



# RADIO WORLD

APRIL 8, 2015 | The News Source for Radio Managers and Engineers | \$2.50 | [RADIOWORLD.COM](http://RADIOWORLD.COM)

## Tom King Extols Virtues of AM



Kintronic Labs president is recipient of NAB Radio Engineering Achievement Award

King stands before an array operated by Far East Broadcasting Corp. in 2005. The 250 kW station is on Jeju Island, South Korea.

nizes significant contributions to broadcast engineering. King will be honored in Las Vegas during the NAB Show Technology Luncheon April 15. Richard Friedel, executive vice president and general manager for Fox Networks Engineering and Operations, will receive the NAB TV Engineering Achievement Award.

Kintronic Labs, headquartered in Bluff City, Tenn., designs, fabricates, installs and commissions analog AM and digital-ready AM terrestrial broadcast transmission systems, with projects domestically and in numerous countries overseas.

The company worked with Star-H Corp. to develop the Kinstar AM low-profile, high efficiency, wideband anten-

na. It was the first of its kind accepted by the FCC for full-time omnidirectional operation in the United States, according to the company.

Kintronic offers products and services from the transmitter port out, King said. "The transmission lines, towers, ground systems, RF feeder systems. All the hardware, too, including installation and commissioning."

The 67-year-old King travels on international business a substantial amount of time; he's out of the office "five to six weeks at a time," often troubleshooting overseas projects.

"It really helps me to learn how our equipment is utilized overseas and how we can help broadcasters be more efficient."

### INTERNATIONAL PROJECTS

International projects now make up approximately 60 percent of Kintronic's business. "It's been that way since the domestic market went through the Great Recession. Asia and the Middle East

*(continued on page 8)*

## NEWSMAKER

ANDY J. STINE

**BLUFF CITY, TENN.** — It is hard to find a more ardent advocate of AM radio than Thom King. Few people have pushed so hard for the FCC to adopt new rules to

help revitalize AM in the United States and place it back on competitive footing with FM and other media services.

King, president and CEO of Kintronic Labs Inc., has joined the honor roll of NAB Radio Engineering Achievement Award winners, a list that includes his father, Louis A. King, recipient in 2007.

The NAB'S engineering award recog-

## Online Listening Has Reached Critical Mass

Infinite Dial survey also sheds light on music discovery, podcasting, more

### RESEARCH

BY TOM VERNON

It's no secret that media consumption habits are changing rapidly and that online listening is on the rise. Recent research conducted jointly by

Edison Research and Triton Digital fills in some of the blanks and gives numbers to these and other trends. The report also has implications for station managers who are developing strategic plans and creating budgets for the coming years.

"The Infinite Dial 2015" is the *(continued on page 24)*

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# Radio Comes Together on Contest Rule

## Urges agency not to specify online format, nor mandate online URL each mention

BY LESLIE STIMSON

**WASHINGTON** — Since the FCC began enforcing the current contest rule in 1976, broadcasters have complained about a requirement to announce all the rules of a contest on the air. They say the practice drives listeners away and is an inefficient use of air time.

Entercom Communications in 2012 filed a Petition for Rulemaking on changing the contest notification rules. The FCC asked for comment and received no opposition.

The agency took note and late last year it proposed modernizing the rules to keep up with how the audience expects to get its information. Essentially, the commission proposed giving broadcasters a choice of meeting their contest rule disclosure obligation by posting contest rules on a website or by continuing to provide those on-air. Among other things, they would be required to announce the website address where contest information can be found each time they mention a contest on-air.

The window to file comments on the

Notice of Proposed Rulemaking (Docket 14-226) recently closed. Sixteen entities filed but they represent a far greater number of stations and organizations; all support the proposal to modernize the contest rules. Media giant iHeartMedia noted that this is unusual. It told the commission that filers in FCC proceedings are "rarely unanimous in their support for (or opposition to) a particular proposal."

One person wondered what the agency intends to do about stations that have no ready access to the Internet, but this filer, who filed anonymously, still supports modernizing the rule.

Here are excerpts capturing major themes on this issue:

## WHY CHANGE IS NEEDED

*Filed by the Coalition for Modernization of the FCC Contest Rule. Members are Block Communications Inc., Cordilera Communications Inc., Cox Media Group Inc., Digits LLC, Granite Broadcasting Corp., and Meredith Corp.*

Together, the coalition's members own or operate 62 television stations and 169 radio stations in markets ranging from Boston, Mass., to Mason City, Iowa to Santa Barbara, Calif. Collectively, those stations conduct hundreds, if not thousands, of contests each year and frequently invite their viewers and listeners to enter promotions online or to go to station websites for more information.

Contest terms are often broadcast while viewers and listeners are involved in various other activities, such as cooking, driving or working. Accordingly, the collective experience of the coalition members supports the notion that viewers and listeners can miss or fail to understand all material terms announced over-the-air during contest promotions because they are distracted by other tasks, increasing the possibility of confusion and failed expectations and making some less likely to enter a contest. Broadcasters can supplement on-air contest announcements with online postings of material terms, but doing so does not meet the requirements of the Contest Rule, so many broadcasters do not post their contest terms online.

By allowing broadcasters to post contest terms online, both broadcasters and

(continued on page 5)

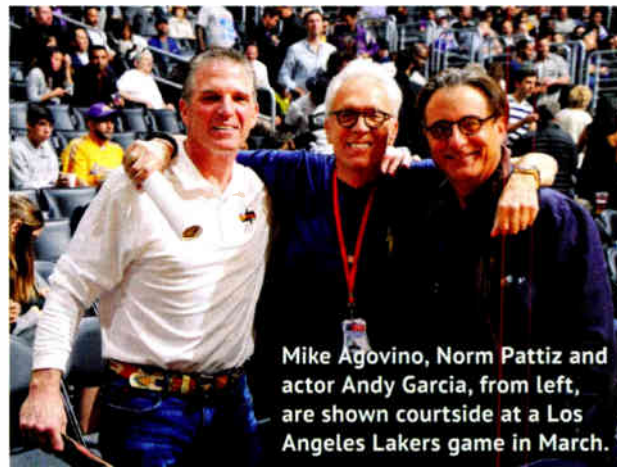
## NEWSROUNDUP

**FCC:** Rep. Greg Walden, a former radio station owner and current chair of the House Telecommunications Subcommittee, wants to improve transparency, efficiency and accountability at the commission. Several proposals were part of a draft measure he circulated in advance of an FCC oversight hearing in March. The measure would reauthorize the agency for the first time in nearly 25 years. The Oregon Republican criticized the agency for taking too long to clear backlogs in rulemakings, petitions and other applications, specifically citing the AM revitalization rulemaking. The agency seeks \$530 million for FY2016. Walden called the request "disproportionate" and said lawmakers remain concerned, saying the "sheer size" of the request warrants additional scrutiny. FCC officials have said much of the increase is to beef up or replace aging IT infrastructure.

**INDECENCY:** The FCC proposed a \$325,000 fine in March against Schurtz Communications-owned WDBJ(TV), Roanoke, Va., for airing indecent images during a newscast in 2012. The fine, if not reduced, would be the biggest amount the agency has levied for a single indecent incident. The fleeting images of an erect penis were part of a 6 p.m. broadcast; the agency, following up on complaints, determined the images violate its prohibition against indecency when children may be in the audience. The station apologized and told the commission that the images were aired accidentally. An NAB spokesman called the decision "unprecedented" and "remarkably punitive," while the Parents Television Council and the National Center on Sexual Exploitation, formerly Morality in Media, praised

the FCC action. Schurtz Communications had 30 days to appeal or pay the fine; it intends to appeal.

**PODCASTONE:** Courtside Entertainment, parent company of PodcastOne, added Mike Agovino to its executive roster in the newly-created position of executive vice chairman. Agovino will work with Chairman/CEO Norm Pattiz, President Kit Gray and Chief Operating Officer Greg Batusic across the divisions of PodcastOne and



Mike Agovino, Norm Pattiz and actor Andy Garcia, from left, are shown courtside at a Los Angeles Lakers game in March.

Courtside Entertainment. Agovino left Triton Digital following its purchase by Vector Capital. Agovino spent some nine years as chief operating officer at Triton, which he co-founded. Pattiz said Agovino will contribute his experience in new media technology, audience analysis and development, and revenue growth for the continued expansion of the podcast network.

# Online Radio Has Become “Mainstream”

Infinite Dial survey also quantifies trends in podcasting and music discovery

As we report on page 1 of this issue, a recent survey from Edison Research and Triton Digital shows that streaming audio has become an ingrained part of Americans’ lives.

No longer is streaming just for occasional listening, the companies found, which means streaming audio is a “huge opportunity” for publishers and marketers to target listeners and maximize ad revenue.

“The Infinite Dial 2015” is the latest in a series of studies that began in 1998. I found it intriguing to flip through its results. Here’s a summary to complement the discussion in Tom Vernon’s article.

Edison provides research for a range of media businesses including Disney, Pandora, SiriusXM, Bonneville, Emmis, CBS and Radio One — a variety of clients that in my mind makes its research results more credible. Triton’s business is to “connect audio supply with advertising demand” with technology like

programmatic ad buying. (Triton was acquired last month by tech-focused private equity firm Vector Capital.)

### WHO DOMINATES?

The study was based on phone interviews with 2,000 Americans in English and Spanish, via both landlines and cellphones. Here are some important conclusions from its summary:

- Online audio is a “fully mainstream” activity for people under 55. (This includes the audio of AM/FM stations consumed online, as well as streamed audio available only on the Internet.) More than half of Americans now listen monthly to online radio, and 44 percent — 119 million people — listen weekly, compared to 8 percent a decade ago. Younger demos are far more likely to listen online.

- AM/FM “continues to dominate” in

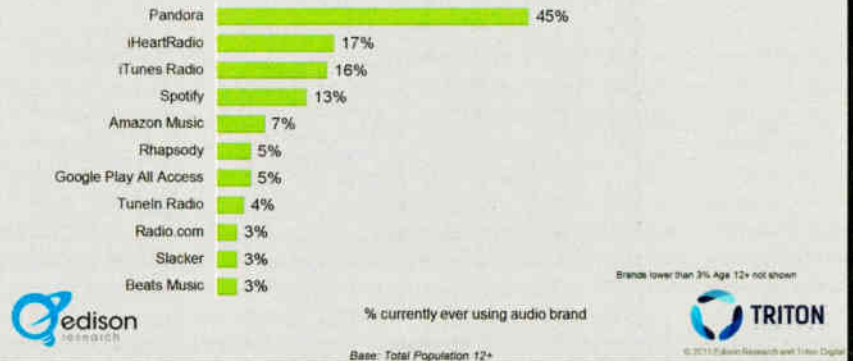
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**FROM THE EDITOR**



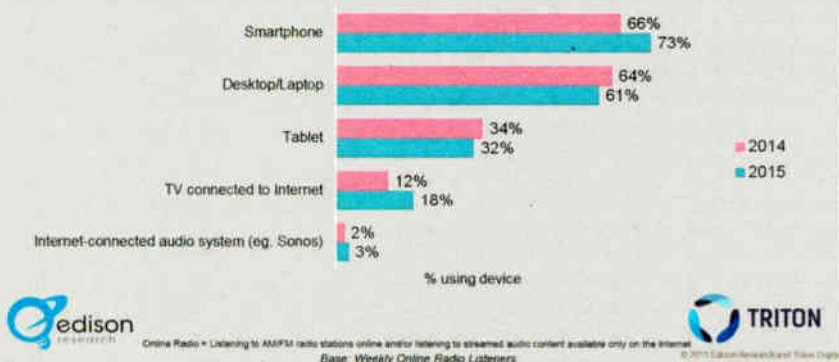
Paul McLane

### Audio Brand Usage



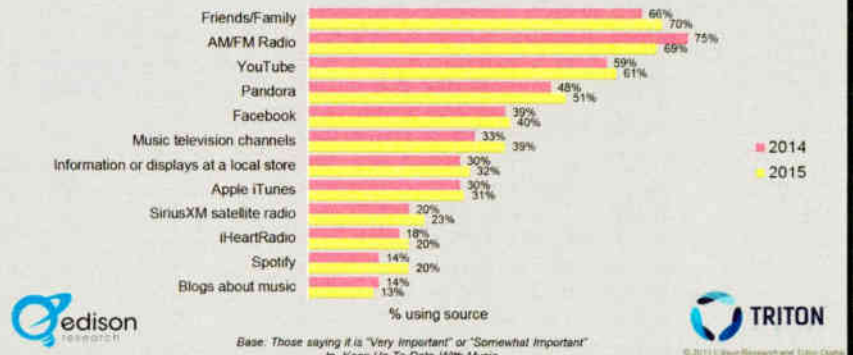
By several measures, Pandora is the leading Internet-only audio service, including the above. A related finding is that more than half of Internet audio users say Pandora is the service they listen to most often, with iHeartRadio a distant second, followed by Spotify and iTunes Radio.

### Devices used to listen to Online Radio



The images on this page are a sampling of the kind of info given by the survey. Here, we see that smartphones and desktops/laptops are the preferred method of listening to online audio, although TVs connected to the Internet are making gains for this purpose.

### Sources used for keeping up-to-date with music



Notice how strong YouTube is in helping people learn about new music. The researchers found that YouTube as a music channel is “as mainstream as all of online audio put together.” Also notice the drop from last year for AM/FM radio.



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# CONTEST RULE

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consumers will be served. Consumers will benefit because they will be able to review contest terms at any time and in a manner that permits greater comprehension. The costs to broadcasters of placing contest terms online will be negligible, since most stations already operate their own websites, and stations will devote less air time running strings of contest terms over the air. A better understanding of station contest terms will also benefit commission staff, as wider access to contest terms online should reduce consumer confusion which, in turn, should reduce the number of consumer complaints.

## ONLINE DISCLOSURE MAKES RULE MORE EFFECTIVE

*iHeartMedia:*

Written online material term disclosures would allow consumers to access information on-demand rather than having to wait for periodic broadcast disclosures, affording broadcasters the flexibility to supplant archaic on-air disclosures that are not suited to contemporary audiences. Modern consumers, enabled by 21st century technology, expect to be able to instantly access information by merely logging on to a website, conducting a Google search, or using an app on their smart phone. . . .

These on-air material term disclosures are disruptive to both broadcasters and listeners. Radio licensees in particular must interrupt programming or commercial breaks to broadcast material terms announcements, some of which may be complex. Listeners often consider such announcements to be negative, undesirable or simply boring content and therefore change the channel or tune-out. This not only drives away audience, but also defeats the goals of the Contest Rule, which is designed to increase consumers' awareness of the material terms of licensee-conducted contests. . . .

A study conducted by Media Monitors indicates that audience erosion is twice as great during material term announcements than during "regular" commercial breaks. Using Arbitron PPM data, Media Monitors analyzed audience loss during material terms announcements for a Katy Perry contest. The announcements were broadcast by Sacramento radio station KDND(FM) over a two-week period. The study found that KDND lost more than a quarter of its net listening audience during commercial breaks containing a material terms announcement for the contest. In contrast, KDND lost only 13 percent of its net audience during commercial breaks that did not con-



Greater Media's WBOS(FM), Boston, lists several competitions on its contest page.

tain the material terms announcements. iHeart anticipates that stations would experience far less audience loss during on-air announcements directing listeners to the online location of written material

terms because such disclosures would be much shorter, and therefore far less disruptive to the listening experience, than current material terms disclosures.

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## TOM KING

(continued from page 1)

have been very good for [Kintronic,] especially places like India, Korea and Vietnam.”

King was in Dubai in March for the CABSAT Convention, which organizers bill as the largest broadcast-related convention held in the Middle East.

Kintronic, which has 40 employees, completed a large project in India in 2014 for the rollout of Digital Radio Mondiale DRM30 digital broadcasting on the medium-wave AM band in that country, King said.

“We worked with Nautel on the project. We supplied new matching systems for 27 sites. These were all 100, 200 and 300 kW sites,” King said.

King admits he was seemingly born to be in the AM antenna business. He recalls testing vacuum tubes on summer break when he was young. By the time he reached high school, King was working in Kintronic’s manufacturing shop, cutting steel antenna tuning unit boxes, and painting.

After completing his high school edu-

cation, King said his father gave him limited options when it came to higher education.

“There was only one college and one subject. It had to be the University of Tennessee, and it had to be electrical engineering,” he said with a chuckle.

He received both his bachelor’s and master’s degrees in electrical engineering from the school. King then completed two years of study at the University of Arizona, pursuing his Ph.D. in electrical engineering.

“I was really interested in optical science like lasers and electrical optics at that time.”

In 1973, King went to work for the U.S. Navy as a staff engineer in electro-optical system design at the Naval Weapons Center in China Lake, Calif., followed by a stint with General Research Corp., in McLean, Va., as project engineer in Infrared Countermeasures Systems for Navy and Marine Corps aircraft.

In 1983, King returned to Kintronic Labs to join the family business. His father suffered a stroke soon after. Tom King ascended to the presidency of the antenna manufacturer.



Tom King is president and CEO of Kintronic Labs Inc.

“It was really by God’s grace that I returned to the company when I did and was in a position to help my father,” King said. “He was working extremely hard and needed help.”

God is part of the Kintronic story; on the company website King states: “We know without a doubt that our company is what it is because of the grace and mercy of our Lord Jesus Christ. One thing that Louis knew to be true and that we as a company know to be true is that ‘Anything is possible with God.’ He is the one that makes all things possible.”

### PROMINENT AM SUPPORTER

King is the author of numerous technical papers on the subject of AM broadcast antenna systems. He credits broadcast engineering friends and consultants Ron Rackley, Jack Sellmeyer and Ben Dawson for helping him through a period that was critical to the company’s long-term success. Rackley is a partner at du Treil, Lundin & Rackley; Sellmeyer is principal engineer for Sellmeyer Engineering while Dawson is president and senior electrical engineer of Hatfield and Dawson.

“Within two years my father had nearly fully recovered from the stroke and rejoined the business, working with me. That was about the same time we moved

(continued on page 10)

## CONTEST RULE

(continued from page 6)

### DON’T REQUIRE FULL WEB URL EACH MENTION

*Hubbard Broadcasting:*

While the movement to bring the contest rules online is laudable, requiring a station to broadcast a Web address each and every time it mentions a contest, even if only in passing, is unnecessarily burdensome and will result in the very aural clutter that the commission seeks to mitigate. What are the boundaries for this requirement — if a DJ mentions a contest three times during the same segment, does the Web address also have to be given three times, or is once enough? What if the contest name itself is not mentioned, but only marginally referenced?

What if a caller unilaterally mentions the contest when making a song request — is disclosure required then? Rather than requiring disclosure of a website address in every instance, the commission should simply require periodic announcements of the Web address, as a parallel to what is required under the current rule.

*iHeartMedia:*

Contests are generally discussed by radio stations on-air in one of three ways. First are the material term disclosures mandated by the FCC’s current Contest Rule, which generally consist of a produced announcement containing all material terms of a contest and lasting approximately 60 seconds. Next are contest promotions in which a station publicizes a contest and invites its audience to participate via a promotional spot, akin to a commercial advertisement. These contest promotions generally last 15

to 30 seconds each, and are generally scripted or recorded in advance. Finally, there are briefer on-air mentions, which are typically unscripted and sometimes last much less than fifteen seconds.

Mentions occur in a variety of contexts, including, in radio, very frequently over a song intro (e.g., “Coming up after Katy Perry, your chance to win Ariana Grande tickets!”). Under the current Contest Rule, a station may air material term announcements one or two times a day. However, a station may air a contest promotional spot or mention a contest multiple times in one hour. For example, D.C.-area iHeart stations may briefly mention major station contests four times in an hour, air one recorded 30-second promo per hour and run several 15-second contest promos a day. The time spent promoting or mentioning contests increases with each separate contest run by the station at a given time. Requiring stations to mention the online availability of material contest terms every single time a contest is discussed on-air would create clutter and disrupt the listener’s experience, and would be impractical for brief mentions that occur during song intros that themselves are only a few seconds long.

### REMOVE RULES FROM WEBSITE WHEN CONTEST ENDS

*Alpha Media LLC; Emmis Communications Corp.; Gray Television Inc.; Nexstar Broadcasting Inc. and Radio One Inc.*

The commission also asks how long a licensee should be required to maintain material terms on its website. Without question, listeners and viewers should have access to a contest’s material terms for the duration of the contest. More precisely, material terms should remain posted at least until a contest winner has been announced or notified (whichever occurs first). This requirement would provide broadcasters

with a clear and readily ascertainable date on which to remove material terms from their websites. In addition, the ability to access material contest terms through the conclusion of a contest is consistent with the expectations of listeners and viewers, who are unlikely to want to access material contest terms after a winner has been identified. Further, a requirement to maintain rules online after a contest has ended could create consumer confusion about whether a contest is still ongoing.

### SOME CONCERNS

*Anonymous filer:*

I do have concerns about listeners who do not have access to the Internet. This proposal does not resolve issues that they may face. Additionally, the proposal does not address the problems that listeners come across when tuning in midway during a broadcast. Also, the proposal does not ensure that listeners will become aware that additional information is posted on a website for them to access.

Another concern relates to small businesses who offer these contests, but who do not have websites of their own. The proposal allows for these companies to post the requested information on a site operated by a state broadcasters association. However, this brings up questions of liability and maintenance. If the company itself does not have immediate access to the site, and terms and conditions change, does this lack of immediate access pose similar potential problems to the listener that existed prior to the proposal?

The concerns I addressed are not major and I still support the amendment to provide immediate access to additional information online.

*Comment on this or any story. Email radioworld@nbmedia.com with Letter to the Editor in the subject line.*

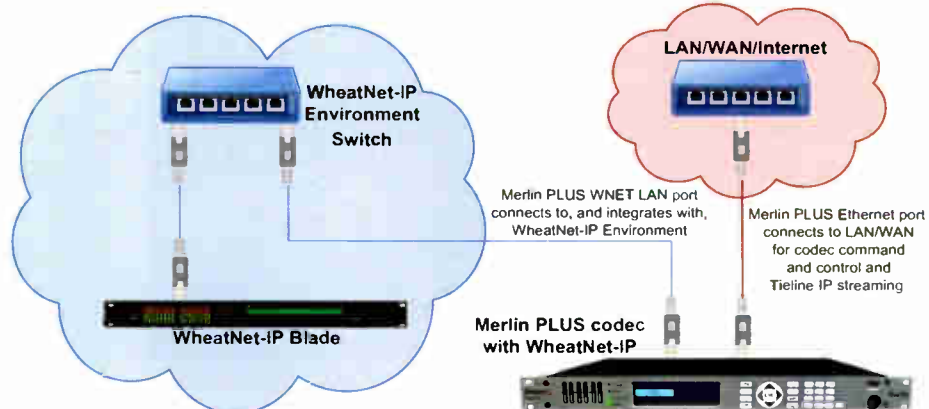
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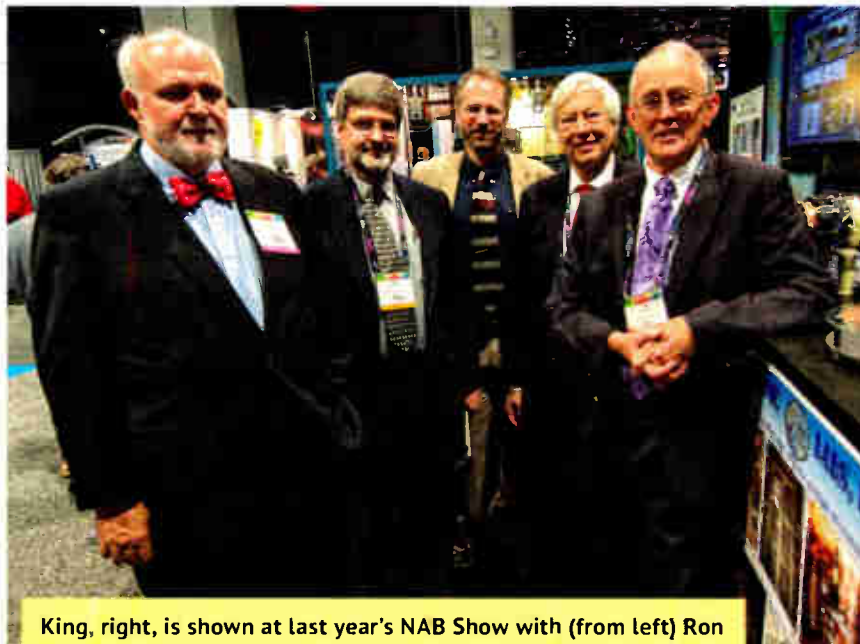
# TOM KING

(continued from page 8)

into our current facility," King said.

Through the years, King has been a prominent supporter of AM broadcasting and has worked to educate others of the problems facing AM broadcasters. He points to the worsening electromagnetic environment and what he believes is the failure of consumer electronics industry to provide high-quality AM receiver systems as two of several challenges facing AM station owners.

King lauds the FCC for the commission's work in the AM Revitalization Notice of Proposed Rulemaking, though he would go further than the initial six proposals being discussed. "The FCC must move immediately to enforce Part 15 unintentional radiator rules on utilities



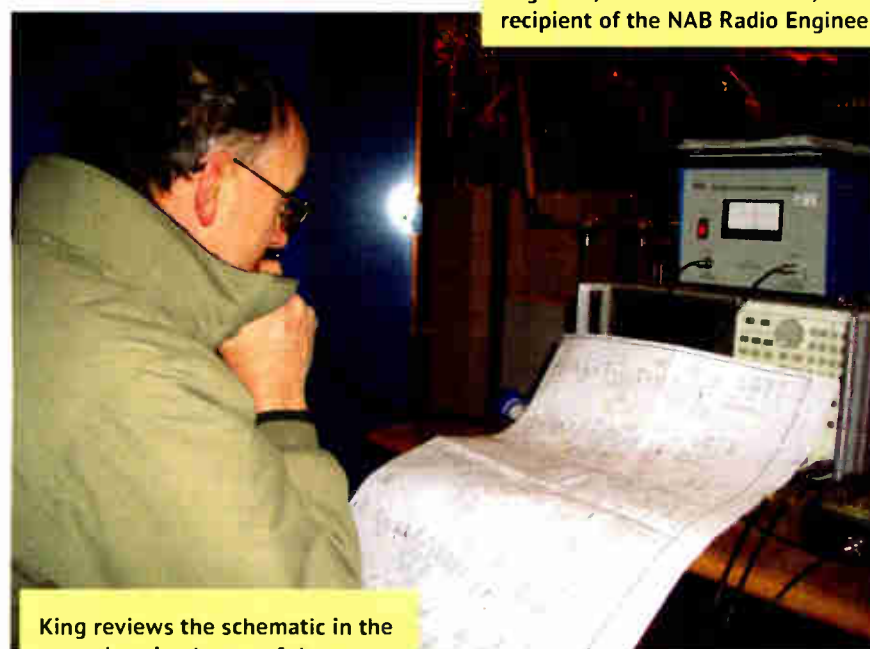
King, right, is shown at last year's NAB Show with (from left) Ron Rackley, PE, duTrel, Lundin and Rackley, and King's Kintronic colleagues Jim Moser, senior RF engineer; Dr. Bobby Cox, RF design engineer; and Dr. Steve Smith, consultant. Rackley is a previous recipient of the NAB Radio Engineering Achievement Award.

Photo by Jim Peck

Bristol, Tenn. They have four grown children.

For a detailed discussion of King's further proposals for AM, see his commentary "Let's Save a Vital National Media Resource: AM Radio," from the October 2014 issue of *Radio World Engineering Extra*. Find it at [radioworld.com/am\\_king](http://radioworld.com/am_king).

**In the field: King talks to Jim Hulse, president of Towers for Jesus, at a high-power medium-wave station in Kavastu, Estonia. At the base of the 200 kW tower is the base insulator and tapered base section of the tower. This is a two-tower directional antenna operated by Tartu Family Radio. King recalls that he was working at this station on the day of the 9/11 terror attacks of 2001.**



King reviews the schematic in the central tuning house of the station on Jeju Island, South Korea.



and others," King said.

He predicts the FCC will move ahead with its AM plans soon after being "side-tracked" with Net Neutrality discussions.

Despite the obstacles in the way of AM's revitalization, King remains optimistic about the long-term future of the senior band.

"I believe AM is going through a period of transition. I think it will eventually return to what it was designed to be and that is a local public service medium. I think it can compete again with FM with proper noise regulatory action by the FCC and minimum technical standards for receivers," King said.

He proposes the idea of "a consortium of AM broadcasters" to meet with members of Congress and the FCC in Washington to address matters. "This is an urgent matter and AM broadcasters need to push forward with ideas that can help them," King said.

King and his wife, Leigh, reside in

## HONOR ROLL

Winners of the NAB Engineering Achievement Award are listed here. Beginning in 1991, radio and TV winners were named; radio winners are shown.

- 1959 John T. Wilner
- 1960 T.A.M. Craven
- 1961 Raymond F. Guy
- 1962 Ralph N. Harmon
- 1963 Dr. George R. Town
- 1964 John H. DeWitt Jr
- 1965 Edward W. Allen Jr.
- 1966 Carl J. Meyers
- 1967 Robert M. Morris
- 1968 Howard A. Chinn
- 1969 Jarrett L. Hathaway
  
- 1970 Philip Whitney
- 1971 Benjamin Wolfe
- 1972 John M. Sherman
- 1973 A. James Ebel

- 1974 Joseph B. Epperson
- 1975 John D. Silva
- 1976 Dr. Frank G. Kear
- 1977 Daniel H. Smith
- 1978 John A. Moseley
- 1979 Robert W. Flanders
  
- 1980 James D. Parker
- 1981 Wallace E. Johnson
- 1982 Julius Barnathan
- 1983 Joseph Flaherty
- 1984 Otis S. Freeman
- 1985 Carl E. Smith
- 1986 Dr. George Brown
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- 1988 Jules Cohen
- 1989 William Connolly
  
- 1990 Hilmer Swanson
- 1991 George Marti
- 1992 Edward Edison & Robert L. Hammett
- 1993 Robert M. Silliman
- 1994 Charles T. Morgan

- 1995 Robert Orban
- 1996 Ogden Prestholdt
- 1997 George Jacobs
- 1998 John Battison
- 1999 Geoffrey Mendenhall
  
- 2000 Michael Dorrough
- 2001 Arno Meyer
- 2002 Paul Schafer
- 2003 John W. Reiser
- 2004 E. Glynn Walden
- 2005 Milford Smith
- 2006 Benjamin Dawson & Ronald Rackley
- 2007 Louis A. King
- 2008 Thomas B. Silliman
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# Turns Out It Wasn't the Antenna

Consultant Richard Wood describes an FM troubleshooting scenario

## WORKBENCH

by John Bisset

Read more Workbench articles online at [radioworld.com](http://radioworld.com)

**R**ichard Wood relates an experience troubleshooting what appeared to be a problem with an FM antenna or line.

A client station had experienced a rapid increase in the standing wave reading on its tube-driven FM transmitter. Severe winter weather had been through and the problem was thought to be weather-related; so the chief engineer took an air-cooled load to the site and hooked the transmitter to it.

Lo and behold, the VSWR went to 200 and the transmitter appeared to be making full power. Out went the call for a tower crew and an antenna troubleshooter. Enter Richard.

Whenever he goes on a trouble call, he's aware that the client is basically at the end of his or her rope and hanging onto the last knot. So he comes prepared to solve issues.

Before hooking up the network ana-

lyzer to the antenna, Richard used a spectrum analyzer to "sniff" for local carriers with a whip antenna. He identified the station's signal on the display, then headed up the dial to measure the second through eighth harmonics. He found no signals.

The next step was from the center carrier; he increased the span to 20 MHz and noticed a spike. This was larger than the station's signal and about 5 MHz down in frequency.

He moved forward and tested the antenna system, tuned it up, then had the tower riggers look it over. They found no issues; so Richard directed his attention back to the transmitter.

With the rig running into a dummy load and through a line section in place, Richard could see the out-of-band emissions that were occurring.

The antenna is a single-frequency device, so any off-frequency power returns as reflected power. Because the transmitter reflectometer is broadband, it does not differentiate between on- or

off-carrier power; it considers it all as power and displays it. And because the dummy load also is a broadband device it will absorb whatever frequency, within reason, fed into it.

The fix for the transmitter was to tune it up while watching the spectral signals, not just the power meter. Richard also ordered up a new set of doorknob capacitors for the driver tube input circuit.

Test metering certainly can help diagnose problems; but always remember the limitations of your equipment.

**Y**ou've probably seen and smelled candles and thought you'd heard of every imaginable scent. But you probably didn't imagine Two Stroke Smoke.

Gino Balossi found it and passed it along to us; he is chief engineer for Emmis Radio in St. Louis. Two Stroke Smoke smells just like burning motor oil. Flying Tiger Motorcycles of St. Louis sells the candle, which might make a good \$20 Father's Day gift.

States the website: "Super awesome



**Fig. 1: An engineer's favorite, Two Stroke Smoke.**

custom-blended Two Stroke Smoke candle. It's made with real live Klotz 2 stroke oil with high-octane fragrance. We have reformulated the candle and are using metal cans with an awesome new label; however, the wood wick and 16 oz. of wonderful soy wax stay the same."

The site also sells Grime to Glory soap, a spicy/woody fragrance in glycerin soap.

Head over to [flyingtigmoto.com](http://flyingtigmoto.com) for details.

(continued on page 14)

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# The Forecast Is Mostly Cloudy

Broadcasters take advantage of virtual platforms and storage



Here's the next in our new series of columns called What'sNext. Radio World's watch on everything new in audio content distribution. In this edition, we take to the cloud, specifically some of the cloud-based services that radio broadcasters are starting to use.

## SPORTS REMOTES MADE UBER EASY

Milwaukee's WTMJ(AM) has found an extremely simple way to broadcast and package live high school football on location: They feed their on-location play-by-plays through their account at [radionomy.com](http://radionomy.com).

A cloud-based Internet radio support service, Radionomy provides music licensing for any songs played from the company's database, insertion of WTMJ-supplied ads and the ability to mix live and pre-recorded content on the fly.

WTMJ sends two announcers to the games with two microphones, a laptop computer and audio mixer to the game; Radionomy does the rest. The "Preps Live" play-by-plays are distributed on Radionomy's own website, [WISports.com](http://WISports.com) and via the free Radio League Mobile

App (available at [RadioLeague.com](http://RadioLeague.com); Android/Apple/Blackberry).

"As Wisconsin's radio station, WTMJ has a great tradition of sports broadcasting, starting with the Green Bay Packers in 1929," said Tom Langmyer, VP/GM of Journal Broadcast Group's Milwaukee Radio Operations. "In 2014, we continue to grow in our commitment to play-by-play with the addition of key high school match-ups."

## CALL INTO THE CLOUD

Call-in shows normally require a serious investment by broadcasters in control room equipment and telephone lines. The cloud-based Call In Studio solution ([www.callinstudio.com](http://www.callinstudio.com)) eliminates those costs, by providing virtual call-in platform designed for Internet and radio show producers. It allows anyone to virtually accept and manage calls using Web-based interface.

Before the show starts, the station calls into the Call In Studio system over a regular phone line, over which the show's audio is fed to callers. At the same time, the caller audio is fed back to the station over this same line. The Call-In product automatically answers up to new 35 callers and puts them on hold with show audio until it is their turn to talk — and yes, it supports call screening.

The cost: All calls made into or out of Call In Studio are \$0.03 a minute (toll-free incoming calls are \$0.06/



Here is a screenshot of the WTMJ620 Preps Live app.

## WORKBENCH

(continued from page 12)

In the March 11 Workbench, we mentioned concrete "pylons" or "pillars" sunk in the ground to protect a tower. In the construction industry, these are known as bollards.

Thanks to Al Hajny for the term, which will help readers describe them to a contractor.

You have many choices for remote monitoring of A/C power. San Diego engineer Marc Mann says the PL-PMIRJ by Whirlwind appears to address every facet of power. It can help you decide whether a problem is with an upstream utility, a generator or the transmitter load itself.

Its ability to view all parameters in real time over the Ethernet or the Internet is a plus. The only limitation seems to be the device is only for three-phase wye (Y) power with 120 V legs.

Type in [whirlwindusa.com](http://whirlwindusa.com) in your browser, then search for "PL-PMI" for information on their Power Link Power Meter. Or browse the Power Link/Electrical Distribution section of its online catalog.

Marc read about this monitor in a sound and video



Fig. 2: Whirlwind's power monitor is suitable for monitoring older gen-sets.

contractor publication but thought it might be useful to engineers as a retrofit for older gen-sets that lack active monitoring.

Contribute to Workbench. You'll help your fellow engineers and qualify for SBE recertification credit. Send Workbench tips to [johnpbisset@gmail.com](mailto:johnpbisset@gmail.com). Fax to (603) 472-4944.

Author John Bisset has spent 45 years in the broadcasting industry and is still learning. He handles West Coast sales for the Telos Alliance. He is SBE certified and is a past recipient of the SBE's Educator of the Year Award.

minute). Phone numbers on the Call In Studio system are \$6 a month; toll-free phone numbers are \$12 a month.

## BBC GOES TO THE CLOUD

In a bid to save money, Britain's BBC has moved local U.K. station BBC Radio Northampton onto a cloud-based production/payout system. Under the Beeb's Virtual Local Radio (ViLor) project, this station will process, mix, store and stream audio files from a remote privately owned cloud database. The BBC intends to add three more stations to this same cloud in the next nine months, with all 39 BBC local stations eventually making this move if the process pans out.

Centralizing the BBC's local radio stations onto a centralized cloud-based platform will reduce local infrastructure, equipment and space expenses; and make station technical refreshes occur more quickly, while improving overall sound and production quality.

**Northampton is a first, but significant, step toward us proving the potential for a fully virtualized BBC Local Radio network.**

— Peter Coles

The new system was developed by BBC Technology and BBC Local Radio.

"This is an excellent example of BBC innovation helping us find new, lower cost and more flexible ways of providing the technology our program makers need to deliver great local radio to our audiences from the local community," said Peter Coles, the BBC's interim CTO. "Northampton is a first, but significant, step toward us proving the potential for a fully virtualized BBC Local Radio network."

## CLOUD-BASED RADIO BROADCAST PLATFORM SEEKS FUNDING

Want to help fund the potential future of radio? Then consider throwing in a few dollars to help Studios.FM's Virtual Automated Broadcasting Solution to market. According to Studios.FM, VABS is a browser-centered, cloud-based production package that makes it easy for non-techies to broadcast individual radio shows, or entire stations. For professional radio broadcasters, VABS could be a useful option for doing remote broadcasts with a minimum of equipment, hassle, and expenses.

"We will provide all investors with a detailed plan, updates on development and detail where all monies are spent," according to the VABS IndieGoGo fundraising website (<https://www.indiegogo.com/projects/the-future-of-radio-with-studios-fm>). It was planning to launch in February.

Send ideas for What'sNext to [radioworld@nbmedia.com](mailto:radioworld@nbmedia.com) with "What'sNext" in the subject line.

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The latest generation of Tesla coils includes solid-state designs and backpack "Ghostbusters" portable units — the ultimate in stun guns.

Photos by James E. O'Neal

# Teslathon Isn't About Expensive Cars

Ozone, noise and manmade lightning continue to woo Tesla followers

## ROOTS OF RADIO

BY JAMES E. O'NEAL

For nearly a quarter of a century, a small group of Nikola Tesla faithful have gathered in Brockport, N.Y., just a few miles from where the Serbian electrical genius helped to engineer the world's first hydroelectric generating plant and forever established the superiority of alternating current for electrical distribution. They meet to pay homage to the inventor.

The occasion is a "Teslathon" sponsored in the late summer by Tesla enthusiast Ed Wingate. Admission is limited to a few dozen persons and some travel thousands of miles to pay homage to Tesla and witness the unleashing of man-made thunderbolts in Wingate's lab.

### TESLA AND RADIO

While Tesla's name is associated with generating extremely electricity of extremely high voltage, some argue that he should be called the father of radio, too, as he may have beaten Guglielmo Marconi to the punch.

Tesla publicly exhibited a wirelessly controlled model submarine at a New York exposition in 1896, and at about the same time, was set to demo wireless signaling between his New York City lab

and West Point, N.Y., when a fire sidetracked things.

It would appear that Tesla and Marconi were both interested in using "Hertzian waves" for communication, but Tesla changed directions, focusing instead on high-frequency, high-voltage electricity apparatus, polyphase AC power evangelism and wireless transmission of electrical power.

Marconi's focus remained on communications, and he's generally credited as the individual who put radio to work. However, Marconi relied on Tesla's resonant transformer technology to power the apparatus that sent the fabled three "dits" across the Atlantic in late 1901, and after lengthy litigation over priority in U.S. radio patents, the Supreme Court upheld Tesla's priority over Marconi.

### HIGH-FREQUENCY, HIGH-VOLTAGE HERITAGE

Today, more than 70 years after Tesla's passing, experimenters still delight in building tuned resonant transformer voltage "step-up" devices — Tesla coils — to create high-frequency discharges.

Ed Wingate is one of those persons.

"I've always enjoyed seeing electrons jump through the air from one place to another, and I've been interested in high voltage and technical things since I was in the eighth grade," said Wingate. "That's when I built my first Tesla coil. I entered it in the eighth grade science fair and won first place."

Wingate, now 67, has been building bigger and better Tesla coils ever since, with the latest iteration powerful enough to send thick arcs across tens of feet.

Wingate never pursued a career in electricity or electronics, nor has he had any formal training in the subject. He retired several years ago after 31 years as a tool and die maker at Eastman Kodak, learning electricity strictly from self-study and as he puts it, "the school of hard knocks."

In 1991, his home workshop could no longer contain the large sparks he was generating, and he constructed a 30x40x14-foot laboratory to accommodate his experimentation. Even this structure is no longer adequate, as the heavy discharges easily reach the ceiling, walls and floor of the structure.

"When you do stuff like this, you really have a need to show someone else what you're doing," said Wingate. "I could come home and fire up my coils and watch them all night, but it's not as fun as sharing them with someone."

Wingate began opening up his lab to invited guests in 1992, his first Teslathon. He's careful to note that was not *the* first Teslathon, as other super high-voltage electricity devotees were hosting similar events earlier. However, those gatherings have either been discontinued or are now focused on other areas.

In addition to demonstrating large-scale electrical discharges, Wingate uses

Ed Wingate



his Teslathon to bring established "coilers" together and to encourage others to create their own apparatus and show it off.

"We do this to disseminate knowledge. We are trying to get people up to speed on how to find materials, how to build the coils, what not to do, what to do so people don't have to struggle to get the information."

### THE TESLA COIL EXPLAINED

So how does one go about stepping up "sane" electrical potentials to the thousands or millions of volts and the big discharges that Tesla followers "ooh" and "ahh" over?

The Tesla secret lies in the use of an air-core transformer driven by a high-frequency AC source with the transformer primary and secondary tuned to resonate at a particular frequency.

In examining the basic Tesla coil circuit, it's difficult not to notice the similarity to a spark radio transmitter from a hundred years ago. In both, an iron-core transformer steps up line voltage to the kilovolt range and a high-voltage capacitor or "condenser" is connected across

(continued on page 18)

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## TESLATHON

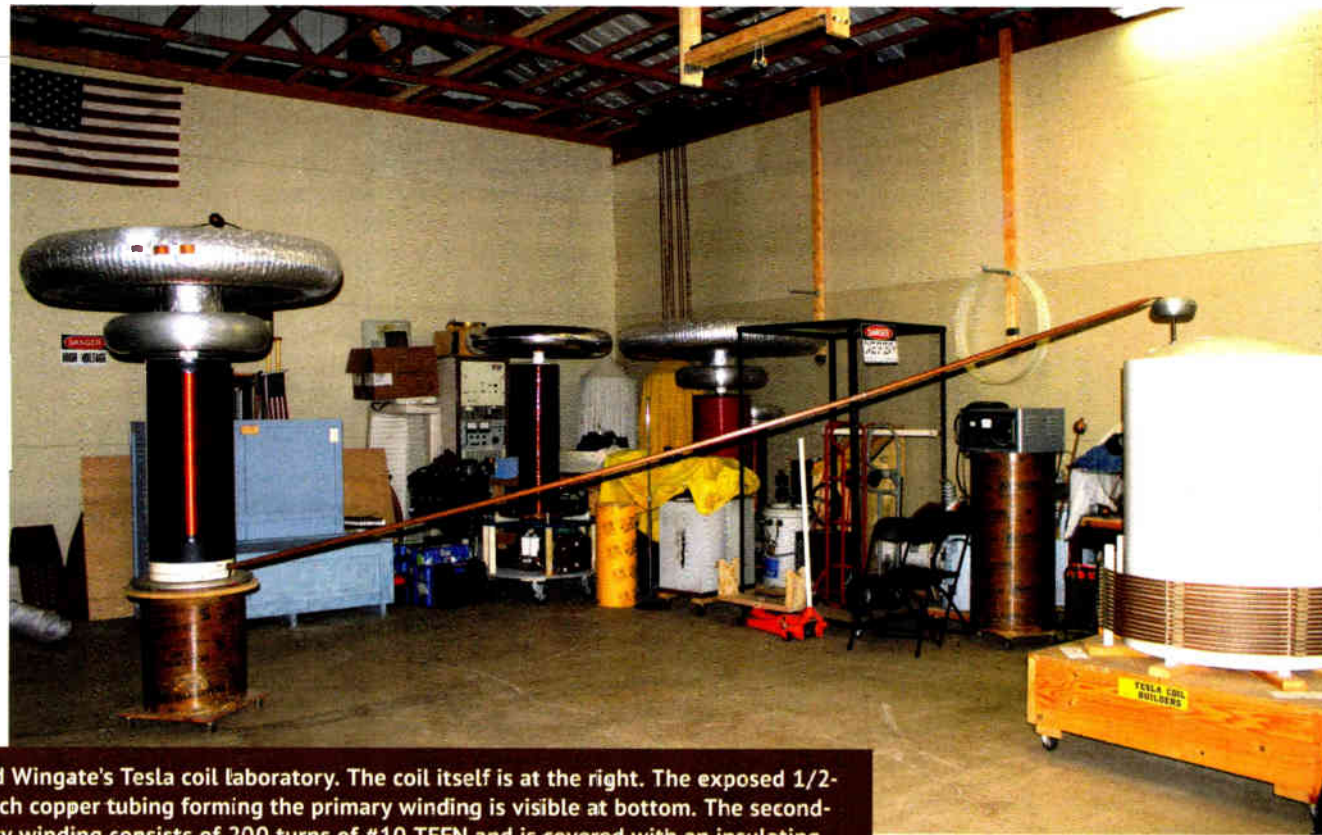
(continued from page 16)

the transformer's secondary. One leg of this transformer/capacitor pair connects directly to the primary of an air-core transformer (antenna coupling transformer). The path from the other side of the secondary to the air core transformer is broken by a spark gap. This gap is adjusted so that when the capacitor reaches a sufficient state of charge, the gap breaks down (ionizes) and momentarily connects the capacitor in parallel with the air-core transformer primary. This forms a tuned circuit with the capacitor and inductor exchanging energy in an oscillatory fashion. Operating frequency is roughly determined by the inductance of the air-core winding and the capacitor value. High frequency alternating current energy (RF) from the secondary of the air-core transformer is fed to an antenna. (The transformer secondary is tuned after a fashion by capacitance between the antenna and ground.)

The Tesla coil schematic is virtually identical, with the exception of a metal toroid or "capacity hat" replacing the antenna and providing the capacitance for resonating the coil's secondary.

Spark transmitter and spark-excited Tesla coil similarities are driven home in an August 1911 "Electrician and Mechanic" article written by Stanley Curtis on constructing a Tesla-type high-voltage machine:

"The primary helix of the resonator and the transformer with condenser constitute the chief essentials for a high-grade wireless telegraph installation and by winding a second drum with 30 turns of narrow copper ribbon, this to replace



Ed Wingate's Tesla coil laboratory. The coil itself is at the right. The exposed 1/2-inch copper tubing forming the primary winding is visible at bottom. The secondary winding consists of 200 turns of #10 TFFN and is covered with an insulating layer to prevent arcing to the primary. A large diameter copper pipe connects the secondary of the coil to the "magnifier" or secondary resonator on the left. The toroidal "capacity hat" and discharge terminal is 56 inches in diameter.

the secondary of the resonator, the builder will have an oscillation transformer which will give good service in a wireless installation.

### DAINGEROUS ELECTRICITY

To excite his big coil, Wingate uses a 14.4 kV power company distribution transformer or "pole pig" connected in reverse to step up 240 V mains power. The transformer is sized to accommodate the 13 kW drawn from the mains. A wrong move with electricity at this level

can be lethal, so it's no place for inexperienced or careless experimenters.

"There's always the danger of electrocution," said Wingate. "But generally by the time that people get to building the size coil I built, they are knowledgeable enough so they don't do anything bad to themselves."

In addition to "keeping one hand in the pocket" and checking and double-checking everything before powering up, Wingate advises those who might want to follow his path to not work alone.

"Start small, work your way up, get yourself together with people who know what they are doing. It's supposed to be a fun hobby, not a deadly hobby."

Wingate notes that, while many experimenters have constructed Tesla coils, perhaps only two dozen U.S. Tesla enthusiasts have built really large coils with outputs in the megavolt range. He adds that there's sometimes a tendency to overestimate output potentials.

"Voltage claims sometimes get exaggerated," said Wingate. "The way a Tesla coil works is that an 'arc channel' is initially created, with subsequent sparks moving through the channel and becoming lengthened in the process. Each successive spark takes less voltage to push through the arc channel."

### THE COIL IN OPERATION

Demonstrations of Wingate's giant coil are performed in a semi-darkened room to more dramatically show off the thunderbolts created.

In starting the demos (referred to by coilers as "runs"), Wingate activates a rotary spark gap and then uses a large Variac to slowly raise voltage being fed to the pole pig. As voltage is ramped up, oscillatory action starts and the light (and sound) show begins.

When moving across an open space, electricity at this potential is a sight to behold. The discharges appear to take on a life of their own, rising and falling slowly, undulating unpredictably in almost a snake-like manner, all the time seeking something to strike. Noise from the giant arc and the rotary spark gap is so great that hearing protection is mandatory.

### CIRCUIT ELEMENTS

The majority of such big coils are fashioned from components made by

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Wingate's rotary spark gap in operation. The special energy storage capacitors are on the left. Normally, the gap is covered to reduce the light and deafening noise that results from making and breaking high-current 14.4 kV 60 Hz electricity. (Spark transmitters were sometimes referred to as "rock crushers" due to the acoustic noise generated.)

coilers themselves, with usually the only "off-the-shelf" items being the AC transformer and perhaps the high-voltage capacitor.

"Herb Feldhouse, an engineer at Condenser Products, designed a special pulse discharge capacitor for Tesla coil use," said Wingate. "The caps are rated at 0.1 mfd at 40 kV and cost somewhere in the neighborhood of \$400 each."

He uses two such capacitors in series in his coil, operating them in the Tesla "equidrive" configuration.

Wingate's rotary spark gap is equally special.

"This is my own design. There are 12 separate gaps and all are breaking at the same time. The quench time is extremely fast — down in the 10 micro-second range."

Coilers rely on a variety of materials for coil forms. Smaller coils can be constructed from PVC pipe, while cardboard tubes used for forming concrete have been used for larger coils. Wingate's coil is constructed around a polyethylene agricultural spray tank 37 inches in diameter and 48 inches high.

#### MOVING BEYOND SPARK

As radio evolved, spark oscillators gradually fell out of favor due to inefficiency and the "spread spectrum" nature of their signals.

Coilers also moved on into new technologies too. Vacuum tube-excited coils began to appear in the 1930s and schematics for tube-type coils frequently appeared in hobbyist magazines.

Now that silicon devices have become more robust, some Tesla buffs use solid-state components to power their coils. Advantages include lower primary voltages, compact size and the ability to easily vary operating frequency. (Coilers have taken advantage of this latter attribute to construct coils with discharges modulated by music.)

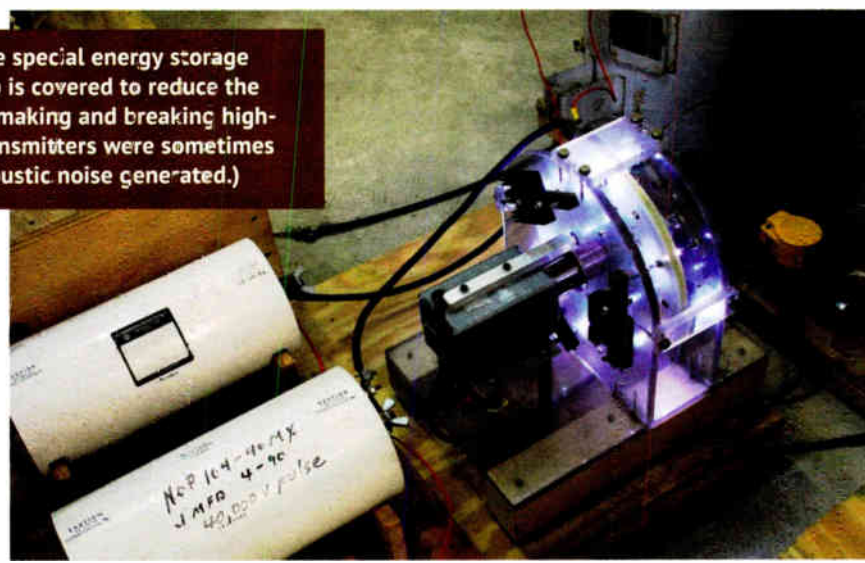
Wingate has worked with tube designs and now is getting ready to try his hand at solid state.

"I'm building a dual-resonant solid-state Tesla coil," he said. "The coil will use CM600 insulated gate bipolar transistors which are good for 600 amps at 1,200 volts."

#### BEING A GOOD NEIGHBOR

Even though his megavolt coil is at heart a large radio transmitter, Wingate has no interest in trying for a 21st century spark communication record.

He also noted that most coilers recognize the communications-disruptive nature of their creations and try to avoid interfering with nearby electronic devices.



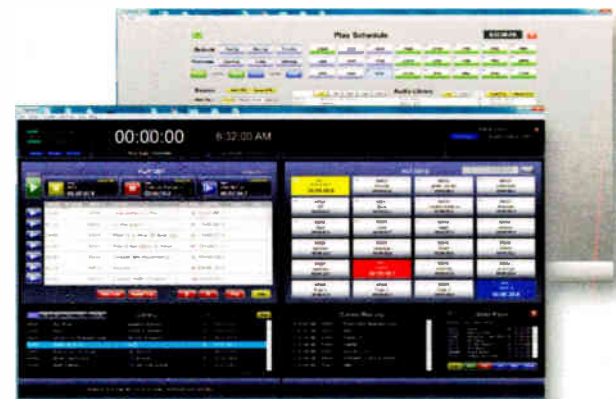
"My entire lab is a Faraday cage," said Wingate. "Every panel in the [metal] building and roof is tied together with jumpers and grounded with common ground rods. In the power panel I have bank of EMI filters to keep RF from going into the line to keep the neighbors happy."

Speaking of neighbors, Wingate says "Don't lie to them; let your neighbors know what they are doing. Most people are pretty receptive, but if you try to be secretive they can manufacture all kinds of things that may not be true. Honesty is best!"

**NEW...**  
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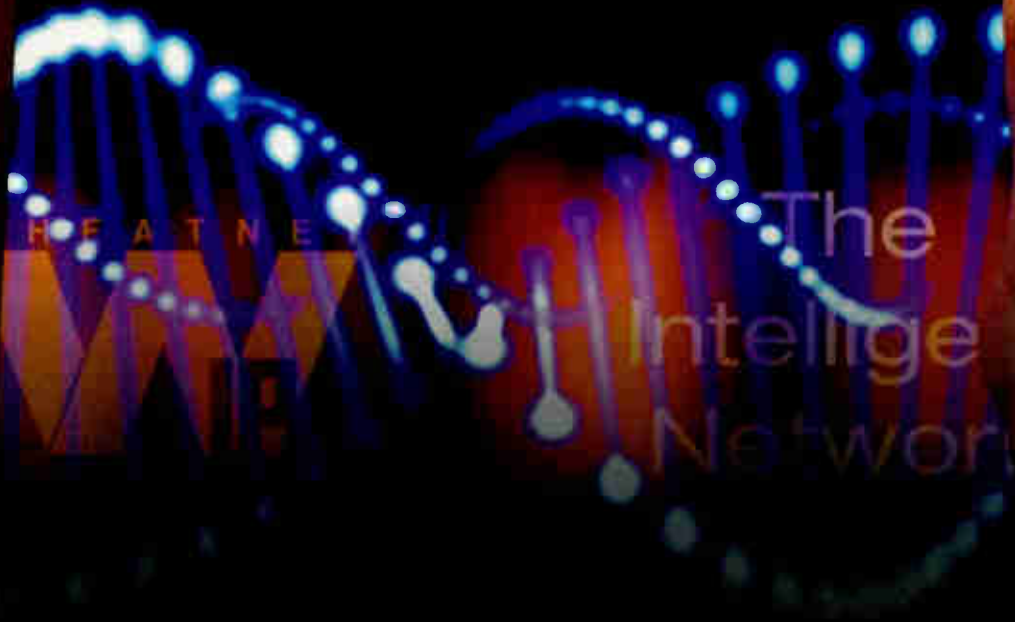


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# Radio Station Not Required

We share stories of DJs' online transitions

## STREAMING

BY JAMES CARELESS

The growth of Internet radio, combined with broadcast radio's contracting career opportunities, has led more than one radio personality/producer to consider taking their shows to the Web and leaving radio in the dust.

But is streaming via the Web a viable career option? Yes and no.

The success of former KSLX personality Adam Carolla's popular ongoing podcast ([adamcarolla.com](http://adamcarolla.com)) has shown

broadcast radio personalities and their efforts to make it online.

### THE MILKY SHOW

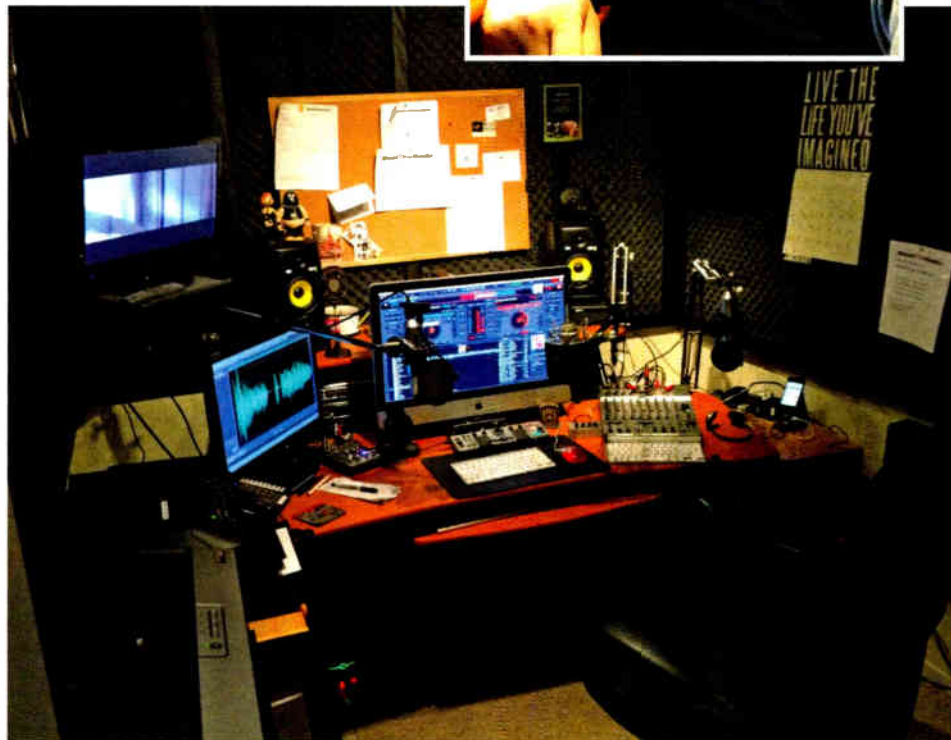
John Mielke (a.k.a. Milky) is a business-minded radio DJ. In addition to working on-air in Ottawa, Canada, for the last two decades, Milky has been running an advertiser-supported radio news/job website called Milkman Unlimited ([milkmanunlimited.com](http://milkmanunlimited.com)) since 1996. He has also garnered 1,862 Facebook friends at his "Milky Show" page.

On Nov. 10, 2014, Milky and the rest of the broadcast staff at Ottawa's CKKL(FM)—BOB-FM—were uncer-

moniously dumped as the station flipped its format from '70-'80-'90s pop to new country. The news was announced in a brief corporate statement on BOB-FM's Facebook page.

In response to this job loss, Milky recently launched his own streaming site called BlastTheRadio.com. It streams the "Milky Show" live weekdays 9 a.m. to 1 p.m. to his loyal listeners — he was up to 12,312 total streams at the time of writing this article — and gets paid to host streams by other local webcasters as well. He produces the show in his home studio.

"I waited several weeks after being let go for the phone to ring with any potential job opportunities, but realized that another opportunity on conventional radio could be weeks or months away," said Milky. "More than the job, I missed the connection with the audience and wanted a way to keep that interaction going. Being a business person, I recognized that I wasn't the only person in this position, so I set out to create a home where other experienced broadcasters could launch similar shows from."



Mielke's home studio includes Virtual DJ with controller, MegaSeg automation, music stored on a Mac, a Neumann TLM 103 host microphone and Rode NT2 for guests; ART Pro Channel mic preamp, compressor and EQ; Behringer 1604-A board, Behringer Tube Ultra EQ (T1951), KRK Rocket 5 monitors with subwoofer, and Bose and Sennheiser headphones. A Blue Mike with stereo input is connected to an old iPhone 4s to stream via MixLR. A cellphone with Bluetooth mic is connected to the PC with Adobe Audition for call recording and editing, and the mic for telephone calls is a Behringer B2 Pro.

To encourage interactivity with his loyal Facebook fans, the "Milky Show" offers a live (and very active) chat page during webcasts, and takes requests there, as well as via Facebook, Twitter, Skype and an old-fashioned telephone request line.

What started as a way to maintain his fan base and keep his on-air skills sharp while job-hunting is turning into a full-time business venture for Mielke.

"I'm hoping I can show other broadcasters that just because your 'AM/FM' job has disappeared, there are other options," he said. He is also seeking

advertisers to buy sponsorships or individual spots.

"How many commercials a day would you and your magazine like?" he joked. "Have your people call my people."

### GAINESVILLE CASE STUDY

In June 2013, WBXY(FM) "The Star 99.5 FM" of Gainesville, Fla., dropped its talk format and became electronic dance music station "Party 99.5." Among the format flip casualties was "Talk of the Town," a conservative talk show hosted by Jake Fuller and Ward Scott.

**What started** as a way to maintain his fan base and keep his on-air skills sharp while job-hunting is turning into a full-time business venture for Mielke.

that it is possible to move from radio to the Web and make a living; especially since Amazon.com pays Carolla every time someone clicks from his site to Amazon and buys a book. On the other hand, the small audiences delivered by Internet radio makes it hard to sell advertising on a meaningful basis, even though websites collect audience data on a per-user basis.

Here are three stories of former

moniously dumped as the station flipped its format from '70-'80-'90s pop to new country. The news was announced in a brief corporate statement on BOB-FM's Facebook page.

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Fortunately for “Talk of the Town,” a financial angel swept in and put the show online, just a few days after it had been cancelled. That angel was Alex Patton, principal of the conservative political media consultancy Ozean Media. A frequent guest on “Talk of the Town,” Patton decided the show was too good to lose. So he moved the hosts to his office and set them up to broadcast on *AlachuaTalks.com*.

From there, “Talk of the Town” sprang back to life.

“Our first broadcast was rough,” said Patton. “Demand was so high that we crashed a server.”

Unfortunately, Alex Patton’s decision to bring Talk of the Town to the Web was predicated upon the show paying its way through advertising — and that just didn’t fly.

“Lack of revenue was the biggest hurdle,” he said. “In a town our size, with a controversial subject matter, we could not gain sponsorships/advertising dollars in a sustainable manner.”

That wasn’t all: “Talk of the Town’s” conservative content skewed to an older audience, and some of them couldn’t figure out how to tune into the show online. “Most were able to follow the show once they were told how, but some did give up,” said Patton.

Much as he hated to, Patton eventually chose to pull the plug on “Talk of the Town.”

For the sake of other webcasters, he detailed the entire process — including costs — on his website (<http://ozeanmedia.com/political-media/what-we-learned-from-talk-of-the-town>).

“I am bummed,” Patton wrote. “We lost money, time and ego, and if you know anything about me, you know that I don’t take losing easily. Losing hurts, and I admit upfront that I am a horrible loser.”

Given that Patton’s goal was to keep “Talk of the Town’s” form of conservative talk alive in his community, he did succeed. A month after “Talk of the Town” left the Web, Ward Scott was hired by MARC Radio Group to do a similar show on 980-720 Newsradio WDVH(AM) Gainesville/WRZN(AM) Hernando, Fla., weekdays 7–9 a.m. It could be said that Patton and his Web venture maintained Scott’s presence in Gainesville long enough to get him back on the air.

**ALTRADIO KEEPS OLD-STYLE FM ALIVE**

AltRadio ([altradio.org](http://altradio.org)) is that truly classic rock station you grew up with, back in the day when FM was pushing the boundaries of radio.

Said James Duval, AltRadio’s music director: “We’re currently sitting on a constantly rotating library of 20,000+ tracks, air 10 programs sent through syndicated outlets or produced in-house,

or in the host’s home studios in two cases, and feature ‘Sunday Specials,’ which range from album retrospective pieces, ‘bonus episodes’ of our syndicated programming — looking back at the ‘Year in Music,’ or the occasional ‘think piece’ on a certain sound.”

This rock Web station is paid for and hosted by public radio station WHRO(FM) of Norfolk, Va.

In 2005, “WHRO was given a grant to create HD [Radio] channels and in order to fulfill that grant, content needed to be created,” Duval said. “Thus, AltRadio and several other HD feeds

were born.”

One of AltRadio’s producers wanting to make their archived material available online 24/7, which motivated the move to the Web. The entire stream eventually ended up online, where it can be found today. AltRadio is not carried on WHRO’s HD Radio broadcast feeds.

The good news? “We’re at the point now where we’re mostly self-funded,” Duval said. “Federal grants helped us secure the equipment we use for encoding our stream, broadcasting and storing our library. Our host station pays for the SoundExchange royalties and licenses

needed to remain on the air.”

Duval is paid by John Heimerl, the programmer who created the AltRadio stream in 2005 and still owns the rights to the name.

“The downside to this is that, if at some point, John or our host station feels our relationship has reached its endpoint, John is free to take his equipment and the AltRadio name, and seek it to the highest bidder ... assuming he finds one,” Duval said.

*James Careless reports on the industry for Radio World from Ottawa, Ontario.*

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# INFINITE DIAL

(continued from page 1)

latest in a long-running series of studies about consumer adoption of digital media. Possibly the biggest takeaway from the study is that this past year was when online listening reached critical mass.

"For years Americans have been occasional listeners, but for the first time it's apparent that streaming audio has become an ingrained part of our lives as the number of Americans listening weekly is now 44 percent," said John Rosso, president of Market Development for Triton Digital. "This is a huge opportunity for publishers and marketers to better identify and target their listeners to maximize ad-based revenue."

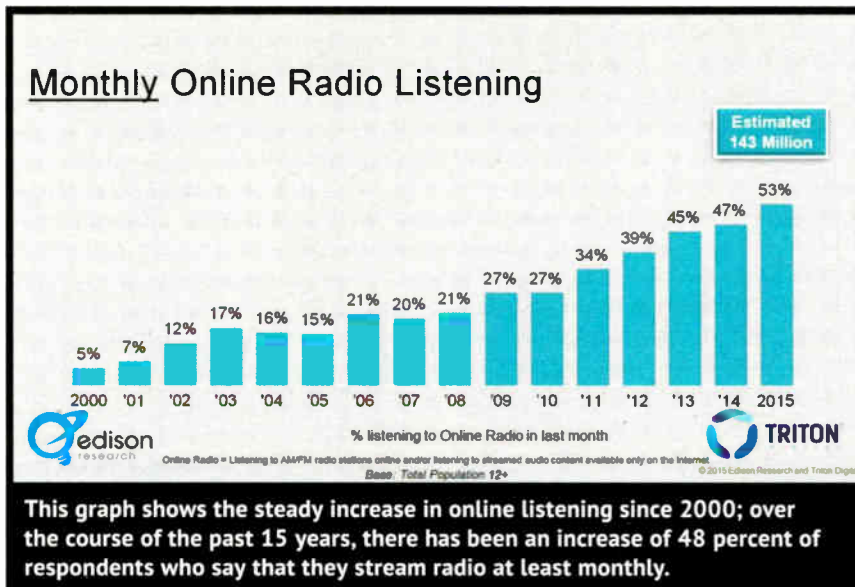
## ONLINE LISTENING

Starting in 2000, just 5 percent of the population aged 12 and older listened to online radio monthly (whether to Internet-only stations or to the online streams of over-the-air broadcasters). That number has grown until estimates for 2015 place the number at 53 percent, or 143 million Americans.

Not surprisingly, that number is skewed towards younger listeners, with 77 percent in the age 12-24 demographic listening monthly, 61 percent 25-54 and just 26 percent age 55+.

The devices used to listen to online radio have changed dramatically over the years as well. Much of the early listening to online radio was done either through a PC's external speakers or with Internet-connected appliances, such as the Logitech Slimplayer.

But times have changed. Today, smartphones are far and away the device most used to listen to Internet streams, and 73 percent of users access them



**This graph shows the steady increase in online listening since 2000; over the course of the past 15 years, there has been an increase of 48 percent of respondents who say that they stream radio at least monthly.**

using mobile devices. Desktops and laptops are a close second with 61 percent. Internet-connected audio systems bring up the rear, with only 3 percent of listeners using them. And that Logitech Slimplayer? Long gone.

Missing from "The Infinite Dial 2015" is any information about metadata, the artist/song title, sports scores, promotional information and emergency alerts that appears as text in the RDS display of FM radio, as program service data on HD Radios and on Web streams.

Do listeners pay attention to metadata? Does it matter? Tom Webster, vice president of strategy and marketing for Edison Research, said, "This is one of those things we poll regularly, but not every year. The last time it was surveyed, respondents characterized metadata as very important."

## AUTO PREFERENCES

Online radio listening in the car environment is increasing but has yet

to reach the tipping point. When asked, "Have you ever listened to Internet radio in a car by listening to the stream from a cell phone that you have connected to a car audio system," 35 percent said

percent said most of the time they use AM/FM radio; that's down from 58 percent for the past two years. Fifteen percent prefer an MP3 player with their own music. Bringing up the rear are CD players with 11 percent, satellite radio with 10 percent and online radio with 9 percent.

Despite this gradual shift in listening preferences, interest in in-dash information and entertainment systems appears to be lukewarm. When asked how important it is that their next car has an in-dash system that enables reception of information and entertainment over the Internet, 41 percent said not important at all, while 24 percent said not very important. Just 15 percent responded very important.

## KEEPING UP WITH TRENDS

Respondents are divided as to the importance of keeping up with new music and releases.

Among the total sample, 51 percent felt that it was not important at all,

**Despite a gradual shift in listening preferences, interest in in-dash information and entertainment systems appears to be lukewarm.**

yes in 2015, up from 21 percent in 2013. Again, the largest component, over half, are in the 12-24 demographic.

AM/FM radio still has a commanding place in the automotive environment, although its influence is declining.

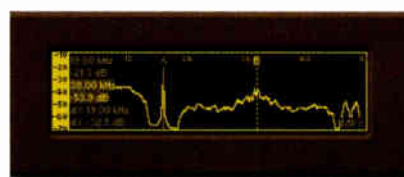
When asked how often they use a given medium in their primary car, 53

while 33 percent noted it was somewhat important, and just 16 percent that said it was very important.

Among those who say it is somewhat or very important, AM/FM radio still leads with 29 percent. That number changes dramatically when the 12-24 demographic is polled. Then AM/FM radio draws just 8 percent.



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**BRAND AWARENESS**

The series of questions about audio branding yielded some predictable results.

Subjects were asked, "When thinking about Internet-only audio, what is the *first* word that comes to mind?" The overwhelming response was Pandora, from 75 percent of respondents; iTunes and iHeartRadio came in second and third, with 62 and 59 percent respectively. The survey also showed moderate gains in weekly listening to Pandora, Spotify, iTunes and iHeartRadio when compared to last year.

Missing from the survey is information about how much time listeners spend with streams from local media vs. national brands. Webster said, "That type of information is surveyed for a different report, which is only available to subscribers."

**PODCASTS**

Podcasting has also seen a significant increase in listenership. Beginning with individuals recording in closet studios to minuscule audiences, podcasts have become mainstreamed, drawing the attention of big media. The recent launch of Play.it by CBS has provided a focal point for many popular serialized podcasts.

The researchers have tracked the growth of podcasting, starting with 9 percent listening monthly in 2008 to 17 percent, or about 46 million today. Respondents listened to an average of six podcasts per week. Serialized podcasts however seem to be on the trailing edge. The survey indicated that only 10 percent of respondents were aware of serialized podcasts, and only 3 percent have ever listened to one.

**THE BOTTOM LINE**

The study is likely to be a discussion point at this month's NAB convention. What will managers of traditional stations take from it that can be applied to budgeting and strategic planning?

While stations have been streaming for a number of years, online audio has never quite gotten beyond second-class status for many of them, whose attention and resources remain directed towards terrestrial signals. As online listening is reaching parity with over-the-air listening, that position may no longer be tenable, though the question of whether online *revenue* justifies a broader transition remains an open one.

But these stations cannot compete head on with Pandora or iTunes, so how can they differentiate themselves and their product to gain a larger share of the online audience?

On the technical side, big players in online media have raised listener expectations. So audio processors tailored for online streams are becoming more important; with advances in

**On the programming side, will online competition renew discussion of localism, one of the strengths of radio?**

coding algorithms and audio processing schemes, delivering a high-quality online stream is obtainable. Also, sufficient backup for 24/7/365 uptime for an audio stream becomes important.

Major-market broadcasters contemplating large online audiences may want to seek out the services of a content distribution network; notable brands include Akamai, Level3 and Arkena. They will manage both distribution of the stream and the gathering and reporting of statistics about online listenership. Will stations continue to move in these directions?

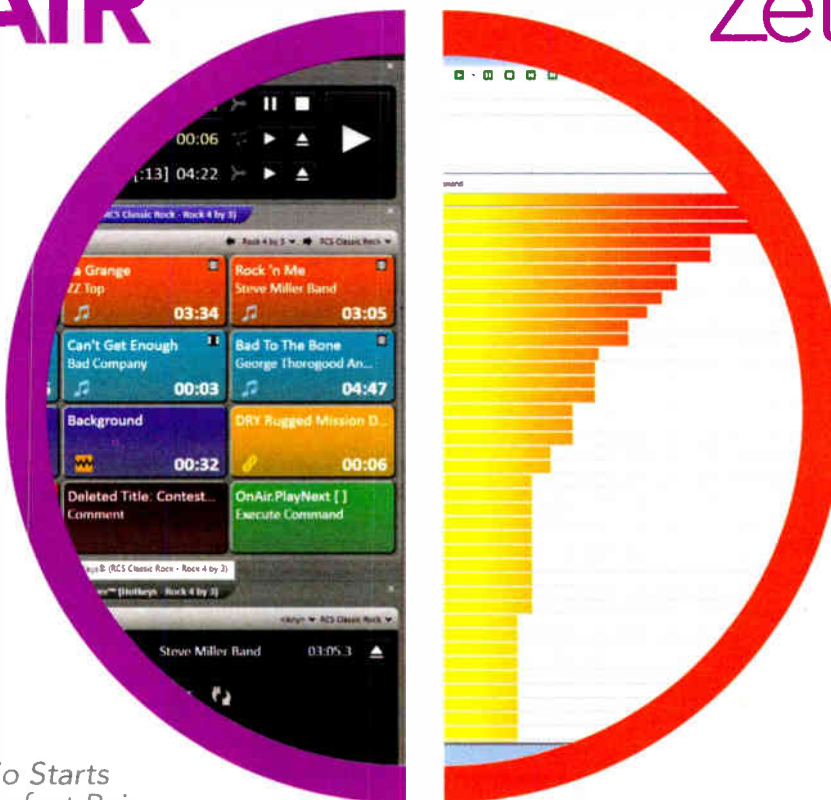
On the programming side, will online competition renew discussion of localism, one of the strengths of radio? Local traffic, news, weather, music and promotions remain strong characteristics of traditional radio operations, and offer to ways to differentiate a product from a biggie like Pandora as well as from online-only alternatives that are less well-resourced.

On-air personalities are another way that radio might strike back. As described by its critics — and many insiders as well — U.S. commercial

*(continued on page 26)*

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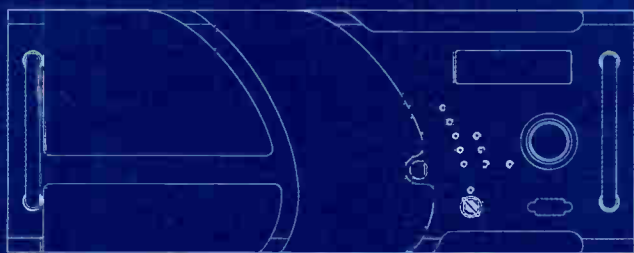
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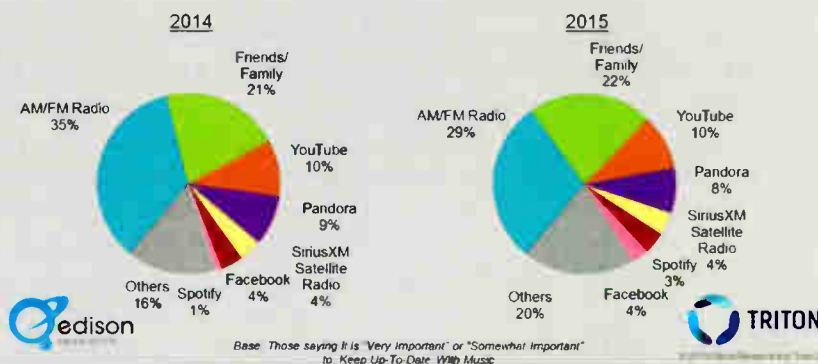
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radio has allowed a gradual de-emphasis of personalities from the dial. Many of the online giants are jukeboxes with little in the line of live presence. Will more managers differentiate their content with live personalities who know the community, its people and its events?

interviews from morning shows can be podcast.” said Webster, “and interesting content from other programs can be chopped up and repurposed.” He adds that listeners with special interests may be another source for podcast material for local stations.

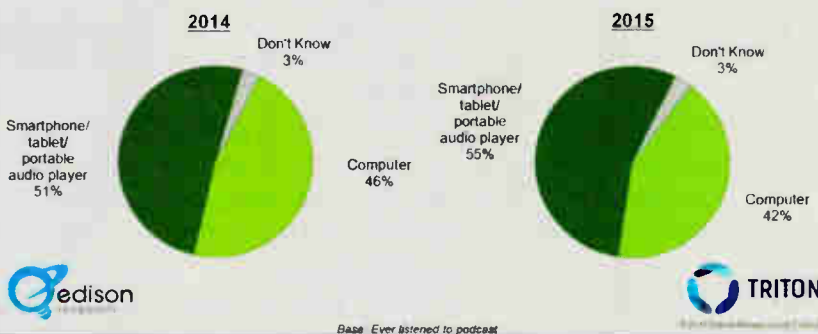
How should radio managers react to the data in this study? Email [radioworld@nbmedia.com](mailto:radioworld@nbmedia.com) with Letter to the Editor in the subject field.

Source used most for keeping up-to-date with music



AM/FM has maintained supremacy for music discovery – but by a considerably slimmer margin than in the past. As more streamers and other music aggregators appear on the scene, consumers continue to turn to friends and family for music updates. YouTube and Pandora also continue to be on many listeners’ radar.

Devices used most often to listen to podcasts



Mobile devices, like smartphones and tablets, play up the mobility of podcasts. Podcast apps also facilitate listening on these devices. However, computers still have a strong foothold in this market, perhaps in part because many podcast users chose to stream, rather than download, episodes.

Radio has become an interactive medium. The challenge for managers is how to deliver the best possible experience for their listeners – be it on air, online or through social media. A big part of that experience is metadata. Many stations that do a stellar job of getting the text out along with the music on the radio side don’t do so well on their streams. A handful of companies sell hardware and software solutions that ensure metadata is distributed properly over terrestrial radio, online and on social media.

Podcasting presents opportunities extend localism onto the Net. “Artist

The “Infinite Dial 2015” is the 23rd in a series of studies about consumer adoption of digital media dating to 1998; it used a random probability telephone sample representative of Americans age 12 and older. The survey was offered in both English and Spanish. Both landlines and cell phone numbers were called. The survey was conducted in January and February 2015 and surveyed 2,002 people.

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



# 58-Plus Years of Broadcast Adventure

Dick Witkovski has lived the ins and outs of the broadcast world

## NEWSMAKER

BY MARK PERSONS

Dick Witkovski is a Texas gentleman with a rich history in the radio business.

Born a natural salesman in 1937, he was bored after two years of book-taught sales training in college. His approach was to make a customer feel comfortable before asking for a sale. Dick caught the attention of, and was subsequently hired by, James B. Tharpe, president of Visual Electronics in New York in 1957.

Visual was a manufacturer and rep for some 70 major vendors serving broadcasting worldwide. Since Dick was the only bachelor out of 42 salesmen at the company, he was selected to go abroad and stay there until the task was finished. It was good broadcasting education.

When Dick started in the equipment business, stations used disc cutters to record commercials on vinyl records, then they moved on to Ampex and Magnecord reel-to-reel tape recorders.

Visual sent Dick to Disneyland to develop a relationship with Lou Mackenzie, the person who provided some 500 channels of audio for sound effects in the park. Visual adapted the Mackenzie 5CPB Five-Channel Selective Program Repeater for top 40 radio stations to do tight news and production.

It was an early tape machine that featured "instant"



Witkovski demonstrates the Mackenzie machine.

audio. It revolutionized the way locally produced sound effects and commercials were put over the air. Dick traveled from New York to L.A. on that project. The photo above shows Dick demonstrating a Mackenzie machine at a Florida Broadcasters meeting in 1960.

When the Fidelipac audio tape cartridge was introduced, Spotmaster built cart machines to handle them. Visual became the largest Spotmaster dealer.

### DOOR-TO-DOOR SALESMAN

Since there was no Internet at the time, Dick simply got in his car and drove station to station in ten states

showing off and selling this miracle product for radio. He fondly remembers meeting with many famous broadcast company owners and their program directors along the way.

After Visual developed a large U.S. customer base, the company decided to send Dick packing with cartridge machines to the BBC in England, where they were doing station breaks and IDs in 20 languages using reel-to-reel tape machines. Operators had to rewind and cue each one frequently.

Dick said, "You should have seen their eyes when they saw Spotmasters run network IDs. No manual cue time was required."

He left England with an order for five recorders and 30 playback machines. In recounting the tale, Dick said, "I then knew the broadcast industry was where I belonged."

He continued on to France, Spain, and Switzerland, taking orders from more government-owned stations. Private ownership of stations was not allowed there until the mid-1970s.

There was a major turning point in Dick's life in 1962 when he married his dream girl, Bonnie Sue. Some 52 years later they are still together.

After his Visual days, Dick started what became Besco Internacional, a world leader in pre-owned AM, FM and shortwave transmitters. As technology changed, the market was flooded with used transmitters that needed to find new homes. His company has been doing that for the last 40 years.

Dick realized that FM was where the future of radio was headed when FM radios became available in automobiles. FM stations started with horizontal transmitting antennas. Car radios had vertical receiving anten-

*(continued on page 29)*

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# Podcast Network Offers Audio On-Demand

CBS Play.it combines immediacy and ubiquity of electronic media with tradition of spoken word

## PODCAST

BY TOM VERNON

The podcast is at the intersection of spoken word and radio. This form of media — relatively new, yet already enjoying a “resurgence” in public awareness — combines the immediacy and ubiquity of electronic media with the tradition of spoken word material in prerecorded formats.

A new initiative from CBS aims at making access to podcasts easier for listeners.

“The interest in on-demand audio content is huge,” says Ezra Kucharz, president of CBS Local Digital Media. “With the release of Play.it, we aim to bring consumers a unified, easy-to-use platform featuring the best podcasts.”

Play.it underwent an 11-month gestation period from concept to launch. As Kucharz recalls, it was a busy time. “We looked at the audio-on-demand landscape and discovered that there were a number of music services, but very little for the spoken word.”

### TAKING CUES FROM YOUTUBE

CBS decided to pursue this segment and use a delivery platform similar to YouTube. “As we begin, the content will be delivered over the Internet in a format that any Web-enabled device will be able to utilize it.” He adds that an app will be

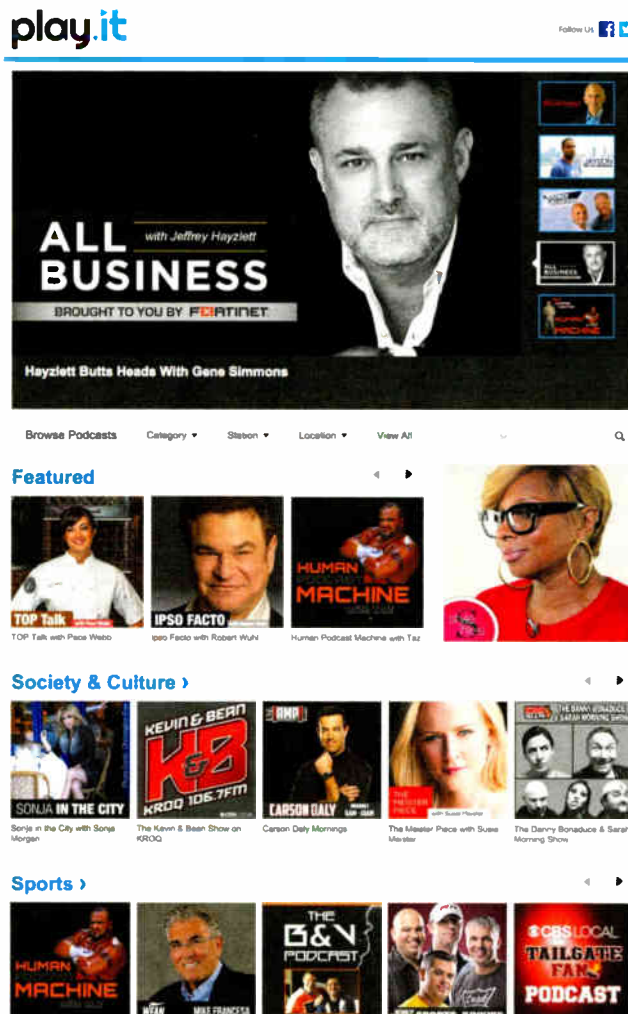
available during the second quarter.

Play.it is available online at [www.play.it](http://www.play.it) and through a mobile-optimized site for steaming across devices. Podcasts are available to stream or download, and Play.it content is available across

Content for Play.it comes from a number of sources. “First and foremost is the on-air talent from the 117 CBS radio stations,” said Kucharz.

Podcasts from CBS Radio talent include WCBS’s “CEO Radio with Ray Hoffman,” WFAN’s “The Mike Francesa Show” and KAMP’s “Mornings with Carson Daly.”

“Play.it enables us to extend the CBS



The Play.it homepage offers a highly visual representation of popular podcast offerings.

CBS Local Digital Media’s properties — including Radio.com, the Radio.com app, CBS Local sites nationwide and the CBS Local app. They are also distributed across TuneIn’s site and apps, as well as on iTunes. The Play.it podcast network will also be available on CBS Radio’s HD radio stations in select major markets in the coming months.

### CONTENT

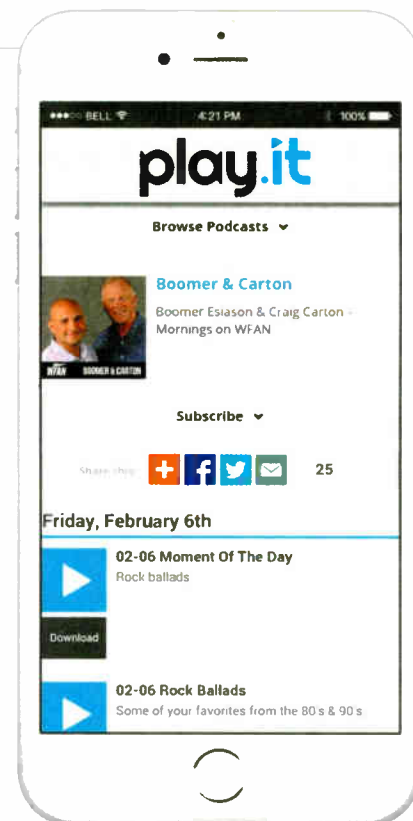
Play.it launched Jan. 7, and the content is divided into several major categories, including News & Information, Sports, Entertainment & Lifestyle, Comedy, Health & Wellness, Business, Society & Culture and content from CBS Radio programs.

Radio brand into the on-demand space,” he adds. Beyond that, the new venture sought out original programming.

“There’s a huge pool of talent out there waiting to be discovered,” said Kucharz. Some of these individuals have had their own podcasts; others are new to the concept.

“Our team reached out to people we thought would be interesting podcasters, and we’ve also been approached by people who want to have a podcast on Play.it.” Kucharz adds that there’s about a 50/50 ratio between these two groups. The search for new talent is ongoing, and there are plans to add new podcasts on a weekly basis.

One of the new talents showcased on



The Boomer & Carlton podcast page is shown on the mobile app. Here users can subscribe to a podcast, select past episodes or interact via social media.

Play.it is Jeffrey Hazlett, former CEO of Kodak. A recent podcast of “All Business” featured an interview with former Kiss front man Gene Simmons.

Another, “Define Your Life,” with fitness trainer Shaun T, shares uplifting stories of overcoming hardship through fitness, family, nutrition, fashion and fun.

New talent are coached in the fundamentals of podcasting. They then create pilot shows before going live. There are no hard and fast rules regarding length of podcasts, but most run between 45 minutes to an hour and are produced weekly.

No matter the source or topic, Kucharz notes that there are some elements common to all good podcasts.

“Most important, is the host engaging? Is he or she someone that the audience can identify with?” Beyond that, there are several models that work well. “The host can talk one-on-one with a subject matter expert, or engage a number of guests in a discussion format.”

An important difference between live radio and recorded podcasts is the level of interactivity, and Kucharz notes that is something that hosts need to be aware of. Although podcasts are not interactive, listeners are still able to engage with the hosts through social media. Questions or comments that are posted may be addressed by the host on the next podcast.

Play.it podcasts will include advertising, and Kucharz explains how that dimension was explored during the planning phases of the project. “We asked potential advertisers what they would

(continued on page 29)

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# WITKOVSKI

(continued from page 27)

nas. It didn't take long to see that dual or circular polarized antennas were the improvement required to give maximum coverage for FM.

## "FUTURE MONEY"

Many back then thought that FM stood for "Free Music," but Dick said it was known as "Future Money" by industry analysts.

stations and took their used units on trade, then in turn sold them to stations 90 miles west, in the Dominican Republic. After three years, he sold approximately 80 new and pre-owned transmitters, made hundreds of new friends and drove 16,000 miles each year on an island only 125 miles long by 30 miles wide. Dick hosted some 85 houseguests and played golf on the nicest courses in the Caribbean with customers and friends.

The Canadian government allowed AM stations to shut off their AMs in

some 34 FM stations in the past 12 years. Dick relocated six in Dallas-Fort Worth taking them from 6 kW to 100 kW on towers as tall as 2,034 feet. Dick currently owns KOME(FM) in Meridian, Texas; KZRC(FM) in Bennington, Okla.; KMAD(AM) Madill, Okla.; KKHA(FM) Markham, Texas; and KBYC(FM)-Markham, Texas.

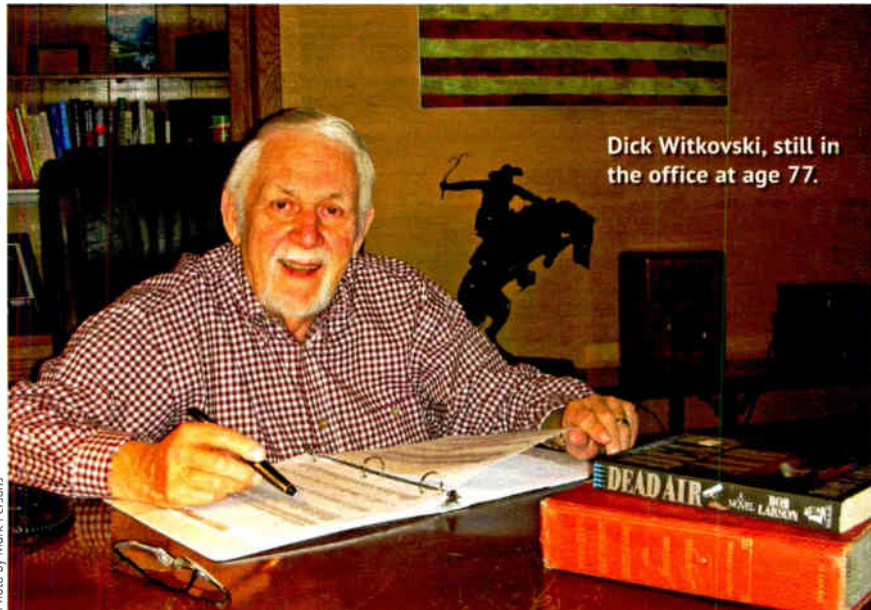
The FCC has always encouraged better use of the spectrum, and Dick did his part to help them accomplish the task.

After attending 27 NAB National Shows as an exhibitor, Dick attended four more as a broadcaster. It was much

easier being a customer than an exhibitor, he said.

That brings us to the rest of the story, as Paul Harvey would say. One of the most interesting parts of Dick's 58-year broadcast career was being involved in the development of commercial "pirate" radio stations. In a later article, we will relate Dick's Radio Nord and Radio Caroline stories.

Mark Persons, CPBE, has over 45 years of experience. He has written numerous articles for industry publications over the years. His website is [www.mwpersons.com](http://www.mwpersons.com).



Dick Witkovski, still in the office at age 77.

Photo by Mark Persons

In 1973, Dick, his wife and youngest son went to Puerto Rico to scope out FM broadcasting in the Caribbean. Much to their surprise, Puerto Rico, the Virgin Islands and the Dominican Republic were just learning about FM; a one-month visit became a three-year adventure.

The family moved to Aguadilla, Puerto Rico, where the pre-owned transmitter business began to blossom. Dick became the exclusive dealer for the CSI transmitter line. They were made in Boynton Beach, Fla. Dick became a close friend of pilot Bob Fleming, who would fly CSI equipment to Puerto Rico on three-hour flights from Miami for \$100 per skid.

With FM becoming profitable in Puerto Rico, Dick sold new CSI units to 44

trade for an FM channels. This opened an avenue for Dick to purchase well-maintained AM transmitters. In total, Dick bought and sold about 45 in the 5 to 50 kW range. Most went to Central and South America, in order to do charitable work for missionaries on limited budgets.

In order to locate even more transmitters, Dick wrote and printed ID Magazine. It was sent out to 12,300 stations in America, Canada and Mexico and was a success for three years until the Internet came along. Then Dick became his own best customer after observing profits being made on FM with the ability to buy rim-shot stations, which were then upgraded to serve much larger markets.

He has owned, operated and upgraded

across the entire network of hundreds of programs. Kurcharz adds that advertising time will be available through programmatic, but the bulk of the advertising will be sold by a direct sales team.

Most of the work to roll out this new venture has been predictable, but Kurcharz notes that there have been a few surprises. "Some of the advertisers have reached out to us and express an interest in doing their own lifestyle podcasts related to their brands. This type of content has been up on YouTube for a while, but doing it in an audio-only format is fresh territory."

(continued from page 28)

need to participate, and the biggest response was the ability to measure audience metrics instantly. That is something we already do with streaming audio, and was easily ported on to the podcasts."

Play.it uses ad insertion technology as well as native and sponsorship advertising. Brands will be able to buy campaigns across platforms in a simple one-stop-shop manner including over-the-air, live streaming and podcasts. Additionally, brands will be able to deliver targeted messaging to specific fans of a particular show or

# M4-IP Brings a Smile to Crawford in Detroit

Four great sound sources to be had from this IP-routable Wheatstone mic processor

## USERREPORT

BY BRIAN KERKAN  
Engineer  
Crawford Broadcasting

**DETROIT** — The Wheatstone M4-IP four-channel mic processor Blade has become a problem-solver for us at Crawford Broadcasting in Detroit.

We produce a syndicated talk show for four hours daily; I wanted microphone processing that could provide a warm sound, one that would mute or gate the other microphones that were not in use (I'll discuss another cool gating feature a bit later on).

In this four-channel mic processor I found a unit that would integrate with our Wheatstone Bridge system, and connect to new WheatNet IP Blades as we upgrade our plant. Having four microphone processors in a single rack space was helpful; I didn't have to make room for it.

Most important, though, is that the M4-IP helped me take the hollow sound out of the room. It has a wide range of tools to tweak the processor, and includes presets as a good starting point.

One standout feature is that it allows you to set up the EQ before or after the dynamics section, which features a compressor, expander, de-esser, phase rotator, phase invert and phantom power. The four-band parametric equalizer shares the same type of controls found on other Wheatstone processors. The frequency response plot shows the settings as you work on them

selected via an easy-to-use menu from the front panel.

It's professionally engineered. The M4-IP has 32 dB of input headroom, which is comparable to the best recording studios. Like other Wheatstone mic processors, the M4-IP has a fairly high input impedance and high available gain. All of this comes out in the sound.

I was able to develop a nice-sounding preset, with



through the computer interface. There is a high- and low-pass filter that can help eliminate rumble or limit excessive highs if needed. Its de-esser can be finetuned to help with sibilance issues.

Oh, and about that gating feature, the M4-IP gate's sidechain is filtered to voice frequencies, which reduces false triggering when you accidentally bump the table the mic's sitting on, for example.

There's a full set of metering tools available, on the front for each channel, and through the Wheatstone M4-IP GUI. The M4-IP has analog, AES or WheatNet IP inputs and outputs, providing flexibility in how it's installed.

I would recommend the M4-IP for anyone looking to upgrade their analog microphone processing. No more dirty, noisy pots, no more bad switches, everything is

pleasing resonant bass, and smooth details in the high frequencies using the M4-IP GUI. As needed, my presets can be selected and changed by talent using the software interface on the control room computer. The M4-IP also can be set up remotely, allowing evaluation and setup without having to be in the air studio.

I found the M4-IP to be quiet, smooth and clean. Since the M4-IP is part of the WheatNet-IP Blade network, it can provide processing for any available input or output on the WheatNet-IP network.

In a few months, we will be able to take full advantage of the WheatNet-IP connectivity when we bring our new Blades online.

For information contact Jay Tyler at Wheatstone in North Carolina at (252) 638-7000 or visit [www.wheatstone.com](http://www.wheatstone.com).

## TECHUPDATES

### INOVONICS RELEASES JUSTIN 808 HD RADIO ALIGNMENT PROCESSOR

According to Inovonics, the Justin 808 is a time-alignment processor that brings analog FM and HD1 channels into sync, and automatically maintains sync, day-in and day-out. The manufacturer says it eliminates problems such as echo, stuttering and even lost or repeated words when receivers cross-fade between analog and digital reception.



The Justin 808 is placed in line with the AES digital audio feed for the analog FM or the HD1 digital program. It then monitors the station's off-air signal and utilizes correlation algorithms to sync the analog and digital programs with 23 microsecond ( $\pm 1$  sample) accuracy. The unit also corrects for program audio phase inversions between the formats, and optionally can trim the program audio level to match FM and HD loudness, based on true-RMS values.

The Justin 808 includes a Web interface with SNMP support. This allows remote control with a PC, tablet or smartphone Web browser. Signal loss and other alarms are dispatched as SMS text or email messages and actuate rear-panel tallies. The unit logs errors and can generate a graphical display of timing correction over a specified period.

For information, contact Inovonics in California at (831) 458-0552 or visit [www.inovonicsbroadcast.com](http://www.inovonicsbroadcast.com).

### DAYSEQUERRA OFFERS NEW NEUSTAR

DaySequerra's NeuStar2 digital radio processor is a two-stream AES stereo audio processor designed to improve the audio performance of low-bitrate HD Radio multicasts, DAB+ and DRM+ channels, with particular focus on stereo at 24 kbps.



It features the company's loudness measurement algorithm and newly developed psychoacoustic processing with lookahead gain correction to make audio level adjustments that the company says are transparent to the listener.

DaySequerra's NeuStar codec preprocessing engine is tuned for operation at 24 kbps, 32 kbps, 48 kbps, 64 kbps and 96 kbps bitrates to reduce artifacts from lossy codecs and low-bitrate transmission.

The NeuStar2 also features 10 presets with a parametric equalizer and adjustable dynamic range contours, an auto sensing EAS/CAP input with auto-daypart that automatically changes operating profiles via the rear-panel GPIO.

NeuStar2 is an easy-to-operate 1RU unit with bright, accurate bargraph metering, rear-panel GPIO and an Ethernet interface for status monitoring and settings/preset management and field software updates. DaySequerra says it delivers pristine, powerful sound and lets broadcasters get their "signature sound" across their multicasts efficiently.

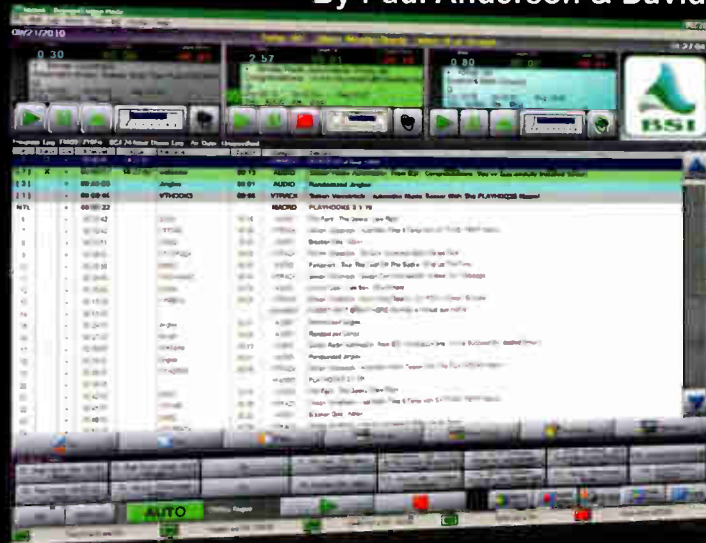
For information, contact DaySequerra in New Jersey at (856) 719-9900 or visit [www.daysequerra.com](http://www.daysequerra.com).



Broadcast Software International

# Streaming Made Simple! With Simian 2.2 Pro & Lite

By Paul Anderson & David Bowman of KOUU



Paul Anderson at KOUU in Pocatello, Idaho

Idaho Wireless Corp is a small market group in Pocatello, Idaho, and we're the only independently owned and managed radio group left in our market. As technology evolves we evaluate the costs and benefits of each change, and streaming was one of those projects.

When we changed the format January 1st on our 50,000 watt AM KOUU to Country Classics the response was immediately positive, but our audience wanted to listen in their offices and on their smart phones. We had considered streaming KOUU in the past, but the expense and complexity meant it was always a project that got pushed back to "later".

In 2009 we installed our first Simian system, replacing a beloved but tired Scott Studios system. We were ready for the benefits of a Windows based system that had more features, and we found that Simian is easy to use, powerful, and installation was a breeze. Since then we've converted all of our stations from Scott to Simian.

Simian offers many options to set up streaming. Country KOUU audio streaming is being outsourced to a third party (Crystal Media Networks) using data provided by Simian. Using the Metadata tab in Program options is where all the set up takes place. Crystal Media Networks required certain parameters to interface with their streaming player. The majority of the setup is all contained in an .xml file.

To create an .xml file, use Notepad and type in the syntax for each parameter required by the streamer (Syntax for Artist is <artist><![CDATA[%ARTIST%]]></artist>). Simian support can help with this, or a template is pictured in the Simian Pro Manual. In the case of KOUU, Artist, Title, Filename, Category, and Length of each piece of audio was provided to Crystal Media Networks. This file becomes the Template File.

Some final setup is required. The template file is loaded in the Metadata tab in Program Options in Simian. The IP Address corresponds to the computer that will be accessed by the streaming software. This computer needs to be networked to the on air Simian computer. The port and TCP/UDP address is set up with information provided by the streaming company (in the case of KOUU, Crystal Media provided this information).

All of the programming for KOUU is played by the Simian Pro system. In order to stream with more than one source (i.e. switching from local audio to network audio like a satellite receiver) Data Repeater-available from BSI-can handle multiple metadata sources and destinations.

Our streaming project for KOUU was easier than we imagined. The support team from BSI and the streaming features of Simian made it simple.

*Paul Anderson is the General Manager of KOUU, KZBQ and KORR. David Bowman is the Operations Manager. KOUU uses Simian Pro, though the metadata output features of Simian Pro are also available in Simian Lite. Simian Pro & Lite contain built in metadata output templates for Windows Media Encoder ShoutCast, IceCast, SAM Cast, Live365, Orban Optimod, and Omnia A/XE. Metadata output in Simian Pro & Lite is template based, so most stream encoders not listed are compatible.*

For More Information Call: 1-888-BSI-USA-1 ~ Email: sales@bsiusa.com ~ Web: www.bsiusa.com

## TECHUPDATES

### DEVA DEVELOPS DB6000 PROCESSOR

DEVA Broadcast says that real-world experience in broadcasting shaped creation of its DB6000. A low-latency DSP-based design ensures control of important sonic parameters producing what the company describes as clean, artifact-free audio for music and voice.

Users can make use of factory processing presets optimized for popular formats or configured by the user. The DB6000 has an IP audio player supporting MP3, AAC+ and PCM audio formats and a dynamic RDS/RBDS encoder, as well as a DSP-based stereo encoder with advanced peak control and two independently-configurable composite MPX outputs.



The processing includes dual-stage wideband AGC with "intelligent gating," multiband adjustable range equalizer, multiband peak limiter and advanced distortion-controlled pre-emphasized final clipper.

The audio processor has an independent backup audio source to guarantee that fresh audio will be delivered by the built-in audio player. Email notification will be sent upon change in the main audio input, allowing the engineering team to react. The backup content can be updated via PC, using a standard FTP client. The unit features a fallback function; when the signal at the default input is restored, the DB6000 switches back to it automatically. Silence sense parameters are user-defined.

The tool allows setup and control via the front panel and remote access via TCP/IP. The HTML5-based Web interface allows the unit to be accessed remotely through iOS, Android or other mobile device.

For information, contact DEVA Broadcast in Bulgaria 011-359-56-820027 or visit [www.devabroadcast.com](http://www.devabroadcast.com).

### AXEL FALCON XT OFFERS FLEXIBILITY

Axel Technology's Falcon XT digital audio processor features five-band architecture, dual-band AGCs, three-band equalizer, stereo enhancer, speech detector and four limiters.



An internal stereo generator ensures an accurate MPX signal and the RDS encoder, available as an option, provides two data sets, each with a wide range of services.

These include static programmable PS 60 messages, 16 radio text messages, alternative frequency to receive the best frequency as a function of the "coverage area," traffic program/traffic announcement to listen to traffic information and functions such as EON, M/S, DI, CT, PI, PTY, PIN. Switching between the data sets takes place by means of serial commands, GPIO or TCP/IP from a radio automation system.

Falcon XT's MPX power control, brilliance control, expander, overdrive, super bass and harmonizer minimize unwanted noises, says the firm. The unit features full connectivity with analog and digital I/O (over XLR connectors), two independent MPX outputs and two additional inputs Aux (SCA) with different functionality.

Moreover, the Falcon XT is fitted with an Aux input (SCA) for use with the external RDS encoder as well as an input that allows users to switch audio from another processor MPX so as to create a subnet managed by the automation system. All outputs include audio fault input changeover.

The unit can be controlled remotely via Windows-based client software and receive commands by Ethernet TCP/IP, USB, RS-232 port and four GPI/Os.

For information, contact AxEL Technology in Italy at 011-39-051-736-555 or visit [www.axeltechnology.com](http://www.axeltechnology.com).

### OMNIA AUDIO DEBUTS .7

The Telos Alliance's audio processor badge, Omnia Audio, has a new processor.

Highlights of the Omnia.7 features include what the company's "Undo" technology, which removes distortion and mathematically recreates peaks sliced from heavily mastered contemporary music. It also has a Psychoacoustic Controlled Distortion Masking Clipper, which analyzes and masks distortion perceptible to the human ear.



Other features include a two-band final look-ahead limiter for HD Radio and streaming, multiband downward expansion (source noise reduction), three-stage wideband AGC with adjustable sidechain equalization and two to five bands of program-dependent multiband AGC and limiting.

Analysis tools include real-time analyzers, oscilloscopes, FFTs and loudness metering. Also provided are monitor speaker calibration tools and remote control via IP including remote audio monitoring.

On the physical side the Omnia.7 has dual, independent power supplies and a composite pass-through (relay bypass) for backup processor.

Simultaneous stream processing and encoding, processing for HD Radio/DAB, and RDS encoding with HTTP push support for dynamic RDS are available as optional features.

For information, contact Omnia Audio in Ohio at (216) 241-7225 or visit [www.omniaaudio.com](http://www.omniaaudio.com).

### SYMETRIX EXTENDS SYMNET RADIUS 12X8 DSP

Building on the SymNet Radius 12x8 DSP, which features support for Audinate's Dante media networking, Symetrix expands the line with the introduction of the SymNet Radius 12x8 EX.



This new "EX" features an I/O expansion slot, making it possible for an existing installation to be expanded quickly and easily as requirements change. SymNet Radius 12x8 EX makes it possible to take the total audio input/output count to 24 within the same compact 1U format.

The I/O expansion slot supports optional SymNet audio I/O cards, including analog, digital, AEC, VoIP and telephone, supporting multiple system configurations. The I/O formats of 16x8 and 12x12 — which are gaining in popularity across install applications — can both be accommodated.

SymNet Radius 12x8 EX includes a 64x64 channel Dante network audio bus and built-in GPIO, RS-232 and ARC wall panel support offerings for control, as well as free access to the Symetrix ARC-WEB browser-based user-interface.

Existing users can upgrade to the new version using a dedicated Migration Tool, which uses Radius 12x8 hardware to convert files to deploy SymNet Radius 12x8 EX hardware without additional modifications.

For information, contact Symetrix in Washington state at (425) 778-7728 or visit [www.symetrix.co](http://www.symetrix.co).

# BW DSPX-AM Rocks in the North

KSRM says processor produces a clean, crisp and punchy sound that stands out



## USERREPORT

BY PAUL JEWUSIAK  
Chief Engineer  
KSRM Inc.

**KENAI, ALASKA** — The KSRM radio group, KSRM(AM), KSLD(AM), KFSE(FM), KKIS(FM) and KWHQ (FM), delivers programming on five stations and has served Alaska's Kenai Peninsula since 1967.

Located 140 road miles south of Anchorage, KSRM sits between Kenai and Soldotna and covers an audience of around 40,000 people. The flagship station, KSRM/920AM, has been broadcasting news/talk format for over 40 years. It is especially popular during morning drive when it pulls in its largest listening figures.

A great-sounding radio station will keep listeners coming back. If the audio is fatiguing people won't like what they hear. This often is due to the loudness war. You try to be louder than the competitor, but quality suffers when you push the processor past its limits in the quest for more loudness. You could have superior content, but if the audio quality is poor, people will turn it off.

In Alaska, we have the disadvantage of being a sparsely populated state. So, KSRM did not want to spend \$7,000 on an AM audio processor. As I searched for a lower cost solution, Doug Tharp with SCMS recommended I try the BW Broadcast DSPX-AM. At \$2,495 the price was right. However, I wasn't sure about the quality so SCMS provided a

30-day try-before-buy. I had 30 days to return it for credit or send in our payment for the processor. I decided to give it a try.

I found the DSPX-AM easy to set up. It was clear that BW Broadcast had spent lots of time building the factory presets. In fact, I ended up choosing a rock preset to get the desired high-energy sound. With built-in sine and square wave generator, set up was fast. I tweaked the sound a little and was impressed with

the difference. I then decided to go to the car and give it a listen. With the remote control software I could make changes from the parking lot. It didn't take long for staff to take notice. The GM was pleased with the sound. The DSPX-AM produces a clean, crisp and punchy sound that stands out.

I found the DSPX-AM has a formidable feature set for any processor, at any price. DSPX-AM offers four-band

limiting and a four-band window-gated AGC processor. The three-band look-ahead path allows the simultaneous full 20 kHz digital radio processing. Of course, we use the asymmetrical clipping to optimize the sound for voice. Add this to the Tilt Equalization and we have a bright and energized sound unmatched in this market. It has a real-time clock for preset scheduling. The DSPX-AM offers dual processing paths if we ever decide to do HD.

We sent our payment to SCMS. We are pleased with the sound we've achieved and the ease to do it. So I'd recommend the DSPX-AM to anyone in any size market. I've used processors that cost much more and have not been able to get these results. I can't wait to try the BW Broadcast DSPX-FM on my next project.

For information, contact BW Broadcast at (866) 376-1612 or visit [www.bwbroadcast.com](http://www.bwbroadcast.com).

## TECHUPDATE

### ORBAN SHIPS OPTIMOD-FM 8500S



Orban's new Optimod-FM 8500S model is described by its maker as providing "8500 sound in a compact, cool-running 1U package at a more affordable price." The unit is aimed at the budget-conscious. It ships in FM-only and digital versions. The latter handles Internet streaming and HD Radio paths as well as analog. The FM-only model can be upgraded to digital model later.

The 8500S offers stereo enhancement, equalization, AGC, multiband compression, low-IM peak limiting, ste-

reo encoding, composite limiting along with a delay (up to 16 seconds). It is also network remote-operable.

More than 20 format-specific factory presets get users started, including Orban Optimod-FM 8500 presets. Although the factory presets are ready out of the box, they can be customized with one-knob "less-more" control or with some 60 controls for advanced tweaking. Customized presets for Optimod-FM 8500, 8400, 8300, 5500 or 5300 can be imported so that a user can retain a designed sound.

For information, contact Orban in Arizona at (480) 403-8300 or visit [www.orban.com](http://www.orban.com).

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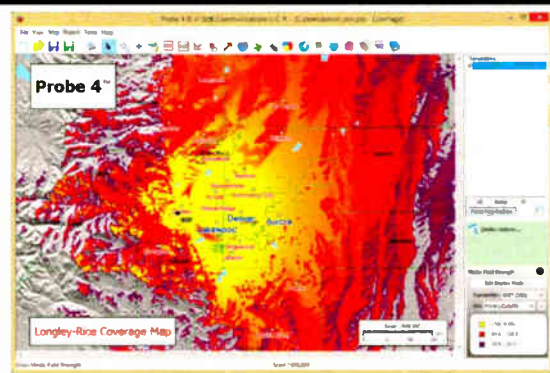
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### AUTOMATION EQUIPMENT

#### WANT TO SELL

It's free and it has been expanded. The only cost is to keep us informed as to how the system is performing and let us know how you are using it. DIY-DJ, is a Linux based radio automation system and now sports a record sched-

uler (DIY-DJ-RECORDER) which allows you to schedule the recording of a network or any other program for replay later as well as a basic logging system. Beside these additions the system schedules music, does voice tracking (ALWAYS hit the vocal), create a shell, live assist, exact time events, join satellite feeds, automated temperature announce, do unattended remote events and more. Call (406) 679-0527 or email [krwvs@digitaldevelopment.net](mailto:krwvs@digitaldevelopment.net) for a copy today.

### MICROPHONES/ HEADPHONES/ SPEAKERS/AMPS

#### WANT TO SELL

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

#### WANT TO BUY

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## READER'S FORUM

### SHOPPING FOR HD RADIO

Tom Ray's article ("Shopping for a Car With HD Radio) in the Jan. 1 issue was spot on, but he doesn't tell the half of it.

I don't particularly care for the IBOC system, but I view it as a necessary evil of technology; so I felt I had to have it in two vehicles, a 2009 Ford Ranger pickup and a 2010 Ford Transit Connect van.

Neither offers an HD Radio receiver as an option, and the Transit Connect has the *worst*-sounding, most stupidly engineered speaker system in automotive history (but that's another story).

The only option on these vehicles was to turn to aftermarket radios.

There are a lot of *good* ones, and for the most part they're not too much of a pain to install, though I couldn't get the stock radio out of the dash of the Transit Connect. After a local auto audio shop said that *he* could get it out and came back with a claw hammer and cold chisel — muttering "You don't by any chance *want* the old radio, do ya?" — it cost me \$50 at the Ford dealership for *them* to remove the stock radio. But I didn't feel too bad about that; the trained Ford mechanics with all of the proper tools had a heck of a time getting it out. Watching those two mechanics struggle with it was worth \$50.

The real story that's missed here isn't about auto radios.

Just try to find *any* radio, other than automotive, that includes HD.

A few years back I got myself a rather high-end HD table radio. It worked fine until it went belly up; the microprocessor went sort of spastic. I contacted the dealer to inquire about repairs (I'm getting lazy in my curmudgeonhood). The service manager told me flatly that they couldn't fix it. "No parts," he said, "why, that radio hasn't been made in two or three years now; it's *ancient*."

I inquired about purchasing a replacement radio, something not so "ancient." Guess what? *Nothing* they

### CHANGE FOR AM

Andy, you tell the truth ("Skotdal: AM Band Needs Drastic Change," Dec. 3, 2014 issue), which the FCC doesn't want to hear.

The noise floor is rising every day, and nothing is being done to stop it. If anyone believes that the electric utilities are voluntarily going to spend millions making their systems compliant, and the U.S. consumer is going to replace all his computers, lights and other RF noisemakers with Part 15 compliant devices, I have some desert land in southwest Wyoming I'd love to sell them.

Changing 82–88 MHz to FM broadcasting as a primary allocation with TV broadcasting as a secondary allocation, and allowing existing AM stations to migrate there, makes sense.

*Bob Spain*  
Director of Engineering  
Wyoming PBS  
Riverton, Wyo.

had includes HD — all sorts of other neat bells and whistles, but *no HD*.

A trip to Radio Shack was interesting. The kid tried to sell me a satellite radio with a pricey and long subscription. When I finally got through to him that I was looking for an HD Radio, his eyes sort of glazed over; he hadn't the faintest idea of what I was talking about. And he tried one more time to sell me a satellite box.

Taking to the Internet, it became apparent: The HD Radios out there are aftermarket automotive stuff. Want something for your home? Lotsa luck, Charlie. Unless you want to go with the one or two available that are really top-of-the-line stuff (translation: expensive as the national debt), you can forget about IBOC at home.

As far as HD Radio goes: As broadcasters, we're in there pitchin', but the listeners don't even have a chance to buy a catcher's mitt.

*Tom Adams*  
Staff Engineer  
Wisconsin Public Broadcasting  
Madison, Wis.

### WELCOME TO THE AFTERLIFE

My brother bought a new Subaru that came with HD Radio. He didn't want it or not want it. It just came with it. So I asked him, how is it?

In the Washington, D.C., metro area? Poor. The secondary channel drops to nothing much of the time and the primary channel reverts to analog. My brother: not a radioman, not impressed. Actually a bit miffed.

Flip the page to the HD skeptic ("A Chat With an HD Radio Skeptic," Jan. 1 issue). He pegs it. It's about programming and people, not technology. If this were the 1930s, the HD people would sound like all those futuristic articles explaining how we would go to work in our flying cars we tucked into the garage.

Sometimes you have to go back to the future. And to borrow from a slogan I heard about newspapers, if live radio is dead, welcome to the afterlife.

*Jim Jenkins*  
Owner/General Manager  
WAGS Radio  
Bishopville, S.C.

### WE NEED A BETTER WAY

On Jan. 14, 2015, I filed an informal complaint with the FCC and asked them to conduct an independent evaluation of whether iBiquity (aka HD Radio) is "broadcasting in the public interest." I don't feel they are because there are so few people listening to HD Radio. My complaint is FCC Ticket No. 83715.

We are into the 13th year of the IBOC/HD experiment, and it clearly is not succeeding. iBiquity frequently says that HD Radio "shows up in the ratings book," but it appears that people are not listening to an HD channel but rather an FM translator.

My complaint is based solely on the assertion that Americans aren't adapting to HD Radio in its current form. We need to look for a better way to serve the public with digital radio.

I am asking the FCC to appoint an independent panel to review the performance of iBiquity and HD Radio. Maybe the current system can be fixed or maybe bigger changes are needed. Doing nothing won't make this expensive problem get any better.

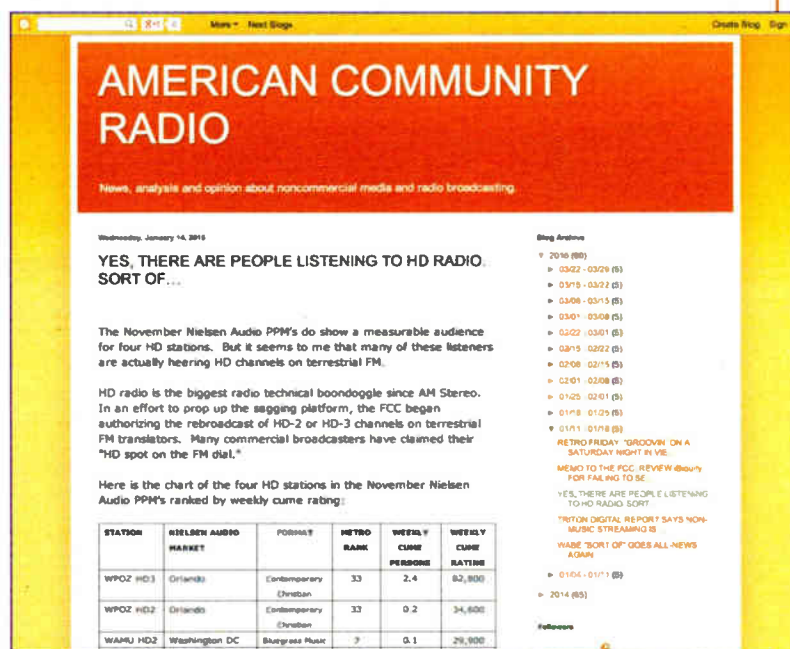
I am a consultant and blogger (seen at right); my specialty is noncommercial media, particularly NCE radio. In my work I frequently review and post ratings data from Nielsen Audio. Recently I was looking at noncommercial reports from last fall. I noticed four HD2 or HD3 channels were listed in the November 2014 PPM report.

I investigated and learned that the four stations are likely drawing enough listeners to meet Nielsen Audio's In-Tab criteria via simulcasts on terrestrial FM translators. HD broadcasters are staking out territory in the good old FM band.

You can see my report at <http://tinyurl.com/HDmills>.

I can never recall an HD channel showing up in "the book" without simulcasting on a translator. If there are exceptions, they are so few it further underscores my point: People aren't buying what iBiquity is selling and it is time to see if there is a better way.

*Ken Mills*  
Ken Mills Agency LLC  
Minneapolis



### LPFM ASPIRATIONS

It's an exciting time for small broadcasters ("LPFMs Look Ahead to 2015," Jan. 1). A decade ago, amidst mega-media mergers and FCC foot-dragging on LPFM (inaction supported by industry behemoths NPR and the NAB), I, too, urged expanded LPFM licensing.

But reading news about LPFM nowadays prompts me to ask, "What the ...?"

Competition for frequencies? *Time-sharing*? Then turn the page for a striking juxtaposition: Industry handwringing, in story after story, about challenges from technology advances ... leading to revolutionary changes in audience media-consumption habits ... resulting in OTA radio's vanishing listeners (aside, that is, from the articles touting radio's persistent low-90-percent reach but that neglect to mention declining TSL).

Who do these fearless new LPFM licensees think will tune in? While the spirit behind frequency sharing is laudable, I question the odds of success for either partner when getting and keeping listeners is more difficult than ever, certainly no less so for those sharing small sticks, no matter how "local" they might be.

"Localism," an inherent strength of LPFM, was my mantra ([http://bit.ly/radio\\_study](http://bit.ly/radio_study)). That was back when few people outside the FCC knew the term (the word did sound slightly made up). But I'm over it. I

still believe live, local programming is a good thing. But with the damage done (partially thanks to corporate consolidation), I no longer espouse localism as sufficient.

If local programming alone were the answer, as some seem to suggest, why didn't cable-access TV channels long ago topple the major networks? Because, obviously, more important than program origination is program *quality*. That has always been true, of course, and local programming can be relevant, compelling and good quality. But high-quality *live* programming, with strong *national* reach fostering far-flung shared experiences, has proven to be a winning formula for many successful syndicated radio hosts.

Today when I hear "localism" or its companion, "hyper-local," I yawn and think some people are finally getting it — a decade (or two) too late.

The more relevant question now: What must the industry do in terms of *content in combination with delivery* to help the medium *regain* relevancy with consumers? I teach 20-year-olds — so, trust me, the challenge before us concerns not merely *staying* relevant, but, regrettably, needing somehow to *re-establish* relevance in their lives.

On delivery, mobile surely must be part of the



equation. As for content: For starters, radio's perennial *problem of commercials* seems to be the *problem perennially ignored* (though kudos to KNDD(FM) in Seattle for trying something new: blowing up the outdated strategy of long stopsets — a tired tactic not well-suited for the digital age).

Solidly pro-radio, I often tout the medium's many strengths and advantages over other media: its coming full embrace of digital after initially weak strategies; its gradual evolution (eventually moving away, I predict, from an aging, unimaginative 60-year-old formula centered on music, jingles and seemingly never-ending commercials); and its ultimate survival.

Like many, I wish I knew the sure-footed path to radio's thriving future, for I'd share it with my students, next-generation industry leaders. But I have no doubt about the medium's long-term viability, and I take comfort in the hope that, down the road, some of my students will creatively meet the challenge.

In the meantime, best wishes to you, brave new LPFM licensees. It's an exciting time.

*Michael Saffran*  
Faculty Director/Communication Lecturer  
WGSU(FM), SUNY Geneseo  
Geneseo, N.Y.

### HOLD OFF ON CHANGES TO NRSC MEASUREMENTS

I read Mark Persons' article "Adjust Rules for NRSC Measurements" (Feb. 1, 2014) and tend to disagree with some points.

First, many solid-state transmitters of the past few decades use PDM/PWM modulation techniques and are subject to PDM leakage on either side of their carrier frequency. This is not particular to any manufacturer as much as it is to the modulation technique and the aging of filter components. Many of us have had to change out the old "big blue" capacitors that have quit functioning.

But the point is how do you know when that issue is becoming a problem? It takes an NRSC type measurement, a call from the AM station that is being interfered with or a visit by the FCC with their spectrum analyzer to reveal the problem.

Then, on occasion there is a piece of audio gear that begins oscillating in the supersonic range and puts out a sideband that covers someone else signal. I've seen audio processors do this, though it is rare.

With co-location of stations increasing, there is chance of an intermod component exceeding the FCC limits. How will anyone know of these IM products if they aren't diligently monitoring the whole RF spectrum? Can a mon-and-pop station afford to own a spectrum analyzer to monitor this issue?

There is no doubt that technology has advanced significantly on the past decade. We have now high-quality transmitters that may not be capable of generating some of these issues. But not everyone owns a new transmitter.

I'd stretch a guess that "most" stations are operating with AM transmitters that are 10 to 20 years old, and that more than a few operate with even older transmitters.

It's a bit early to eliminate or compromise existing NRSC measurement requirements; let's wait a decade or so.

*Dave Dybas*  
Sparks Broadcast Service  
Buffalo Grove, Ill.

### GOOD LUCK, WHCP

I was interested to read about LPFM station WHCP in the Jan. 14 issue. I am on a community station in Ocracoke, N.C., WOVV(FM); one of the founders of WHCP called me about six months ago while I was on the air. I answered some questions, as I remember, and gave him the name of our station manager to talk further.

I'm glad to hear that things are working out for WHCP. LPFM and "community radio" in general seem like one of the waves of the future.

I wonder sometimes if AM would be more popular with varied formats like LPFM/community radio.

*John Alexander*  
WRDV(FM) and WOVV(FM)  
Doylestown, Pa.

### NEWS WHCP(LP) on Target for Sign-On

#### FIRSTPERSON

BY MIKE STARLING

The author is general manager and chief engineer of WHCP, Cambridge, MA, and former executive director of NPR Labs. This is the first and part in this case study series about this low-power radio station, here covering funding, equipment and studio space. Part 1 appeared in the Aug. 14, 2014 issue; see [radioworld.com/whcp/](http://radioworld.com/whcp/).

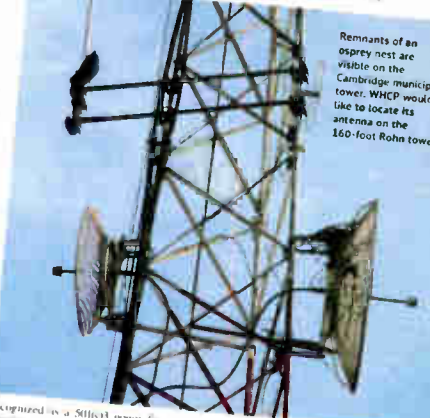
**CAMBRIDGE, Mo.** — The all-volunteer staff at WHCP Radio has reached more than 90 percent of our construction budget goal largely thanks to generous donations from engineers and students around the country.

From a QRT and Minnow to an 800-skinner, from a half-dozen recent vintage computers to almost new CD recorders, a partly used audio interface to vintage Pacific Recording consoles, vintage microphone systems, loudspeakers, we are excited by the outpouring of support received to date. It appears that instead of building a modest, bare-bones low-power FM, we are on the brink of commissioning a multi-studio, near-state-of-the-art community radio complex.

#### ORGANIZATIONAL STRUCTURE

In rapid order, we grew our fledgling organization to a half-dozen accomplished board members, with half of us now go-journalists, lawyers, fund-raisers, technical and programming pros.

Additionally, thanks to the IRS's new streamlined 1023E form, Cambridge Community Radio Inc. was formally



Remnants of an osprey nest are visible on the Cambridge municipal tower. WHCP would like to locate its antenna on the 160-foot Robin tower.

recognized as a 501(c)(3) nonprofit, retroactive to our date of incorporation within weeks of our 2013 application. This means all of the equipment and cash donations we've received can be recognized with a tax-donation letter for the donors.

#### THE CASE OF THE MISSING TOWER

It has been said that plans or battle never survive first contact with the enemy. In the case of our preferred antenna location, we have been negotiating for use of the centrally located

city municipal tower right in the heart of Cambridge.

It is a 160-foot Robin tower that was built and commissioned in 1978. The tower was constructed to host the city police department repeater but that moved years ago to the new public safety tower couple of miles away. The only active use of the tower at present is the very little osprey nest at about 80 feet up the structure.

Although none of the antennas that remain on the tower is in use, there is generator power for the building since that's a real plus for city government operations, and should be the same for WHCP. In case of any widespread power outages, a finite, interruptible power supply should mean no discernible downtime in the few seconds required for the generator to come online.

The only problem was there did not appear to be an Antenna Structure Registration for this tower on the FCC's website. On further investigation, we believe we found it — mere 800 meters to the southwest. Apparently, due to an error in filing the tower application back in 1978, the coordinates were garbled. We're pretty confident that is what happened because the overall height and type of tower are identical, even the street address is where the tower



WHCP board members gather to review the Cambridge Community Calendar printer proofs. From left, Steve Rifeout, Chuck McFadden, Mike Starling, Paul Clapper, Nancy Barger, Karen Fishell (attending by phone), Paul Littleton.



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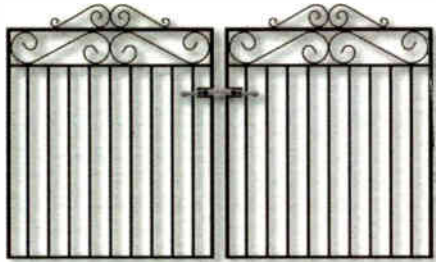
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