations, your ears heard only half of the program information. Another drawback was economic; a station would lose half of its spot positions.

The challenge for the radio industry of the late 1950s was to combine FM's superior audio quality with stereo's heightened sense of realism to

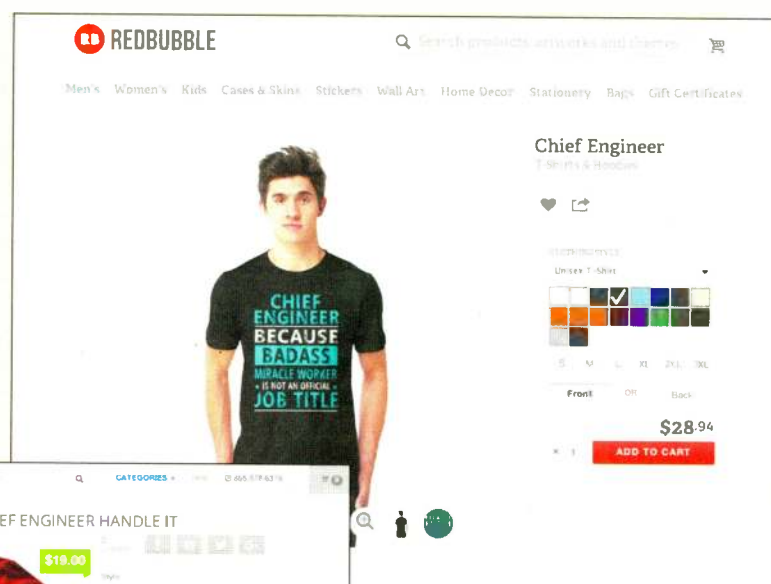


Fig. 2: Say it loud, say it proud — and in color with these cool shirts.

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TRUE HI-FI SPATIAL SOUND

The solution was to encode both channels in a single FM signal using multiplex techniques.

In the late 1950s, the FCC considered a multitude of systems to add stereo to FM radio. Fourteen proponents put forward systems including industry heavyweights such as Crosley, Halstead, EMI, Zenith and General Electric. Of these, eight were deemed to provide desirable qualities and acceptable performance. Six got as far as detailed field-testing. A technical industry committee formed, and the surviving systems were evaluated for their performance qualities during field tests in Uniontown, Pa., using KDKA(FM) in Pittsburgh as the transmitter test bed. The GE and Zenith systems were so similar that they were considered theoretically identical.

The final report and order came down to two real contenders. A unified GE-Zenith scheme bearing the fusion moniker of system 4-4A was deemed superior and formally approved by the FCC in April 1961 as the standard stereo FM broadcasting method in the United States, and subsequently by most of the worldwide radio industry.

The FCC authorized regular stereo FM to start June 1, 1961. WGFM (now WRVE, Schenectady, N.Y.) was the first station to go stereo at midnight Eastern time. WEFM Chicago, had to wait an hour later until midnight in the Windy City, as the implementation order specified local time, making them second to go on-air.

WGFM was owned by General Electric and not far from its broadcast equipment division labs in Syracuse; it was a co-proponent of the multiplex standard, so it was hardware-ready to go to stereo.

The national experience with color TV had taught the industry that any FM stereo standard would have to be compatible with existing mono sets. For this reason, the left (L) and right (R) channels are algebraically encoded into sum (L+R) and difference (L-R) signals. A mono receiver will use just the L+R signal so the listener will hear both channels through the single loudspeaker, while a stereo receiver will add the difference signal to the sum signal to recover the left channel, then subtract the difference signal from the sum to recover the right channel.

The (L+R) main channel signal is transmitted as baseband audible audio in the range of 30 Hz to 15 kHz. The (L-R) signal is modulated onto a 38 kHz double-sideband suppressed carrier (DSBSC) signal occupying the baseband range of 23 to 53 kHz. If you wanted to continue the programming

Fast-forward to FM stereo 2015. Here is an IC-based purchased by the author for a buck at a dollar store, complete with signal seek and ear buds. The batteries cost more than the radio.



you had been distributing on 41 kHz SCA, you had to move to the new ad hoc standard SCA location of 67 kHz.

A 19 kHz pilot tone is generated; this is at exactly half the 38 kHz sub-carrier frequency and with a precise phase relationship to it as defined by the formula below. It is transmitted at 8-10 percent of overall modulation level and used by the receiver to regenerate the 38 kHz sub-carrier with the correct phase.

The final multiplex signal from the stereo generator contains the Main Channel (L+R), the pilot tone and the

(continued on page 18)

Pick a Winner

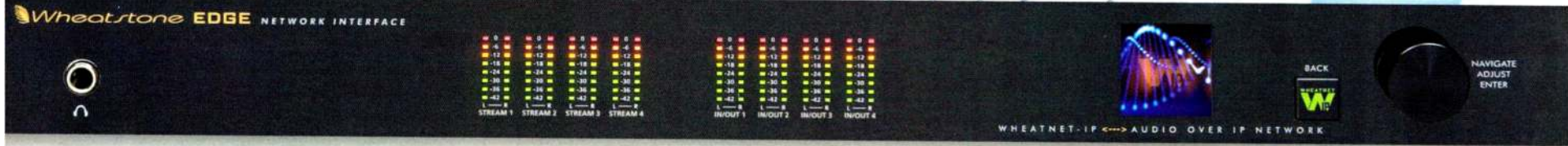


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Ben Blevins, the engineer in charge, tells us they've literally moved an entire sports broadcast into a different studio while it was live, on the air. And, not one fan noticed.

That's an impressive display of studio athleticism, and brave too, considering that sports fans can get rather vocal about even minor disruptions in the game.

For the entire story... INN30.wheatstone.com

Screen Builder At IMG World

This is the screen that Ben Blevins built using Screen Builder, a new app for WheatNet-IP. He designed this customized interface to help his producers



navigate over a dozen sports games, often in real-time and on the fly, for a new "Red Zone" channel called IMG College Football Blitz that features highlights from college football coast to coast. "There's a production assistant that moves around the building and coordinates with the producer to acquire post-game, post-coach comments or other highlights from any of the games being produced (anywhere in IMG's 48-studio complex)," explains Blevins. "We built this little all-in-one access panel so they can have access to everybody at once as a sort of intercom, complete with their own headphone mix to monitor all that is going on and to drive the show where it's going next."

Ben gives a guided video tour of his Screen Builder project... INN30.wheatstone.com



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World Radio History



Kempf Tackling 21st Century Radio

Job description entails taking on public media's greatest challenges and best opportunity

DIGITAL PROFESSIONALS

BY TOM VERNON

Public radio and television, like all broadcast media, are in a state of transition. Many stations are redefining relationships with their audiences as social media and new delivery platforms take hold; some also are rebranding themselves, as an identity with call letters, FM, TV and big towers in the sky doesn't seem as important as it once was. All are adapting to a rate of technological change that only seems to quicken with every passing day.

It is into this challenging environment that Bob Kempf, formerly vice president and general manager of digital services of NPR, joined WGBH in Boston as its vice president for digital services in September.

There, he works across the organization to create digital products, platforms and services related to WGBH programs and journalism.

Radio World spoke with Kempf about his vision for managing these and other challenges at his new position, which supports WGBH programming no matter where it appears, be that with a national network, digital platform or under its own brands.

Kempf manages a staff of 40. Three-quarters of them work on national programs, such as "Frontline," "Antiques Roadshow," "Masterpiece" and "Nova." Ten staff members are attached to local programming.

CULTURAL FUSION

"I learn a lot from the people on my team," says Kempf. "They bring to the table not only a knowledge of code, but also innovative ways of working. It's really a fusion of the tech and media cultures."

He said the management style is team-focused, rather than top down. They embark on short cycles of building new products, releasing and improving them.

As stations rebrand and remarket

themselves in order to better align with the online world, two questions come to mind. Will we see the demise of terrestrial broadcasting over the next 10



Kempf, center, at work with members of the digital team.

years? And what are Kempf's thoughts on rebranding WGBH?

"Certainly the emphasis on online media will continue to increase, while the importance of linear broadcast will decline. However, I don't see the towers and transmitters going completely away

in the next decade."

He continues, "Rebranding can be a positive step for some public broadcasters. Cleveland's Ideastream, KPBS and Alaska Public Media have all successfully recast themselves as online entities. I think we're very fortunate here at WGBH, because our brand is already so well known; I don't believe any efforts at redefining our identity are necessary."

Community building and harvesting the online community both for information and fundraising dollars have become hot topics in public media. Recent efforts by community broadcaster WFMU with its Audience Engine advocate for keeping online dialogue

and fundraising efforts in-house, as opposed to having it take place via big media such as Facebook or Twitter. Should a broadcaster's digital strategy include keeping the listener dialogue and fundraising internal?

DON'T PLAY FAVORITES

"Building and maintaining an online relationship with the audience is the most important challenge and greatest opportunity for public radio. I don't think that we can view it as choosing between an internal or external location. You need to pull the best information out of both, and understand why you're in both. Knowing that, you can strengthen the core experience for listeners," Kempf said.

"Fundraising is a billion dollar economy, accounting for half of public media's revenue. While there is a lot of merit to maintaining an in-house dialogue, you can't ignore the big players, either. To do so runs the risk of losing a connection with the audience. You need to ask and answer the question: How do you play on Facebook?"

In terms of promotion and community building, Kempf cites an example of how a "Frontline" segment was promoted on Facebook. "A five-minute post about an ISIS-controlled village in Afghanistan generated 10 million views and got 100,000 shares. Social media is a very powerful way to expand the 'Frontline' brand."

Strategic planners often advise organizations to step back and ask themselves what business they are in. What business is public media in right now, and is this the business it should be in?

FM STEREO

(continued from page 15)

sub-channel (L-R). This composite signal, along with any other sub-carriers, modulates the FM transmitter.

The instantaneous deviation of the transmitter carrier frequency due to the stereo audio and pilot tone (at 10 percent modulation) is:

$$\left[0.9 \left[\frac{A+B}{2} + \frac{A-B}{2} \sin 4\pi f_p t \right] + 0.1 \sin 2\pi f_p t \right] \times 75 \text{ kHz}$$

where A and B are the pre-emphasized Left and Right audio signals and $f_p = 19 \text{ kHz}$ is the frequency of the pilot tone. Slight variations in the peak deviation may occur in the presence of other subcarriers or because of local regulations.

In modern receivers, all of this normally is accomplished in a single decoder chip. Early in the standards proceedings, the common logic was that a multiplex (stereo data) signal would be sent supersonically *a la* the existing 41 kHz SCA technology; for this reason, many receiver manufacturers included wide-band multiplex outputs for future stereo adapters.

Stereo FM signals are more susceptible to noise and multipath distortion than are mono FM signals. For this reason, many stations, including many signal-challenged educational FMs, have opted to air in mono, pragmatically extending their reliable service area.

CREATING AN INDUSTRY

The introduction of FM stereo led to increased listening as well as higher station values. Industry hoopla and coverage in trade publications put FM back on the FCC's radar. More rule changes and revisions followed, including a decision to divide the country into three zones instead of two, and the creation of FM station classes (A, B and C) detailing power limits and height reference performance points for each class. This regulatory overhaul defined the FM universe for a generation of listeners and station managers, at least until the so-called Docket 80-90, which expanded the number of FM stations significantly.

The flip of a switch in the WGFM transmitter building on the high Helderbergs overlooking Schenectady and Albany lit up a handful of stereo lights on a few stereo-ready receivers. FM would never be mono only again.

For a nifty description of how multiplex stereo works, see <http://transmitters.tripod.com/stereo.htm>.

Radio World contributor Mark Durenberger has posted a PDF of the 1961 FCC report and order allowing stations to transmit stereophonic programs on a multiplex basis at www.durenberger.com/documents/FMSTEREO.pdf.

Charles S. Fitch, W2IPI, is a registered professional consultant engineer, member of the AFCEE, senior member of the SBE, lifetime CPBE with AMD, licensed electrical contractor, former station owner and former director of engineering of WTIC(TV) in Hartford, Conn., and WSH(TV) in Boston.



"I recently re-read the original NPR vision statement," said Kempf. "It was penned in 1970 by Bill Siemering, one of the original founders. It says in part, 'National Public Radio will serve the individual: It will promote personal growth; it will regard the individual differences among men with respect and joy rather than derision and hate; it will celebrate the human experience as infinitely varied rather than vacuous and banal; it will encourage a sense of active constructive participation, rather than apathetic helplessness.'

"That statement still resonates today. Beyond that, we need to remember that even though we are non-commercial, we are in a business. We are in the business of creating connections, of being storytellers, and creating community around those stories."

"We are in the business of creating connections, of being storytellers, and creating community around those stories."

Much of Kempf's new job at WGBH involves providing leadership in keeping the organization abreast of new technologies. How do you conduct strategic planning in a realm where change is a constant?

"You can't do strategic planning in the traditional sense anymore. What you can do is engage in short cycles of test-measure-learn. Look at how the audience reacts to what you're doing, and develop smart ways of building on that over time." He adds, "We must be mindful of how our audience is consuming content of all kinds. That makes you ask questions like, 'how do podcasts affect audio?'"

Maintaining an online dialogue with listeners and members is an ongoing priority for public media. Where is WGBH now, and where should it be in five years?

GOALS

"Our engagement with the audience has room to grow. One of my priorities is to develop a more coherent social strategy centered on marketing and customer support. We're using the power of our brand to launch My WGBH, an online site for members that provides them access to additional content and a personalized experience. It will build a value proposition for our members, and

(continued on page 20)

WGBH STATIONS

What began in 1951 as a single FM station — WGBH 89.7 in Boston — has grown over the years into a number of FM, TV and online channels serving metro Boston and surrounding communities.

On the radio side, WGBH(FM) operates WCRB 99.5 with a classical music service. This signal is simulcast by WNCK 89.5 Nantucket and WJMF 88.7, Smithfield, R.I. WCRB is also broadcast over translator W242AA, 96.3, East Cambridge, Mass.

WGBH operates a separate news-and-information service for Cape Cod and the islands. The format is aired on three stations: WZAI 94.3 Brewster; WNAN 91.1 Nantucket

and WCAI 90.1 Woods Hole. The WCAI and WCRB channels are also broadcast over WGBH(FM)'s HD Radio channels.

The WGBH(TV) digital channel is multiplexed. Channel 2.1 carries the main WGBH programming and PBS. Channel 2.2 broadcasts WGBH World. WGBX airs original programs not broadcast on WGBH, as well as reruns of the latter's programs on digital channel 44.1 WGBH Create airs on channel 44.3, while 'GBH Kids is seen on 44.4.

The WGBH Educational Foundation operates WGBY Channel 57 in Springfield, Mass. WGBY is run separately from the Boston operations, although the programming is similar to WGBX.

All radio and TV channels are also streamed over the Web, along with original Web content, at wgbh.org.

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EAS

(continued from page 1)

and FM-RDS receivers via these stations for about two years. The metadata we are sending includes both static and dynamic information: station call signs, slogans, music title/composer/artist, talk show topics, names of shows and program hosts, weather reports and station promotional information.

As an active participant in our state Emergency Alert System, as well as a leading proponent of PAD transmission, it struck me that it would be a useful public service for listeners if text information for serious EAS alerts were visible on the radio receivers with RDS capability and HD capability. Our goal: If a listener hears the EAS alert tones but misses the audio message, a glance at the radio display would provide the important info.

Immediately the question arose as to whether or not we should include information related to weekly and monthly tests in the EAS data being fed into the WPR PAD stream. I weighed the options, and discussed the pros and cons with colleagues. Most felt that EAS testing is meant more for proof of system performance and less for education of listeners. For example, most stations conduct weekly tests with no announcements purely for confirmation that the technology is working. Monthly tests more often contain announcements, and in many areas do serve a secondary listener-education purpose — they sound more like alerts. Should EAS tests show up on radio data displays? Our decision was “no”; we would only transmit PAD data for actual emergency alerts, but the question remains open pending future feedback from listeners.

GETTING STARTED

What would be our sources of appropriate emergency alert information? Where should it come from and where should it be sent? Given the geographically-coded nature of the EAS system, the WPR EAS encoder/decoder in each region of the state should be the source of the EAS text for the PAD data system serving the stations in that region. The EAS system would become another input source for our PAD system.

It seemed wise to shake out any kinks in this project using our flagship station WHA AM-970 in Madison, Wis. WHA would be the guinea pig, especially handy since the equipment that would be involved would all be found in our Radio Operations Center just down the hall from my office!

So the first stage of the project would be to put EAS on the HD PAD stream for WHA and the RDS text signal going to WHA's FM translators. If this proved successful the next stage of the rollout would be to add EAS messages to the HD-PAD and RDS of our other Madison area stations. And eventually the project

KEMPF

(continued from page 1)

through customer relationship management enable us to learn more about them at the same time, for example, what content are they looking for from WGBH?”

Audience building is also a priority for Kempf. “Right now our digital audience for local programming is relatively small. I'd like to see us grow so that our local presence digitally is equal to our outreach over the air. There are three pieces to make that happen — social media, content delivery and managing the data.”

Kempf earned his undergraduate degree from Boston College, where he majored in political sci-

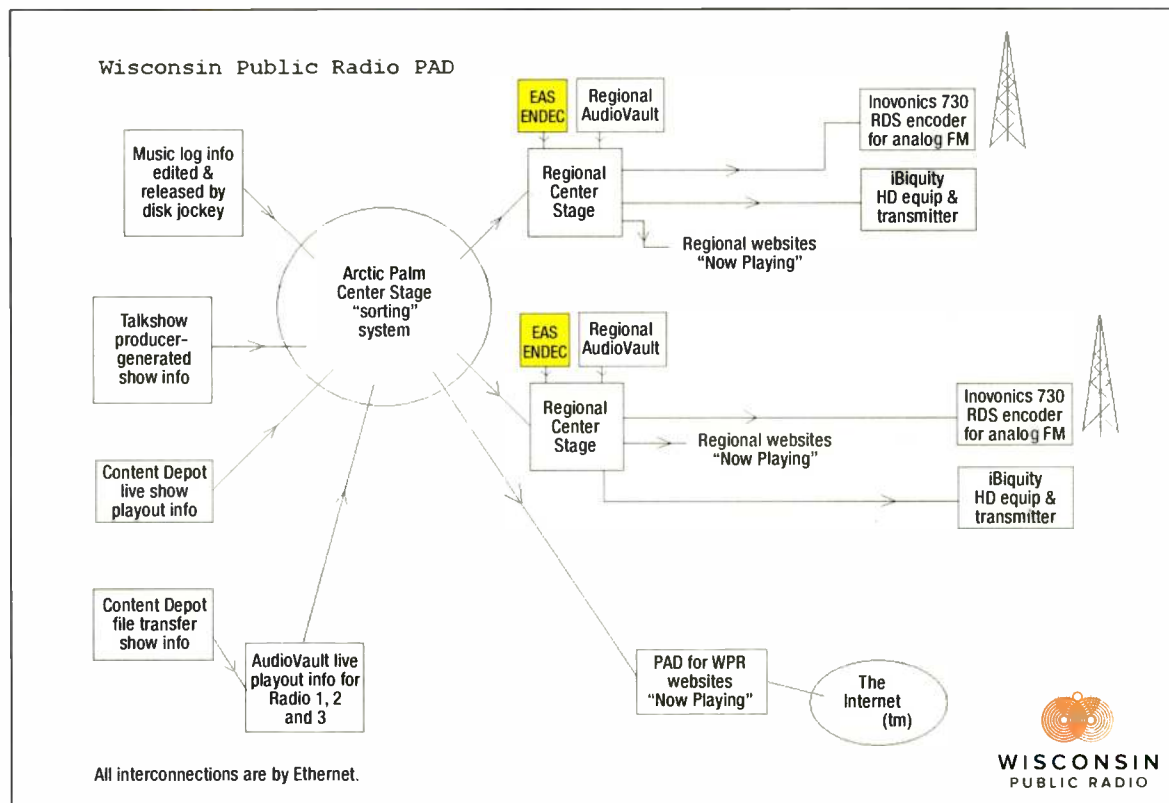


Fig. 1

would grow to include our stations in Milwaukee, Green Bay and other areas of the state.

WPR'S PAD SYSTEM

Fig. 1 shows the relatively complex system necessary for WPR's transmission of Program Associated Data. To the left on the diagram you can see most of the inputs — the PAD information sources for networks. In the middle of the image is the main PAD sorting/routing system based on Arctic Palm's Center Stage product, and to the right are the regional sorting/routing systems and examples of the outputs — the radio stations transmitting the data. Note that the geographically-coded Emergency Alert information is to be inserted into the “regional” data flow that serves clusters of stations in a given geographical area.

Interconnection of the various pieces of the existing system is provided by TCP/IP communications by wired Ethernet. I noticed that all the EAS devices involved had Ethernet ports — wouldn't it be nice if the emergency information could move from the EAS encoder/decoder to the PAD sorting system by TCP/IP on the local area network? Networked connections

ence and philosophy. How does a degree in liberal arts prepare one for a career in media and technology management?

“The short answer is — it doesn't, although a liberal arts education does give you a sense of what is important in the world. In my case, it also gives me a sense of the importance of public media's mission.”

Kempf recalls his brief stint as a disc jockey. “I had my own morning show on the college's carrier current station, WVBC. It was widely listened to in the dining commons. So I guess I did get some hands-on radio skills at Boston College.”

Tom Vernon is a longtime contributor to *Radio World*. Find more of his articles by searching keyword “Vernon” on radioworld.com.



Fig. 2

could be especially useful given that in many instances our EAS equipment is not located in the same room or even the same building as the PAD server.

DETAILS, DETAILS

All the WPR stations are driven by Sage Alerting ENDEC equipment. Sage let me know that the ENDEC can send a file by FTP, and there are hopes for RDS encoders and HD gear will eventually be able to use that data directly. Unfortunately this idea would set up a one-to-one relationship between the EAS unit and its station's HD and RDS encoders, not suited to our more complex plans in which the emergency alert information from an EAS box would be merged into an already existing flows of metadata headed out to multiple stations in a given region.

Sage suggested that the serial port output from the EAS units would be another possibility. Most, if not all, of the manufacturers of EAS equipment provide a serial text output that is sometimes used to drive wall displays and video character generators (Fig. 2).

At the same time, Arctic Palm Technology responded to my inquiry and confirmed that their Center Stage Live software had a module in beta test for handling serial Emergency Alert System data. Arctic Palm had modified Center Stage's “CSWeather” program to create the capability to handle EAS text data received via serial port. These serial ports seemed like the most likely source of appropriate text information about the EAS alerts for our PAD stream.

DODGING THE LIMITATIONS OF SERIAL

It appeared that the only practical option would be a serial connection. Unfortunately this is only convenient



Fig. 3

if the EAS box and the computer are relatively near to one another.

Since IP network connectivity was available near each system, I next envisioned using tunneling devices to carry the serial data via the Ethernet network. I have had considerable success sending both contact closure and serial data across the wide area network that interconnects our various radio facilities around the state. For example, when we produce one of our network call-in talk shows at one of our bureaus I provide a remote profanity delay “dump” button that is a contact closure tunneled through the Ethernet network.

Serial tunneling enables you to establish a link across an Ethernet network for signals like contact closures or RS-232. The serial data is packetized in both directions into Ethernet TCP/IP packets by a converter device, an adapter of sorts, sometimes called a serial device server. The packetizing allows a user to connect a serial device to another serial device via the Ethernet network in a way that is hopefully transparent to the serial devices and of little or no impact to other uses of the Ethernet network.

In my vision for the EAS PAD data connections, a serial-to-ethernet converter device would connect to the serial port on the Sage EAS unit and would make the serial data available via the existing local or wide area network. At the other end, the mating ethernet-to-serial converter could be used to send the data into a serial port on the PAD server.

A search for such products revealed numerous sources. One appealing unit was the Lantronix NET232+ devices offered by Grid Connect (Fig. 3). The hardware is simple and the supporting software seemed to be well regarded. Ease of configuration and reliability in operation are important in on-air systems such as these.

It was easy to imagine a pair of these NET232+ devices being used to tunnel the serial data across our Ethernet network as shown in Fig. 4.

AN EVEN BETTER IDEA

It occurred to me that the PAD server PC already had an Ethernet connection. Could the server receive the tunneled serial data directly? Digging deeper, I learned that the NET232+ could also be used to reach a “virtual serial port” directly in the computer, eliminating one of the converters. With this real-

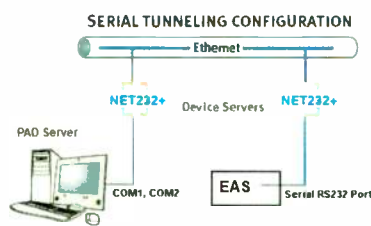


Fig. 4

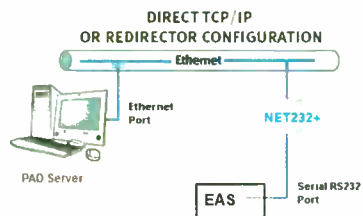


Fig. 5

ization it was easy to imagine one NET232+ devices being used to tunnel the serial data from a Sage ENDEC across our Ethernet network to the PAD server as shown in Fig. 5.

Com Port Redirector is a free software utility available from Lantronix to send and receive serial data between a virtual Windows COM port and a NET232+ device. Most application programs should not know the difference between a real, hardware com port and the virtual port. As the Lantronix website describes it, Com Port Redirector is software that maps “virtual COM” ports on a PC platform. It redirects application data that would normally be intended for an attached device via the PC’s local serial (COM) port. Rather than going out the local serial port, the data is transmitted across the Ethernet network using TCP/IP. A device server attached to the network receives the data and transfers it from its own serial port to the attached equipment.

Likewise, data sent from the equipment to the serial port of the device server is transmitted back to the application software on the PC via Ethernet. Com Port Redirector receives the data and presents it to the control application in a virtual simulation, as though it came in from a COM port via a local serial connection.

But beware: some programs expect instant responses from serial ports when opening and closing com ports. To deal with this issue, Com Port Redirector can be set to keep the IP connection open even when the com port is closed, reducing latency and soothing these picky programs.

CONFIGURATION

Lots of details are important in setting both ends of the serial-over-Ethernet link: The Sage EAS unit’s serial port must be selected and configured — baud rate, data format, etc. Likewise there are

various settings for the virtual serial port in the server, and the static IP addresses assigned to the network side of the link.

The Sage EAS unit’s serial port must be selected and configured — baud rate, device format, etc. I chose COM4 and 9600 baud.

The Sage ENDEC’s character generator serial output precedes each message with a number representing the “severity” of the emergency. This would be used by the Center Stage software to decide if the EAS information was to be sent through the PAD system, or not.

Level 1 message are direct threats to

life and property like weather warnings. Level 2 are informational, like weather watches and Level 3 messages are tests. This would be used by the Center Stage software to determine if the EAS information was to be sent through the PAD system. A given organization might prefer for everything to be sent through for display on HD and FM-RDS receivers, but there is an argument to be made for limiting the messages being transmitted to actual alerts.

We decided to configure the CSWeather-EAS software to pass along

(continued on page 22)

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EAS

(continued from page 21)

only EAS Level 1 messages, and edit the text down to just the type of alert, with the phrase "for our listening area" added. This allows the coverage area of the radio station to automatically limit the geography of the alert. Radio displays are limited in the number of characters displayed, so it is important to keep the total text string down a readable length. In our configuration an EAS text message on a WPR station would appear like this:

TORNADO WARNING FOR LISTENING AREA

This message would continue to appear among the rotating PAD messages displayed for the duration of the emergency activation.

TESTING

First and foremost, I patched the Sage ENDEC out of the WHA program path so I could generate test messages without annoying the listeners. Don't forget this step! I speak from painful

experience back when we were first testing EAS gear in the 1990s.

With the redirector software installed on the PAD server computer and everything connected, I first used Windows own "HyperTerminal" program running on the PAD server computer to make the first connection and troubleshoot. There I was able to see test messages from the EAS unit.

Next I configured the CSWeather-EAS program to look to the same COM port and confirmed EAS test messages were being logged.

Then I configured the CS-Weather-EAS software program to forward warning-level 1 alerts, but not watches or tests, to the associated stations. For this first stage of the project the destinations are the HD PAD generator for AM station WHA and RDS encoder for its FM translator stations.

RESULTS AND SUMMARY

The CSWeather-EAS program keeps a log of all the EAS messages received and transmitted. Fig. 6 shows a sample page of this log showing of various tests and alerts. For each entry I've noted the

Level 3 Test - No PDS and PAD sent.	EAS Received:Tuesday, Jul 22,2014 10:59:18 13A Broadcast station or cable system has issued a Required Weekly Test
Level 3 Test - No PDS and PAD sent.	EAS Received:Wednesday, Jul 30,2014 12:59:20 13A Broadcast station or cable system has issued a Required Weekly Test
Level 1 Warning - RDS and PAD sent.	EAS Received:Friday, Aug 01,2014 16:29:54 11The National Weather Service has issued a Severe Thunderstorm Warning RDS:Severe Thunderstorm Warning for Listening Area
Level 1 Warning - RDS and PAD sent.	EAS Received:Friday, Aug 01,2014 17:09:39 11The National Weather Service has issued a Severe Thunderstorm Warning RDS:Severe Thunderstorm Warning for Listening Area
Level 1 Warning - RDS and PAD sent.	EAS Received:Friday, Aug 01,2014 17:13:17 11The National Weather Service has issued a Severe Thunderstorm Warning RDS:Severe Thunderstorm Warning for Listening Area
Level 1 Warning - RDS and PAD sent.	EAS Received:Monday, Aug 04,2014 16:28:41 11The National Weather Service has issued a Flash Flood Warning for Dane RDS:Flash Flood Warning From:4:28PM To:7:58PM for Listening Area

Fig. 6

type and whether or not the RDS and HD PAD text message was forwarded. This confirms that only Level 1 alerts are being sent to the radio receivers.

In summary, Wisconsin Public Radio has successfully added Emergency Alert System messages to the mix of metadata being transmitted via our Program Associated Data system for display on HD and FM-RDS receivers.

Our initial tests on our flagship AM station WHA and its FM translators proved the reliability of the system, and it has since been expanded to serve our other Madison-area stations. The next phases will bring this service to WPR stations in Milwaukee, Green Bay and other areas of the state.

Cost for this project is low, listener

feedback has been positive, and the effort involved has paid off in useful public service. Our goal has been reached: If a listener hears the EAS alert tones but misses the audio message, a glance at the radio display will provide the vital info.

Steve Johnston, CSRE, started taking apart radios as a youngster and became a ham radio hobbyist at age 13. He worked for Susquehanna Radio Corp. for 20 years, then went into public radio as director of engineering and operations for Boise State Radio. In 2005 he moved to WPR. He holds FCC Radiotelephone and Radiotelegraph licenses, network engineering certifications, a BA in history and a master's in business administration.

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AWARDS

Congratulations to recipients of NewBay Media's Product Innovation Awards for 2015.

For Radio World, the winner is the Inovonics INOmini 635 FM/RDS SiteStreamer, shown; winners were also named by our sister

publications Radio magazine, TV Technology, Digital Video, Video Edge and Government Video. All nominated products are featured in the PIA Program Guide available at radioworld.com.

Now in its third year, the PIA program recognizes excellence in manufacturing of products to serve the TV/pro video and radio/online audio industries. Companies pay a fee to nominate; winners are selected by a panel of professional users based on the description provided by the companies. Evaluation criteria include innovation of concept and design, creative use of technology, price value and suitability for use in a broadcast TV/pro video or broadcast/online radio environment.



The Tech Guy Praises Telos VX

Simple integration and easy-use phone system brings show up to date

USERREPORT

BY LEO LAPORTE

Host
The Tech Guy, Premiere Networks

PETALUMA, CALIF. — I'm the host of "The Tech Guy" show on the Premiere Networks. As the "tech guy" I have to use the latest hardware and software, and it better work, or I'm the "wreck guy" and all my credibility is shot. That's why I rely on equipment from The Telos Alliance for my entire audio workflow, including my new Telos VX phone interface.

When I started hosting the show in 2004 I used an analog Mackie mixer and Telos Zephyr with ISDN to send my audio from my northern California "studio" — really a converted attic room in a former bed and breakfast — to the studios of KFI(AM) in Los Angeles. Call screening was handled in L.A. I controlled the calls locally by VPNing into the L.A. studio and running vintage 1998 call screening software on a Windows XP laptop. I didn't dare update either the software or the laptop for fear the entire house of cards would crumble.

MOVING UP

Fast forward a decade. In the intervening years "The Tech Guy" had grown into a podcast network, TWiT, with two dozen shows and more than



Leo Laporte with the Telos VX Phone System

7 million downloads a month. We moved the operation from the garret studio to a 10,000-square-foot studio designed for audio and video production. We'd also upgraded my little analog mixer with a state-of-the-art Axia Element digital console and routing system. The Axia proved a perfect solution for our big studio — allowing us to put mics anywhere and route the audio everywhere. With six sets and 25 shows the Axia system made it possible to produce network-quality audio programming with very little training.

In 2007 the radio show expand-

ed from KFI to 200 stations on the Premiere Networks, but the call screener remained in southern California using that same ancient software. We were getting considerable latency introduced into the calls, resulting in an intermittent echo that didn't go out over the air, but drove me crazy.

After much troubleshooting, Premiere's Senior Vice President of Engineering Bill Hickey decided to move the call screener up to Petaluma, eliminating the latency. And naturally, since we were a happy Axia house we decided to upgrade to a Telos VX phone interface.

The Telos VX a multiline, multistudio on-air phone system that works with almost any kind of phone line and interfaces to any audio console.

Kirk Harnack and his team at Telos made it trivially easy to install and configure the system. It integrates with Axia's Livewire IP audio standard. The Web-based interface and configuration pages are similar to the equipment we were already using so my studio engineers took no time getting up to speed. Telos sent an engineer who installed the POTS interface and integrated the VX system with the Axia. We were up and running perfectly in just a few days.

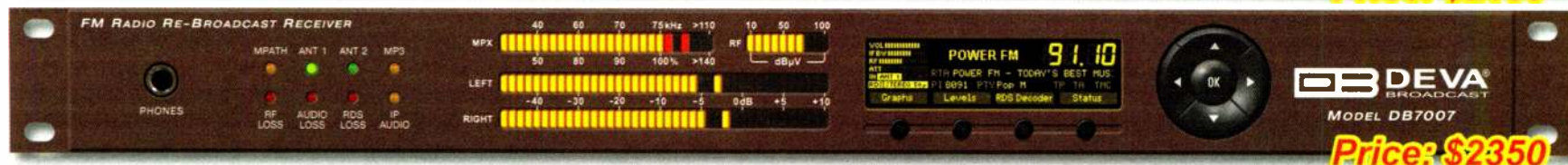
The handset interface and the call screener software are complementary and straightforward. I may be "The Tech Guy" but that doesn't mean I want to suffer with a complicated or opaque handset UI during my show. The VX is a breeze to use, and I'm happy to say the echo has been eliminated. Even though the quality of the incoming calls can vary widely, the Omnia audio processing in the VX does an excellent job of maintaining optimum caller levels — which means I don't have to ride gain on the board.

In sum, we're super happy with our VX system. It works hand-in-hand with our Axia and digital Zephyr Xstream to make my job easy. And our engineers love the quick and helpful support Telos provides whenever we have a configuration question. Thanks to the Telos VX, "The Tech Guy" really looks like he knows what he's doing.

For information, contact Angi Roberson at the Telos Alliance in Ohio at (216) 241-7225 or visit www.telosalliance.com.



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TECHUPDATES**COMREX RELEASES STAC VIP 2.0**

STAC VIP 2.0 is the newest version of Comrex's VoIP-based call management system. STAC VIP 2.0 contains several notable new features, including split studio and other new utilities.

Comrex says that STAC VIP 2.0 is an ideal solution for users looking to utilize their call management system in multiple places. The split studio feature enables users to run two independent studios at once from the same mainframe. Configuration options are customizable to suit varying use cases. With a modular setup, users will be able to modify their existing STAC VIP systems to make use of split studio (as long as they have a minimum of two separate control surfaces).

Along with split studio, STAC VIP 2.0 has new call transfer functions. If the STAC VIP mainframe is downstream from a PBX, it has the functionality to transfer calls back to the PBX. In this way, several mainframes attached to the same PBX can transfer calls between them.

For information, contact Comrex in Massachusetts at (978) 784-1776 or visit www.comrex.com.

**BROADCAST BIONICS PHONEBOX 4 IS SOCIALLY ADEPT**

The Broadcast Bionics PhoneBox 4 talk show system manages social media, studio cameras, phones, prizes, codecs, email, SMS from one cross-platform multifeatured software application.

The user interface uses touchscreen technology, which the company says improves workflow and simplifies complex tasks.

The PhoneBox 4 allows stations to filter, select and queue Facebook posts and tweets. Operators can see a running commentary on chosen subjects and engage with potential new listeners on air. In addition, listeners can tweet back directly to the studio. Smart cues hook into a playout system to give official artist feeds for the tracks that are played, or location co-ordinates can be used to find out who's saying what from an event downtown.

Sentiment analysis features tells users the mood of one's listeners by means of key words scrutiny so as to modify content accordingly and quickly, and lets operators share videos with the simple click of a button. The system's unique algorithm mimics a director so video content will look professional.

PhoneBox 4 is scalable to suit any size enterprise, from a single studio small independent through to national and international broadcasters. It can use SIP, ISDN or analog lines through its audio server software or from a Telos VX.

For information contact Broadcast Bionics in England at 011-44-1444-473999 or visit www.bionics.co.uk.

**NEOGROUPE NEOSCREENER FITS ALL STATION SCENARIOS**

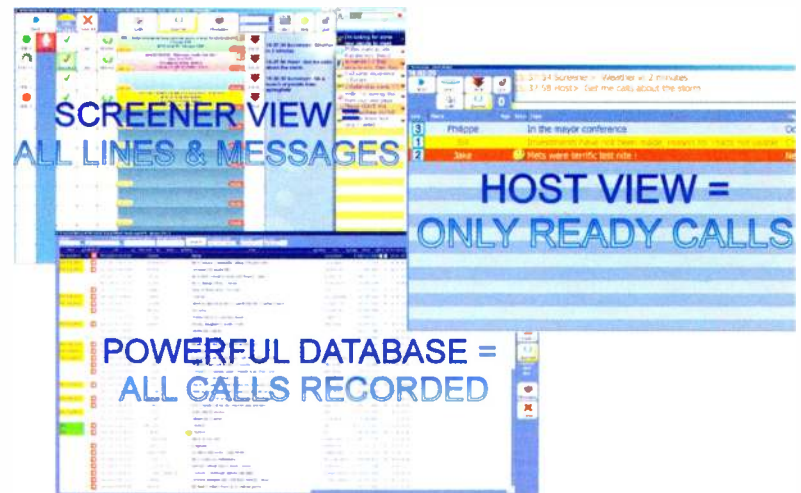
After serving the talk show industry for 10 years, NeoGroupe says its NeoScreener system has become a must-have tool for many major talk shows, even in television.

NeoScreener was designed for showing screened calls to talent and eliminating talkback, and featured a strong database. Now it has now added enhancements such as interfacing to AEQ SysTel and Telos VX systems, crisis-recovery functions and added stability.

In addition there is added compatibility with NeoGroup's Neo Winners prizes and contest winners application. This new feature lets NeoScreener recognize regular winners before answering the line. It operates cluster-wide. The company highlights the system's utility for station promotional management.

NeoScreener can support talk shows, contests, mornings, self-op and other configurations.

For information, contact NeoGroup in France at 011-33-9-72-23-62-00 or visit www.neogroupe.com.



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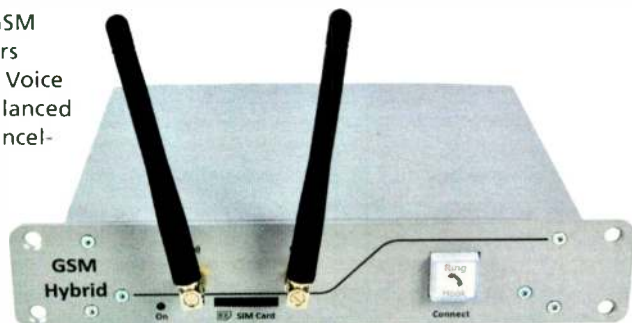
D&R INTRODUCES NEW GSM HYBRID

The new D&R 9.5 GSM hybrid from D&R offers features including HD Voice (AMR-WB/G722.2), balanced audio IOs and echo canceling.

In addition, the hybrid also provides digital EQ control, configurable AGC, PC control application via USB, GPIOs for remote pickup and incoming call signalling.

The D&R 9.5 GSM hybrid's software application shows input and output level meters (ppm), input and output gain adjust, dialing, number recognition, GPIO configuration and the GSM signal strength indicator.

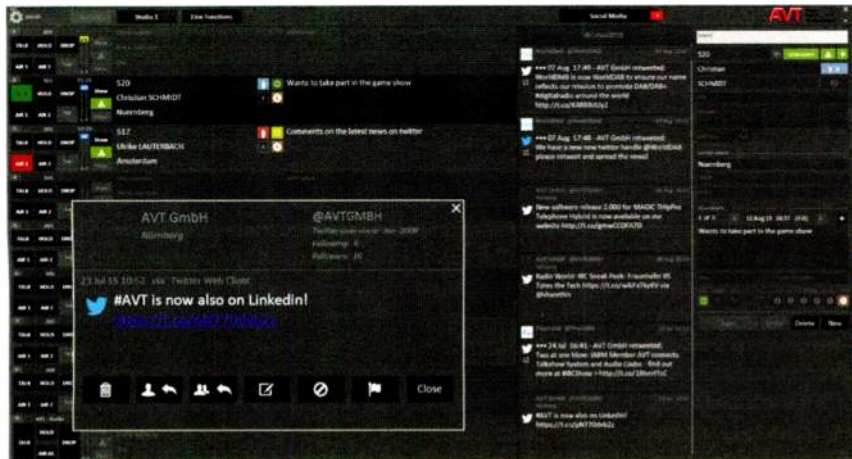
For information, contact D&R in The Netherlands at 011-31-294-418014 or visit www.d-r.nl.



AVT UPGRADES MAGIC THIPRO SOFTWARE TOOLS

New tools become available for the AVT Magic THipPro Screener talk show system in its latest software update.

The first one is the Noted Callers List. The screener/producer can assign selected callers to this list along with information about the caller and his or her subject. A Call Back List within this feature offers several options, including one-click call back, added information and archiving of the number and accompanying information.



In addition to these new functions, Magic THipPro Screener users can create show profiles. With these profiles, screened callers can be assigned to a certain show and topic.

A social media upgrade allows the integration of Twitter and Facebook in Magic THipPro Screener and Magic THipPro LAN software.

After the user sets up a Twitter account in the configuration dialogue of the Magic THipPro software, a separate column of the user interface displays all received and sent Twitter messages. Messages can be filtered and interesting comments marked via the Screener software; comments can be displayed for the presenter to read during the show.

With a click on a tweet the message is displayed as popup with relevant information about the author. Standard functions of Twitter are directly available. Users can edit or delete their own tweets, write a personal message/answer or retweet a comment. It is also possible to send a status message to all your followers.

Furthermore, Twitter can be searched for certain subjects or hashtags. The results are displayed in the list and are permanently updated.

For information, contact AVT in Germany at 011-49-911-5271-0 or visit www.avt-nbg.de.

AEQ SYSTEL IS COMPATIBLE WITH NEOGROUPE PRODUCTS

SysTel-IP is AEQ's third talk show system designed over 20 years. In the mid-1990s, AEQ launched the SysTel-3000 talk show and multi-conference system, which allowed multiplexing of up to 12 telephone lines simultaneously.

In 2001, AEQ's talk show and multi-conference systems

extended their services through the more powerful SysTel-6000 that allowed more than 60 simultaneous communications in PSTN and ISDN to be managed and shared in parallel among up to 20 broadcast studios.

SysTel-IP was launched in 2014; the company highlights its suitability for a broadcast sector that is transitioning into IP-based technologies.

The SysTel-IP basic unit allows up to 12 simultaneous VoIP lines in up to four broadcast studios.

The use of IP technology drastically reduces the call costs at the same time as it is increasing the audio quality through the use of quality encoding algorithms like G.722.

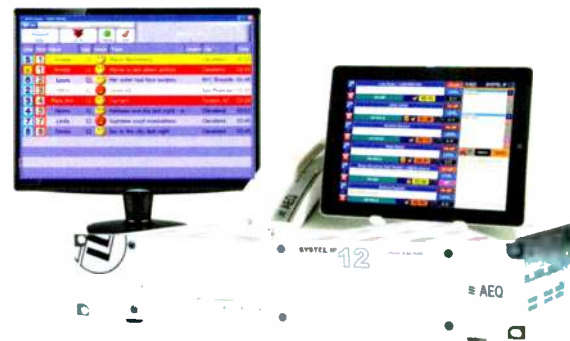
The SysTel-IP was awarded Radio World's "Best of Show" Award at the 2014 NAB Show.

Neogroupe is a French designer of call-handling software interfaces. Products include Neoscreener software and NeoWinners contest management software.

As a result of collaboration between the companies, the AEQ SysTel-IP can now be controlled by the NeoScreener and NeoWinners user interface.

This makes it possible for users of NeoScreener and NeoWinners on older communication platforms to migrate to IP multi-conference platforms through the AEQ SysTel-IP.

For information, contact AEQ in Spain at 011-34-91-686-1300 or visit www.aeq.eu.



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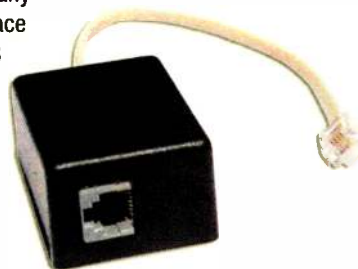
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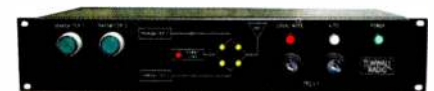
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The Evolution of Audio Streaming

We've come a long way since early Internet audio debuted

COMMENTARY

BY JOHN SCHAAB

In my almost 40-year career in broadcast technology sales, we've gone from NAB carts and pressure rollers to high-definition audio streaming. It has been an amazing journey through technology. Over the last 10 years I've had the privilege to work with one of the true gurus of audio streaming, Greg Ogonowski, first with Orban and now as part of his own company, Modulation Index, including the StreamS Hi Fi Audio brand.

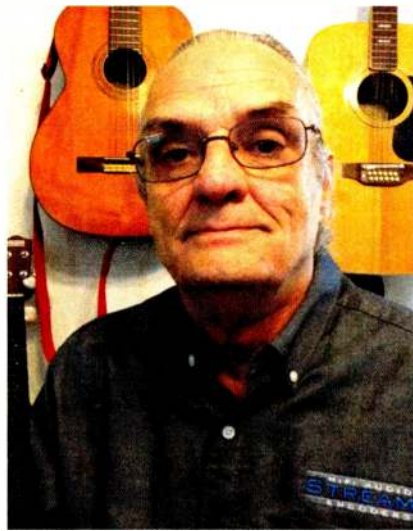
EARLY INTERNET AUDIO

My first experience with Internet audio was in 1998, while at TM Century when someone gave me a folder full of photocopied material on a new company called Broadcast.com, headed up by some guy by the name of Mark Cuban. I remember returning it to the person who had me review it with a comment that this wasn't going to make it. What kind of yahoo would invest in something like this, right?

Available bandwidth was very limited; however Broadcast.com was doing sports talk, which meant that low bitrate MP3s could be tolerated. The rest is history.

By 2000, TM had sold its technology department to a German company called ON AIR, and they had developed an MP3 encoder that we had up for a long time. It was a mono stream of 64 kilobits per second, which for the day sounded good. This new technology showed promise, but then the tech boom crashed; to go along with the crash, royalties on the Internet became an issue, and the technology went into hibernation for a couple of years.

Eventually, once the royalty issues were worked out, several entrepreneurs would establish music channels



using high bitrate MP3, 128 kbps and above. Not all browsers would accept MP3 directly, which meant that either Windows Media Player or another player (typically WinAmp), needed to be downloaded — which in corporate America was a big no-no. Port blocking issues would continue to halt the progress of streaming audio and limit it to home computers.

At the same time there were some new codecs being developed.

HIGH QUALITY, LOW BITRATE

AAC, and especially the ultra-low bitrate HE-AAC, showed the ability of the Internet to deliver high-quality audio at low bitrates, including bit rates that would allow streaming to some of the new generation 3G phones. These phones required different streaming protocols over the well-established ICY HTTP (Shoutcast/Icecast) protocols, RTSP.

While this showed great promise, it was never pushed by the phone carriers, which had no problem promoting downloads but had no desire to promote a technology that required real time streaming reliability.

Nonetheless, streaming gained in popularity as almost all browsers now played MP3s. Adobe's Flash player, delivered on almost all PCs, became a way around the port issues. However both methods required fairly high bitrates, and despite the ability to be played on most browsers, audio streaming was being discouraged by companies whose 10baseT connections were being overloaded.

In the meantime, the new streaming codecs AAC and HE-AAC were gaining popularity because Apple pushed the AAC protocol. (Neither A in AAC is Apple; it stands for Advanced Audio Codec.) However users still required the

the number of listeners increasing and the advent of streaming video, carrier networks were getting overloaded and stream reliability became a big issue. To address this issue came two new streaming formats: HTTP Live Streaming developed by Apple and MPEG-DASH, an evolving MPEG standards-based protocol that has made some impact in the video field but due to a lack of standards for meta-data has yet to make an impact in the audio only field. Both HLS and DASH use segmented audio files and support adaptive bit rate streaming. However, the lack of meta-data standards within DASH has hindered the development of players capable of playing those streams.

Both incorporate segmented audio and adaptive bit rate streaming. Segmenting refers to the fact that instead

AAC, and especially the ultra-low bitrate HE-AAC, showed the ability of the Internet to deliver high-quality audio at low bitrates, including bit rates that would allow streaming to some of the new generation 3G phones.

download of a player like WinAmp to play the AAC and HE-AAC files. That would change in the late 2000s as Adobe would include both AAC and HE-AAC into their Flash Player. Windows Media Player would include native support, which would become the standard for PC audio playback.

In the office environment, bandwidth would continue to increase making concerns about data through-put a thing of the past. Audio streaming was on its way to becoming the most popular way to listen to audio programming in the office, replacing radio that was plagued by reception problems coupled with dissatisfaction with 20-minute stop sets on radio.

High-quality audio streaming was now available in the home and office. However, with the exception of the few who actually knew they could stream audio to their 3G phones, streaming audio was still not mobile.

This would all change in 2007 when Apple introduced the iPhone. Ironically the iPhone could not stream audio by itself. However apps that could stream audio soon appeared and all of a sudden, streaming was everywhere. It was the Apple iPhone's ease of use UI that changed everything.

SEGMENTED AND ADAPTIVE STREAMING

There were still issues, however. With

of endless real time data, segments or packets of files are sent and fed into a buffer on the player end. This allows for network interruptions in some cases as long as a couple of minutes to take place without any loss of audio.

The adaptive part is a means of eliminating interruptions because of bandwidth reductions which can take place in mobile applications. As an example, the content provider sets up three HE-AAC streams: 64 kbps (very high quality), 48 kbps (excellent quality) and 32 kbps (good quality). When the player is no longer capable of maintaining its buffer at 64 kbps, it switches to the 48 kbps stream and if it continues to drain the buffer it goes to 32 kbps. A properly designed encoder will keep audio in sync with the switch from the higher to the lower without audio transcoding, which reduces audio quality.

Currently, most HLS streams are being generated at the server end requiring dedicated and expensive media servers from Adobe or Wowza. However, a couple of companies have or are in the process of providing encoders that do the segmenting at the encoder level and since HLS contains segmented files, they can now be streamed using virtually any server or cloud based solution which should dramatically reduce

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READER'S FORUM

FM "CONGESTION"

FM congestion will be even worse than indicated in this article ("Will FM Band Grow More Congested," Dec. 16) as translator and full-power NCE applicants and permittees from 2003, 2007 and 2010 windows go on the air. This past year Michi Bradley with RECnet and Dave Solomon with Low Power Advocacy Group filed petitions requesting more power for low-power broadcasters, up to 250 watts, to provide improved coverage.

After the 2016 translator moves and the 2017 FM translator windows for AM broadcasters, there will be very little spectrum left in populated areas for more powerful LPFMs. Having an LPFM major mod window for power increases will be "moot" if most LPFMs will not be able to participate because of the crowded spectrum.

*John O. Broomall, Sr.
Senior Consultant
Christian Community Broadcasters
Canton, Ga.*

TWO BIRDS, FOUR STONES

The congestion dilemma is why many of us continue to strongly advocate for repurposing the TV Channel 5 and 6 bandwidth for FM radio broadcasting. Between present and future FM translators, boosters and LPFMs, as well as the full-power "rimshot" FMs that were allowed to move in to large and major markets, before the commission came down with its "no rural to urban move-ins," interference will absolutely arise in already crowded urban markets.

So with the very lengthy complaint process mentioned by Mr. Vernier, the full-power FM owners, who invested millions of dollars to acquire their stations and operate them, will now have the affirmative burden of defending the integrity of their signals, at a not-inexpensive cost.

My solution includes four components:

1. All AM stations except Class As would be required to move to the Channel 5/6 spectrum by a date certain. Once the move to the new FM frequency is completed, the AM licensee would be required to immediately shut off the FM translator and the old AM station and surrender the licenses for both.
2. All LPFMs would be mandated, by a date certain, to move to the "5/6" bandwidth, with the same requirement to shut off the original signal immediately. Ideally, a defined portion of the 5/6 bandwidth would be reserved for LPFMs.
3. Non-commercial/educational FM stations in the "commercial" 92.1 to 107.9 spectrum would be required to move to the 5/6 bandwidth. As with LPFMs, that portion of the Channel 6 spectrum adjacent to 88.1 FM would be the reserved "real estate" for the relocated and new NCE FM stations. For example, 86.1 to 87.9 MHz could be the portion reserved for NCE FMs.
4. Finally, after the move of all Class B, C and D AM stations to Channel 5/6 spectrum, the cleaned-up AM band would continue to be used exclusively by Class A stations, with two improvements that would address parts of the AM revitalization efforts: Class A stations would

OPINION

be required to upgrade signal power to 100 kilowatts; and a limited number of additional AM Class A frequencies would be created from the former Class B/C/D frequencies, and mandated to operate at 100 kW signal power. The Class A AMs would retain their skywave protection, both as an incentive to continue broadcasting in the AM band and for the public safety purposes they already serve in their respective coverage areas during times of emergency.

Once these steps are completed, the 5/6 bandwidth could be used for other new FM stations, including LPFMs.

Yes, my proposal is significant and "disruptive," to borrow an economics/business term, but I believe it effectively addresses two major issues facing radio broadcasters today: FM band congestion and improvements to a beleaguered AM band.

*Robert E. Lee
Owner/General Manager
QXZ MediaWorks LLC
Phoenix, Ariz.*

CONGESTION? POPPYCOCK

Several articles in Radio World and elsewhere have raised concerns of congestion and interference in the FM broadcast band because of the proliferation of new licensed facilities. The fear is that LPFMs and translators will degrade the coverage of existing services. Poppycock.

It's worth mentioning that the interference model used today by the FCC for FM allocation, with minor changes, is the same one adopted in the middle 1960s. It relies on a combination of distance and terrain and specifies interference ratios for co-channel, first, second and third adjacent frequencies. There is even a distance and ratio requirement that addresses the limitation of the 10.7 MHz I.F. receivers from back when the rules were written.

Receivers, like every other form of technology, have gotten better in the past 50 years. I have personally

parked a rental car directly beneath the Devers tower, east of Houston, Texas, and exactly the 65.6 miles required second adjacent distance away from Houston's Senior Road tower. The FMs from Senior Road with second adjacents on Devers — predicted to be badly interfered with — come in perfectly. Paint-peeling levels of second adjacent interference gave my rental car radio no problem.

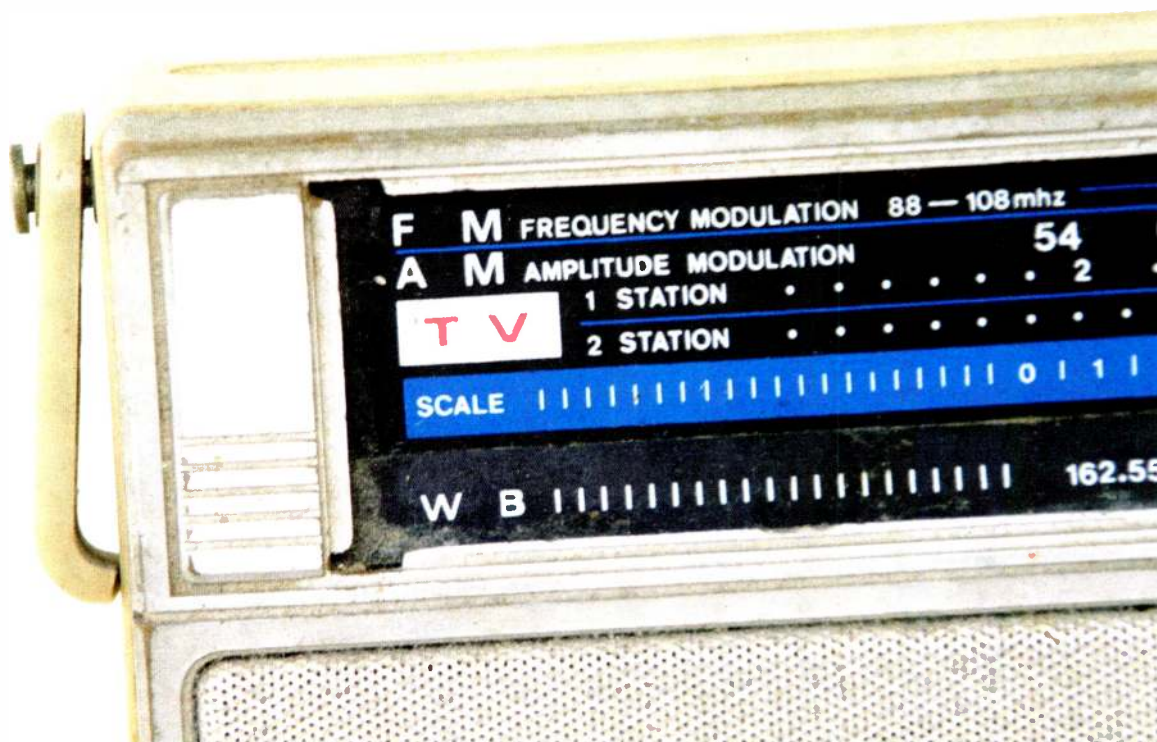
Why? Because receivers no longer have AFC. Remember AFC from the 1960s and 1970s? Your FM receiver compensated for internal drift by developing a DC error voltage that was fed back into the tuning circuits as a correction. But strong adjacent channel signals would often capture this feedback system making it difficult to keep weak signals tuned in. If there was ever a rationale for third adjacent protections, AFC was it.

Now we have receivers that tune digitally using their own precision clock signal as the reference. Because second adjacent spacings and ratios are the same as third adjacent, my bet is both were a function of AFC capture mitigation. I believe we could get rid of both limitations tomorrow and no one would notice. This, alone, would probably add 35 percent more full-power FMs and who knows how many smaller facilities.

First, adjacent spacing and interference ratios are a little more of an issue but not much. The present rules are almost certainly a product of the limited shape factors obtainable with hand-tuned iron-loaded I.F. cans of the 1960s and 1970s. Today you can get a ceramic 10.7 MHz filter with a few dB of loss, already laser trimmed to exact tolerances for about \$1.50. Two or three of these babies one after another and your adjacent channel issues are history. Again, reasonable easing of ancient restrictions would add opportunities.

It's long past time to review the interference rules in light of receiver technology advances made in the past half century. In doing so, we could accommodate current AM licensees and plenty of new faces. And who doesn't think our industry could use a little new blood?

*Frank McCoy
Chief Engineer
Salem Chicago
Forest Lake, Ill*



READER'S FORUM

MARTI MEMORIES

It's nice to see you folks are paying homage to Mr. Marti and his contributions to the broadcasting industry ("Marti Knew How to Make Connections," Jan. 6). Now for my two cents.

Radio 101 for me and many of my colleagues who started in the business in the late 1980s included the following:

- After you connect the antenna and turn the unit on, don't touch the antenna mast! Ouch!
- Common phrase uttered by the on-site talent at a remote: "If you can hear me, dump the audio." (Who needed cell phones?)
- Have the switch in "transmit" mode ... *not* "stand-by"! Or no one will hear you!
- Always have extra fuses.

Ken Hawk
President/General Manager
WSNQ(AM)
Saxonburg, Pa

STREAMING

(continued from page 28)

content distribution costs while increasing stream reliability.

To date, few HLS encoders are known to be 100 percent IETF compliant, per the Apple specified HLS encoder solution. For those that are, they offer secure server connection modes and also play and display metadata correctly in iTunes. Many content delivery networks are currently offering poor misinterpretations of the HLS standard.

With HTTP 2.0 coming, the buyer should beware.

John Schaab is a 44-year broadcast hardware/software sales and marketing veteran. Starting at International Tapetronics in 1972, He was the manager of TM Century's advance technology department and general manager of the department when it was spun off to ON AIR Digital GMBH. He spent the last 11 years as PC Products manager and then North American sales manager for Orban before taking on the marketing director position for StreamS Hi Fi.

Share your own experiences and comments about audio streaming technology. Email radioworld@nbmedia.com.

GAZINTA, GAZOUTTA

Excellent article by Paul McLane in Jan. 6 Radio World on George Marti.

Only one tiny error: The picture of the unit is labeled a Marti receiver, when in actuality, it is a M30BT Marti transmitter. This was the vacuum tube version made until it was replaced by the RPT-line of solid state transmitters. It was every bit as rugged as the solid-state versions, and actually a bit easier to work on.

I particularly liked the very last sentence in the article. I wonder how many of today's broadcasters will ask themselves if their radio stations are really "helping" the community they are in? My guess is few, if any. The ones that do, if they are honest, will not like their answer in most cases. Playing the same 12 songs of their "for-

mat" over and over is hardly serving or helping their community.

Jerry Arnold
Retired Director of Engineering
Terre Haute, Ind



Charles S. Frich

PIRATE REVENUE

Responding to "Pirates Are a State Level Problem, Too":

I have heard advertising being aired on certain pirate stations.

In addition to going after the pirates directly, I don't know why state/local law enforcement agencies don't go after businesses that buy ad time on these stations. By simply notifying them that they are supporting an illegal enterprise, I suspect that many would stop buying ad time, thus drying up a major source of funding for the pirates. If a business fails to comply, in addition to stiff fines, a business that continues to support a pirate, could possibly face seizure of assets and/or loss of their operating licenses.

Steve Donnell, WA1YKL
Broadcast Engineer
Newmarket, N.H.



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