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INSIGHT TO IBOC

HD Radio EPG explained

FIELD REPORT

JK Audio Bluepack & Nautel NV20

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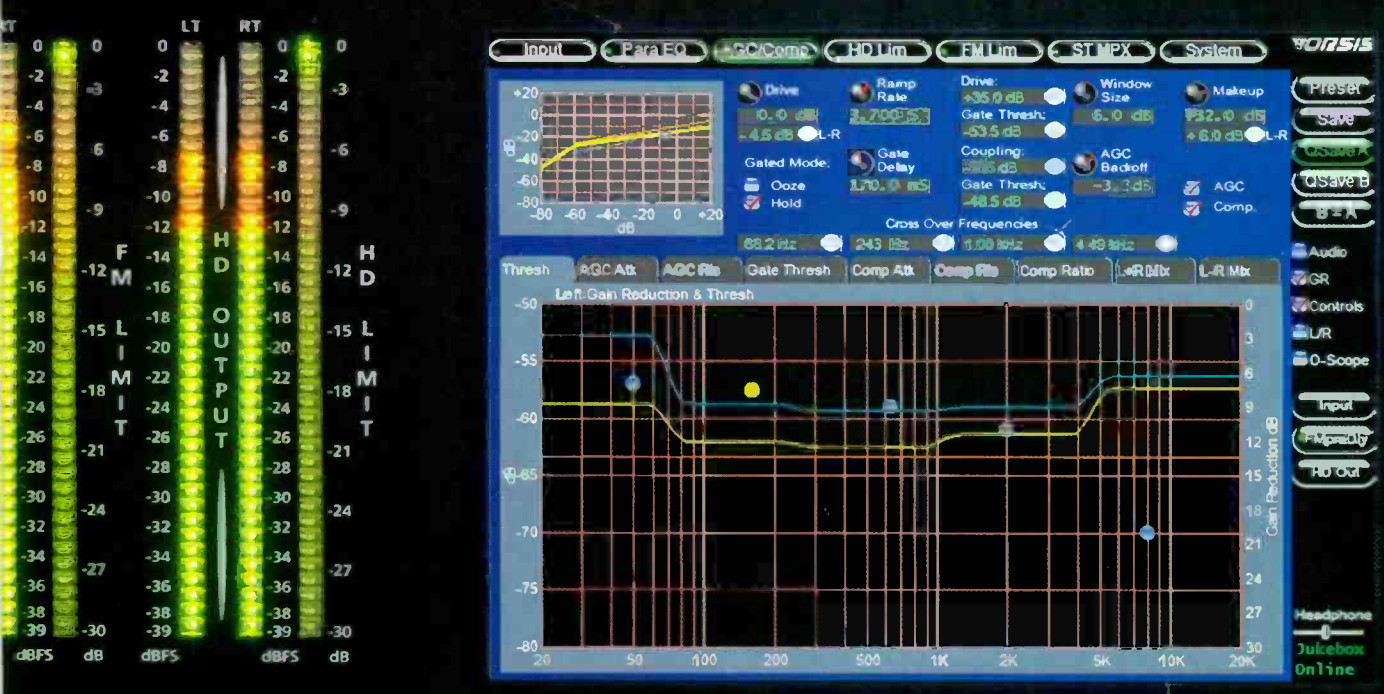

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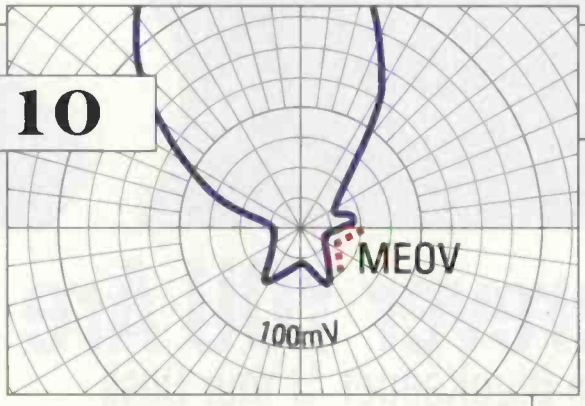

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ON THE COVER

When New Hampshire Public Radio made the switch from classical music to news/talk, it's 10-year-old facility wasn't cutting it. Read the story on page 28. Cover design by Michael J. Knust.

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The *Radio* magazine Pick Hits of the 2009 NAB Show

15 new products are chosen by the Pick Hits judges.

Digital Radio Continues Growth

The worldwide market for digital radio experienced year-over-year growth of 85 percent between 2007 and 2008, reports In-Stat.

SBE Honors Heimerl, Scherer as Fellows

John Heimerl of Hampton Roads Educational Telecommunications Association and Chriss Scherer, of *Radio* magazine were bestowed with the honor.

NAB Announces 2009 Crystal Radio Award Winners

The National Association of Broadcasters has named 10 winners of the NAB Crystal Radio Awards

APRE Announces 2009 Engineering Award Recipients

John Kean of NPR Labs and Don Danko of Cincinnati Public Radio get the pub radio tech nod.

Broadcaster Traffic Consortium Expands with New Broadcasting Partners

Journal Broadcasting, Regent Communications, Saga Communications and Corus Entertainment join the traffic data effort.

SBE Expands Education Program

The organization will triple its education programs and hire an education director to oversee the plan.

Find the mic and win!

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Site Features

2009 NAB Show Photo Blog

See what happened at the convention through the camera lenses of the *Radio* magazine floor reporters.

- *RadioMagOnline.com/nab/photoblog2009*

Podcasts Keep You Informed

Download the weekly Radio Currents Podcast and stay on top of current radio events, or the monthly Radio Mag Online Podcast where you can hear more about APT selling its hardware manufacturing business to Audemat.

- *RadioMagOnline.com/podcast*

Industry Insight in Talkback

The blog from *Radio* magazine Editor Chriss Scherer is updated throughout the week. It's commentary and views on radio events and news.

- *blog.RadioMagOnline.com/talkback*

RSS, Facebook and Twitter

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The show is over

It's in the books now, the 2009 NAB Show is behind us. As an attendee, your preparation for the convention was probably limited to making some notes about sessions to attend and exhibitors to visit. That's important as an attendee. For the exhibitors and trade press, our planning started months ago. For *Radio* magazine, some of that started last November.

Now that it's over, we can look back and review and analyze it. The general verdict? The NAB touts it as a huge success. Most of the exhibitors I talked to agree. Despite the fact that attendance was down – there were almost 84,000 registered attendees compared to 105,000 last year – it seems like it was a good show. (Keep in mind that attendance figure is registered, not actual.)

With 21,000 fewer people there, the exhibit floor was obviously lighter on traffic this year. Before the show, people told me they were only going for two or three days, not four or five. That contributes to the look of the thinner crowd. Traffic on the floor was less dense. Keep in mind that a person in the door counts in overall attendance. A shorter stay at the show just means less crowd density on the floor, so the combination of a smaller crowd and a shorter stay makes the exhibit hall look sparse.

Some people remarked that the aisles were wider. Some main aisles were very wide, I agree. Most aisles looked to be about the typical 10' to me, but I didn't measure them.

For years exhibitors have been talking about the quality of the attendees being good even though quantity had slipped. This year was the ultimate example of that. Those attending were very serious equipment and service buyers. There were few if any tire kickers.

As one exhibitor told me, "I don't care if attendance is 100,000 or 10,000. As long as I get 150 good leads from the show, I'm happy."

I think he got his wish, and he had more time to see those 150 people thanks to the 20 percent drop in attendance.

The lighter crowd also made it easier for me to work through the floor. While I made other adjustments to my schedule to increase the efficiency of my time on the exhibit floor this year, fewer attendees made it easier for me to see the people I needed to see. Exhibitors weren't as busy. Fewer people were stopping me en route. Fewer people were clustered into traffic jams. I even had some extra time to explore for new ideas and products that I might have otherwise missed.

As far as new products go, there were some interesting technology applications to be found. As in previous years, I would classify most of the new products as enhancements and refinements to existing products, but there were some unique ideas to be found. I posted some of my own picks online in Talkback.

If you weren't at the show, you missed the in-person experience. But don't worry, we'll help you catch up on what you missed. We'll have lots of convention details in next month's issue. But in the meantime, there's lots of NAB info at RadioMagOnline.com. The *Radio* magazine Pick Hits – now in their 25th year – are posted online. We'll have the complete details on all 15 posted soon. Also, take a look at our Photo Blog, the NAB Insider newsletters, and Talkback posts from during and after the show.

Chris Scherer

- *Photo Blog*
  RadioMagOnline.com/nab/photoblog2009
- *Talkback*
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What's your opinion? Send it to radio@RadioMagOnline.com

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Photo: Jonathan Tichler/Metropolitan Opera

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Do you remember MEOV?

By John Battison, P.E., technical editor, RF

Maximum Expected Operating Voltage (MEOV) is a relic of the earlier days of directional antenna design and proofing. It died about 30 years ago. I'll cover some history since the concept formed a very important part of current antenna design work and led to the development of the standard pattern. The term also became very important in the professional life of the consulting engineer whose directional antenna system failed to operate as planned. It can also be important to today's engineer who might encounter the term in an old proof and be puzzled by its meaning and application.

The value of MEOV proved to be immeasurable to consulting engineers who had the foresight to use it. Some directional antenna patterns proposed to the FCC had specified zero radiation in a pattern null. The FCC's engineers very wisely, in my opinion, eventually said it is almost impossible – and maybe impossible – to reduce radiation nulls completely to zero in view of the environment in which the antenna system has to operate. This led to development of the standard pattern, which basically imposes a built-in minimum radiation of about 6mV.

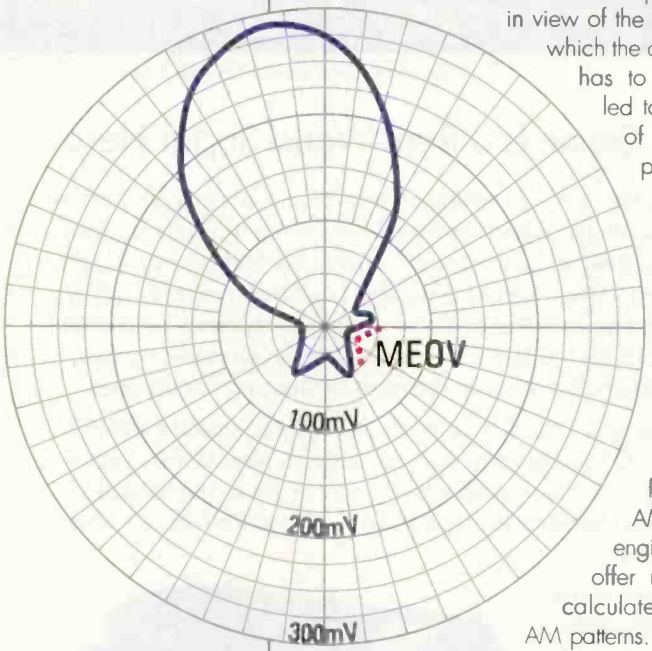

Fig. 1. Typical DA polar plot of a theoretical pattern with MEOV protection

After the first excitement over the Commission's approval of the first directional AM pattern, other engineers began to offer mathematically calculated directional AM patterns. Some of these relied solely on mathematics in presenting theoretical antenna designs. These theoretical antennas required actual construction in order to be tested and prove that the radiation field would do exactly what the design engineers said it would. Sometimes, much to the embarrassment of the designer, it was found impossible to achieve the promised radiation pattern. Occasionally large changes had to be made in the already-constructed antenna systems in order to satisfy the Commission's requirements for licensing.

Knowing limits

The Commission's procedure for licensing requires the antenna pattern and radiation obtained in the proof of performance measurements to always be within the limits of the proposed antenna pattern. The usual problem delaying license approval was probably the presence of unexpected measured radiation that was greater than the proposed and approved, radiation value in the pattern nulls. The solution quickly became apparent. It seems that troublesome, larger-than-acceptable, measured null values could be acceptable if they were covered in the application by an acceptable caveat.

The approved pattern was generally the theoretical pattern, if this pattern could be easily obtained. In the higher-level areas, a small deviation in the null region could probably be written into the pattern so it passed the pattern proof. In many cases it seemed impossible to get closer than plus 3 percent to 5 percent of the theoretical value shown in the application. Sometimes filing an amended Form 301 could satisfy the condition and allow licensing to proceed. Unfortunately this procedure would involve another application showing the obtainable allowable radiation, presumably more legal fees, additional delay and professional embarrassment for the consulting engineer.

The new application would show a new value in the offending null that amounted to a few percent. Some very bright person conceived the idea of filing an original application, showing the desired theoretical pattern with a broken line outside this pattern, at the potentially offending null showing the maximum expected operating value in that area.

Thus MEOV was born. It offered a wonderful means of providing a way around a potential difficulty in meeting the approved radiation pattern. So the wise thing to do whenever a directional antenna pattern was filed was to add a few percent more than the theoretical pattern in any potentially

Insight to IBOC

May 2009 Part of the *Radio* magazine DAB Answer Series

The Electronic Program Guide

By Rick Ducey

What's on the radio? As more stations not only go digital but also offer multicast services, this question gets harder and harder for listeners to answer. As of March 2009, according to BIA Advisory Services, there were 1,887 HD Radio stations on the air. Many of these digital stations also offer one or more multicast services. Digital subscription services such as cable and satellite TV, and radio all offer guide services. Most homes subscribe to a cable or satellite service and get the benefit of the service's program guide for broadcast television stations carried on these services. In addition, broadcast digital television signals carry over-the-air guide information the stations transmit themselves. In stark contrast, radio sends its signal right to the listeners' receivers with no intermediary to produce a master program guide. Radio broadcasters must provide their own guide information. Among the electronic media, broadcast radio may be the hardest for the audience to answer the simple question, "What's on?"

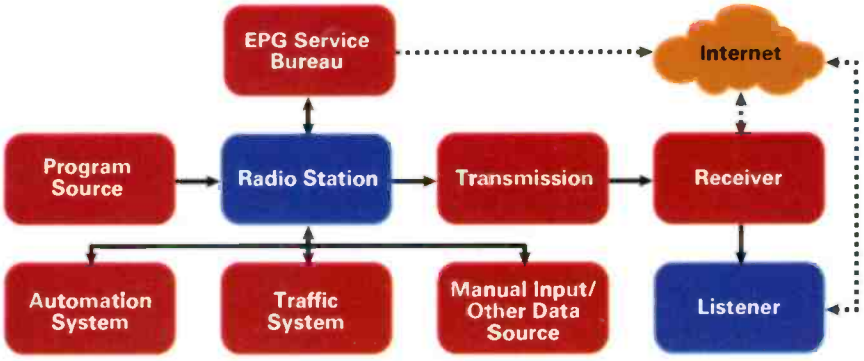

Figure 1. Possible EPG data flow

Without a guide, the three most common tools radio listeners use to figure out what's available are their self-programmed tuning buttons (which narrows the listener's options to a half dozen or so pre-programmed channels), and the seek and scan buttons. To make the most of these tools, listeners must practice enough patience to listen through the undesirable content before they pick the station with the desirable content. Even then, a listener may be immediately satisfied by the current offering on a new-found channel, but must spend time with the channel to get a sense of its programming format and style. And unlike television, radio receivers and their displays are more limited in how they convey information. Finally, unlike all but the most cutting-edge TV services, radio is a mobile medium – what exactly is receivable at any

Open Mic

Elevated sidebands

The idea of increasing the power level of the digital sideband carriers in the hybrid HD Radio signal was introduced just more than a year ago. In the time since, debates have ensued about the idea itself and the specific power level. With the issue outstanding, some stations have decided to place their HD Radio transition plans on hold pending the outcome. *Radio* magazine talked to Jeff R. Detweiler director, broadcast business development at Ibiquity Digital.

Radio: *Where do we stand with the proposed digital level increase in relation to NPR actions and the FCC?*

JD: Ibiquity and the broadcasters have proposed that the FCC move forward immediately with a power increase for commercial stations where there is support for an immediate power increase. So, it's with the FCC.

NPR Labs tells us that it is supportive of and committed to a power increase. They have questions about the appropriate amount of the increase and want to have what they call a "managed increase". NPR Labs is currently planning

continued on page 6

Inside

Multicast Milestones 6

The *DAB Answer Series* is an ongoing series of supplements that covers the technology of digital audio broadcasting.

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given location varies, placing a new design constraint on a digital radio program guide. Listeners will not want to be burdened with a list of all stations in the market, half of which are out of the receiver's range. Television viewers enjoy the benefits of on-screen electronic program guides featuring the usual day/time program grids as well as search, bookmarking, digital recording and even sorting by content type among other features. Television as a medium offers its viewers far more transparency and control in finding content than radio can provide its listeners.

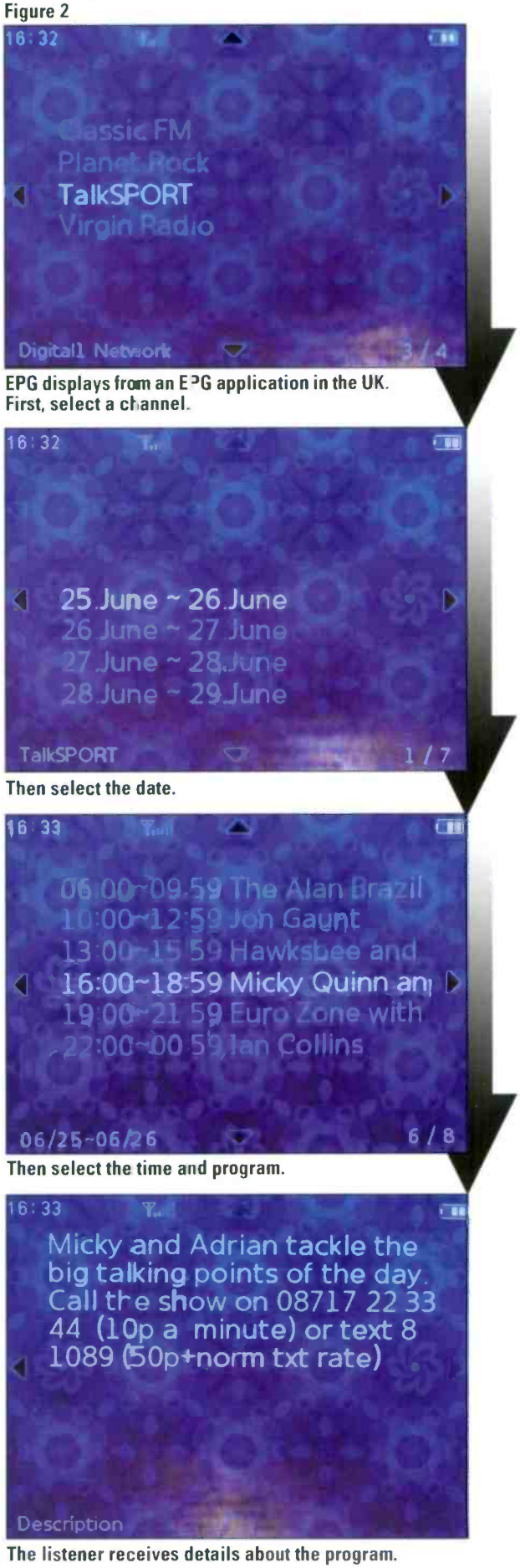
Getting started

To jump start an industry solution, the NAB Fastroad technology initiative, funded by the National Association of Broadcasters, decided that the problem of letting listeners know what's on HD Radio was significant enough to merit further research and development. BIA Advisory Services and Broadcast Signal Lab jointly submitted the winning proposal for developing an Electronic Program Guide (EPG) for HD Radio. BIA and BSL teamed with the British software firm, Unique Interactive, which has extensive experience in developing a commercially deployed electronic program guide for DAB in Europe. Ibiquity Digital has also provided critical technical support for this project.

NAB Fastroad divided work on the EPG into two phases to design, develop and test an Electronic Program Guide (EPG) solution for HD Radio broadcasting. Phase 1 was completed fall 2008. The goals for Phase 1 were to (1) develop and document a set of comprehensive business requirements; (2) develop preliminary and then a final EPG architecture, and (3) recommend a market for field trials. The project team has completed Phase 1 work in researching business and functional requirements and developing specifications. The business requirements document is publicly available at the Fastroad website, and the project team invites industry review and input. The field trial will be conducted with the cooperation of radio stations supporting this effort in the Boston radio market, including Worcester, MA, and Providence, RI.

Phase 2 efforts to develop EPG software and then lab test it before conducting field trials are now underway with the goal of completion by the fall of 2009. Once the project team started tackling the problem of developing a radio EPG service, however, it quickly became apparent that to create a successful business and technical model for a universal radio program guide service is more complicated than it appears on the surface. For example, in the case of television, a cable or satellite operator obtains and provides a

Figure 2



EPG displays from an EPG application in the UK. First, select a channel.

Then select the date.

Then select the time and program.

The listener receives details about the program.

common program guide for all of its services. Also, there are national program schedule databases for television programming that are routinely fed program guide information from the individual stations and networks. Finally, there are third parties who provide and operate program guide services. None of this infrastructure exists for radio.

Because radio is a medium that serves its audience directly rather than via a cable or satellite distribution platform the way most broadcast TV is watched, radio stations must take primary responsibility for delivering program information for what's on radio. And since the locations of radio transmitters are so geographically diverse, the radio signals received on the northern side of a market will be significantly different from the signals received on the southern side. Who will transmit all this program data and how will the receiver make sense of it?

The BIA/Broadcast Signal Lab/Unique Interactive project team envisions four possible models for EPG data delivery.

Four Models for EPG Delivery

Parochial Model – each station transmits only its own EPG data.

Shared Model – each station transmits all market EPG data (at least high level data without details).

Master Station Model – one or more stations transmit market level EPG data for all other stations.

Network Model – stations transmit "pointers" to EPG data sources which can include over the air sources as well as other sources such as Internet-based program guides.

Figure 1 (page 1) shows how the Electronic Program Guide data could flow from source to listener. Program guide data can be provided by the program source (network or program syndicator), automation systems, traffic systems or input manually by station personnel. A third-party EPG service bureau can provide some or all of these services. Another function of a service bureau is to scrub the data for consistency, accuracy and formatting. Once the EPG data has been acquired and prepared for delivery to the listeners, it can be sent either over-the-air or over the Internet to receivers for display to listeners.

The listener experience

How might this look to listeners? The examples in Figure 2 (page 3) are actual displays from a Unique Interactive commercial deployment of an EPG service in the United Kingdom. In this example of a live service, a listener can drill down for EPG information on a favorite station. Starting from the top left, the listener first selects a station (Talksport), then selects a day (25 June - 26 June), then selects a time period (16:00-18:59), then finally selects the program. The receiver displays show some program-related information. The user can then directly tune to the station, or set up a reminder to listen or a recorder to capture the program.

Notice also that the EPG display can be used for a call to action. The example here shows a call to action inviting the listener to call the show (on a telephone number that costs the listener 10 pence (15 cents) per minute) or send a text message to the show (with a 50-pence (74 cents) charge plus any other applicable text fees for that listener's mobile phone service plan). Hot links to websites or social networking services can be selected to connect the listener to information about the program or its sponsors.

Unique Interactive's experience is that about 10 percent of the DAB receivers in the U.K. market are currently equipped with EPG capability, and the results are encouraging. The BBC uses an EPG service both via the Internet and over the air that makes possible a type of multicast programming and scheduling promotion that would not otherwise be possible.

The benefits of an HD Radio EPG service from a listener's perspective makes the radio more convenient to use. EPGs will enable a recording solution that will introduce time-shifting to radio, something television viewers have long enjoyed. For receiver manufacturers, EPG receivers offer an opportunity to increase profit margin on unit sales by providing value-added features and functionality. EPGs can help broadcasters by supporting forward promotion and helping listeners discover their stations and programming more effectively.

To suceed, an EPG must appear as a coordinated service. Its power will come from the collective information it provides about all stations in a market. The EPG service for HD Radio stations can be a rising tide that lifts all radio broadcasters, giving a new face to an old medium, at a time when it can use a good competitive boost.

The author recognizes other members of the project team: David Maxson, Broadcast Signal Lab; Skip Pizzi, EPG consultant to BIA; and Adrian Cross, Unique Interactive. David Layer of the NAB is the NAB Fastroad HD Radio EPG program manager.

Ducey is the chief strategy officer for BIA Advisory Services.

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Sample and Hold

1,000 multicasts and counting

By Chriss Scherer, editor

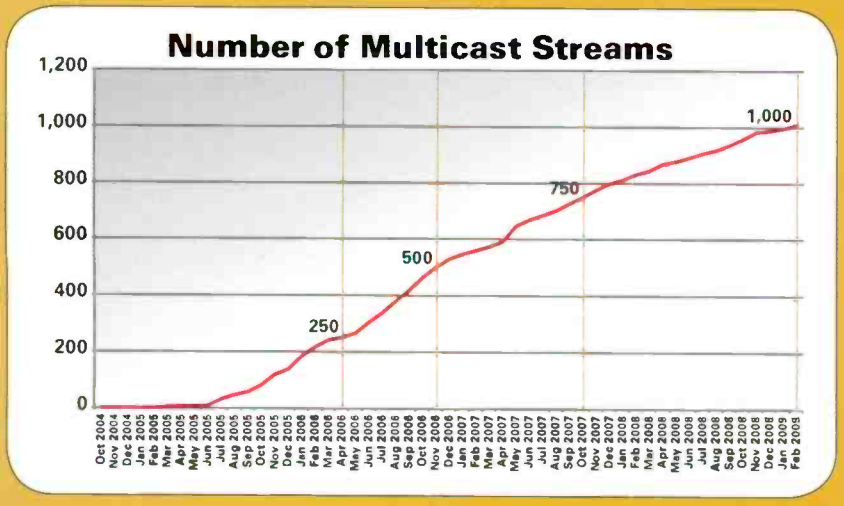
There are several enhancements to terrestrial radio that HD Radio offers, and each has its own merits to help further the technology and its acceptance. Despite these enhancements, many stations have difficulty identifying the return on investment. But for one FM enhancement, the return is obvious.

Multicasting, the ability to transmit more than one program stream on the FM HD Radio path, is one enhancement that can show a direct result right now. The added program streams are an immediate outlet for an additional revenue stream. And while the main program stream provides the main source of revenue, multicast stream formats can be tested and evaluated with little effort at the start.

In February, the 1,000th multicast stream was turned on. According to the HD Digital Radio Alliance, CBS-owned WODS-FM Boston launched the 1,000th multicast stream on its HD2 with the format Soft Hits - Love Songs. But there are more statistics related to multicasting than the overall quantity.

There are currently nearly 1,900 stations transmitting an HD Radio signal. Of those, almost 300 are AM stations. The 1,000 multicast streams are spread across 1,600 FM stations.

The Ibiquity website lists all the stations currently transmitting HD Radio signals, and according to this list, of the 1,000 multicasts 900 of them are on HD2 signals. The remainder are on HD3 slots. The Ibiquity list shows no multicasts on HD3 channels.

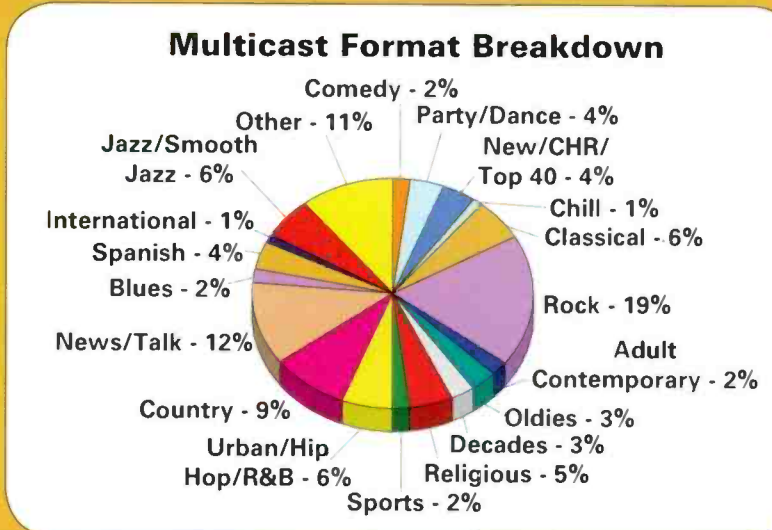


The first multicast streams were launched at the end of 2004. By the end of 2005, there were 21 multicast streams. The multicast adoption has seen a steady increase ever since, albeit with a few growth spurts. The 250th stream went live in April 2006. The 500th stream was activated in November 2006, and the 750th stream was launched in October 2007.

Multicast formats span a variety of formats. Many of them are unique niches in some way, such as deep cuts, all live, all acoustic or other similarly focused aspects of a traditional radio format. Some multicast streams are rebroadcasts of AM stations. The BBC World Service and NPR programs are also popular multicast offerings.

So with 1,000 multicast streams and counting, it appears that it has established a firm foot hold.

Data for charts courtesy of Ibiquity Digital and the HD Digital Radio Alliance.



Open Mic

continued from page 1

more testing to determine the appropriate power increase for NPR member stations and Ibiquity has offered to provide input on and help support these tests. Ibiquity continues to work directly with public radio stations to ensure they are fully educated about the benefits of a power increase.

Radio: *Is there an expected date when the FCC will finalize it?*

JD: With a new administration and an acting commissioner, this is very difficult question to answer. We're hopeful that we'll see some action in the next several months.

Radio: *The actual digital power level has been debated to a range from -20 to -10dB. Do you expect a fixed-level ruling, a stations-can-choose level, or a value based on certain criteria?*

JD: The commercial broadcasters are asking for approval to go to -10dBc. If additional testing demonstrates that less power for non-commercial stations would be appropriate, then a suitable algorithm will be developed to fix the appropriate levels.

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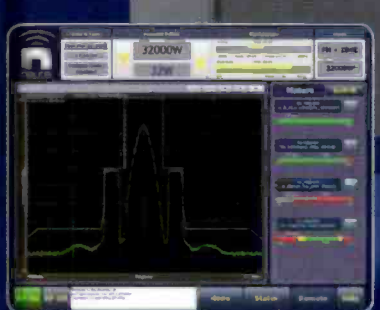

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troublesome areas. As time passed it became very unusual to see a proposed DA pattern without an MEOV. As a matter of fact, several consulting engineers have been known to put an MEOV around the full 360 degrees of a pattern. Actually, this is not quite as strange as it sounds. The electronic environment surrounding directional antenna stations is still changing for the worse, and presenting more tower structures than there were 80 years ago. It was becoming more difficult every year to construct and proof a new directional when proposing a new antenna system. In much the same way as MEOV was developed, time passed and another problem involving theoretical patterns and MEOVs began to develop.

Meoving, I mean moving on

Around the end of the 1970s it became apparent that some confusion would often exist for both FCC engineers and consulting engineers; it was often difficult to determine looking through the files whether an MEOV or the theoretical pattern had been used in the final operation. To avoid this increasing confusion the Commission decided to introduce the standard pattern for directional antenna applications. The standard pattern was produced by adding a term representing the minimum allowable radiation to the generally used equation in directional antenna design. Thus was born an acceptable antenna pattern that could never decrease to zero in a null.

The Commission generated and provided a list of standard patterns for all licensed AM directional stations in the early 1980s. Later it issued the edict that all applications involving directional antennas must be based on the standard pattern. It was inevitable, of course, that there would be instances when the standard pattern just couldn't fit due to excessive radiation on one or more azimuths. To take care of these situations, augmentation was allowed as described in the commission's rules. Provided that the excessive radiation did not produce unallowable interference the pattern could be augmented over the pertinent arc. Appropriate information concerning the degree of augmentation used is noted in the directional antenna data. Thus any engineer can easily and accurately obtain precise information on any licensed directional station or applicant and the theoretical DA pattern with MEOV is no longer used.

E-mail Battison at batcom@ohio.net.

Relaxation of LPFM interference standards

By Harry Martin

Two bills (H.R. 1147 and S. 592) have been introduced in Congress that could lead to a wave of new LPFM stations – possibly thousands of them. The bills would statutorily eliminate LPFM's third-adjacent channel protections to full-power FM stations. The House version has garnered the support of 22 Representatives, including members from both sides of the aisle.

The new legislative initiatives are part of a back-and-forth struggle over third-adjacent channel protections, which has been going on since the LPFM service was initiated in 2000. The bills have new momentum as a result of Washington's interest in localism in the radio service. This interest, in turn, has been fueled by the consolidation of the radio industry and the resulting diminution in local ownership of stations. The economic downturn has contributed to the problem by causing the elimination of news and informational programs on radio.

Dateline

June 1 is the deadline for submission of biennial ownership reports by radio stations in Arizona, DC, Idaho, Maryland, New Mexico, Nevada, Utah, Virginia, West Virginia and Wyoming.

June 1 is the deadline for radio stations in Arizona, Idaho, New Mexico, Nevada, Utah and Wyoming with more than 10 full-time employees to electronically file their Broadcast EEO Mid-Term Reports (Form 397) with the FCC.

June 1 is the deadline for radio stations licensed in the following states to place their annual EEO Reports in their public files: Arizona, DC, Idaho, Maryland, Michigan, New Mexico, Nevada, Ohio, Utah, Virginia, West Virginia and Wyoming.

As originally conceived, LPFM stations were not expected to protect third-adjacent channel full-power FM stations from interference. Such protections were thought to be unnecessary due to the relatively small geographic areas where interference might occur (i.e., immediately adjacent to the LPFM's transmitter site). But radio industry concerns about the interference that could be caused by a large number of new LPFM stations triggered Congress to step in and overrule the Commission by amending the Communications Act to maintain third-adjacent protections. Acknowledging some doubt as to the extent that such interference would pose a threat, Congress directed that the FCC study the issue further.

That in turn led to the 2003 Mitre Report, prepared for the Commission by the Mitre Corporation at a cost of more than $2 million. Mitre concluded that third-adjacent channel interference would not be a significant problem. The broadcast industry disputed these findings.

In 2004 the FCC, based in part on Mitre, asked Congress to delete the third-adjacent provision that had been added in 2000, but no action was taken on that request. Then, in late 2007 the FCC adopted interim processing rules that would permit LPFM stations to seek waivers of the second-adjacent channel protection requirements. At the same time the FCC proposed to do away with the second-adjacent channel protections now included in the LPFM rules. These actions caused the FCC and Congress to focus anew on the third-adjacent channel interference issue.

As noted above, the bills are viewed as bolstering the Commission's efforts to promote localism in broadcasting generally and have language in them to that effect. The bills also suggest that increasing the number of LPFM stations will increase minority and female ownership in broadcasting and will enhance communications during local or national emergencies. Nevertheless, the new bills, while generally de-regulatory, provide that third-adjacent protections must be maintained for full-service noncommercial FM stations that provide radio reading services (RRS) on their SCAs.

If the bills pass and third-adjacent protections are eliminated, and if the FCC then pursues its 2007 initiatives and adopts final rules eliminating the second-adjacent channel protections as well, full-power FM stations will be protected only from co-channel and first-adjacent channel LPFM interference. Because the FCC is planning to open a window for new LPFM stations later this year, adoption of all the pending proposals by Congress and the FCC would make spectrum available for thousands of new LPFM stations.

Martin is a member of Fletcher, Heald & Hildreth, PLC, Arlington, Virginia. E-mail: martin@fhhlaw.com

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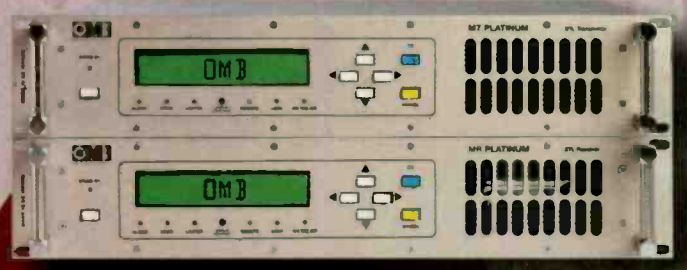

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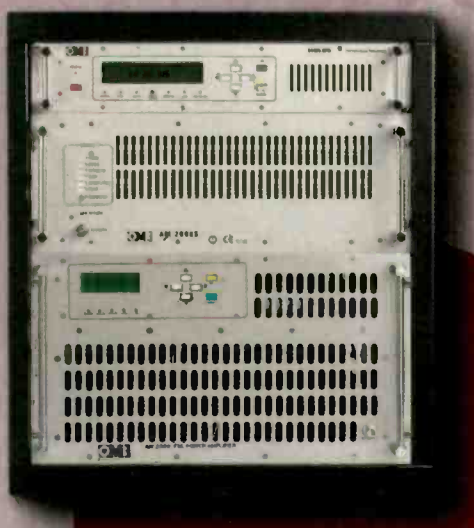
is a high-performance Studio-to-Transmitter Link. It is made up of the SW MT transmitter externally synthesized in 10MHz sub-bands with a step of 100KHz, and the MR double conversion receiver, that is externally synthesized, too. The MT is microprocessor controlled, and includes LCD display for the visualization of the most relevant transmission parameters (frequency (6-digit), forward and reflected power, modulation level), balanced Mono, Stereo (MPX). The MR receiver has the same visualization system as the transmitter. It includes balanced Mono and Stereo (MPX) outputs. Furthermore, the MT/MR Platinum STL includes a jumper in order to get a proper operation with digital signals.



EM 2000

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EM 10000

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Letting Go of Legacy

Goodbye analog (and some digital) STLs, hello IP

By Doug Irwin, CPBE AMD DRB

By now you know I'm a big fan of new technology. However, I also know there is still an important role in a radio station's technical facility for legacy equipment. Like many, I find it difficult to retire a piece of equipment that has served its purpose reliably over a 10- or 20-year (or maybe even longer) period of time. Some equipment is truly classic. It seemed very expensive when new, but easily proved its worth over the years. However, time and technology move on, and those classics' original design specs – good as they were then – are in many cases simply inadequate today.

Analog STL systems fit into this category well. While we've moved on to the current state-of-the-art in our STL systems here in New York, we still hold on to our old reliable STL systems as backups.

Perhaps you find the time has come to relegate your old analog STLs to backup status as well. There are too many advantages to ignore in a digital STL, such as constant audio performance over a varying receive level, or the ability to extend a local area network from the studio to the transmitter site. There are various radio systems available for any need in a broadcast facility.

Basic change from analog to digital

The digital STL systems for our 950MHz band will of course work on a channel that you currently have licensed, but because they use more bandwidth, you'll have to essentially relicense the channel to reflect the change. For example, a Moseley PCL 6010 has an FCC emission designator of 300KF8E (which essentially means it has analog modulation with 300kHz of bandwidth) while a Moseley Starlink (using 64 QAM) has an emission designator of 500KD7W (digital modulation with 500kHz of bandwidth). You will have to recoordinate with local users in the same band. The good news is that a digital STL transmitter is less likely to interfere with co-channel or first adjacent channel analog receivers (since whatever happens to be heard by the other receiver pretty much sounds like incoherent noise). Conversely, a digital receiver is more likely to be interfered with by an analog transmitter, because any analog modulation heard by the digital receiver has the potential to degrade its BER since it is essentially incoherent noise.

My experience is that digital STL systems are very good at ignoring other co-channel digital systems; some experiments showed that co-channel systems would ignore each other as long as the desired-to-undesired ratio exceeded 15dB. Your mileage may vary, but don't forget to consider fade margins if you put more than one system locally on the same channel.

The well-known STL manufacturers of course have mature digital STL products available.

TFT makes the Model 460 digital STL. This radio system will carry up to six channels of uncompressed digital audio, with the modulation scheme (and bandwidth) depending upon the number of channels actually used. For example: six channels of audio (at a 32kHz sample rate) calls for the 256 QAM modulation scheme. In that case the receiver (according to their published specs) requires, at minimum, a -84dBm signal to operate at a BER of 10^{-6}. This system has both analog inputs and outputs, along with AES ins and outs. Configuration is done by way of a GUI that runs on a PC (serial connection).

For those who remain unconvinced that there are advantages to using a digital STL, let's consider those specs for just a moment. This type of radio system is carrying the equivalent of what three analog radio systems would carry; at the same time, its audio specs are way beyond what the best analog radio could ever do, and the receiver needs less signal to do it.

In a nutshell, the digital radio systems are way more efficient in terms of the bandwidth they need, along with the amount of power they need, and oh by the way – the audio is better too.

Moseley offers the Starlink SL9003Q, which will also carry up to six channels of digital audio; the bandwidth and modulation scheme depend upon the number of audio channels specified by the end-user. The Starlink has both analog inputs and outputs along with AES inputs (built-in SRC) and outputs. As you would expect from a digital radio, the audio specs are great with a dynamic range of 90dB and a THD spec of less than 0.01 percent. The Starlink can also be configured to use up some of its native bandwidth for a simplex LAN extension which will deliver UDP data streams (up to a total of 544kb/s).

Other configurations

The trend in technology for audio transport (along with most other forms of communication) is certainly more and more based on IP. So, though you may simply need one AES data stream for your analog transmitter, there may very well be many other pieces of gear at the transmitter site that want to communicate with you by means of a LAN. These would include RBDS encoders, remote controls, computers, remote cameras, VoIP phones, satellite receivers, and on and on.

As mentioned above, the Starlink can send UDP data streams to a transmitter site, but most of the items you would place at the transmitter site are going to require a duplex link so they can communicate via

Letting Go

TCP (as opposed to UDP). What's the practical way to accomplish that, assuming there are no other options at your transmitter site?

Fortunately for us broadcasters there is the 900MHz ISM band (which actually extends from 902 to 928MHz). Unlicensed channels can be used in this band (subject to FCC parts 18 and 15) for the purpose of carrying digital data, to and from the transmitter site. The relative proximity to the 950 band we're accustomed to using means that we can re-use the antennas already in place easily enough. This is done by adding duplexers to an already established link. (When you fill out the 601 for your new digital STL system make sure you add in the additional loss incurred due to the duplexer on the transmit side.)

TFT Model 46

Moseley Lanlink and Starlink SL9003Q

Moseley makes a system called Lanlink that works in exactly this fashion. The ISM band transceivers that are the heart of the system can deliver 512kb/s of data, 10base-T Ethernet. (In addition to the Ethernet connection, it also provides two RS-232 serial links that can be configured for a data rate between 1200 and 115,200 baud.)

With the explosion in networking, though, there may be other options for you to check. A quick search online is all that is needed to find other manufacturers of 900MHz ISM band radios that transport Ethernet. You could even avoid the cost of the 900MHz duplexers by purchasing separate antennas for the ISM band. And, obviously with this method, there is no effect upon your current 950MHz system.

Higher ISM bands

So far we've covered the 900MHz ISM band mainly because it was close to our familiar 950MHz STL band. You're probably aware that there are quite a few other ISM bands (2.4, 5.3 and 5.8GHz) and there are multiple manufacturers that make gear for use thereupon. Again, the explosion of networking has had a positive effect for end-users in the sense that there are more and more players making the gear and antennas, since the potential market is so big.

Of course the down side to that same explosion is that the potential for interference, even while using the spread-spectrum (frequency-hopping) radios, is real and substantial. Proper engineering of the link will be

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necessary to minimize the effects of interference from other unlicensed users: highly directional antennas are a must. (Be sure to adjust the TPO of each transmitter so that the ERP remains within legal limits.) Obviously you can also change the polarity of the link to minimize the effects of interference.

Broadcast Electronics makes the Big Pipe LT, which is a radio system that works in the ISM bands mentioned. The entire system is made up of eight components: the program interface (single rack unit that goes in the technical center); a managed Ethernet switch; the IDU (indoor unit) which also goes in the tech center; and finally the ODU (outdoor unit) which mounts near or upon the antenna used on either end. The far end is a duplicate of the near end.

The interface unit has both analog inputs (A/D conversion of up to 24-bit, 96kHz sample rate) and AES inputs (with clock source selectable between its internal clock, AES derived, or word-clock). Additionally, the unit has provision for four GPI/O ins/outs and status, along with an RS-232 data path. By means of the managed Ethernet switch, all the TCP connections necessary for HD Radio (including one representing the analog audio and MPS), the SPS (from a local importer), and the PAD information will be aggregated and trunked over to the IDU. The IDU and ODU are connected by way of a coaxial cable; and finally the ODU communicates with the far end via the selected ISM band RF link. The radio link itself can be managed by way of SNMP, RS-232, HTTP or Telnet.

Perhaps you just want to build a high-bandwidth LAN connection to your transmitter site. After all, you have quite a few choices today in choosing boxes that take audio (analog or digital) in, and put TCP out. As I wrote earlier, almost everything communicates in that fashion today.

Take, for example, the Adtran Tracer series 4205. This radio operates in the 5.8GHz ISM band, and the system consists of only two units – one transceiver on either end. (No IDU/ODU combo.) It has a 50ohm female N output (so plan on using some very good transmission line). The interface for DS-3 data is a 75-ohm BNC so, if you were to elect this type of radio system, you would probably opt to aggregate all of your host TCP sources by means of a managed switch that has a 75-ohm BNC DS-3 interface.

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The Adtran 5045 is a similar radio system, but includes a built-in Layer 2 switch on both ends, and so obviously the data interface is strictly Ethernet. Both systems are specified to have a maximum TPO of +20dBm, and will achieve a BER of 10^{-6} with a -78dBm receive level signal.

The options are nearly boundless but for a system that is more economical than the Adtran you may want to consider the Airmux 200 system. Like the other radios I've mentioned, it operates in the high ISM bands. One feature of interest in the Airmux 200 is that in addition to the 100base-T Ethernet port, it has up to two separate T1 inputs; so in the event that T1 must be transported for a legacy TDM system, it can be sent along with the Ethernet transport. The total data throughput of the 200 system is specified at 48Mb/s.

Another option available to broadcasters is a portion of the 18GHz band that can be licensed for STL use under Part 101. If this makes more sense for you then there are at least two options out there right now. Radio Systems offers a microwave radio link called IP Connect. Hardware configuration is ODU and IDU (single rack unit with all interfaces). It's very configurable, giving the following options: Ethernet up to 250Mb/s, or up to 32 T1s, or 2 DS3s, or 2 STM1 (155Mb/s) plus 2 T1s. Management of the system is done via a Web browser, SNMP or Telnet.

Axia users have made use of various Ethernet radios such as the Dragonwave Air Pair 100. This system also makes use of the ODU/IDU configuration. The native interface of the system is gigabit Ethernet, and it provides for full-duplex 100baseT (200Mb/s of bandwidth). It can also be configured to transport T1s if so desired – that way TDM systems can be kept during a transition period (or maybe forever). Management of the system is done via SNMP.

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So there you have it. The original digital STLs are themselves practically in the class of legacy equipment today. Carriage of Ethernet is the primary function of all the radios mentioned herein. So many of the devices we find in a broadcast plant today communicate by way of IP; what was once kind of a luxury (LAN at the transmitter site) has now pretty much become a necessity. If you haven't already jumped on the bandwagon, then in my (humble) opinion, you need to do so as soon as you can. Fortunately there are many, many options today that'll make the job a little easier.

Irwin is transmission systems supervisor for Clear Channel NYC and chief engineer of WKTU, New York. Contact him at doug@dougirwin.net.

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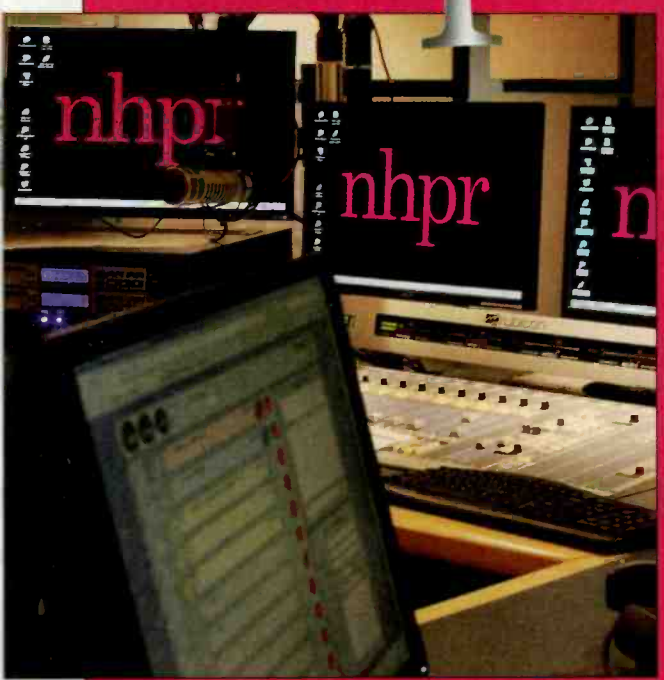
New Hampshire Public Radio

By Chriss Scherer, editor

Twice the space and an open road to future expansion



expands

Dan Colgan broadcasts the first show from NHPR's new studios.

Every station move or rebuild project is set into motion because of some fundamental need. Sometimes the equipment has fulfilled its useful lifespan. Sometimes a format change makes the facility inefficient. Sometimes simply more room is needed. For New Hampshire Public Radio, it was all of the above.

In the spring 2001, NHPR had been in a facility that was only 10 years old. When it was built in 1991, the network was producing a classical music format, and the sit-down studios and analog routing served the needs adequately. But after a format change in 2001 to a news/talk format, it was quickly realized that the music-centric facility had severe limitations. It was just not going to meet the long-term business and programming needs.

The first step: Conduct a needs assessment study. NHPR worked with its board of directors to plan what was desired and how it would be funded. The realization that the North Main Street facility was not ready to serve NHPR's future needs was a primary point. The plans were set into motion for a facility upgrade.

NHPR now distributes programming to six full-power stations and six translators in the state. While all the transmitter facilities carry the same programming, the ability to distribute different material to different sites was a desired option. Likewise, as the stations adopt HD Radio, providing various multicast streams was a consideration. Flexible routing was also a checklist item.

Like any station, being off the air is an unacceptable circumstance, so multiple levels of redundancy were built into the plan. Finally, additional space was needed to accommodate the growth of the network.

A new building

Once the needs were determined, the process of finding a new location began. It didn't take long to find one. An office condominium on Pillsbury Street was looking for tenants. This was almost a new building in some ways, even though the previous owner – Blue Cross Blue Shield – had moved out in 1990. The building sat vacant for many years because of asbestos building materials within.

In 2003 and 2004 a developer worked with the city remove the asbestos and prepare the building for new tenants. NHPR then began raising money for its relocation project, and in spring 2006 purchased the sixth floor (top floor) of the building. But NHPR wasn't ready to begin building. It would be two more years before that would happen.

Plans were further refined while funds were being raised. In April 2008, NHPR issued a request for construction bids. By May, the bids were received and the station selected North Branch Construction. On June 2, 2008, the initial construction began.

(Left to right) Bob Smith and Mark Bisbee, Technet; Dan Colgan, Scott McPherson and Michael Saffell, NHPR.

Advantages and challenges

The plan was to have the new facility ready for its first broadcast on Dec. 31, 2008. NHPR had already worked with Russ Berger Design Group (RBDG) on the layout of the studio core in the new 20,000-square-foot space (about twice the size of the previous facility). The general architect, C.N. Carley and Associates, took the RBDG plans and designed the office and operations space around it.

One advantage to the new location is that is it about 2.5 miles from the main transmitter

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The blocks on the walls and ceiling are to support the acoustic treatments that will be applied.

Read about NHPR's acoustical design at RadioMagOnline.com

Studio B just as the final installation is nearly completed.

site for WEVO. The tower can be seen from the new studios. This was good news for the station, because that STL hop would be a single-hop. The previous studio location required a double-hop STL.

One challenge with the new facility was presented by the city zoning board. NHPR planned to install its satellite uplink/downlink antenna and a small tower for STL and other antennas on the roof. The city wanted the rooftop items to be concealed from view. A compromise was made by erecting a 20' x 40' steel enclosure around three sides of the antenna farm and HVAC cooling tower. The open side allows the needed line of site for the antennas.

Inside the empty shell sixth floor space, there were some additional challenges. The elevator lobby and restroom areas were fixed positions, but they were not difficult to incorporate in the design. The top-floor location, however, required some fire codes to be observed for roof protection. There was also some roof drainage plumbing that had to be left in place. RBDG and NHPR

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Installing the STL dishes on the roof

planned to build the studio core on a floating, elevated base. Wiring could be run in the 6" floor space underneath. HVAC would run above the floating ceiling. Despite these challenges, the studios have sufficient headroom, although it is tight in the space above the studios.

Studio core

As the plans for the facility were being drawn, it's important to note that the studio core was designed first, and then the offices were designed around that. You probably know of a station that was designed with the owner's or GM's office first, then sales, then some programming, and then finally a few closets for studios. This was not the case at NHPR. The studios – the area where the network's valuable product is created – came first. Even so, the offices are still comfortable and practical.

One advantage of locating the studio core in the center of the facility is that it reinforces the focal point of the operation. Even those staff members not directly involved with on-air operations feel attached to the prime purpose. No matter where you are, a studio is nearby.

The studio core is comprised of six control rooms (four smaller and two larger). The larger control rooms have studios attached to them. In addition, a small studio is available for voice tracking.

A larger multipurpose studio is available for live performances or producing a show with a live audience. An audience of up to 70 can be accommodated here. This works well for a town-hall meeting or membership drives. The multipurpose room is also wired for video.

Peeking inside the TOC

Equipment List

SAS 32KD, consoles
Vorsis M1 mic processors
Comrex STAC
E-V RE-20
Sony 7506 headphones
Broadcast Electronics Audio Vault
Avocent 5010 KVM
Studio Technology furniture
Genelec 8030, 8040
Harris World Feed Panels
Yellowtec Mika
Heil Sound mic mounts
Middle Atlantic racks
Signal Transport wiring interface boxes for customized connector access
Moseley SL9003Q

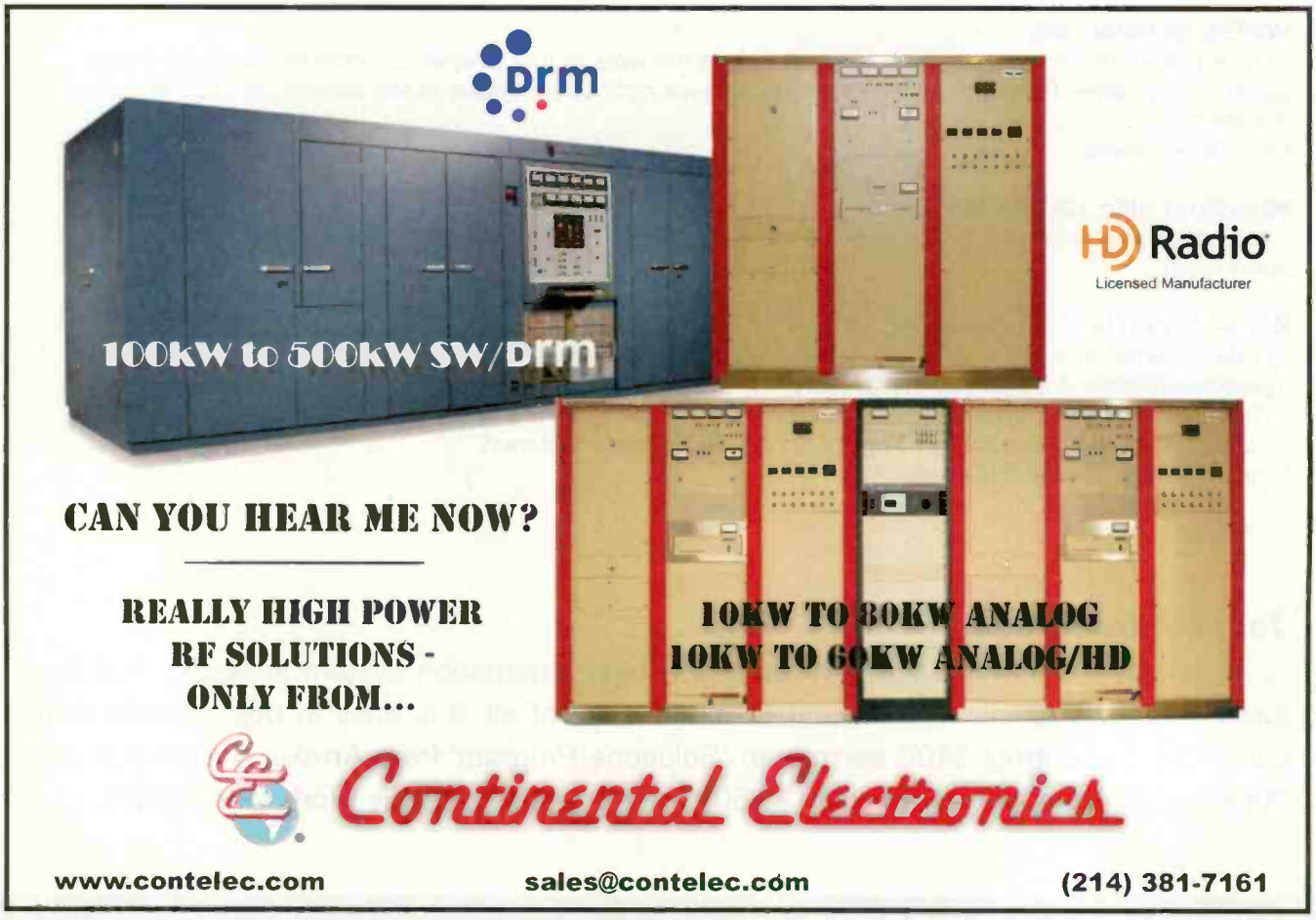
A technical operations center, engineering shop and IT work area round out the space. The racks in the TOC were integrated into the cooling system to provide a constant airflow for the equipment.

As mentioned before, the studio core is built on a 6" raised floor, which is built from two layers of plywood sandwiching three layers of sheet rock. This solid mass is then supported on rubber blocks to isolate it from the building floor. The studio walls are then built onto this foundation.

Near the studios is a newsroom that houses about 20 people. NHPR produces two daily talk shows and regular new inserts, and the desks in the newsroom are arranged into team groups.

Redundancy

Redundancy was an important consideration for the project. The entire facility is supported by a 150kW generator



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Monte Lyons, Operations Manager

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Mike Glass, owner

Woodland Hills, CA Internet Radio
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John Tobin

KIKO-FM/KIKO-AM, Claypool, AZ
" I rate (Xtreme) at a 10 for ease of use. It's very simple, with limited engineering experience needed. You open the software & it's all self-explanatory."
" The manual is great! When I have a basic question I can open it & find the answer."
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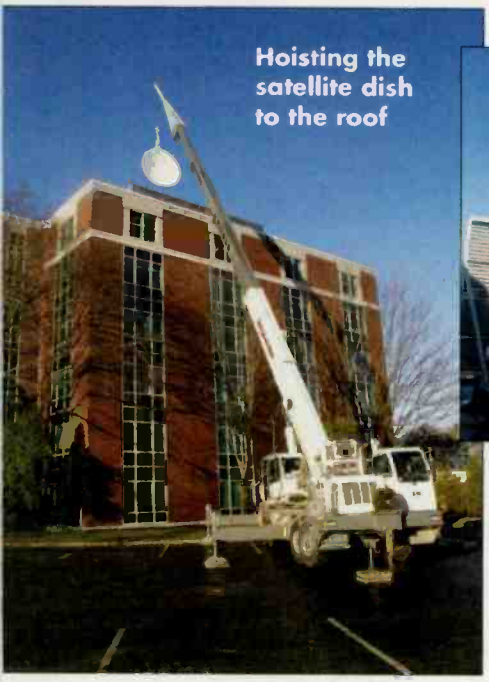

Hoisting the satellite dish to the roof

Photo by Scott McPherson

Installation of the satellite dish

Photo by Scott McPherson

supplemented by a 35kVA UPS. The UPS will power the facility for about eight minutes at full load. Equipment loads are also distributed among the power system to minimize an outage. Even the HVAC system for the sixth floor has a backup system in case of an extended power outage.

The redundancy plan is also applied to the audio network. The SAS 32KD with two frames is the heart of the routing system. Audio sources and destinations are distributed between the two frames to reduce the chance of an audio failure if one frame were to fail. The built-in nature of the audio router provides many options to distribute audio as needed to route around a problem. While all the transmitters carry the same programming, this routing flexibility allows NHPR to deliver any source to any transmitter as it may need.

Even the STLs have redundancy. The satellite system is the primary STL for all the transmitters located around the state. These are all backed up by Moseley Starlink SL9003Q systems. As a tertiary backup, the station uses the Comrex Access or Matrix.

Future-ready

While the new facility has some changes, such as stand-up furniture instead of sit-down and an integrated routing system, other aspects are familiar. The Comrex STAC was chosen for on-air phones because the staff had been using a Gentner TS612 previously. The STAC operates similarly, which simplified training on at least one piece of equipment.

There is one corner of the sixth floor space that was left unfinished. This area of about 2,000 square feet is part of the plan to accommodate future needs. Its exact purpose has yet to be planned, but possibilities

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Word of Mouth host Virginia Prescott primes for the first show from the new facility.

include new media, alternative programming streams, partnership with TV stations, or possibly subletting it to another tenant. The facility was built to be future-ready. This space allows for that.

Although the timeline for the construction project was to be on the air from the new facility by Dec. 31, 2008, in an almost unheard of turn of events, NHPR originated its first broadcast from the facility at 2 p.m. on Dec. 15. NHPR credits the efforts of Technet Systems Group, the system integrator, for staying ahead of schedule. Once the on-air operation was in place, the office and administration moved in on Dec. 19. These four days allowed the network to address any on-air problems before the office staff moved in.

And while the project progressed like clockwork, the final days were not without some frustration. The move on Dec. 15 was three days after a major ice storm passed through the area. Several of the transmitter sites were still on emergency power. Still, the on-air transfer went well. But even on Dec. 19 as the staff moved in, a snow storm passed through.

One added benefit to the new facility is that it has inspired the air talent to improve their games. The new facility is a modern technology showcase. Some members of the air staff have commented that they feel they have to live up to the look and feel of the new space, and this is reflected in their on-air performances.

NHPR planned a campaign to raise $6.5 million, which was met in March 2009.

Thanks to Scott McPherson, assistant general manager, and Michael Saffell, director of engineering, at NHPR for their assistance in preparing this article.

Photos by Cheryl Senter unless noted.

More images and a floor plan are posted at RadioMagOnline.com.

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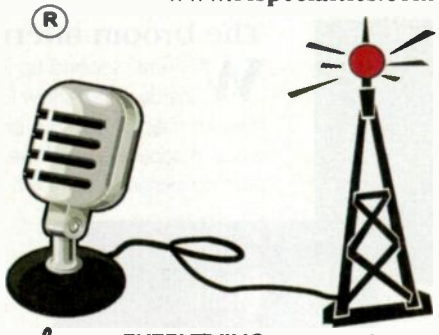

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TECHtips

Tips, tricks, hints and more

By Chriss Scherer

The pressure is on

Glenn Williams is the chief engineer of KUC in Kansas City. He submitted two ideas to Tech Tips. The first one addresses a common problem when using nitrogen bottles to pressurize a transmission line.

You probably have a line pressure monitor to indicate when it drops below the typical 6psi. When the pressure gets too low, it's usually time to replace the bottle. Depending on the integrity of the transmission lines seals, the <6psi warning may not offer enough advance notice.

Williams' double regulator in use. The compressor switch, pressure transducer and low-pressure regulator are mounted on a board. A relief valve is installed to protect the transducer in case of excessive pressure.

To provide his desired advance warning, Williams uses a dual regulator system with two pressure monitors. He set the bottle regulator to provide an output of 100psi. This intermediate pressure line feeds a second low-pressure regulator and a pressure switch. The switch is set so that when the output of the first regulator drops below 80 psi it activates a tally on the remote control.

This two-step process gives him a 74psi cushion before the line pressure is affected. He says this buffer could buy several days or several weeks to get a new bottle in place depending on how leaky the line is. He also notes that the two-stage regulator maintains a more stable line pressure because the bottle regulator is not trying to regulate an incoming pressure of more than 1,000psi to 6psi in just a single stage.

The broom alternative

Williams' second tip lets him stay warm and inside when snow falls on the satellite dish. He was tired of taking a broom to sweep the dish when it snowed, and the cost of a commercial deicing system was not in the budget. His first effort was to install a vinyl cover over the dish. This worked most of the time, but during icing conditions it proved to be ineffective.

The power cord inserted through a collar on the back of the dish

The light tree keeping things warm

What he needed was a method to keep the cover warm. For this, he placed a tree of six 250W heat lamps in the center of the dish between the dish and the vinyl cover. The tree base is the female end of a heavy-duty extension cord inserted through the center of the dish through a collar. The tree itself is a stack of socket adapters. He places a burned-out lamp on top of the tree to keep the vinyl cover a safe distance from the heat lamps.

He says the tree has no measurable effect on signal strength because it is largely in the shadow of the feed horn assembly. The station remote control activates the heat lamps when the transmitter-site deicers are activated. He reports that setup has kept KUC snow and ice-free for four seasons. He also likes the added effect of the eerie red glow.

Timing is everything

Because of the time delay in the digital portion of the HD Radio audio path, the analog audio component of the hybrid signal has to be delayed to match the digital. When the alignment is just right, the transitional blend from analog to digital or back can be almost transparent. However, if the alignment is off by even 1 millisecond, listeners will hear the transition. Likewise, a difference in audio level between the two signals can cause problems.

Brian Beezley has documented the audible effects of misaligned time delay and mismatched audio to show the effects. He has even written a small program to compare the analog and digital signals so the best alignment can be found. His program runs in DOS or from the command line. It uses the computer's sound card and an HD Radio tuner than can split the audio into analog on one channel and digital on the other. The results of the program indicate time alignment, level differences and phase relationship.

Beezley's site has lots of useful information, so look around while you're there.

ham-radio.com/k6sti/roster.htm

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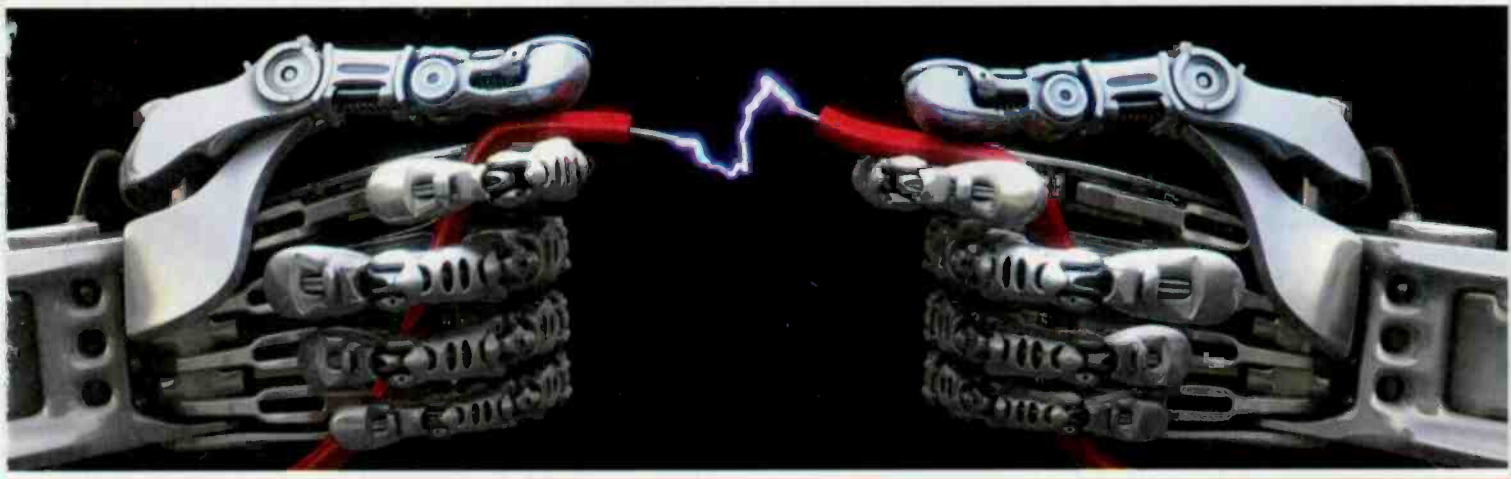

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JK Audio Bluepack

By Mark Nootbaar

For years, the WDUQ news department, with the help of our engineering department, has been looking for something for live field reporting that did not include holding a cell phone up to a speaker. Our stable of Marti units worked well for big events, in fixed locations (that were not too far from our studios or transmitter), but that was very limiting. Web-based products had too much delay for live reports and other mixing units were too cumbersome. Nothing else seemed to fit the bill. Then, just a few days before the 2008 election, our engineer handed me a pair of JK Audio Bluepack wireless cell phone interfaces and his timing could not have been better.

The Bluepack provides an audio input/output interface that connects to a cell phone via a Bluetooth connection. To a cell phone, it looks like a wireless headset. To the audio equipment, it is a compact mixer and headphone amplifier that can be worn on a belt. While designed for use with a cell phone, it can be used to connect to any Bluetooth-capable device.

The device

The back of the unit features XLR mic and 1/8" stereo line level inputs (labeled aux send) along with a 1/4" headphone jack and a 1/8" stereo line out. The front of the unit has three simple thumbwheel volume controls (mic, aux send, headphones), a power button and a button that couples the device with a cell phone via a Bluetooth connection. There are a few lights on the front as well. One to indicate power on, two to indicate the Bluetooth status, and one to indicate audio clipping. The entire device is powered by a 9V battery and has a handy metal belt clip. It measures just 4.7" × 3.75" × 1.65" and weighs less than a pound. The manufacturer says the device can be used up to 25' from the cell phone. I can't vouch for that but it does work across a crowded room about 18' away.

Performance at a glance

- Line and mic inputs and ouputs
- Thumbwheel level controls
- One button coupling with Bluetooth-enabled cell phones
- Lightweight and small
- Powerful headphone output

The device quickly linked to my cell phone with a solid Bluetooth connection, and as soon as I plugged in a mic, a pair of headphones and my Marantz PMD660 field recorder (using the headphone out from the 660 to the line in of the Bluepack) I had a little mobile studio. A few test calls showed me this was going to be a great tool. The device was combining my voice and recorded sound without me having to juggle a bunch of knobs on a pile of equipment. At the same time the cues were coming back to me from the studio all on the same device and without any detectable delay. I could tell that from now on I was going to be able to focus on the reporting aspects of my job rather than the technical duties. The sound back at the studio was clean and the line coming back to me was as crisp as you could expect from a cell phone. And the headphone output was clearly going to be strong enough to hear over the din of a room full of election-night celebrants.

Trial by fire

A few days later I was bouncing back and forth between two election night headquarters, cell phone clipped to one hip and the Bluepack on the other. I was feeding live reports every half hour despite a 15-minute drive from one location to the other. By using a microphone headset I had full hands-free operation so I could hold notes in one hand and my recorder in the other. A quick phone call back to the station right before my live shot and I was ready to go. By plugging a mic into the recorder, and feeding the recorder's output into the Bluepack, I was able to feed live on-air interviews. The device can also be used to record cell phone interviews simply by running the output from the Bluepack to a field recorder. Battery life has not been a problem. The manufacturer says to expect 10 hours of use.

Give a reporter a piece of equipment and he will figure out a way to screw it up. Every problem encountered so far can be traced back to operator error. First, remember to prepare the cell phone to accept a new Bluetooth device. The Bluepack comes with instructions on what steps need to be taken (a single button) to associate with a new phone, but if you have forgotten how to use your own phone that could be a longer

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task than you expected. Also, if there are other Bluetooth devices associated with the phone make sure they are not turned on. The two devices will fight for control of the phone. You could also run into a problem if you want to have several reporters using one unit. The Bluepack can only be coupled with one phone at a time. So if a different reporter will use the unit each day he will have to couple the phone and the unit each morning. With those few issues in mind expect a great deal of flexibility and usability from the JK Audio Bluepack.

Nootbaar is the assistant news director at WDUQ-FM, Pittsburgh.

Editor's note: Field Reports are an exclusive *Radio* magazine feature for radio broadcasters. Each report is prepared by well-qualified staff at a radio station, production facility or consulting company.

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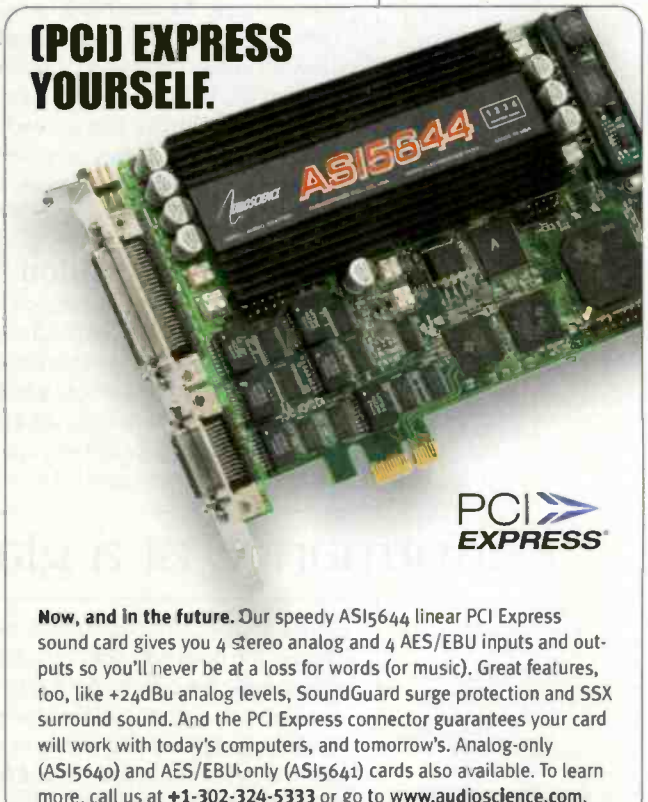
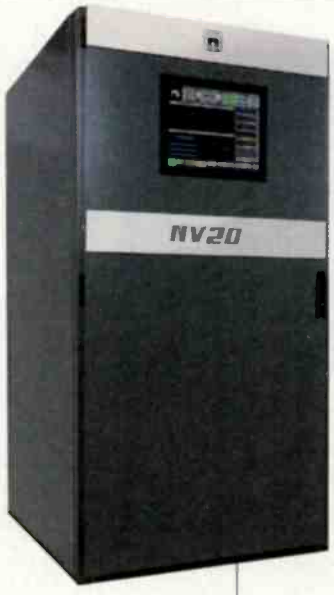




Nautel NV20

Bill Eisenhamer

When we started the plan to install HD Radio in 2008, we allowed ourselves a year to meet the deadlines. The 2008 NAB Show was around the corner, so we looked at what manufacturers had available or might be planned. Our needs sounded simple: two stations (KIFM and KBZT), two HD Radio transmitters.

The usual thoughts of tube vs. solid-state were considered, but we had more direct concerns. The transmitter had to be the right size physically and produce 10kW of analog power with digital. Combined solid-state looked likely, but the external combiner presented some space issues. Were we going to have to give up one, maybe two, full-powered analog backups? I did not like that prospect.

A group from Lincoln Financial Media met with Nautel to see the new NV40 solid-state transmitter. After seeing the unit, I began to lose focus on the talk. The talk ended and I said, "Cut that in half and we will get two of them." Though the comment was not a sale, when Nautel said our end-of-year deadline of having the transmitters on site could be met, the off-the-cuff comment became reality. We took delivery of the first NV20s on Dec. 24, 2008.

Planned installation

Working with pre-installation documentation based on the NV40, our electrician prepared the wiring. When the transmitters arrived, they were a perfect physical fit in our tight space. To the surprise of Nautel I had the first transmitter operating into a dummy load by lunch time. I poked around the Advanced User Interface (AUI) and found the AUI more intuitive to navigate than expected. By the end of the day I had both transmitters running into their respective dummy loads at full TPO of 10kW, analog-only mode. Not bad for a day's work.

The remote interface wiring to the Burk remote control system was easy to install as the preconfigured interface on the NV20 had all the inputs and outputs I planned to use. We ran our AES audio feeds to the new NVE300 exciters. These exciters are based on the M50 core, but are redesigned to fit within the transmitter.

In a short time we learned how to balance the power modules via their own bias settings to make the HD Radio mask perfect. We discovered that the factory swapped the bias settings between the KIFM and KBZT transmitters by accident. When all was said and done, KBZT was on the air in digital and we had the ability to put KIFM on the air in digital.

The transmitter

The Nautel NV20 is a solid-state FM transmitter capable of running in analog, digital and hybrid modes. The footprint of this box is amazingly small for the power levels attained.

Centered in the front door is the 17" touch-screen AUI display. There are no buttons on the front; all operations are performed through the AUI or with switches accessible on the controller board when the door is open. Ethernet access also displays the same information as the AUI and both run independently.

The remote interface board is buffered by opto-couplers on the controller board. The remote-control wiring is sectioned to eight-pin screw headers making it easy to connect. All remote functions are user-configurable through the AUI.

The reject load assemblies are behind the plate that supports the controller board. Below these are the eight RF power modules. Below these are the 20 power supplies. Two supplies power each hot-swappable power module for redundancy. The other four run the IPAs and the fans, two each. Below these are the low-voltage power supplies, again two each for redundancy.

Up to two NVE300 exciters fit inside beside the power supply bays. In our installation we feed AES audio to the exciter, and we feed the RBDS and subcarrier client separately via the SCA 2 and SCA 3 BNC jacks, but the exciter also provides SCA, RBDS and analog audio inputs on a DB connector configured through the AUI. The exciter interfaces with the controller and AUI through a standard CAT-5 cable. A pilot/MPX sample port is provided on a BNC.

A Web server is built in for monitoring and rare configuration changes. If a second exciter is installed, the transmitter will recognize it as soon as it is connected and powered. The AUI can be configured to run from either exciter or failover automatically. An RS-232 connection is provided for troubleshooting to a deeper level.

Performance at a glance

Occupies less than one square yard

Advanced User Interface software control

Up to 22kW maximum analog

Ethernet accessible

More on the AUI

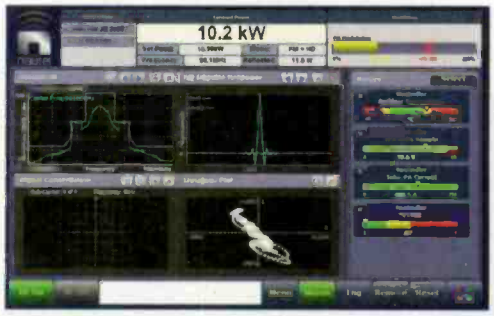
Welcome to a fully software-controlled transmitter. The display is intuitive and took little coaching to navigate the main parameters. The main display shows the power settings, modulation metering, a group of instrumentation panels, user-configurable real-time meters, and a row of control and menu buttons. The status button is multicolored depending on the state of certain parameters with green being normal, yellow a warning, and red as trouble.

The menu button provides a graphical list of options to access the presets, hardware configuration, software configurations, remote input/output configuration and change-over configurations. The AUI can be configured with user accounts allowing for different levels of access to the system. Event logging is phenomenal.

The presets are where all the station-specific parameters are entered. Much of this information is preconfigured and other presets can be built on.

After the learning curve and the excellent support Nautel has provided I have been quite satisfied by the operation and very confident the transmitters will hold their own.

We needed a box to fit our small space. With that, we also have the issue of heat generated by a solid-state transmitter running in hybrid mode. As I write, an improvement to the efficiency of the transmitter is one of Nautel's concerns. As these boxes are so new, a couple of minor issues were found with the controller. There are things to be said about a software-controlled transmitter, and the fixes were all software-based. I could not have asked for a better transmitter for our application.



The NV20's AUI display

Nautel

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W www.nautel.com

E info@nautel.com

Eisenhamer is the chief engineer of Lincoln Financial Media Co. of CA.

Editor's note: Field Reports are an exclusive Radio magazine feature for radio broadcasters. Each report is prepared by well-qualified staff at a radio station, production facility or consulting company.

These reports are performed by the industry, for the industry. Manufacturer support is limited to providing loan equipment and to aiding the author if requested.

It is the responsibility of Radio magazine to publish the results of any device tested, positive or negative. No report should be considered an endorsement or disapproval by Radio magazine.

by Erin Shipps, associate editor

Volume control
TC Electronic

Level Pilot: With many DAW setups, control of monitors is dependent on the computer being powered up, and even then volume levels are often set with a mouse. This inhibits the ability to control levels easily and at crucial times – like when a computer crashes or if the user needs to mute or lower levels fast. Level Pilot fits into any active speaker setup. It is a simple way to control levels, a high quality, analogue, stereo volume control that works independently of the computer or audio interface, so no matter what happens, the user has complete control over their volume levels. Level Pilot features a slip-free design that fits into any active desktop (or even live set-up) without the need for an extra power supply, and employs quad-core cabling to minimize untidy cabling.

818-665-4900; www.tcelectronic.com
info@tcelectronic.com

Dynamic vocal mic
AKG

D7: Like its popular predecessor the D5, the D7 additionally features an improved capsule design with a humbucking coil and a high-pass filter along with a sleek new look. AKG's newest dynamic microphone features a humbucking coil that greatly reduces electrical interference and stage feedback. The D7 also features an integrated high-pass filter that cuts out low frequencies, eliminates handling noise and provides better audio clarity. The result is a higher-quality microphone that offers complete control for singers and announcers and, therefore, a better audio experience for audiences.

818-920-3212; www.akg.com
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CAT5-Flex: The CAT-5-Flex cable is a truly distinctive product. The black pressure extruded polyurethane jacket makes this cable extremely resistant to cuts and abrasions, while maintaining unbelievable flexibility. The stranded conductors give a very high flex life minimizing breakdowns. A true field cable, it is resistant to sunlight, oil and water. Compatible with standard RJ45 connectors (stranded conductor rated).

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Multi-purpose amplification
Alesis

Transactive 50: The Transactive 50 is a portable 50W (RMS) multi-purpose mixer/speaker/amplifier, featuring two input channels plus an aux input and selection of internal digital effects. It is driven by a 5" LF driver and a 1" tweeter for full-range sound reproduction. Channel 1 features an XLR microphone input and 1/4" stereo inputs, while Channel 2 offers two 1/4" stereo inputs. The master section of the Transactive 50 features a high, mid, and low frequency EQ, plus selectable digital effects (reverb, chorus, delays and rotary).

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IT and broadcast monitoring
Dalet Digital Media

Dalet Dashboard: Based on award-winning technology from open source Web infrastructure management provider, Hyperic, Dalet Dashboard offers system operators and administrators comprehensive analysis tools for monitoring and managing the performance of Dalet solutions across the entire workflow. More than a standard IT monitoring system, Dalet Dashboard incorporates the language and concepts of broadcast into the system giving administrators and users the ability to swiftly interpret, analyze and respond with immediate results. Customers can add Dalet Dashboard to the existing Dalet workflow or include it in their new deployments.

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NEW PRODUCTS

X/Y stereo field recording mic
Audio-Technica

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800-728-0536; www.aeqbroadcast.com; sales@aeqbroadcast.com

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True condenser mic
Avlex

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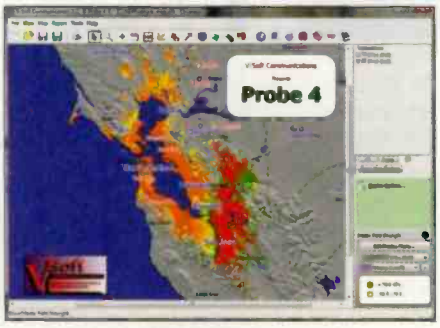

Probe 4: This program update includes several new tools and program enhancements. A new Calculation Engine takes advantage of multiple computing cores for faster calculation times. The updated Profile Tool makes units, line types, number of divisions and other setting user-configurable. Also new is the display of the path broken into multiple line-of-sight paths, multiple Fresnel zones, and the ability to edit the hard copy output to add custom user labels, arrows, legends and logos. Other updates include display enhancements, improved search functions, IBOC interference tools, and expanded plotting and contour displays. Probe 4 is bundled with a variety of database information as well.

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Mic stand
Audio Engineering Associates

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stereoms@aol.com

Strategic programming
Media Monitors

Mscore Series: The Mscore Series will be a new way for radio programmers of all formats to understand how radio listeners use radio. The first in the series, Mscore Switching, calculates an index of switching when radio panelists react to songs on the radio. The Mscore is derived from looking at what happened during many spins of the song on a specific station and then displayed on the Media Monitors Web service. Mscore can also be downloaded into RCS' GSelector so that music scheduling is enhanced even further.

800-676-3342; www.mediamonitors.com
info@mediamonitors.com

Power management/light modules
Furman Sound

Classic Export Series: The Classic Export Series provides increased protection and filtration to 220V-240V countries. Just like their domestic counterparts, the models feature Linear Filtering Technology, Series Multi-Stage Protection, automatic Extreme Voltage Shutdown, and Smooth Track LED retractable lights. The series includes two 10-amp models, the PL-8C E and the PL-PLUS C E, and one 16-amp model, the PL-PRO DMC E. All Classic Export models provide 10 filtered and protected rear-panel IEC outlets with a front-panel convenience outlet and Protection OK indicator light. The PL-PLUS C E adds a segmented LED voltmeter that monitors and displays incoming line voltage while the PL-PRO DMC E features a large digital voltmeter/ammeter with a discrete dimmer button that displays line voltage and true RMS current draw with a color-coded voltage indicator. In addition, the PL-PRO DMC E provides a front-panel charger for small USB-powered electronics or to power a USB lamp. At a capacity of 16 amps, the PL-PRO DMC E also features a high-inrush-capable magnetic circuit breaker for added protection.

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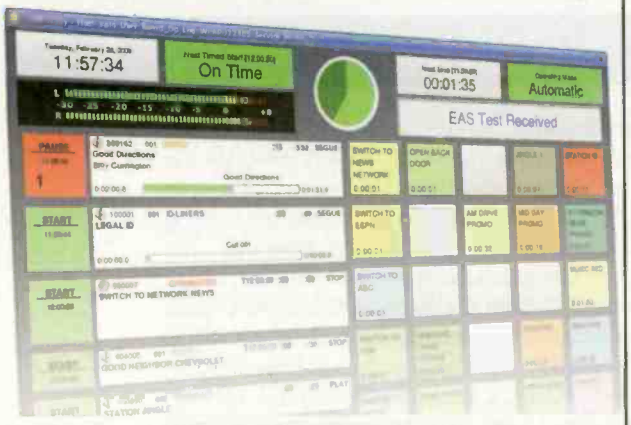

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Find the mic winner
March issue

Congratulations to

Rich Archut

of WKDN Family Stations, Camden, NJ. His name was drawn from the correct entries for the March issue. He won a Heil Sound PR-40 from Heil Sound.

HEIL SOUND

The mic icon was inside the B on the puzzle piece.

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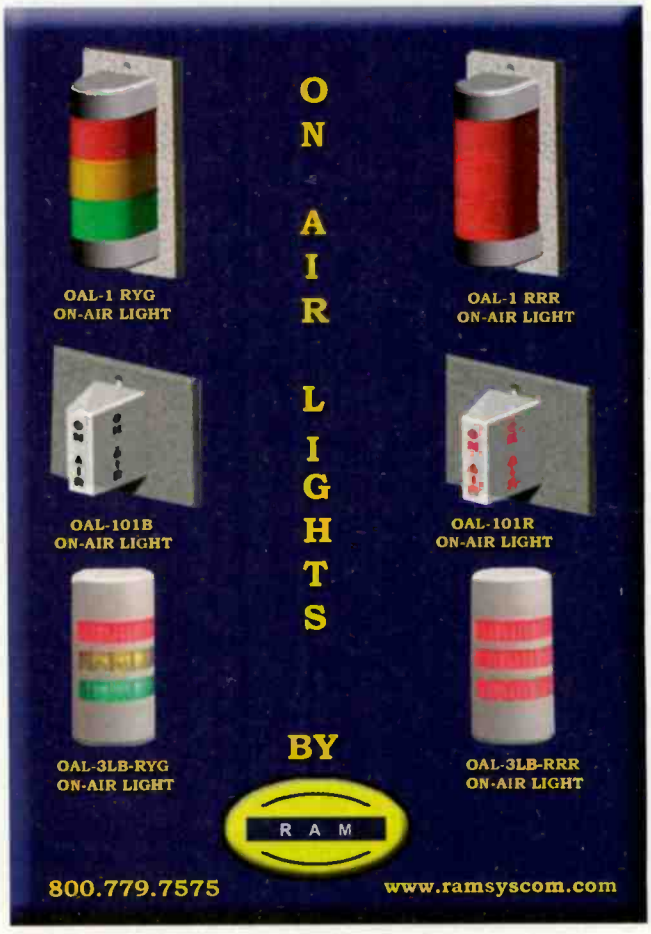

UPGRADES and UPDATES

Working with Silicon Laboratories, **Global Security Systems** has debuted FM radio data chips plus RBDS-based protocol for cell phones and consumer electronics. (www.gssnet.us)...**APTX** has introduced Apt-X Lossless, which offers up to 96kHz sampling rates and sample resolutions up to 24 bits. The codec can operate in a special hybrid mode to use near-lossless coding mode. (www.aptx.com)...The **RCS** HD Importer has been retooled to match the latest software release from Ibiquity in software release 4.2. (www.rcscommunity.com)...**Stream the World** now offers in-stream targeted ad replacement to all of its clients when combined with Ando Media's Targeted Ad Injector. (www.streamtheworld.com)... **Adobe** has issued an update to Audition 3 labeled 3.0.1. The downloadable patch is designed to increase the overall performance of Audition 3. Key updates include multi-core processor support, Windows Vista 64-bit SP1 compliance and overall stability improvements. (www.adobe.com) ■

Stereo SDHC flash recorder
Fostex

UR-2: The UR-2 is a 1RU stereo audio recorder using SD card and USB storage device. It uses two SD cards (SDHC compatible) and a USB storage device as the recording media. The recording/playback file format is BWF (WAV). It offers high quality recording of up to 24bit/96kHz. Employing FAT 32 disc format, it is easy to process the file transfer to a PC based DAW. The analog input and output are balanced XLR/+4dBu and un-balanced RCA/-10dBV, the digital input and output complies to AES/EBU and S/P DIF digital signal. The playback function includes Chain Play and Timer Play, it is suitable for live stage performance and sound installation. In addition to the external control via parallel remote with D-Sub 25pin and RS-232C serial remote, a USB keyboard and 10-key keyboard can trigger the instant playback start. The mic input located on the front panel offers 48V phantom power.

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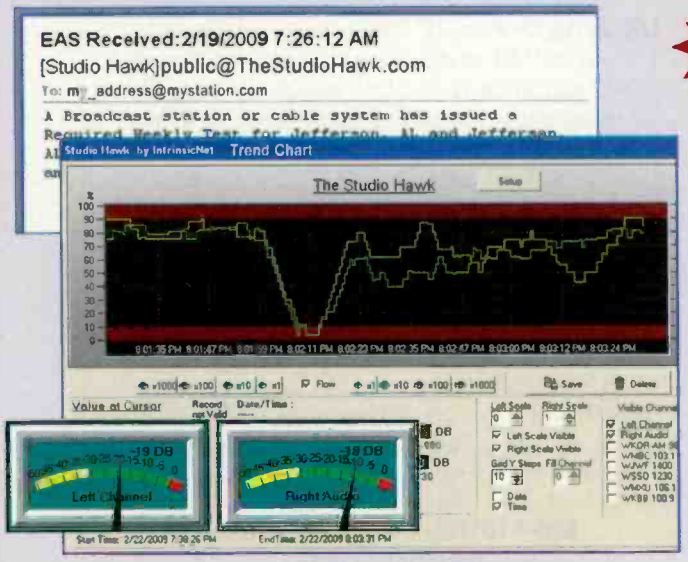

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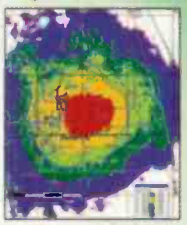

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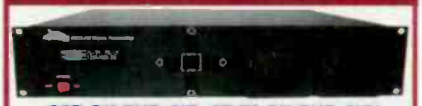

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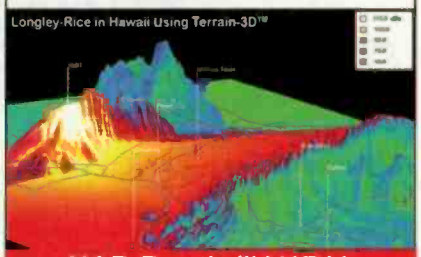

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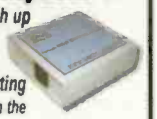

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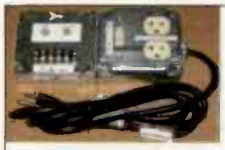
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Editor – Chriss Scherer, CPBE CBNT, *chriss.scherer@penton.com*
Technical Editor, RF – John Battison, P.E., *batcom@ohio.net*
Associate Editor – Erin Shipps, *erin.shipps@penton.com*
Senior Art Director – Michael J. Knust, *mike.knust@penton.com*
Art Director – Robin Metheny, *robin.metheny@penton.com*
Senior Digital Content Specialist – Brad Erpelding, *brad.erpelding@penton.com*
Digital Content Specialist – Chris Flenker, *chris.flenker@penton.com*

Technical Consultants
Harry C. Martin, *Legal*
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Mark Krieger, CBT, *IBOC and Contract Engineering*
Russ Berger, *Broadcast Acoustics*
Donald L. Markley, P.E., *Transmission Facilities*

Contributors
Doug Irwin, CPBE AMD; Chris Wygal, CBRE; John Landry, CSRE

Group Publisher – Wayne Madden, *wayne.madden@penton.com*
Associate Publisher – Steven Bell, *steven.bell@penton.com*
Marketing Director – Kirby Asplund, *kirby.asplund@penton.com*
Marketing Coordinator – Crystal Shires, *crystal.shires@penton.com*
Vice President of Production – Lisa Parks, *lisa.parks@penton.com*
Senior Director of Production – Curt Pordes, *curt.pordes@penton.com*
Group Production Mgr. – Melissa Langstaff, *melissa.langstaff@penton.com*
Production Coordinator – Steven Kapp, *steven.kapp@penton.com*
Client Services Coordinator – Jesse West, *jesse.west@penton.com*
Classified Ad Coordinator – Sarah Maxey, *sarah.maxey@penton.com*
VP Audience Development – Geoff Smith, *geoff.smith@penton.com*
Audience Marketing Director – Barbara Kummer, *barbara.kummer@penton.com*
Audience Marketing Manager – Sonja Cheadle, *sonja.cheadle@penton.com*

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Field Report, page 40.

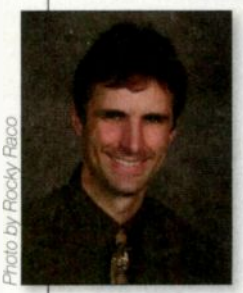

Photo by Rocky Raco

Mark Nootbaar
Assistant News Director
WDUQ-FM, Pittsburgh

Before joining WDUQ in 1996, Nootbaar was an anchor/reporter at KEDT-FM in Corpus Christi, TX, and WSOY-AM/FM in Decatur, IL. He often serves as station guinea pig for testing new field equipment and has been spearheading WDUQ's Web 2.0 efforts. He has a bachelors degree from Western Illinois University. He is also a frequent contributor to National Public Radio.

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by Erin Shipps, associate editor

Do you remember?

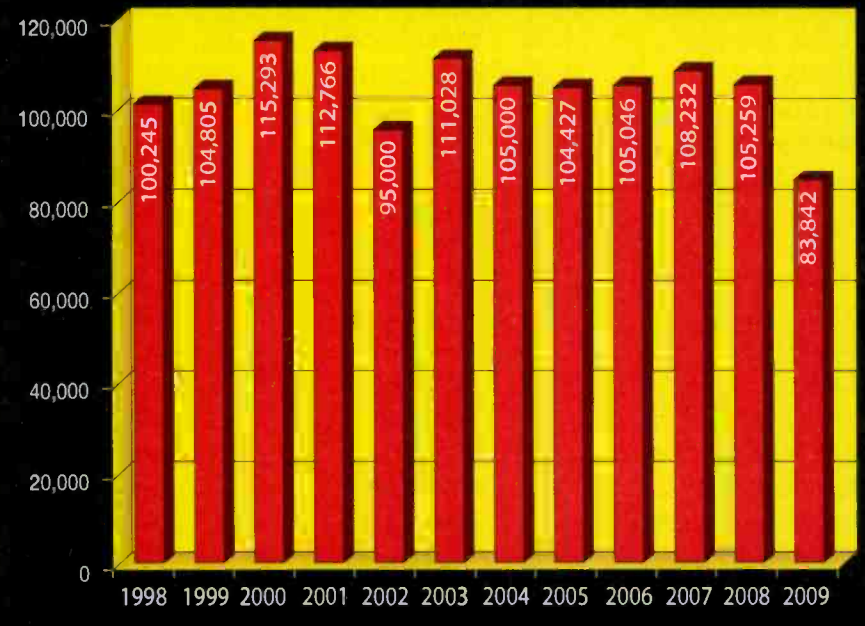
Two weeks ago, NAB President and CEO David Rehr pushed for Apple to begin including FM radio capabilities in future Iphone and Ipods. A 2008 NAB Fastroad study (www.nabfastroad.org) concluded that mob le phone service providers, radio broadcasters and handset manufacturers all stand to benefit from FM-capable mobile phones. At least one mobile phone integrated with FM capacities, Motorola's ROKR EM35, was featured at the 2009 NAB Show.

But this isn't the first time radio has tried to put itself in our hands. Transistor radios, like this RCA Victor model from a 1961 ad, look a little familiar, dare I say, like an Ipod.

What will it take to get FM receivers back in our palms? And are we willing to pay for it? The RCA Victor at $24.95 in 1961 would cost about $177 today. That's just about the price of a 16GB Ipod Nano as it is now. Will added capabilities up the price? We may, or may not find out.

Sample and Hold

NAB Attendance Through the Years



Historically, attendance for the NAB Show has reflected the U.S. economic state. This year's registered attendance marked the lowest number in more than 10 years at 83,842. The last time numbers were near this low was the last marked recession of 2001-2002, after which attendance rebounded very well. Following the statistics at left, gathered as accurately as possible, the NAB Show reached a peak before and after the 2001-2002 recession and has maintained a slightly lower number since 2003. This year's low number can obviously be attributed to the current recession; but, if history repeats itself, we should be looking forward to at least bouncing back above 100,000 for 2010 or 2011.

Other notable numbers: 39,000 in 1986, 51,217 in 1991 and 54,000 in 1992.

Source: NAB???

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