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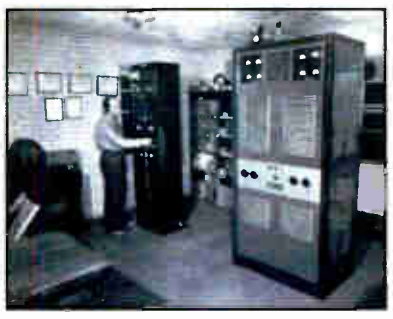

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Newsletters Help Chapters Stay in Touch

by Ken R.

SBE members are employed in radio and TV. But when it's time to communicate with their fellow chapter members, what medium do they often choose? The written word.

Despite the growth of the Internet and other information sources, traditional newsletters, whether mailed or e-mailed, remain an important communication tool for some chapters.

One that does it particularly well is Chapter 24 in Madison, Wis., which won the national SBE's award for best large-chapter newsletter in 1989 and has won again every year but one since 1992.

The current editor is Michael Norton, a maintenance engineer at Wisconsin Public Broadcasting. He minored in graphic arts and majored in broadcasting at the University of Wisconsin in Platteville.

Norton has worked on the newsletter since 1996. The chapter mails about 125 copies to members each month; the content also is posted online in PDF and text form.

He is quick to give credit for the chapter's awards to the contributors.

"My skills are in the mechanics of

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The Low-Power Radio Movement Wants More

Nearly Six Years After Launch, LPFM Still Chafes Under Restrictions

by Randy J. Stine

WASHINGTON Hundreds of community groups, churches and schools from the first wave of low-power FM licensees have their stations on the air. Many are in rural areas of the country with a reach of approximately 3.5 miles and broadcast at 100 watts.

In November, 690 LPFMs were on the air. A total of 1,260 construction permits had been granted, according to FCC data. The commission has processed 3,160 of the more than 3,200 applications filed in the original windows in 2000-02. Proponents originally had hoped that there might be thousands of stations.

"LPFM has been extremely successful to this point in the limited areas where it has been allowed. Still to be addressed is how to get more of the stations on in urban areas," said Pete Tridish, one of the founders of the Prometheus Radio Project, a non-profit resource center that helps guide LPFM broadcasters through the launch process.

"We feel the FCC has done a very good job of clearing out the backlog. However, they should adopt some form of flexibility to work around the current unjust limitations

See LPFM, page 6 ▶

Photos by Nick Mann

Prometheus Radio volunteers work to secure the tower supporting a Nicom antenna for Radio Free Urbana on the roof of the town post office. WRFU was the ninth 'barnraising,' the term Prometheus uses for building an LPFM.

More Change Expected at the Commission

by Leslie Stimson

WASHINGTON The FCC is getting a partial makeover.

The agency advanced its public meeting for the month to Dec. 9 to get its work done while it still had four commissioners. FCC Commissioner Kathleen Abernathy planned to leave the agency on that date.

After serving 4-1/2 years at the commission, she said earlier this year she wanted to spend more time with her young daughter, but would wait for the Bush administration to nominate a replacement. Her term expired more than a year ago; by law she would have had to step down when the current congressional sessions ends because she had not sought to have her term extended.

Just prior to her resignation in November, the White House said the president would nominate Republican Deborah Tate as a commissioner and renominate Democratic Commissioner Michael Copps.

Tate is director of the Tennessee Regulatory Authority, which regulations telecommunications. If confirmed by the Senate, she would fill the remainder of former Chairman Michael Powell's term, until 2007.

The Senate Commerce Committee designated a Dec. 13 confirmation hearing for Tate and Copps.

Assuming Tate is confirmed, Chairman Kevin Martin will lead a four-commissioner FCC — two Democrats and two Republicans — until Abernathy's replacement is nominated and confirmed. Senate Commerce Committee Chairman Ted Stevens, R-Alaska, was said to be seeking candidates for Abernathy's slot.

Normally the FCC has five slots, with a majority belonging to the president's party. Martin has been operating with a four-member slate since Powell departed in March.

If the Senate fails to act, President Bush could name a replacement during the congressional recess; that individual could serve temporarily as nominees await confirmation, the agency noted.

Looking back

As Abernathy set her departure date, she looked back at accomplishments during her term.

"Our largely market-driven approach to advanced services has helped create a vibrant market for new wired and wireless telecommunications products, and our spectrum reform initiatives have improved our ability to put this scarce resource to its most effective use," she said in a statement.

Kathleen Abernathy at the NAB Radio Show this fall.

"Implicit in the commission's competition-oriented approach to telecommunications regulation is recognition of the fact that competition is a journey. It is a

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NEWS ANALYSIS

FCC, Congress Grapple With EAS

Satellite Services, HD Radio Will Take Part in Emergency System

by Leslie Stimson

WASHINGTON While the FCC is expanding its Emergency Alert System rules to encompass digital media, it also is seeking help on how to develop the alert and warning system further. Industry observers, though, say several key issues will have to be resolved for that to happen.

In the short term, the FCC action on EAS last month means some stations may incur new costs. Depending on how their audio is routed now, stations broadcasting IBOC and those that are multicasting may need to purchase additional EAS equipment within the next year.

Meanwhile, Congress is reviewing EAS as it considers a broader comprehensive emergency warning system. The Senate Commerce Committee in October passed a bill to establish a network for transmitting alerts across various communications platforms including cell phones and Blackberries, the Internet, digital, analog, cable, satellite TV and satellite and terrestrial radio. The measure would require that alerts provide individuals with instructions about what to do in response to a threat.

The measure was not yet on the Senate voting calendar in late November.

Multicast too

The FCC's vote in November extended the EAS rules to cover digital radio and TV stations as well as satellite radio, satellite TV and direct broadcast satellite services. Most must comply by Dec. 31, 2006; DBS gets an extension to May 31, 2007.

As of those dates, the digital and satellite media must be able to carry national EAS alerts, as analog stations do today. This means the services must install and maintain EAS encoders/decoders and conduct periodic tests.

Carriage of state and local alerts remains voluntary, said attorney Jean Ann Collins of the FCC Enforcement Bureau's Office of Homeland Security.

If digital broadcasters take part in EAS activations, they must provide the EAS message on all program streams, applying to multicast stations that carry programming; data channels would be exempt.

Some stations that convert to HD Radio can use their existing encoder/decoders and routing switchers to add EAS to their digital channels without incurring additional costs, while others would need to buy additional equipment, according to Darryl Parker, senior vice president of TFT, a manufacturer of EAS equipment.

Stations must be able to insert the required audio information into their digital stream, typically an AES/EBU stream, he said.

"If they're carrying the same programming on both analog and digital, they don't need to do anything," he said.

"Some stations may already have a routing switcher that handles AES/EBU, so it depends on the plant's configuration," Parker said. Typically, a station would need one to four switcher boxes all tied to the same encoder/decoder to be able to interrupt programming for an EAS test or message for up to five stations, four digital and one analog.

In the case of TFT gear, the switcher, a Model 999 Digital Insertion Unit, lists for $2,395 and an EAS encoder/decoder lists for between $1,700 to $3,995, depending on the number of inputs and data ports featured.

The FCC said in the text of the EAS decision that "commenters indicate these updates will neither be complex nor costly." The commission paraphrased NPR's earlier comments on this issue: "National Public Radio has also stated that, using relatively inexpensive distribution amplifiers and switching devices, stations should be able to carry EAS or other emergency information virtually instantaneously via each free over-the-air program channel."

Playing ball

The FCC action also addresses a discrepancy in EAS obligations that has existed for years between over-the-air broadcasters and satellite broadcasters, said Clay Freinwald, the chair of the Washington State EAS Committee. He is vice president of the SBE and chair of that organization's EAS Committee.

"Essentially the FCC has taken these new technologies and said, 'You'll play ball like everybody else.' It's something that fills the gap that has been in existence for some time." Freinwald was speaking on his own behalf; SBE had yet to file comments in this most recent EAS development in November, he said.

The commission also is seeking input from the public on ways to develop a comprehensive digital EAS system.

"The Further Notice looks at how do we get there and what are the technical constraints as we try to move in the right direction," said Commissioner Kathleen Abernathy in November. "It puts us on the right path and recognizes that as a regulatory agency, we have to keep pace with new technology." She was set to leave the agency in early December.

Richard Rudman, president of consulting firm Remote Possibilities and vice chair of the California State Emergency Communications Committee, said the agency left out of its decision details of the work afoot to develop a national warning strategy, to tie broadcast entry points to the actual warning originators.

"Most of EAS' notable failures ... occur at the warning origination point," he said, which is outside of broadcaster control.

He called this situation "a major disconnect." In Rudman's view, EAS works best where local Primary Entry Point broadcast committees coordinate with local government officials about how emergency warnings are to be authenticated and disseminated. He said this point has been made before to the agency and EAS experts likely will repeat it in further comments to the commission.

A nationwide, state-by-state EAS "needs assessment" should be conducted, he said, to determine what parts of state systems are ineffective or need adjustment and what it would take to get local warnings integrated into NOAA weather radio.

The agency is seeking comments on general topics such as system architecture and message distribution and whether there should be a common alerting protocol.

Mandatory?

One question in the EAS notice is whether satellite radio should be required to deliver state and local messages. This touches on a controversial matter. A requirement that satellite services take part in EAS at anything beyond the national level raises a host of issues, Rudman and Freinwald agreed.

For example, when the commission asked this question in a previous EAS review, the SBE's position was clear, Freinwald said: there must be training for local emergency managers beforehand.

"The fear is this could open a Pandora's Box in giving statutory authority to the emergency manager, such as a sheriff, and he would be able to take over the airwaves.

If satellite radio is required to deliver local alerts, he said, "The question is, where does it stop? How do we know the message being sent is authentic?"

Rudman said using something akin to an "e-chip" — where, in theory, all warnings are in text form and transmitted on

See EAS, page 18 ▶

FCC

▶ Continued from page 2

journey in which there are winners and losers, change and upheaval, and no clear destination where all things are settled and all competitors are satisfied. Our effort to create greater regulatory symmetry between cable and telephone company providers of advanced high-speed broadband networks is but one example of that process."

Additionally, the commission has taken steps to ensure that emergency communications work reliably, Abernathy said.

NAB President/CEO Eddie Fritts said of Abernathy's announced departure, "Kathleen Abernathy has served the FCC and the American people with class and distinction. Her dedication to principle has been matched only by her gracious demeanor and steady professionalism."

Fellow Commissioners Copps, who also began as a commissioner in 2001 along with Abernathy, and Jonathan Adelstein said they would miss her.

Abernathy did not indicate what she intends to do next. Prior to her FCC appointment, she was vice president of Public Policy at BroadBand Office Communications, Inc. Before that, she was a partner at the law firm of Wilkinson Barker Knauer. She also did stints at U.S. West, Inc. and AirTouch Communications, Inc.

In addition to her experience in the private sector, Abernathy held several positions at the FCC. She was a telecommunications legal advisor to FCC Chairman Jim Quello, legal advisor to Commissioner Sherrie Marshall and special assistant to the FCC's General Counsel.

They Populate the Pages of RW

From the Editor

Paul J. McLane

Each issue of Radio World and Radio World Engineering Extra contains an index of advertisers as well as a list of our editors and other key staff.

But I don't have the space regularly to thank everyone who makes our outstanding editorial content possible. Allow me, as the year draws to a close, to thank by name the many hundreds of people who in 2005 wrote our stories, sent letters to the editor, contributed User Reports, submitted Workbench tips or allowed us to feature them or quote their opinions in a prominent way.

The range of knowledge and expertise represented by this list humbles me, and it doesn't even include the many, many other sources who helped our writers with their research or who were quoted briefly.

Thank you, all, for helping to make Radio World possible.

My thanks to Bill Agresta, Gregory Ahlfeld, Cris Alexander, Leon Amstutz, Maurice Anderson, Tom Andrews, Jerry Arnold, Allan Augustyn, David Barner, Bruce Bartlett, Mark Battersby, Fred Baumgartner, Frank Beacham, George Beasley, Gary Begin, Ernie Belanger, Rick Bell, James Bellaire, Angelo Bello, Jon Bennett, William Bennett, Larry Berger, Oliver Berliner, Ralph Bernard and Clarence Beverage.

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From Agresta to Zethmayr, these folks made possible the editorial content of the 32 issues of Radio World and Radio World Engineering Extra in 2005.

And Jack Mullaney, Randy Murphy, Steve Murphy, Mark Murphy, Dave Myers, Graham Mytton, Dirk Nadon, Ted Nahil, Ty Noble, Dave Obergoenner, Dan Odenwald, Doug Olson, Bob Orban, Steve Ordinetz, Tom Osenkowsky, Gary Palamara, Mike Pappas, Brett Paradis, Lee Parr, Will Patnaud, Stuart Peters, Al Peterson, Gary Peterson, Sharon Pettigrew, Skip Pizzi, Peter Polanco, Robert Polhamus, Stephen Poole, John Poray, Richard Porter, Mike Powers and Les Proctor.

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Thank you all. And to our readers, writers, advertisers and employees, may 2006 bring each of us peace and greater understanding.

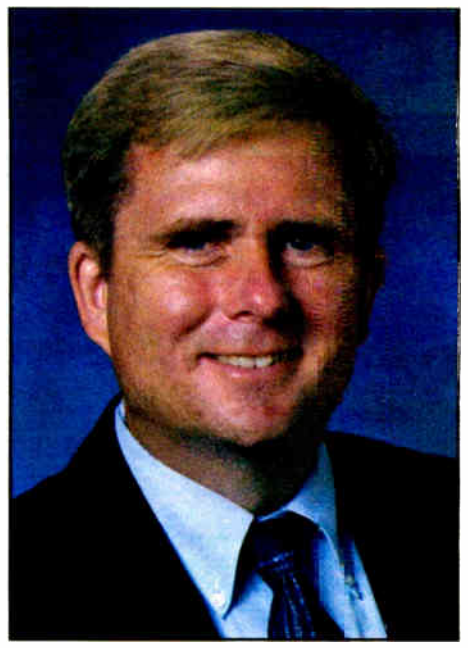
Automakers Need HD-R Incentives

Bringing IBOC Digital Radio Receivers To Market Takes Promotion, Trades

by Dave Wilson

The author is director, technology and standards for the Consumer Electronics Association.

The addition of IBOC digital radio may dramatically increase radio broadcasters' revenue, particularly if it ultimately doubles or triples the number of program offerings from FM broadcasters. For the consumer electronics industry, however, IBOC digital radio offers only modest opportunities for growth.



Dave Wilson

Once CE retailers and auto dealers see consumer demand they will place factory orders, which will increase production volumes and drive down prices.

Why? Because revenue from AM/FM radio receivers is only a tiny fraction of the total revenue for all consumer electronics products.

Why is this significant? Because it illustrates the relative importance of IBOC digital radio to broadcasters and receiver manufacturers, and suggests that broadcasters need to take the lead in driving consumer demand for IBOC digital radio receivers.

For many radio broadcasters, IBOC digital radio's success is critical. They face competitive threats from many new digital media sources. Satellite radio offers consumers an alternative source of live programming in the car. Portable devices like Apple's iPod are making it much easier for consumers to, in essence, program their own private radio stations.

For radio broadcasters to compete effectively in the future they need new technology. The ability to add new audio streams, to have song title, artist and other program information displayed on the receiver, and to have receivers that can do new things such as display weather or traffic maps, or store and replay programming are critical to radio's continued success in a world where satellite receivers and other devices already provide these features.

Big growth vs. modest growth

Converting to a digital transmission method is critical to radio's future, and it offers broadcasters tremendous opportunities for growth. However, the opportunities for growth offered to the receiver industry are much more limited.

According to CEA research, factory shipments of AM/FM receivers for the U.S. market are expected to total $408 million this year. That's a nice number, but it pales in comparison to the $123 billion in total factory shipments of all consumer electronics products.

Radio receiver shipments account for less than half of 1 percent of total industry shipments. This is a critical point.

While individual companies have their own parochial views of IBOC digital radio, broadcasters, and particularly FM broadcasters, generally perceive this technology as a great tool for growth, while the consumer electronics industry generally perceives IBOC digital radio to offer only modest opportunities for growth. Broadcasters who already understand this also understand how critical it is for them to take a leadership role in getting receivers into the hands of consumers.

To accomplish this, products have to be offered at prices people are willing to pay. IBOC is a complicated and expensive technology to implement in a receiver. As with most new technologies it is anticipated that, if it is successful, manufacturing costs will shrink over time. But how much time?

Eureka-47 digital radio broadcasting was standardized in 1994 and the retail price of those receivers has been slow to decline. According to the World DAB Forum's "Digital Radio Product Guide," as of September 2005 Eureka 147 clock radios range in price from $84 to $392 (U.S. dollars), with an average price of $180.

There are consumers in the United States who will spend $180 on a clock radio, but most will not. In fact, even $84 for a clock radio is a hard sell with most people.

XM and Sirius receivers are widely available at affordable prices even though those services are relatively young. This is because XM and Sirius have been subsidizing the cost of their receivers, a common practice when new broadcast services are introduced. DirecTV used this strategy to get its receivers widely deployed. Dish Network did the same.

Promotion, promotion, promotion

If radio broadcasters want IBOC digital radio to be successful they need to do more than simply run some spots on the air promoting it. In these early years of the rollout they need to grow the market for IBOC receivers by demonstrating to consumer electronics retailers and auto dealers that there is strong consumer demand for this new technology.

Once CE retailers and auto dealers see consumer demand they will place factory orders, which will increase production volumes and drive down prices.

The first step in generating consumer demand is to help make receivers affordable for a majority of consumers. In cases where receiver designs are specific to a single service provider, such as with satellite radio and TV, the obvious way for the service provider to do this is to subsidize the cost of the receiver by working directly with manufacturers and/or retailers.

However, in the case of radio broadcasting things are not so simple. There are thousands of service providers, many of whom do not have the kind of money it would take to get a large consumer electronics company interested in producing a line of receivers. So what can the radio broadcasting industry do? It can play within its comfort zones and put its strengths to use.

Radio broadcasters are very good at a lot of things, and four of them are: promotions, live remotes, traffic reports and running ad campaigns for car dealers.

Here are several ideas for how broadcasters might go about using these strengths to get affordable receivers into the hands of consumers. They are by no means the only options.

#1 Demonstrate IBOC Digital Radio Demand to Car Dealers and CE Retailers: For IBOC digital radio to be successful, car makers such as GM, Ford, Honda etc. need to see that they can improve sales if IBOC digital radios are in their vehicles, and consumer electronics retailers need to see that they can increase sales if they carry IBOC digital radio products. Here's a suggestion for how FM broadcasters might make this happen.

• Air programming that will be an attractive feature for drivers on at least one supplemental channel. This will help sell cars with in-dash IBOC digital radio. Non-stop traffic and weather reports would be an obvious choice, though the programming doesn't have to include traffic and could be virtually anything. The programming needs to be on a supplemental channel so listeners will have to get IBOC digital radios to receive it.

• Pay cash or ad trade with consumer electronics retailers for a portion of the cost of a lot of IBOC digital radio receivers, so that the radios can be offered to the public at a discount. The receivers should *not* be free, however, so the consumer will have to go to the retailer and purchase the unit, demonstrating to the retailer that there is a demand so the retailer will want to capitalize on it. An important goal is to get the retailer to order more products and begin promoting IBOC on its own.

See RECEIVERS, page 7 ▶

LPFM

▶ Continued from page 1

and encourage growth."

The LPFM service was launched Jan. 20, 2000. It turns six next month.

'Opportunities'

An FCC spokeswoman said the agency is pleased with the progress of the service.

"LPFM operators are telling us how much their communities rely on the information they are broadcasting. It has opened a wealth of local opportunities and voices that otherwise would have a hard time being heard," the spokeswoman said.

Former FCC Chairman Bill Kennard, who pushed for the LPFM service, declined to comment on the program's effectiveness.

The Media Bureau hoped to begin discussions on proposals to expand and possibly relax LPFM rules before the end of the year. Filed comments were due in late September.

Low-power advocates continue to push the FCC to relax rules and launch an additional window to accept LPFM applications.

"We hope the FCC will decide to agree with us and that LPFM stations should have reasonable options and shouldn't just be relegated to a handful of small towns. LPFMs should be able to use contour overlap rules when there are spaces between protected contours of full-power stations that could be used to introduce new low-power FM service," Tridish said.

Nickolaus Leggett, one of the original petitioners for a low-power FM service in 1997, said, "LPFM has been worth the work and effort to make it happen. There was some disappointment for some that several evangelical groups grabbed up so many of the LPFMs. I think it just needs fine-tuning, and there is a need for another window of application."

Leggett is also one of five petitioners asking the FCC to expand the service to the AM band, a move opposed by NAB. The broadcast association said the commission felt the AM band already was too crowded and interference-prone when it started the LPFM service and that situation hasn't improved.

Translators

As reported last spring (RW, March 16), the potential glut of thousands of new FM translators has LPFM supporters concerned about future growth of the relatively new low-power service, especially in heavily populated areas.

LPFM advocates believe the service should be afforded higher priority than translators; both services are treated as secondary services by the commission. However, translators are licensed to repeat programming, sometimes from hundreds of miles away, while LPFMs serve only their local communities, the low-power advocates say.

Studios for WRFU(LP) are in the Urbana Post Office; mailboxes can be seen through the window. Volunteer Andrew O'Baoill is at the board.

Proponents want the FCC to give LPFM stations primary status and give them precedence over translator applications.

Opponents note that translator applications are pending while no open "windows" to file more LPFM applications are on tap. To give LPFMs priority over translators would be unfair, they feel.

The agency needs to address the translator issue, Leggett said, because of the natural conflict between the two secondary services.

Translators vs. LPFMs

"LPFMs broadcast local content to a local audience. (LPFM) was intended as an outlet for the little guy, as a voice of local democracy. Translators, are by nature, only relaying broadcast material from outside a community," said Leggett, who works as a political analyst.

Still to be determined is the status of third-adjacent-channel protection for existing full-power stations. Sen. John McCain, R-Ariz., earlier this year re-introduced a bill that would drop the protections and open up more opportunities for LPFMs. The NAB, NPR and several large radio groups continue to argue against such a move, saying tighter slots would create harmful interference.

In 2003, the commission fielded nearly 11,000 FM translator applications. The FCC has issued nearly 3,400 CPs for FM translators. Approximately 7,000 applications are pending, according to FCC data.

According to its comment filing to the FCC, the Prometheus Radio Project stated, "The translator (filing) window has had an enormous impact for those who would like to start a low-power station in the future and for those who applied but were denied. The congressional imposition of third-adjacent protection requirements for LPFM stations, along with the unfortunate timing of the 2003 translator window, has utterly decimated the opportunities for LPFM stations in the areas with the highest demand."

The vast majority of Prometheus' clients have been pleased with their results since putting their LPFMs on the air, Tridish said, while few stations have failed.

How does Prometheus measure accomplishments?

An LPFM's success, he said, "depends on the organization, what they do with their signals and their fundraising and volunteer efforts. It definitely has been a resounding success when it comes to serving the public interest in rural areas."

Most LPFMs faced a variety of challenges getting on the air, from financing and construction, to programming and promotion, said Sakura Saunders, a volunteer at the low-power radio station KDRT(LP) in Davis, Calif., which has been on the air since early 2004.

"Starting from scratch, everything has been a challenge. Building the studio, building and maintaining a Web site, fundraising and training volunteers, all takes a lot of time," Sanders said. "Then you have to get people to take you seriously."

Saunders said KDRT, which has its own underwriting director, purchased new transmission equipment, but saved some money by buying used studio equipment during startup.

Saunders believes local content, possibly combined in some way with the Internet, will fuel future growth of her station and others like it.

"With the Internet such a widely used venue for dissemination, I feel that LPFM's strength is to first utilize the Internet to find interesting content to project to its own community, then to produce local content for the LPFM and the Internet," Sanders said.

Marc Jones, manager of broadcast operations for the Maryland Transit Authority, which holds the license for WMVK(LP) in Perryville, Md., said the response of listeners to his station's mix of transit information and music has been positive.

"We provide a transit information service for commuters using the MARC Train and bus service and work in Baltimore and Washington, D.C. It provides a critical source of information that directly impacts the comfort of the commuters," Jones said.

Transit station

The MTA is interested in growing its LPFM efforts, Jones said, which would enable the state agency to form a quasi-network of stations broadcasting transit information.

When the MTA or other applicants might be able to apply for additional LPFMs is hard to determine. It remains unclear if the FCC is getting closer to settling the question of how many LPFM frequencies will be available if the third-adjacent protections are dropped, said observers. The agency would need approval from Congress to research how many more LPFM slots would open.

Dennis Wharton, NAB senior vice president for corporate communications, said, "The NAB position has not changed. We are still concerned that eliminating the protections will be a recipe for interference for radio listeners."

The FCC has said interference fears of large broadcasters have proved unfounded and has urged Congress to relax separation requirements.

"We've had very few complaints filed by full-service FM stations (regarding interference). It appears LPFM permittees are staying ahead of some interference issues by filing modification applications to get off channels that become possible interference problems as a result of full-service modifications," said the spokeswoman.

The commission has asked several LPFMs to change frequencies as a result of full-power stations making changes that cause overlaps in contours, she said.

Do you work at an LPFM? Has your broadcast market been affected by one? Share your experiences at radioworld@imaspub.com.

Receivers

▶ Continued from page 5

• Do some remote broadcasts for as many car dealers as possible in exchange for the dealers offering free installation of IBOC digital radios purchased from CE retailers. It's important that this free installation be performed at the car dealer and not at the CE retailer so the dealer can see the demand for IBOC digital radio. An important goal is to get the car dealer to see the demand and then ask the auto manufacturer to start shipping cars with IBOC digital radio. An added selling point for the car dealer would be the non-stop driver-oriented programming that consumers can get for free, but only if they have IBOC digital radios in their cars. Perhaps the car dealer would even sponsor these broadcasts.

If a CE retailer will ad trade to discount the retail cost of the receivers, this entire promotion could be done without any cash. Broadcasters opposed to ad trading, or that can't find a retailer willing to do it, can dedicate some money from their marketing and promotions budgets to subsidize the cost of the receivers for consumers.

#2 Web Store: Set up a Web store and sell receivers directly to listeners. Sirius does this. XM does this. AM/FM broadcasters should do it, too. Broadcasters don't need to worry about helping listeners find places to purchase receivers if listeners can get them directly from their favorite stations.

One of the big advantages of being directly involved in the sale of receivers for broadcasters is that they get to hear consumer objections first hand, and perhaps adjust their marketing and on-air product to address those concerns.

#3 Promote Aftermarket-Friendly Vehicles: In-vehicle listening is a huge part of the radio broadcasting business model. However, over the past decade it has become harder and harder for consumers to replace the radios that come with their vehicles with new ones purchased from CE retailers.

This has not presented much of a problem for the radio broadcasting industry because all of the radios that come with new vehicles include AM/FM tuners. However, for companies trying to get new products into vehicles it has been a big problem. These companies have been forced to produce cassette adapters and FM modulators to make it possible for consumers to use their products in the car, and while these can perform well, they are an added reason for consumers to stay away from the product.

To address this problem, the CE industry has been working on a standard that would enable aftermarket products to be plugged into a common communications network used in vehicles. This network, called the Media Oriented Systems Transport network, enables many of the signals within the vehicle to be carried over a common cable.

One cable carries all

A single cable can carry signals that monitor and control the vehicle's performance, serve as the link between the various components of the vehicle's audio system, and send DVD video to a display screen in the back seat. There are many cars on the market today that include a MOST network, and the radios in these cars are attached to this network.

What these vehicles lack, however, is an easy way to attach an aftermarket product to the network and have it work properly. Addressing this problem is the CE industry's goal.

Radio receiver shipments account for less than half of 1 percent of total industry shipments.

CE manufacturers would like it to be possible to plug an aftermarket IBOC digital radio tuner into a vehicle's MOST network and have the OEM receiver in the vehicle recognize the tuner and allow it to be controlled from the console that came with the car. Carmakers have generally resisted this, preferring instead for consumers to come back to them to purchase a new radio, or even better, a new vehicle.

The tide has shifted some in the past year or so as carmakers have been inundated with requests for iPod-friendly vehicles. Some automakers are now making it easier for consumers to plug their iPods and similar devices into the vehicle and control them from the console.

Broadcasters can help their own cause by creating consumer demand for aftermarket-friendly vehicles that can accept IBOC digital radio aftermarket tuners.

IBOC digital radio offers tremendous opportunities for broadcasters, and more modest opportunities for receiver manufacturers. For the rollout to be a success everyone needs to work together, but broadcasters need to take the lead because their opportunities for growth with this exciting new technology dwarf the opportunities for the consumer electronics industry, and thus broadcasters' stake in this effort is much higher.

Reach the author at dwilson@ce.org. *RW welcomes other points of view.*

We Love That 'Mr. Clean Attitude'

by John Bisset

Aren't solid-state transmitters great? You just plug them in, and forget about them!

Too often that's what happens, unfortunately; and this "out-of-sight, out-of-mind" attitude eventually will cost you. Dirty air is no friend of the broadcast engineer and it can have a dramatic impact on the operation of solid-state transmitters.

It's not enough to clean or replace air filters. At least once a year, more often in dirty environments, the RF modules should be removed and their heatsinks cleaned. The easiest method is with a can of clean, compressed air and a damp rag. Avoid air from an air compressor, which contain oil droplets. The suction end of a vacuum can also be useful.

Of course, if you use the compressed air canister, do the cleaning outside the transmitter building; no sense in dirtying other equipment by performing the task inside.

The large heatsink surface area on solid-state modules must be kept clean to conduct heat efficiently. Allow a layer of dust and dirt to accumulate, and the cooling efficiency drops. Permit too much dirt to accumulate, and you may lose the solid-state devices in a module.

While you're cleaning, check the filter on the back of your exciter or IPA drawer. Keep in mind that if this small fan dies, you'll probably lose the exciter.

So do you have a spare on the shelf? Replacements can be found from Granger or the exciter manufacturer.

If you're lucky enough to switch to a backup, and can really clean everything, turn the exciter off, remove the exciter filter and inspect the fan blades. Blades caked with dust and dirt reduce blower efficiency; the drag on the fan motor will expedite failure, as seen in Fig. 2.

Do a good cleaning of the blades with rags soaked in isopropyl alcohol to take care of the dirt.

I spoke recently at the Ohio Association of Broadcasters. One of the attendees pointed out that most cleaning alcohol that you get at a drug store can be up to 30 percent water. A pharmacy or medical supply store can supply 93 percent, or higher, concentrations. The higher concentration boosts cleaning power and reduces the time for water to evaporate.

Before leaving the supply store, pick up a box of unsterilized cotton tipped applicators. They're cheaper than the sterilized version. The cotton is wrapped on 9-inch wooden sticks, making for a sturdy cleaning tool, especially when trying to clean dirt out of the bottom of tube sockets.

If you replace your air filters with the pleated, high-efficiency type, write the date on the side. Track your filter usage. It helps you budget, and the date is a good reminder of just how long the filter has been in service.

★ ★ ★

Remote season is slowing down. This is a good time to perform preventive maintenance on your remote gear.

Inspect and repair any nicked or cut cables and broken connectors. If your microphone or speaker cables or snakes have been plastered to the ground with duct tape, the sticky residue can be removed by coating a clean cloth with 3-in-1 oil. Wrap the cloth around the cable, hold the cable taut and run the cloth up and down the cable several times. The penetrating oil will dissolve the sticky mess, and it will come off in the cloth. Remove any oil residue with a clean cloth, coil the cable and store.

You can color-code the cable ends using colored electrical tape. Any electrical supply shop will have various colored electrical tapes. Invest in a few of the Velcro (or other brand of hook-and-fastener-type) cable ties, which will keep cables coiled and easy to identify. An engineer showed me how he wrote the cable length on each end of the XLR connectors, then used colors to also

See TAPE, page 10 ▶

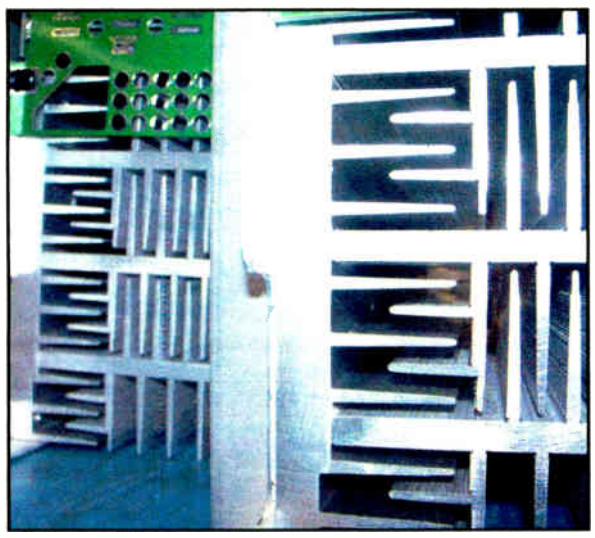


Fig. 1: A sparkling clean heat sink is a happy sight.

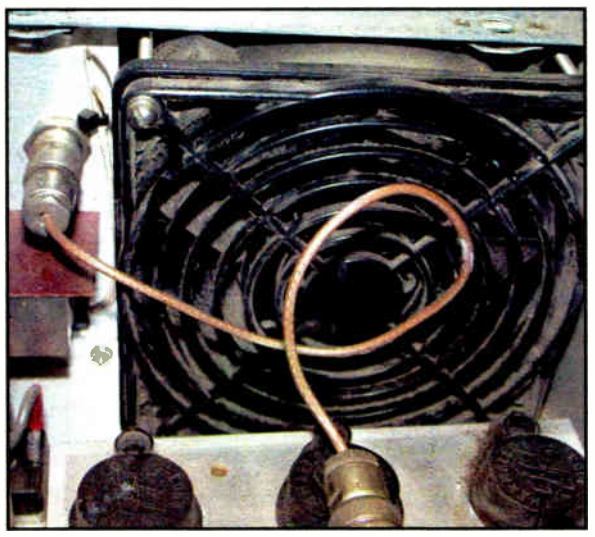


Fig. 2: Dirty fans reduce cooling efficiency.

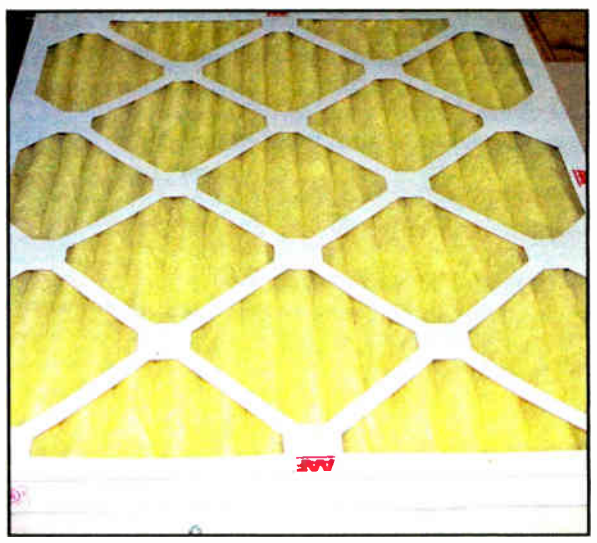


Fig. 3: Mark high-efficiency filters with the date.

Multicasting.

It's like trying to fit —

well, you know.

Management has decided to multicast. Which seems like a terrific idea — until you consider just how little bandwidth each channel will get. How will the sound of your station(s) survive these shrinking bitrates? Omnia can help.

New Omnia Multicast with SENSUS™ restores the fullness and depth that bit-reduction steals. Our DSP gurus teamed up with the codec experts at Telos (the folks who introduced broadcasters to MP3 and MPEG AAC). Together, they developed a unique suite of tools to pre-condition audio for HD Radio™ multicasting.

Omnia Multicast with SENSUS codec conditioning, Omnia Bass Management system and distributed look-ahead limiter significantly improves the sound of HD multicast and other bit-reduced streams.

SENSUS technology enhances punch, preserves presence, and reduces artifacts. Even heavily bit-reduced channels (like multicast) can be significantly improved by Omnia running SENSUS. And like all Omnia processors, Omnia Multicast delivers the smooth, clean, pure signature sound that grabs your listeners and holds them hour after hour. No wonder the top stations around the world choose Omnia over all other processor brands.

Multicast like you mean it... with Omnia Multicast.

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Tape

▶ Continued from page 8

identify the lengths. The few minutes of effort made digging around in a cable box searching for a cable easier.

Fig 4: Use colored electrical tape to identify cables

Don't forget a fresh box of 9 V batteries and a couple of Sharpie or similar brand of markers to date the batteries if you plan to use the equipment over the winter. If your remote gear will be enjoying a winter slumber, remove batteries and buy a fresh box when your remote season begins.

It won't hurt to spend a few minutes inside your Marti gear, too. Jeff Twilley, director of engineering for Delmarva Broadcasting, has found the biggest cause of Marti failure is dirty connections with the Molex connectors on each board. Typical connectors are shown in Fig. 5.

Jeff suggests that before you remove these plugs, note the orientation so the plug gets back onto the same pins. It's easy, in a rush, to get off by one pin, and you don't need those headaches.

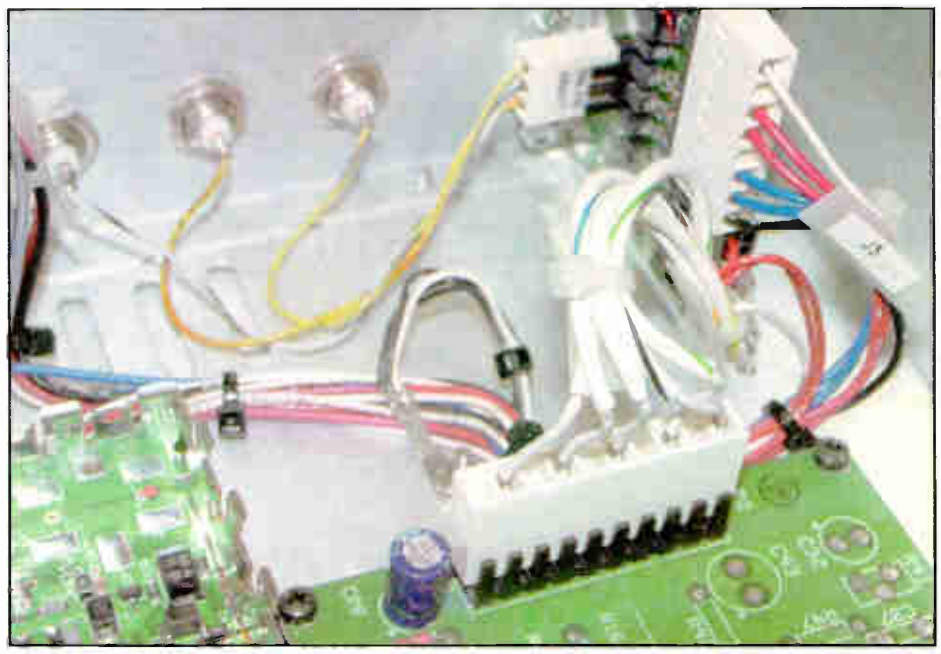

Fig. 5: Note plug orientation when removing plugs for cleaning

Remove all the Molex plugs and treat the pins to a spritz of contact cleaner, or better yet, Caig Labs DeoxIT. Gently swab the pins to apply a thin film of this cleaner/preservative. Work the Molex plug back and forth over the pins to clean the contacts inside the plastic plug.

Again, make sure the plug is properly inserted onto the pins. Fire up the rig before replacing the top, just to make sure everything is working properly before storing the equipment for the season.

A little bit of preventive maintenance now will pay off with snag-free remotes in spring.

John Bisset has worked as a chief engineer and contract engineer for more than 30 years. He is the northeast regional sales manager for Broadcast Electronics. Reach him at (571) 217-9386, or jbisset@bdcast.com. *Faxed submissions can be sent to (603) 472-4944. Submissions for this column are encouraged, and qualify for SBE recertification credit.*

WHO'S BUYING WHAT

Who's Buying What news is provided by suppliers and users. Write to radioworld@imaspub.com.

dMarc said **New Northwest Broadcasters** would purchase Scott SS32 Digital Automation Systems for deployment across its group of 37 stations; the first installations are underway. Ray Edwards, shown, is New Northwest vice president of programming. ...

Dalet Digital Media Systems said a public broadcaster for Wales chose DaletPlus Media Library to manage media and programs for its broadcast operations. **S4C** airs programs in Welsh and English. Andy Palmer is head of technical operations for the broadcaster. It has15 DaletPlus Media Cutter editing workstations. ...

The **Eimac** division of CPI said it is delivering 4CX20,000E tetrodes to **Continental Electronics** for use in 816HD transmitters. The transmitters broadcast FM analog and digital IBOC signals without a combiner or antenna modifications. ...

Ray Edwards of New Northwest

Separately, Continental said it is ahead of schedule in delivering 132 ultra-low-noise transmitters to U.S. government contractor **BAE Systems** for use in the High-Frequency Active Auroral Research Program near Gakona, Alaska.

"When the massive planar array for ionospheric research is completed in 2007, it will include a total of 180 Continental Electronics D616G 10-kW combined transmitters, which the company is upgrading specifically for HAARP," the supplier stated.

The installation began in 1993 with 18 transmitters, grew to 48 in 1998 and is being expanded to a total of 180 transmitters. The final expansion will bring the HAARP array to full power, with ERP increasing from 84 dBW to about 96 dBW. Continental, which has a contract to supply six transmitters per month, stated that the system "will have greater transmitter modulation capability, variable frequency range and beam steering than any other high-frequency transmitting system in the world."

According to the manufacturer, the government is constructing the facility to conduct upper-atmospheric and solar-terrestrial research via a phased array transmitter. The goal is to learn more about the ionosphere. ...

Wheatstone announced the sale of its first networked Audioarts system in North America. The three stations of **NL Broadcasting Group** in Kamloops, British Columbia are the first installation site of the networked audio system, based on the AE-NET router. The order includes six D-75 consoles, three to be used on-air and three in postproduction. Dave Coulter is chief engineer of the facility. ...

Dielectric Communications said **Radio One** in Philadelphia installed a new antenna system at WRNB(FM). Dielectric provided a directional, top-mount single-bay antenna, transmission lines and a custom beacon assembly. The station incorporated the antenna onto the spire of the city's tallest building, One Liberty Place, without exceeding current height limitations. Mike DePolo is chief engineer for the market. Installation assistance was from Don Train of **Train's Towers** and Radio One VP of Engineering John Mathews. Mark Humphrey consulted.

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HARRIS

Different Strokes for Different Blokes

Sometimes Trends We See Abroad Offer Hints Of Our Domestic Future; Sometimes They Don't

by Skip Pizzi

In the United States, as in other countries, we often observe the new-media experiences of other regions as bellwethers for what might happen at home under similar circumstances. For example, the recent U.K. experience with DAB frequently is referenced as predictive of how IBOC will fare here.

Interestingly, such models do not always present an accurate picture. There have been numerous examples where consumer behavior (or behaviour, in this case) in a given region was not duplicated under essentially similar circumstances in another area.

Among the reasons for this are contextual differences, historical precedents, varying economic preferences and diverging priorities — any of which can trump the new-media offering's native parameters and present a localized result that may be unlike how the same technology was received elsewhere.

Some examples

Perhaps the best known of these variances is the use of Short Message Service, or SMS, messaging. While this system is employed widely by cellular phone owners in Europe, it has been historically less used by U.S. consumers.

Some attribute this to relatively expensive, metered (i.e., pay-by-the-minute or fraction) voice service on European wireless phones, whereas most U.S. cellular users have flat-rate monthly (or high monthly-minute) plans. The European tradition of not charging users for incoming calls or messages may also play a part, along with the higher early penetration of cellular phones in some European countries. But there may be less tangible reasons, owing to cultural preferences and the like.

In any case, cellular operators doing business in both regions are aware of the resulting differences and have adapted their respective regional services and marketing support accordingly.

Another interesting case is interactive television. While it has not been hugely successful anywhere, it has garnered far more interest in some European markets than in the U.S., and this deviation has been maintained rather steadily for nearly a decade. Here the likely driving forces are more clearly cut and exemplify some of the classical reasons for different results in different regions:

First, the European deployment of PCs and Internet connections has (until recently) lagged behind that of the United States, and dial-up Internet connections (local calls) are again generally provided there under metered service plans. So any service that offered Internet-like content via free-to-air broadcasting to a TV would be preferred for both device-penetration and economic reasons.

Reliable predictors of universal behavior are rarely encountered.

Second, the European TV market has benefited from the now well-established tradition of Teletext, by which a generation of consumers became used to consulting their TV screens for the auxiliary data carried on European analog TV broadcasts. Teletext is used routinely to read news headlines, weather forecasts, sports scores, train and airline schedules and many other published data sets in video text form. This behavior is unknown in the United States; adoption of Teletext was blocked by television networks when in emerged in the 1980s, out of fear that audiences would turn to these screens during commercial breaks.

Thus the conditions were set by both habit and budget for different acceptance paths of the same technology in different regions.

Consider also how geography and language affect media formats. The higher latitudes and closer proximity of different languages in Europe have worked against direct satellite transmission there, while the lower latitudes and large homogenous language zones of North America have had the opposite effect. Thus satellite radio has become successful here, while no similar service has emerged in Europe.

(A contributing cultural difference is that roughly 30 percent of U.S. radio listening takes place in cars, which is about double that of the typical European environment.)

Same course, different speeds

A more nuanced variant of this phenomenon holds that eventually similar situations may exist in different regions, but the rates or paths taken by these zones to their ultimate uniformity may be divergent.

For example, SMS usage is now increasing in the U.S., and may eventually match European usage, but it has taken many years for this to occur. Similarly, the broadband uptake in some European countries is now faster than that in the United States, and Europe's earlier preference for interactive TV over the Internet is therefore fading.

Meanwhile, South Korea may be a good model for the future of the U.S. market, as the American broadband deployment moves slowly toward the pinnacle of Korean bandwidth and penetration, along with its preference for myriad commercial media services. But cultural differences between the United States and many Asian cultures are notorious (such as physical density and the tolerance for long-term viewing on small screens), and these may dilute or wipe out any lessons for North America from such regions.

The Big Picture

Photo: Gary Hayes, BBC

by Skip Pizzi

Latest lessons

Some recent data appear to indicate that a new divergence is taking place, and it is one that may have some impact on radio broadcasting's prospects here. It involves the emerging market for music listening on wireless telephones.

A new study by TNS, a global research firm, shows that nearly one out of every five mobile phone owners worldwide already uses the device for music listening, with a significant percentage preferring the platform over home hi-fi or even personal digital music players (e.g., iPods) as a primary music-listening system.

But the study also shows that in the United States, only 4 percent of mobile phone users listened to music on their phones regularly, putting Americans dead last among the 15 countries included. (By comparison, South Korea responded at 26 percent, Hong Kong 23 percent and the U.K. 19 percent to the same query.)

This could be another case of the U.S. simply getting off to a slow start, since music-to-phones service has just started to launch in recent months here. But it could also be a function of the many other outlets and platforms that exist here for music distribution.

IBOC vs. DAB

This calls into question just how relevant the oft-cited U.K. success with DAB is to the prospects for IBOC in the United States.

While there is little doubt that the U.K. experience owes much to the availability of unduplicated content on DAB, can one assume that offering such content on IBOC supplemental channels will have the same positive results here?

Consider that the U.K. radio market has fewer radio stations, less diversity of ownership, less in-car radio listening and no mobile satellite radio competition. DAB has also benefited from a degree of cross-promotion across media that would be difficult to achieve in the U.S. It could be argued that this creates a different context for digital radio's emergence there, rendering any transfer of lessons to U.S. prospects somewhat suspect.

So while the experience of one region may enlighten others, reliable predictors of universal behavior are rarely encountered. The deployment of IBOC in the United States will likely take its own unique path, which will in turn be observed by other regions to help inform their future strategies — rightly or wrongly.

Skip Pizzi is contributing editor of Radio World.

We're all talk.

And all action, too.

All talk and no action? That certainly doesn't describe any radio station we've ever seen. With guest interviews, news and traffic feeds, live reports and listener calls to juggle, a talk studio is one of the most active places on the planet. Seconds count, and there's no room for mistakes.

That's why we created Status Symbols® for the Telos TWOx12 Talkshow System. Instead of flashing lights to decipher, there's easy-to-understand picture icons that give talk pros the information they need with just a glance. What caller's next? Who's screened, and who's just holding? With Status Symbols, you'll know instantly. And only Telos has them.

TWOx12 has lots more benefits. Like Digital Dynamic EQ, for uniform caller audio despite less-than-perfect lines. Twin DSP-powered hybrids for quick, no-hassle conferencing. A unique Dual Studio Mode that lets you use your 12-line phone system like dual six-line systems for extra flexibility. And TWOx12 is the world's only talk show system that can work with either POTS or ISDN lines to deliver exceptional caller clarity. Impressive? You'd expect no less from the company that *invented* the digital broadcast hybrid.

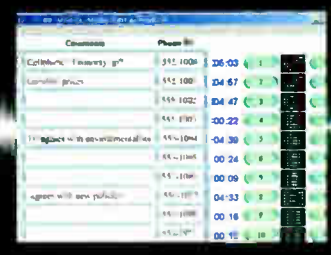
Is TWOx12 the perfect union of word and deed? Thousands of broadcasters worldwide think so. Why not see for yourself?

Telos
AUDIO | NETWORKS

12 lines, two digital hybrids, and superior audio performance. Desktop Director controller features handset, speakerphone and headset jack. Drop-in controls available for popular consoles.

New Call Controller has Status Symbols, DTMF pad and recorder controls (like Desktop Director), but lets talent use their favorite wireless phone or any standard handset for call screening.

Status Symbols show exactly what's what. Intuitive icons show calls locked on-the-air, which hybrid they're on, who's next in queue and more. So much better than a panel of blinking LEDs.



Assistant Producer enables talk show production via LAN or WAN. Status Symbols, Caller ID support, instant messaging and caller database are just a few benefits. Supports touchscreens, too.

HD Radio News

HD Radio Scoreboard

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Radio World | Covering Radio's Digital Transition | December 21, 2005

NEWS ANALYSIS

New NRSC Data Standard Unveiled

by David Maxson

In-band, on-channel digital audio broadcasting is one data pipe. The available data rate is rationed among one or more audio channels on the transport. Each audio stream is slightly elastic, permitting the transmission of a little text with each audio stream. But there's more!

Only the core functionality of the IBOC system was adopted as the NRSC-5 standard in April 2005. The National Radio Systems Committee considered it "core" functionality because it covered the basics for transmitting (and receiving) coded audio over digital waveforms in the AM and FM bands.

The committee's newly named Digital Radio Broadcasting subcommittee deliberated on one more piece of the puzzle and adopted it in September. The new addition to the standard is the data transport, generically called Advanced Data Service.

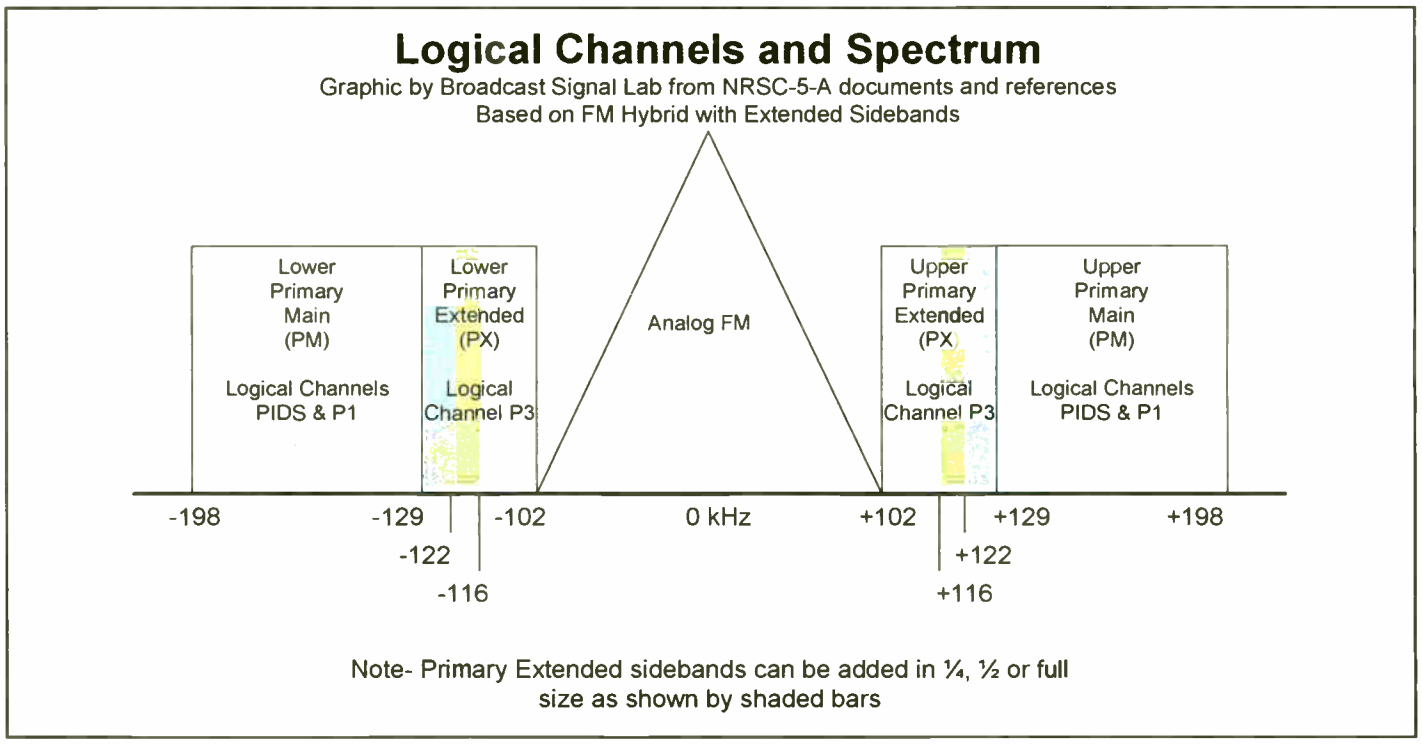
The revised standard containing the core standard plus the ADS Transport is called NRSC-5-A.

Data protocols and services

Some background: The NRSC had been anticipating that with the formulation of a data transport there will be more to do in evaluating and standardizing data protocols and data services.

Leading up to its September meeting, the group faced a question: Should its Digital Audio Broadcasting Subcommittee be responsible for this, or should the dormant Digital Data Broadcasting subcommittee be activated? The latter had been formed several years ago when many NRSC participants thought that people specializing in data services could work in parallel with the audio broadcasting standards process.

It has taken all this time for the black sheep of the family, the data transport, to be ready, so there hasn't been much for the DDB to do. Recognizing that IBOC is one data pipe for audio and other content and services, and now that the hard work on the core standard is past, the NRSC decided to bring activity on IBOC under one roof.



To acknowledge the importance of the data component, the NRSC renamed its DAB subcommittee in September. It is now the Digital Radio Broadcasting subcommittee. Later in this article, we'll look at some of the data issues that DRB will need to consider.

The NRSC-5-A standard is available at no cost on the Web site *nrscstandards.org*. In addition to the relatively brief parent document of the standard, numerous "normative reference" documents contain the detailed recipes for each layer of the IBOC protocols.

Only the parent document, NRSC-5-A, is an NRSC document. The normative references are Ibiquity documents edited with the input of NRSC.

The Advanced Data Service Transport added in September is described in its own normative reference. While NRSC calls the transport the ADS Transport, the normative reference document uses the Ibiquity name for it, the Advanced Application Service Transport.

This distinction — between the generic NRSC name for features and the Ibiquity name for its implementation of them — permeates the standard. For example, the generic name for IBOC is IBOC; Ibiquity's name for IBOC products with embedded Ibiquity software is HD Radio.

The data protocol is a set of rules for implementing data delivery on an IBOC signal. It describes the structure of the information flow so transmitter makers and receiver makers know what to expect to make their equipment work interchangeably.

The protocol does not require someone building a device to incorporate all the features. The actual implementation of the protocol is up to the companies that produce products and services that use the protocol. This article includes features and capabilities that some products do not employ today.

Before delving further into the data protocol, a review of the overall structure of IBOC is in order.

IBOC structure

Recall that the transmitted signal consists of frames of about 1-1/2 seconds' duration. During the time for each frame, a self-con-

See DATA, page 16 ▶

Radio World's HD Radio™ Scoreboard

The HD Radio Scoreboard is compiled monthly by Radio World using information supplied by iBiquity Digital Corp. and other sources. The data shown reflect best information as of Nov. 21. This page is sponsored by Broadcast Electronics. HD Radio is a trademark of iBiquity Digital Corp.

On the Air at Clear Channel

In late November Clear Channel released a list of its 200 stations on the air with HD Radio or slated to be by the end of the month. The broadcaster said it is ahead of schedule in its HD Radio rollout and said it is on track to air HD digital radio broadcasts on 95 percent of its stations in the top 100 markets by the end of 2007.

Rank	Market	Call Sign
1	New York	WAXQ(FM)
1	New York	WHTZ(FM)
1	New York	WKTU(FM)
1	New York	WLTW(FM)
1	New York	WWPR(FM)
2	Los Angeles	KHHT(FM)
2	Los Angeles	KIIS(FM)
2	Los Angeles	KOST(FM)
2	Los Angeles	KYSR(FM)
3	Chicago	WGRB(AM)
3	Chicago	WNUA(FM)
3	Chicago	WRLL(AM)
3	Chicago	WVAZ(FM)
4	San Francisco	KIOI(FM)
4	San Francisco	KISQ(FM)
4	San Francisco	KKSF(FM)
4	San Francisco	KMEL(FM)
4	San Francisco	KYLD(FM)
5	Dallas-Ft. Worth	KDGE(FM)
5	Dallas-Ft. Worth	KDMX(FM)
5	Dallas-Ft. Worth	KEGL(FM)
5	Dallas-Ft. Worth	KHKS(FM)
5	Dallas-Ft. Worth	KZPS(FM)
6	Philadelphia	WDAS(AM)
6	Philadelphia	WDAS(FM)
6	Philadelphia	WIOQ(FM)
6	Philadelphia	WJJZ(FM)
6	Philadelphia	WSNI(FM)
6	Philadelphia	WUSL(FM)
7	Houston	KKRW(FM)
8	Washington	WBIG(FM)
8	Washington	WITH(FM)
8	Washington	WMZQ(FM)
8	Washington	WTEM(AM)
8	Washington	WWDC(FM)
8	Washington	WASH(FM)
9	Boston	WJMN(FM)
9	Boston	WXKS(AM)
9	Boston	WXKS(FM)
10	Detroit	WDTW(FM)
10	Detroit	WJLB(FM)
10	Detroit	WKQI(FM)
10	Detroit	WMXD(FM)
10	Detroit	WNIC(FM)
10	Detroit	WDFN(AM)
11	Atlanta	WBZY(FM)
11	Atlanta	WKLS(FM)
11	Atlanta	WLTM(FM)
11	Atlanta	WWVA(FM)
12	Miami	WHYI(FM)
12	Miami	WLVE(FM)
12	Miami	WMIB(FM)
12	Miami	WZTA(FM)
14	Seattle	KJR(FM)
14	Seattle	KUBE(FM)
15	Phoenix	KFYI(AM)
16	Minneapolis	KFAN(AM)
16	Minneapolis	KFXN(AM)
16	Minneapolis	KJZI(FM)
16	Minneapolis	KQQL(FM)
17	San Diego	KGB(FM)
17	San Diego	KOGO(AM)
19	Baltimore	WCAO(AM)
19	Baltimore	WPOC(FM)
19	Baltimore	WSMJ(FM)
20	Saint Louis	KATZ(FM)
20	Saint Louis	KMJM(FM)
20	Saint Louis	KSD(FM)
21	Tampa	WFLA(AM)
22	Denver	KBCO(FM)
22	Denver	KHOW(AM)
22	Denver	KKZN(AM)
22	Denver	KOA(AM)
22	Denver	KTCL(FM)
23	Pittsburgh	WWSW(FM)
24	Portland, OR	KEX(AM)
24	Portland, OR	KKCW(FM)
24	Portland, OR	KKRZ(FM)
24	Portland, OR	KRVO(FM)
25	Cleveland	WAKS(FM)
26	Cincinnati	WEBN(FM)
26	Cincinnati	WKFS(FM)
26	Cincinnati	WOFX(FM)
26	Cincinnati	WSAI(AM)
26	Cincinnati	WVMX(FM)
30	San Antonio	KAJA(FM)
30	San Antonio	KQXT(FM)
30	San Antonio	WOAI(AM)
31	Salt Lake City	KJMY(FM)
31	Salt Lake City	KODJ(FM)
32	San Jose, CA	KSJO(FM)
32	San Jose, CA	KUFX(FM)
32	Las Vegas	KWNR(FM)
33	Milwaukee	WKKV(FM)
34	Providence, RI	WHJJ(AM)
34	Providence, RI	WWBB(FM)
35	Columbus, OH	WFJX(FM)
35	Columbus, OH	WTPG(AM)
35	Columbus, OH	WTVN(AM)
37	Charlotte, NC	WEND(FM)
37	Charlotte, NC	WREX(FM)
40	Norfolk, VA	WKJS(FM)
40	Norfolk, VA	WOWI(FM)
41	Indianapolis, IN	WFBQ(FM)
41	Indianapolis, IN	WNDE(AM)
41	Indianapolis, IN	WRZX(FM)
42	Austin, TX	KASE(FM)
42	Austin, TX	KHFI(FM)
42	Austin, TX	KPEZ(FM)
43	Greensboro, NC	WGBT(FM)
43	Greensboro, NC	WTQR(FM)
45	Nashville, TN	WLAC(AM)
45	Nashville, TN	WNRQ(FM)
47	W. Palm Beach, FL	WOLL(FM)
47	W. Palm Beach, FL	WRLX(FM)
48	Memphis, TN	WDIA(AM)
48	Memphis, TN	WEGR(FM)
48	Memphis, TN	WHAL(FM)
48	Memphis, TN	WHRK(FM)
48	Memphis, TN	WREC(AM)
49	Hartford, CT	WHCN(FM)
49	Hartford, CT	WKCI(FM)
49	Hartford, CT	WKSS(FM)
49	Hartford, CT	WPHH(FM)
49	Hartford, CT	WWYZ(FM)
50	Jacksonville, FL	WFKS(FM)
50	Jacksonville, FL	WJBT(FM)
54	Rochester, NY	WHAM(AM)
54	Rochester, NY	WHTK(AM)
54	Rochester, NY	WISY(FM)
54	Rochester, NY	WKGS(FM)
54	Rochester, NY	WNVE(FM)
55	Louisville, KY	WHAS(AM)
56	Richmond, VA	WETJ(FM)
56	Richmond, VA	WRVQ(FM)
57	Birmingham, AL	WDXB(FM)
57	Birmingham, AL	WENN(FM)
57	Birmingham, AL	WMJJ(FM)
57	Birmingham, AL	WQEN(FM)
58	Dayton, OH	WIZE(AM)
58	Dayton, OH	WLQT(FM)
58	Dayton, OH	WMMX(FM)
58	Dayton, OH	WTUE(FM)
58	Dayton, OH	WXEG(FM)
61	Tucson, AZ	KRQQ(FM)
62	McAllen, TX	KEFM(FM)
62	McAllen, TX	KHKZ(FM)
62	McAllen, TX	KGXX(FM)
62	McAllen, TX	KTEX(FM)
64	Albany, NY	WGY(AM)
64	Albany, NY	WHRL(FM)
64	Albany, NY	WPYX(FM)
65	Tulsa, OK	KIZS(FM)
65	Tulsa, OK	KQLL(FM)
65	Tulsa, OK	KTBT(FM)
66	Grand Rapids, MI	WBCT(FM)
66	Grand Rapids, MI	WSNX(FM)
66	Grand Rapids, MI	WVTI(FM)
71	Albuquerque, NM	KBQI(FM)
71	Albuquerque, NM	KPEK(FM)
71	Albuquerque, NM	KSYU(FM)
71	Albuquerque, NM	KTEG(FM)
71	Albuquerque, NM	KZRR(FM)
74	Omaha, NE	KFAB(AM)
74	Omaha, NE	KGOR(FM)
74	Omaha, NE	KHUS(FM)
76	El Paso, TX	KHEY(FM)
76	El Paso, TX	KTSM(FM)
79	Harrisburg, PA	WRVV(FM)
80	Syracuse, NY	WBBS(FM)
80	Syracuse, NY	WWHT(FM)
81	Springfield, MA	WHYN(FM)
81	Springfield, MA	WPKX(FM)
84	Greenville, SC	WBZT(FM)
84	Greenville, SC	WSSL(FM)
85	Little Rock, AR	KDJE(FM)
85	Little Rock, AR	KHKN(FM)
85	Little Rock, AR	KMSX(FM)
85	Little Rock, AR	KSSN(FM)
90	Columbia, SC	WCOS(AM)
90	Columbia, SC	WLTY(FM)
90	Columbia, SC	WXBT(FM)
92	Des Moines, IA	KMXD(FM)
92	Des Moines, IA	WHO(AM)
95	Colo. Springs, CO	KIBT(FM)
95	Colo. Springs, CO	KKLI(FM)
95	Colo. Springs, CO	KVUU(FM)
96	Wichita, KS	KRBB(FM)
96	Wichita, KS	KTHR(FM)
96	Wichita, KS	KZSN(FM)
97	Madison, WI	WIBA(FM)
97	Madison, WI	WMAD(FM)
110	Worcester, MA	WSRS(FM)
110	Worcester, MA	WTAG(AM)
119	Huntsville, AL	WDRM(FM)
119	Huntsville, AL	WTAK(FM)
119	Huntsville, AL	WLAY(FM)
171	Anchorage, AK	KENI(AM)
171	Anchorage, AK	KGOT(FM)

The HD Radio Bottom Line

Total Licensed	On the Air
969	585

Last Month

Total Licensed	On the Air
937	546

Market Penetration United States

13,557 AM & FM Stations *(excludes LPFMs)*

Licensed by Ibiquity and on the air

Licensed by Ibiquity and not on the air

Number of FM Stations Multicasting:

43

Data

▶ Continued from page 14

tained chunk of data is transmitted. It contains a fully interleaved and error-protected package. Within the package are several elements.

First, the 1-1/2-second package is divided into "logical channels." Each logical channel is a group of data bits that is configured with its own error protection and interleaving.

For the rest of this discussion, the FM hybrid mode will be used as the example. The primary main digital sidebands ("PM") carry two logical channels. One is the Primary IBOC Data Service ("PIDS"), which carries basic information about the station (call sign, FCC facility ID number, etc — see sidebar). The other logical channel on the PM sidebands is "P1." It carries all the audio and data content that can fit on the PM sidebands. (See the illustration titled "Logical Channels and Spectrum.")

If primary extended digital sidebands are added ("PX"), they squeeze digital information closer to the analog carrier. Logical channel "P3" is carried on the PX spectrum.

When logical channel P1 or P3 is decoded, it reveals up to three classes of information being carried simultaneously. Each frame in the logical channel is partitioned into audio, opportunistic data and/or fixed data. (See the graphic "How IBOC Merges Audio and Data.")

In one configuration, the audio occupies the entire capacity of the logical channel, leaving no room for reserving fixed space for data service; in another configuration, the protocol permits the audio bandwidth to be set lower to create fixed space for data. In the audio portion of the logical channel, the protocol permits one or more supplemental audio programs to be carried with the main audio program.

For instance, the standard says about 98 kilobits per second of useful information can be transmitted over logical channel P1. The protocol permits audio to be assigned the entire information rate for delivering the Main Program audio Service ("MPS") and any Supplemental Program Services ("SPS," a.k.a. "multicasting").

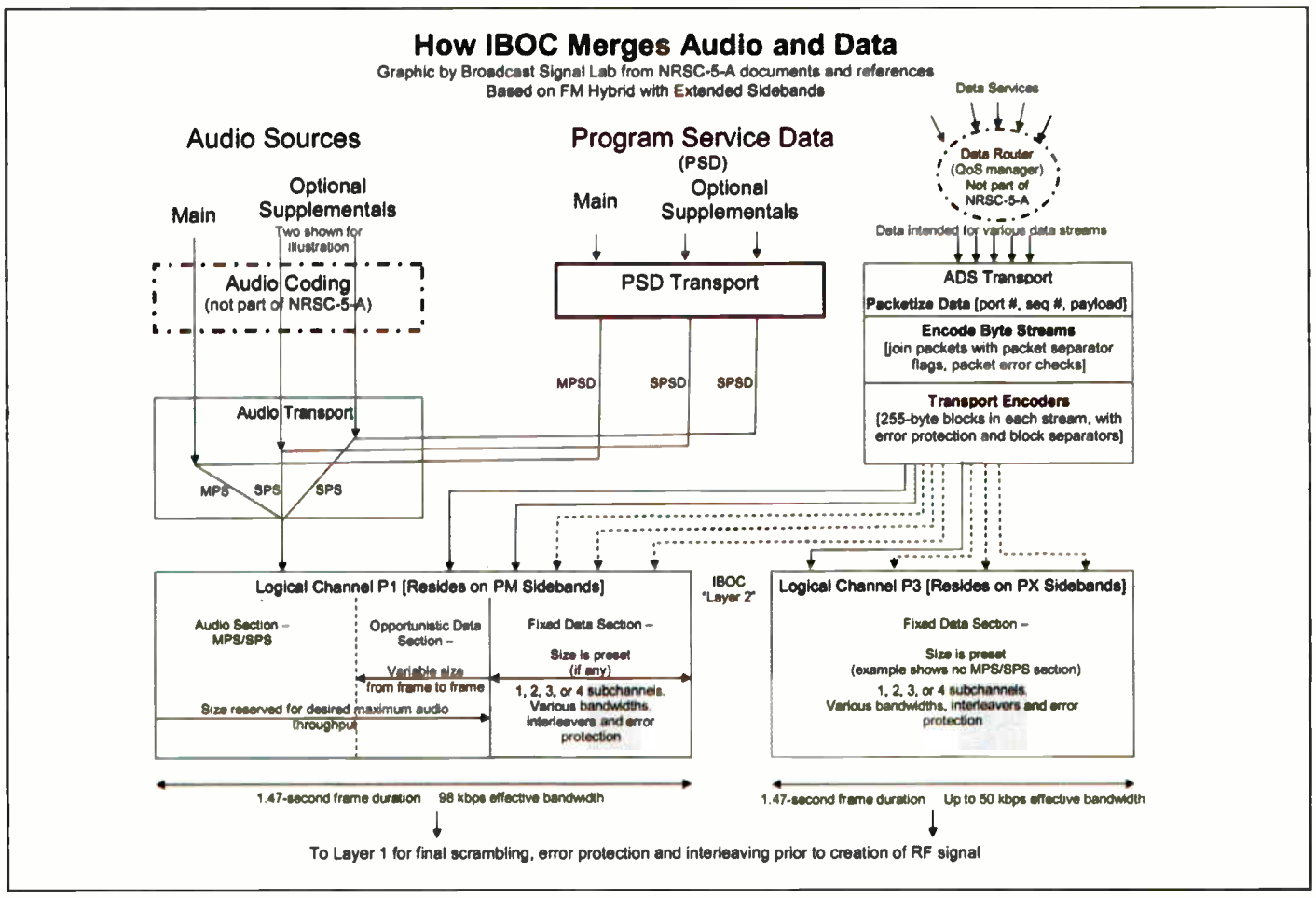
Some basic text information is transmitted with each audio program channel, such as artist and title. This is called Main (or Supplemental) Program Service Data ("MPSD" or "SPSD"). These data are embedded within the audio data stream and are not considered part of the Advanced Data Service. However, they use the same transport structure as ADS.

In addition to allowing an IBOC transmission on P1 to be entirely audio services, the protocol permits the audio portion of the logical channel to have a preset capacity, leaving a desired amount of space for ADS data. The space reserved for ADS is called "fixed."

In addition to the fixed space, the protocol permits the system to be configured to take advantage of the varying demands on the audio codec(s). When the codec is not being challenged by the audio content, for instance with silence or simple audio waveforms, there could be additional space temporarily available in a frame. This is called "opportunistic" data capacity. The ADS Transport also applies to the opportunistic data space in the frame.

Logical channel P3, which is carried on the primary extended digital signal, can have a useful information rate of about 12, 25 or 50 kbps, depending on the user-selected bandwidth of the extended sidebands. The information carried on the PX sidebands is likely to be a little more error-prone (a little less "robust") than that on the PM sidebands.

To adapt to the lower robustness, the protocol permits a higher degree of error correction and interleaving to be applied to data carried on the PX sidebands. At the expense of some additional bandwidth and/or latency, the system implementer can beef up the robustness of an ADS data stream or permit a user or service provider to do the same.



ADS transport

Summarizing, the ADS transport is designed to use fixed and opportunistic data capacity on any logical channel. In addition, opportunistic data resulting from temporarily unused audio bandwidth can also carry an ADS transport stream.

To manage quality of service ("QoS"), future data management products may manage the robustness of each ADS transport stream. While the data on each ADS transport is chopped up to fit in each 1-1/2-second IBOC frame, each ADS transport stream is designed to be reassembled as a data stream at the receiver much like a data stream coming off a modem.

To further manage QoS, Impulse Radio (a member of the NRSC and one of several companies involved in the data aspects of HD Radio) has always advocated that a data service should be able to be sent on any available ADS transport stream that meets the quality requirements of the service. What does this mean? It means that broadcasters must avoid the "subcarrier mentality" when thinking about data transport on IBOC.

For example, a closed circuit service, such as radio reading services, could be accommodated on IBOC in one of two basic ways. The simplest way to visualize adding a reading service is to assign it to primary extended spectrum as if the PX spectrum were like a subcarrier; the subscriber gets a fixed amount of bandwidth and is assigned to a specific part of the spectrum (in this case a logical channel on PX spectrum). This treats the PX spectrum as merely a traditional subcarrier.

Say a reading service requires a given amount of bandwidth around the clock. The temptation would be to simply assign a specific ADS transport stream to the task. If that were on the PX spectrum (logical channel P3), it would be stuck there.

However, if the broadcaster could assign the reading service a set of QoS parameters and the ADS transport manager were smart enough, the service could be managed based on varying demands of other services being offered. For instance, the QoS parameters might call for the most robust ADS transport stream available at any time.

The reading service could occupy opportunistic or fixed bandwidth on more robustly configured PM sidebands in logical channel P1. Then, as higher priority traffic occupies space on P1, the reading service could have its packets directed over logical channel P3.

Receiver design

The way the ADS Transport protocol is set up permits this dynamic QoS allocation scheme to work seamlessly. Each data packet on the ADS transport is assigned a "port" number and a packet "sequence" number.

If the reading service took on a unique port number, and the individual packets of the service arrive over different ADS transport streams as available, the receiver designer could make it look for all incoming data packets assigned to a particular port number to reassemble them in proper sequence and reproduce the reading service audio stream.

A reading service receiver designer, for instance, could make the radio seek a particular data port rather than rely solely on logical channel P3 to find a particular data service.

In addition to awareness of ADS Transport stream robustness, the QoS manager would have to be aware of the latency

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Data

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of each transport stream to be certain delivery of sequential packets is not delayed too long. In this fashion, broadcasters would be able to manage QoS for maximum performance and revenue on their data bandwidth.

Other data services that are not continuous streams could be queued by a QoS manager for delivery during the right combination of conditions, including available time, bandwidth and robustness. This QoS model places control of the bandwidth in the hands of each radio station. QoS management is not part of the ADS protocol, but is enabled by its structure. How data services actually will be managed and delivered remains to be seen.

With the QoS model, rather than entering into a multi-year lease for fixed bandwidth, in the fashion of old analog subcarriers, broadcasters could sell their data bandwidth in the same manner they sell avails on their program channels — on a spot basis. The QoS characteristics of time of delivery, priority, quality, repetition, size of buy and length of commitment are also characteristics of radio spot scheduling and sales.

These characteristics readily translate to the sale of data bandwidth. Impulse Radio has championed the idea that as people develop useful things to do with the bandwidth, competition for, and value of, the bandwidth should increase.

As NPR Chief Technology Officer/Vice President of Engineering and Operations Mike Starling emphasized at the fall NAB Radio Show, it is best to think of the hybrid FM capacity as 150 kbps that can be partitioned for best results. Supporting this approach, the ADS Transport structure lends itself to dynamic allocation of capacity based on quality of service requirements.

Meanwhile, questions remain about how the protocol will be managed. Who should assign port numbers and under what rules? Those ports carrying a variety of data objects will have to have a protocol for identifying those objects. Some ports are likely to have public functions (as opposed to proprietary ones) for which standard markup languages would be desirable.

Impulse Radio proposed the first markup language for radio datacasting, XDS. Ibiquity followed with its HDBML markup language.

These languages intend to be to one-way datacasting what HTML is to the World Wide Web. White papers on the subject are available at *www.broadcastsignallab.com/digital_white_papers.php3*. Ibiquity's HD Broadcast Multimedia Language is available at Ibiquity.com.

Finally, in a world with a plethora of digital radio broadcasting data services, it would be helpful to have a means for discovering what services a radio station is carrying. Protocols for receiver service discovery and for service guides have not been standardized by NRSC.

David Maxson, a founding partner of Broadcast Signal Lab, is writing a handbook on IBOC technology with Donald Lockett, slated to be published by Focal Press in 2006. He recently founded safety sign supplier RFSigns.com.

Maxson is Broadcast Signal Lab's representative to the NRSC. This analysis is his perspective, not reflecting the opinions of the committee.

Data You Can Transmit Today

IBOC transmitters are delivered to the station with data features that should be set up. Broadcast engineers should look into their configuration menus and enter data about their stations.

• Facility ID: This is the FCC facility ID number of the station. It is on your license. Although it does not display on most radios, it could become a useful feature for automatically identifying stations to data services.

• Station Name (short format): If you have a three- or four-letter call sign, with or without the "-FM" extension, enter it here. Translator call signs and the low power "-LP" extensions are not supported.

• Station Name (long format): Up to 56 alphanumeric characters can be accommodated. Keep in mind that radio displays may have 8-16 characters (sometimes more). I think it would be a good thing if broadcasters were to further coordinate with receiver makers on this feature to improve the consumer experience.

• Station Location: Horizontal and vertical position of the transmitting antenna. Altitude above mean sea level (to nearest 16 meters). Latitude and longitude. Convert licensed value (NAD27) to WGS-84 datum. If this is used religiously, it will encourage the development of new features and services.

• Country Code: I think this designation has a problem; it calls for the one-to-three-digit ITU country code to represent the nationality of the radio station. The telephone country code designator in which the United States is 1. The digit 1 is also the dialing country code for Canada and the Caribbean nations, so this code fails as a true national designator. In my opinion, this should have been the ISO 3166 standard country code ("US," "CA," "MX," etc). I have proposed the U.S. be code 658 (decimal), which in binary form is the joining of two numbers representing the letters "U" and "S." "CA" for Canada would be 64 (decimal) in my scheme.

— David Maxson

Newsletters

▶ Continued from page 1

putting it together, dealing with postage and coming up with the printed master," he said. "Getting people who have the knowledge and time to write the stories is the hard part. Most of the chief engineers in the area work well together, since many stations share a community tower."

He also said finding free time is a big challenge.

"It's an unpaid job for all of us and there's a lot of labor involved. One of our members, WKOW(TV), graciously lets us use its conference room to photocopy and fold the newsletter, stamp it and apply the mailing labels. WISC(TV) also hosts our Web site for the electronic version. We usually have about eight pages, sometimes with pictures and graphics."

Chapter 24 volunteers prepare a mailing. From left: Jim Magee, Fred Sperry, Vicki Kipp and Mike Norton.

The newsletter has a small number of sustaining advertisers including a transmitter manufacturer and other interested suppliers.

Chapter President Jim Magee, program manager for Avid, said the factors behind his chapter's awards are dedication, a quest to share information and a love of the industry on the part of the members.

Awards

The national SBE hands out annual awards for the best chapter newsletter in two market-size classifications, according to Angel Bates, membership services director.

Gary Stigall

"Nominations are open to all chapters and the person making the nomination is not asked to do so in a particular (size) class. Once all nominations are made, chapters are divided by class based on median membership numbers here at the national office. This means that there won't necessarily be a winner in each class every year."

According to Bates, several criteria determine the winners.

"It's based on providing up-to-date and relevant information about the chapter in a graphically pleasing and editorially sound manner," she said.

"And chapters must exercise full control over content."

Bates estimates that at least half of SBE's chapters produce an online or printed newsletter.

To 'e' or not to 'e'

Gary Stigall is program chair and Webmaster for SBE Chapter 36 in San Diego; he puts out an e-newsletter. Stigall is a self-taught engineer with a degree in journalism from the University of Oregon at Eugene.

"I taught myself Web design and read tutorials at *www.webmonkey.com*, a great site for learning," he said. "I also used *www.blogger.com*, a Google Web site that has a great way to create a newsletter in a pre-designed format. Other sources are *http://opensourcecms.com* and *http://joomla.org*."

Subscribers receive e-mails about twice per month with news of interest to San Diego engineers and promote meetings and chapter events. The chapter no longer creates a print version of the newsletter, according to its site.

The Madison newsletter is a frequent SBE award-winner.

Stigall said that his biggest challenge is getting fresh content.

"Call it apathy," he said, "But it's also corporate rules. The big groups just don't want to share anything. I'm hoping I can get people to open up a little more as I gain their trust," he said.

The first SBE chapter, formed in Binghamton, N.Y., does not have a newsletter.

"Our chapter was started on April 5, 1964," said Jim Pratt, current chairman. "But we conduct monthly meetings and keep our Web site current."

One of the newest chapters, No. 137, covers the state of Montana. It does not have a newsletter. Chairman Eric Hyyppa said. "Our little chapter is still in its infancy and we're struggling a bit with covering a large unserved area and finding ways of getting folks involved."

What makes for an effective chapter newsletter? E-mail your thoughts to radioworld@imaspub.com.

EAS

▶ Continued from page 3

both analog and digital devices — could be a graceful way of expanding the Primary Entry Point system and relieve AM stations of some of their burdens under the current system.

With this system in place for EAS, "you can move toward getting the warnings out of the main program stream; it's painless. You're not giving up air time for an EAS alert."

The agency also wants input on how EAS more effectively can reach people with vision and hearing disabilities, as well as those for whom English is not their primary language.

Commissioners Michael Copps and Jonathan Adelstein referred to Spanish-speaking residents of New Orleans who were effectively cut off from warnings during and after Hurricane Katrina.

"This item encourages voluntary transmission of multilingual information. I strongly encourage all EAS participants to provide this kind of service to viewers and listeners," said Commissioner Adelstein.

Comments on the Further Notice of Proposed Rulemaking (EB Docket 04-296) were due 60 days after publication in the Federal Register.

EAS move

Chairman Kevin Martin recently announced plans to move the FCC's EAS responsibilities out of the Enforcement Bureau, where EAS is regulated by the bureau's Office of Homeland Security. As part of several steps Martin said would help improve communications and public safety in future disaster response, the commission's Office of Homeland Security will soon be elevated to bureau status.

Asked about those plans by Radio World, FCC officials said the timing is under discussion. Unclear would be staffing and how the move might affect the agency's handling of EAS.

FIRST PERSON

Radio Equipment Now and Then

by James G. Withers

I bought a solid-state AM transmitter a few years ago and recently was thinking about how different it is from those I worked on when I started in radio decades ago. The new rig has been on the air for three years without a hiccup, minus occasional downtime for routine cleaning. I marvel at how simple and reliable this all-important piece of equipment has become.

But it occurs to me that, for those who have grown up in Plug&Play Land, this kind of reliability is not particularly notable. So for the entertainment of those who remember the Good Old Days as well as the edification of those who never felt the heat and light of a roomful of 833s, here's a look at how things used to work.

Computers

Banish any thought of PCs or minis. Computers were behemoths 40 and 50 years ago.

I learned digital computing basics in the Air Force on a Burroughs data processor conceived in the early '50s. This monster filled a 50-foot-by-50-foot room and used (among thousands of other discrete components) 7,600 vacuum tubes. Thanks to its astounding 8K of magnetic drum memory and a clock speed of 500 kHz, a reasonably quick guy using an abacus could outcalculate it.

Maintenance procedures were simple, though: Grab a pocket full of tubes, turn off the lights and look for the dark spots in the row after row of glowing filaments. In my four years in the Air Force, I cannot remember *not* replacing a tube at the beginning of a shift.

Radio stations adopted traffic computers in the 1970s (which were by then much smaller; a typical Data General mini was no larger than a small car). In the operations area, Shafer Systems got into the automation business with a series of tape cart "carousels" and reel-to-reel decks, racked up and controlled by a "computer," which was really little more than a sequence timer and master clock system.

Silicon memory was expensive in those days, so the 940 Shafer simulated chip memory by using simple shift registers that wrote data into a flip-flop and then rewrote it every clock cycle until it was needed.

When the power glitched, the whole thing latched to "zeros." It was exciting to see everything — carousels, reel-to-reel decks and carts — all launch at the same time. Multicasting? The 940 invented it.

Transmitters

Of all the technological changes that have taken place since I started, improvements in transmitter technology have been the most impressive.

The FCC used to require operators with First Class Radiotelephone licenses on duty at broadcast transmitters at all times, but I thought firefighter training might have been as useful. High voltages and currents, coupled with safety devices that were only rudimentary, resulted in more than one emergency trip to the laundry for me.

Some older transmitters, both radio and TV, used a simple spring-loaded shorting bar as protection against accidental contact with high voltage. Held open by an insulated pushrod when the door was closed, the bar (wired directly to the HV circuit) would mate with matching ground contacts if the door was opened when the HV was active. Effective enough.

Multicasting? The 940 invented it.

But one night I closed the door after doing some work inside the cabinet and the pushrod broke and dropped, unnoticed, to the floor. So, unfortunately for me, the shorting bar stayed in its Lightning Simulation mode. And, of course, lightning is precisely what I got when I pushed the button, along with one of those unscheduled trips to the laundry.

I remember looking in a mirror when the smoke had cleared, thinking, "I've cheated Death!"

Along the way, transmitters got smaller and simpler to operate. Gone are the Flash Gordon meters, dials and lights. My AM transmitter is little bigger than a large microwave oven and is easier to operate, since it doesn't have one of those impossible-to-program digital clocks on it.

Seriously: Audio In, Coax Out and

See MEMORIES, page 20 ▶

Memories

▶ Continued from page 19

Power On. No cooking timer or popcorn button; but other than that, pure RadarRange.

Studio equipment

Most FM stations in the 1960s and '70s were money-losers. True!

In a transaction I remember in St. Louis, a seller refused to sell their huge AM rocker unless the purchaser would also take the loser FM off their hands. (Years later, I think the AM was gifted to the Branch Davidians or someone; but in the 1960s, AM was the big deal and the FM was just a placeholder to keep the frequency).

In any event, to make a few extra bucks, a lot of FMs signed on to transmit Muzak on the SCA channel. Muzak was a subscription background music service paid for by doctors' offices and so forth. A station would simply install several reel-to-reel tape machines that would churn along at 3-3/4 ips, playing endless, usually instrumental music to make some easy money. Burt Kaempfert was a staple.

But in order to avoid constant reel changes, the reels were rather large, at 10-1/2 inches. The large reels, in turn, necessitated fairly high torque from the takeup reel motor so it could keep spooling up the tape, no matter how little, or how much tape was left on the supply reel.

Naturally, as things aged — and received zero maintenance attention (because after all, it was *only* the FM, and *only* the SCA channel) — the takeup torque sometimes would overpower the ability of the capstan pinch roller to keep ol' Burt's trumpet on key.

I remember being in the local Piggly Wiggly when a particularly languid Kaempfert tune morphed into Alvin and the Chipmunks playing kazoos, as the tape speed ratcheted up to 500 ips or so. Ah, the stuff of legend.

And then there were AM rockers. The 1950s and '60s saw the advent of the Top 40 station, which, as playlists tightened up, quickly became the Top 25 and then, finally, the Top 14 or 15.

CDs were a few decades from widespread use, so as the 45 RPM singles were played and played and played, they got a bit, shall we say, "fidelity challenged." Add to the mix the typical jock, carbing up on Moon Pies while handling the discs, and the result was awful.

Cueing was manual and consisted of dropping the needle on the record (how quaint, all this talk of "needles" and "records") while the turntable was spinning. The jock would force the record back and forth, back and forth against the first sound groove until the record was cued precisely for that perfect segue, then hold the disc in place as the turntable kept spinning underneath it.

Thus the first few seconds of most records on Top 40 stations sounded like they were being played from inside a metal shed during a hailstorm. You could tell how popular a group was by how lousy the first few seconds of their record sounded.

(As an aside, to make sure the turntable had sufficient torque to pull against the drag of the hamhanded jock, most broadcast models were powered by a motor that was roughly as powerful as the engine immortalized by the Beach Boys song "She's Real Fine, My 409.")

And of course all of this manhandling meant that turntable needles deteriorated with amazing rapidity.

75 cents should do it

Every seasoned Top 40 jock kept a pocket full of change and a roll of Scotch tape handy, to add some critically needed weight to the tonearm to make sure the needle could plow through the occasional glob of Moon Pie detritus.

This "needle longevity extender" did work, but if overdone (three quarters stacked up on the cartridge head was about the practical limit), it would cause the needle to dig into the groove with the grace of a wood chisel cutting into soft pine. Then the station would go to a Top 13 format until someone could hustle down to the record store to buy an emergency replacement.

Reverb was a standard effect. Most PDs wanted each and every jock to sound Big. Not Moon Pie big, of course, but Big, as in Great Pipes.

Today? Just crank a knob. Back then? Well, we built a room in the basement with a labyrinth of walls to create a long, back-and-forth hallway. We put an Altec Lansing Voice of the Theatre at one end and an RCA 77-DX mic at the other. Feed that wimpy jock's mic to the A-L speaker, mix the 77-DX back into the jock's mic channel and there you were; your smallish, Pee Wee Herman-type jock would sound Big. Authentic Sith Lord Big.

In a particularly creative move, our PD decided that a variable delay reverb was needed. No problem. We positioned a DX every few yards down the "The Hall of the Really Big Pipes" and chose the desired Bigness level.

A list of equipment and methods that have changed through the application of better and more powerful technology would be almost endless. But as fun as memories are, as much as I miss the glow of the big glass tubes that powered the transmitters, I would never go back. In fact, as I think about the nights I spent buried up to my neck in transformers and relays and PCB-filled capacitors, I realize I've developed a real fondness for microwave ovens.

The author is vice president of engineering for Pacific Broadcasting of Missouri.

What's your favorite memory of working in radio "back when"? Tell us at radioworld@imaspub.com.

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Photo digitally altered to represent R90-212 model (they were only had a 20-channel photo to work with!)

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FEATURES:

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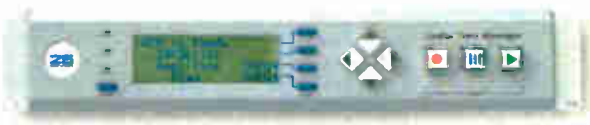

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WAMU: 'We're Content Providers'

Station Chooses D.A.V.I.D. System To Handle Burgeoning Content Demands

by Paul McLane

For a year now, WAMU(FM) in Washington has been running a networked audio automation system supplied by D.A.V.I.D., a German company seeking a stronger foothold in the U.S. market.

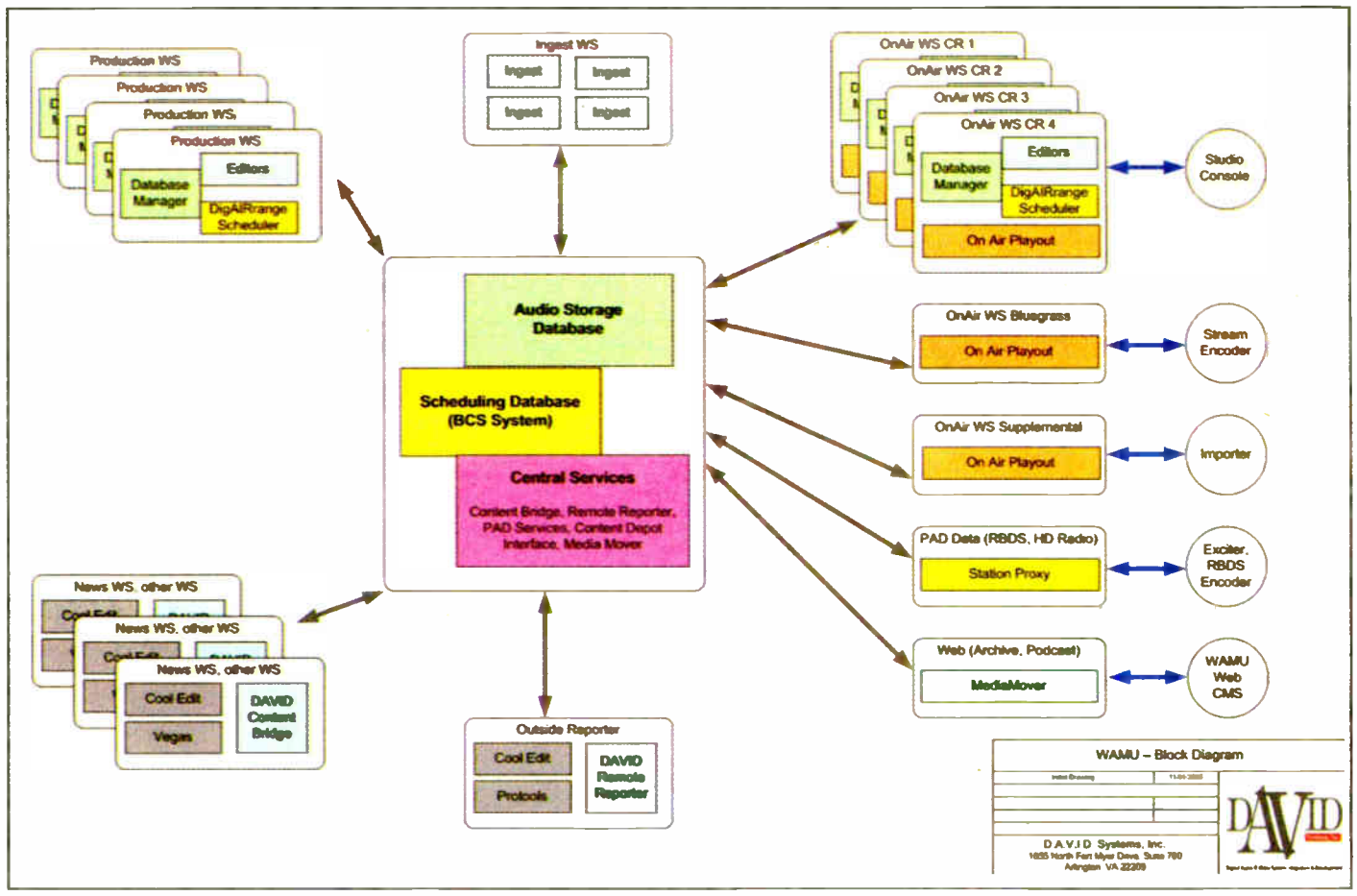
The project gives insight into the design philosophies of the supplier; it also typifies how the goals of a modern, big-city radio station continue to evolve.

Director of Engineering John Holt, at any rate, is clear about WAMU's mission: "We're content providers."

Sitting in the meeting room/cafeteria at WAMU — near a pledge board filled with scribbled numbers and with on-air host Diane Rehm sticking her head into the room occasionally for coffee — Holt ticked off the various ways WAMU now produces audio and data information.

These channels include over-the-air analog, RDS text, over-the-air HD Radio and a supplemental multicast, online streaming of station programming, online archived content and a separate Web bluegrass channel. It has just added podcasts.

Its audio management system has to handle all of that.



Block diagram details the station's D.A.V.I.D. installation.

Open interfaces

WAMU — "Your NPR News Station in the Nation's Capital" — is licensed to American University; it serves 576,000 listeners in the District of Columbia, Maryland and Virginia. Staffed by paid employees, it carries networked programming from NPR, PRI and BBC as well as local shows. It's home to hosts Diane Rehm — who reaches 1.4 million listeners a week through NPR and Sirius distribution, as well as WAMU itself — and Kojo Nnamdi.

The station added HD Radio in the spring of 2004 and was one of the first to activate a multicast channel. It used WAMU-2 to air NPR coverage of the Supreme Court confirmation hearings for John Roberts.

Holt said the station shopped for eight years to find the right platform to manage its mix of offerings before choosing D.A.V.I.D.

The supplier was founded in Munich in 1991, selling a digital storage system for news content called DigAS and a networked audio editor, EdigAS. (The names are based on amalgams of German words.) The product name changed to DigaSystem five years ago "to emphasize the system character and to internationalize the brand," according to its literature, and the company expanded its scope to include production, content exchange and on-air functions as well as news.

In the United States and Canada, the company refers to its solutions simply as D.A.V.I.D. Systems.

The firm has made its U.S. mark mostly in public and government broadcasting; clients include WETA(FM) in Washington; WNYC(AM/FM) NewYork; WNPR(FM) in Connecticut; Marketplace Productions, which is now part of MPR; Oregon Public Broadcasting; the U.S. Department of Agriculture; and Radio Free Europe/Radio Liberty, its largest U.S. installation.

To serve North American clients, the supplier has an office of four employees in Rosslyn, Va., outside of Washington, run by President Richard Doll.

D.A.V.I.D. emphasizes the use of open interfaces that work in various system environments. It says systems can range from single-journalist workstations to designs that handle recording, storing, editing, managing and broadcasting audio. Globally, it has approximately 10,000 "seats," or user positions.

The line is based on standard PC hardware. Database functions are based on SQL and ODBC standards. The systems can operate with a variety of audio formats. Most systems are operating at linear 44.1 kHz, 16-bit stereo or MPEG Layer II standard with MusiFile and BWF formats. They can be configured for linear 96 kHz, 24-bit, stereo WAV audio, as well as hybrid formats, MP3, Windows Media and RealAudio. A recent addition is support for the Suround Sound format RF64.

What WAMU initially purchased was a Latitude Edition system, but the package has since grown into a full DigaSystem setup.

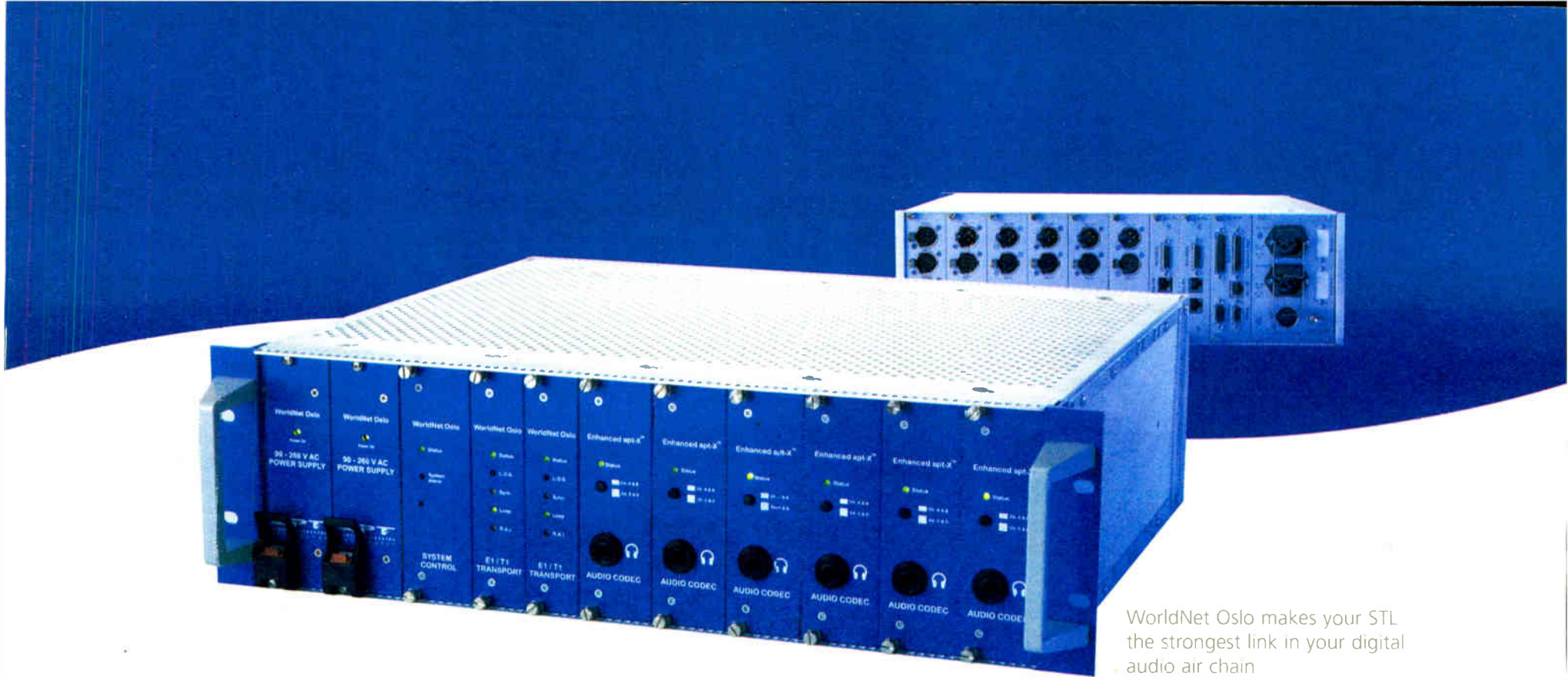
Latitude Edition was introduced in 2004 to appeal to U.S. broadcasters, who tend to be smaller and more economy-minded than D.A.V.I.D.'s European clients. A base package retails for $35,000 and includes three workstations, a file/audio server with 2,000 hours of music in MP2, three flat-panel monitors, soundcards, a network switch and training.

The supplier emphasizes the system's ability to adjust to workflows and its scalable operating environment. It says the modular design can grow like a box of Lego bricks — as it has done at WAMU.

Phased in

"It's never completed," Holt said. The station goals have evolved thanks to digital radio and data-handling needs. WAMU now has 15 Database Managers, four on-air studios and a separate playout system for BluegrassCountry.org; a third system is coming to handle the

See WAMU, page 24 ▶



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WAMU

▶ Continued from page 22

station's multicasting feeds.

The station chose to implement the system slowly.

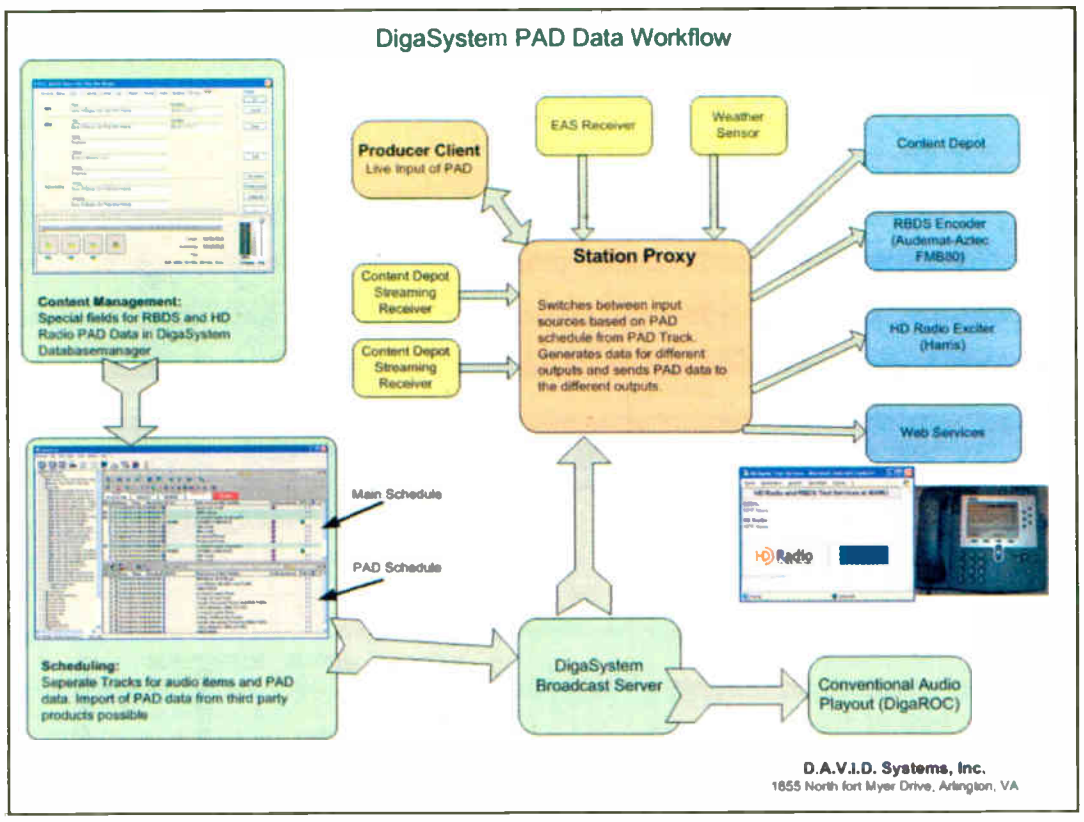
"First we just had people playing with it," Holt said. "Then we began readying long-form NPR programming; then news pieces submitted via the Web interface; then we began managing underwriting announcements and promotions." The station has about 50 employees; perhaps 25 of them use the system.

Richard Doll of D.A.V.I.D. said that at WAMU, a phased-in launch was more productive than a hard switchover. "One of the things we learned is that a turnkey system can be installed, but individual operators must ask their own questions and get a response to them rather than just getting their five-day training," he said.

WAMU employs two major interfaces, according to Fridolin Mueller, vice president for system solutions at D.A.V.I.D. One interface handles content management, including station audio, archiving and Web audio. Another handles the recording of content ingested from network feeds. The station has also been testing the ContentDepot interface. Existing workstations running Adobe Audition or Vegas can contribute audio using the Content Bridge module.

The installation uses linear audio, with 600 GB of main storage, which is mirrored. Backup is a big part of Holt's thinking; he is planning one or more backups off-site, acknowledging that a facility problem is a possibility given the location in the nation's capital.

Systems can mirror each other, so WAMU is talking to at least one other D.A.V.I.D. user in the area about supporting each other as mutual backups.



Workflow of integrated program-associated data services.

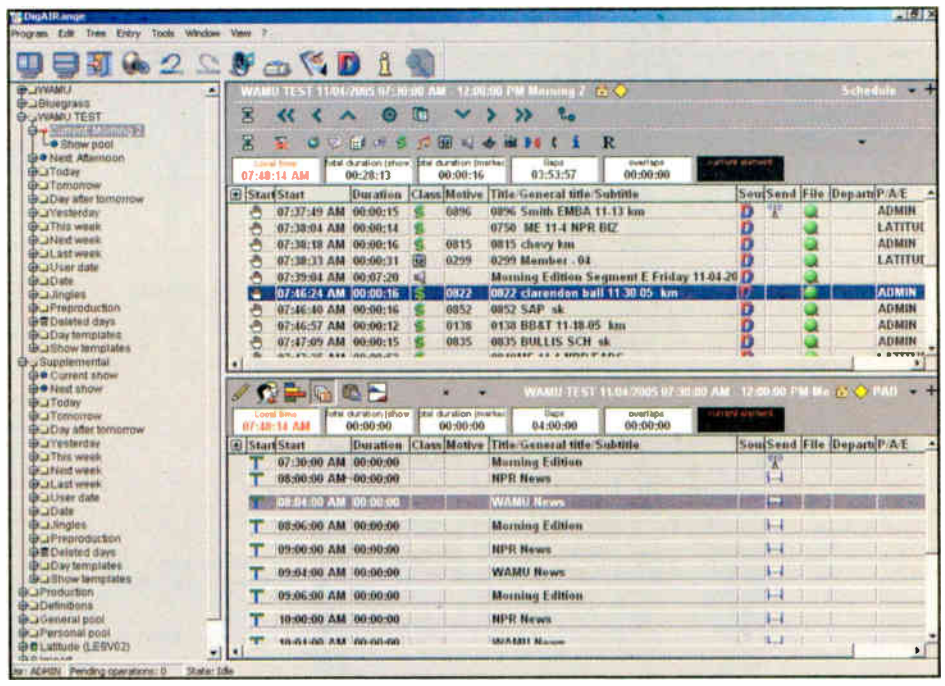
How a station might use these tools, Holt says, was seen in WAMU's decision to carry the Roberts hearings on its multicast channel. The station also recorded the hearings in one-hour segments and rebroadcast them later on WAMU2 and the second Web stream.

"At that time, we started promoting both HD Radio and the Web stream on-air." Some 6,000 people tuned to the "second channel" feed via the Web, and 33,000 more than usual tuned to the main channel during the Roberts coverage.

"WAMU is often at the head of new innovations," Mueller said. "It's not just a client/supplier relationship. John helps us, shows us new things and helps us understand the market."

For his part, Holt is satisfied with his German-born, Washington-bred installation.

"It was obvious this is a system that would grow into a 21st century system, not one built in the 1990s and added onto since."



A scheduler screenshot. The right pane shows the audio schedule on top and PAD schedule at the bottom.

Any control room can go on the air, a feature that was important to Holt. The system allows a user in one room to do audio trimming for production while another studio is still airing the source audio.

A bridge

Another selling point was that the station could continue to use its Vegas or Cool Edit editors, as well as the Latitude Edition editing module.

"WAMU had an investment in certain digital and editing systems," Doll said. "The goal was not to build another 'island' but a system that lets them bridge various islands."

The system can drag and drop multiple file formats and handle multitasking. "All these changes can be done on the fly," Doll said. "A hierarchical user system lets people make changes to the last second that are immediately visible across the environment. There are no operational limitations to how close to air things can be changed."

The multipurposing of content is a big part of WAMU's activities. Once a given piece is produced, said Doll, "all these avenues are automated" — users need only check off items on a command screen to tell the system where the content needs to go.

"Web producers from other stations are stunned when they find out that zero staff time is spent in creating and encoding Web material," Holt said.

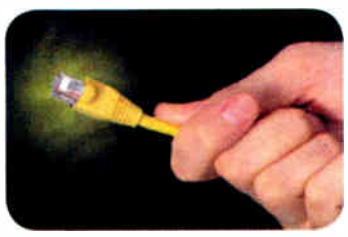
"We've started implementing the end-to-end PAD workflow here," said Mueller. "HD Radio, RDS, feeding back to the Web. So in addition to the audio schedule, there is a data schedule setting what will be displayed."

Doll feels WAMU's experience in expanding its offerings through new channels presents a model for broadcasters. "For any station thinking of multicasting to a secondary channel, it's a good idea to do it now on the Web," as WAMU has done with its bluegrass channel; adding a second on-air channel then becomes less daunting.

"Showcase studios take time, right? Not this time."

"'Challenging' didn't begin to cover it. Our showcase studios were to be located in the high-visibility West Edmonton Mall. With only six weeks 'til our on-air date, our challenge was finding a manufacturer we could trust to deliver on our timeline.

"We'd almost decided on one of the traditional console/router companies; working 25/7, we could *barely* make our deadline. Then we found out about Axia IP-Audio networks.



"Axia gear goes together with RJ-45 connectors, so adding sources to the network takes almost no time. A few clicks and you're done! That produces a substantial cost reduction in terms of wiring from room to room.

"And because the Axia system routes audio using ordinary Ethernet instead of expensive mainframes, the ease of adding to the network allows it to grow and change dynamically with our operations.

"When we decided to go with Axia, the router guys had a fit. They actually tried to tell us that the IP-Audio network would catch viruses! We laughed for days about that one.

"Our studios were finished with time to spare. The installation came together really well, and since going on the air we've been trouble-free.

"We've had several announcers tell us how much they love working with the Axia surfaces and how easy they are to operate. It's great to be able to setup and save multiple configurations that can be recalled at a moment's notice.

"Our experience with Axia has been all positive; we've had no audio glitches or dropouts whatsoever. I don't know why we hadn't gone this route earlier. Where we're installing new equipment, we're onboard with Axia."

— Owen Martin, Director of Engineering, Newcap Radio, Alberta, Canada

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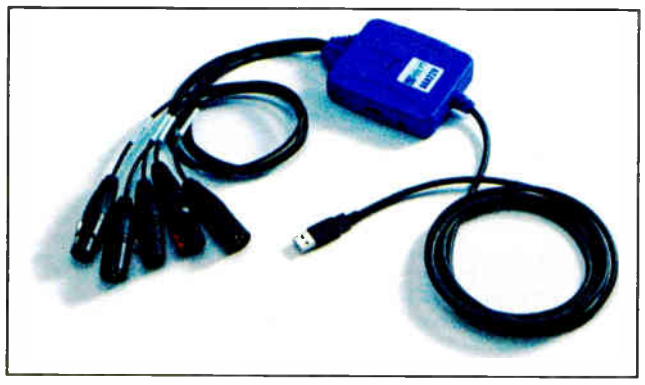
PRODUCT EVALUATION

Digigram Debuts USB Audio Interface

When Connected to USB Port, UAX220 Is Recognized As a USB Audio-Compliant Device Without Driver

by Carl Lindemann



Digigram has a reputation for providing professional soundcards to top OEM equipment manufacturers. Several years back, the company stepped forward to take a high profile with its own branded PCXpocket PC Card audio card. The series, as well as the VXpocket models that followed, took advantage of the increasing power of laptop computers to bring the dream of the professional portable DAW into reality.

The VXpocket has proven to be one of the company's most visible successes. Now, the UAX220 USB Audio interface takes the concept to the next level, combining audio quality with simplicity.

What's inside?

The UAX220 interface consists of a box that's slightly larger than a pack of cigarettes at 3.5 x 3.2 x 0.9 inches, with a USB cable connected on one side and a cable snake with four Neutrik connectors. One pair of female XLR connectors provide balanced analog mono inputs alongside a pair of male XLR servo-balanced analog mono line outputs.

In addition, there is a 1/4-inch headphone jack. The box comes with a gain knob for headphone volume and a single pushbutton to enable direct monitoring. The unit is powered directly off the USB bus. Inside, the A/D and D/A converters are 24-bit/96 kHz quality, and are more than capable of handling the unit's 24-bit/8-48 kHz record/playback capabilities.

Both Windows 2000 and Windows XP Pro recognized the UAX220 correctly as an audio interface and installed the WDM DirectSound drivers for it automatically. (Sorry, no Mac in the house, but it is compatible with OS X and also Linux). It was immediately accessible in the options dialog box in the audio production applications I tested it with, including Sony's Soundforge 7.0 and Adobe Audition 1.5.

The only possible adjustments are tucked away out of sight in the OS controls. The default output levels of the D/A converters can be dropped down from +10 dBu by getting into the Windows speaker volume control or the Mac sound panel. For most purposes, the default settings are fine. Ditto for keeping the 48 kHz internal sampling rate.

Normally, playback of audio with different sampling rates is handled seamlessly with a real-time conversion in the OS. Keeping this fixed solves sampling frequency setting conflicts that happen occasionally with USB Audio.

If you're running different applications using two sampling frequencies, one of which may be Windows playing system sounds, you can suffer a scramble of pitch and speed when, for example, a file recorded at 32 kHz plays back through an audio device supplying samples at 44.1 kHz. Leaving the sampling frequency fixed prevents this.

'Free' mode

For added versatility in specialized applications such as audio measurement, the UAX220 offers a "free" mode to adjust the internal frequency through changing the firmware.

The free mode allows for using a kernel ASIO driver — no automatic frequency conversion available with that — or for doing audio measurement work at the exact sampling frequency required, providing the highest quality and/or the lowest latency. These applications are less likely to run into scrambled sampling rates because they are typically run alone.

At present, the "free" mode requires a firmware swap. Soon, this will be upgraded to a single firmware with controls to run both fixed and free modes and also allow switching from 16-bit to 24-bit word length.

The UAX220 did not disappoint in terms of audio quality. In fact, it matched — and perhaps bested — the analog quality of my longtime favorite, the CardDeluxe PCI soundcard. Company claims of a 104 dB dynamic range and 98 dB S/N ratio proved to be conservative in my testing. That is a major leap beyond what I have seen through USB.

Subjectively, the sound of the D/A converters struck me as pleasing. It isn't "warm" like recording through tubes to tape, but there wasn't any of the harsh digital edge found on lesser digital audio adapters. Radio pros conscious of audio quality as well as voiceover artists and musicians will appreciate the terrific sound.

Remember, you're only as good as the weakest link in the audio chain. For most radio users, the UAX220 will likely raise the bar.

Unlike some of the all-in-one portable USB audio adapters on the market, the UAX220 is designed for use with a mixer. This may add a slight level of complexity for those creating a portable studio on the fly with a laptop, but keeping these components separate is likely why this sounds great.

It also can serve double-duty installed at the studio and taken on the road as needed. If you are shopping for an audio adapter for a desktop DAW, planning on taking your show on the road or both, the UAX220 is the one to get.

I gave this product no thumbs down in the accompanying product capsule, only the second time I've done so in my nine years of reviewing for RW.

Carl Lindemann is a frequent contributor to Radio World.

Product Capsule:
Digigram UAX220 USB Audio Interface

Thumbs Up

- ✓ Top-notch sound quality
- ✓ Total simplicity
- ✓ Broad OS support (Linux users rejoice!)

Thumbs Down

- ✓ None

Price: $495

CONTACT: *Digigram in Virginia at 703 875 9100 or visit* www.digigram.com.

PRODUCT EVALUATION

Neumann Makes Dynamic Move

A Long-time Manufacturer of Condensers Tackles Dynamic Design With the BCM 705

by Charles Dubé

As the Gibson Les Paul or the Fender Telecaster are ubiquitous to the world of popular entertainment, Neumann microphones have been the staple of many a recording session since the "Bottle" mic of 1928 appeared in Germany.

This was followed by the U47 in 1949, the first switchable-pattern condenser; the U49 in the early 1950s; and the popular U67 and its solid-state progeny the U87 and U89.

There's little question about where Neumann is going with this product. The mic was born to hang above a console.'

But a recording studio's or radio suite's budget might prohibit the purchase of a microphone in the price range of the U87, especially if one is budgeting for numerous microphones to outfit a group of studios. It is for this reason that a class of microphones, the dynamic, has become a mainstay in its own right in radio station air and production studios for the last couple of decades.

Dynamic journey

The rugged dynamic mic is more likely to survive morning-show antics, the tropic island remote broadcast and the tribulations of the production studio than its more delicate condenser cousins. The dynamic, while offering an acceptable sound, tends to be priced at a level where outfitting several voicing booths won't require a second mortgage.

And unlike the finely tuned instruments that make up the better class of condenser mics, you won't feel queasy about sticking one in front of a kick drum — or an announcer with the personality of one.

For almost a century, Neumann has offered a plethora of condenser mics designed for various applications, but it is with the BCM 705 that the company begins its foray into the world of dynamic microphone design. It hits the ground running.

There's little question about where Neumann is going with this product. "BCM" stands for "Broadcast Microphone," and it's clear from the design that the mic was born to hang above a console.

The BCM 705, weighing in at about 16 ounces, won't block your view of the copy stand. Its element is suspended beneath the housing, which is the size of a half-can of soda. A rugged tubular headgrille sheathes the element and lightweight internal popscreen.

The grille is removable by twisting it a couple of turns. This allows for easy removal of the popscreen for the cleaning of moisture, food particles and other foreign objects that might build up here. When finished rinsing the pop screen and grille, the pop screen snaps into place and one simply twists the grille back onto the housing.

It is critical that the microphone be positioned so the headgrille is on top. Otherwise, after removing the popscreen there is the danger the element will fall out of the housing, as it is the popscreen clips that also hold this together. And of course, everything must be completely dry before reassembling.

If desired, each talent can have his own grille, which is nice if someone has a cold! Over time, this option is certain to save a station a bit of revenue that might have been committed to periodical microphone overhauls.

Pop quiz

So, after we have our BCM 705 hanging on its boom, what shall we expect?

In side-by-side comparisons I made with dynamic microphones in this price class, I found the most noticeable characteristic to be its transparent response. With the limitations inherent in dynamic microphone design, the BCM 705 no doubt attempts to reach the sweet and rich characteristics found in its condenser lineage.

By no means a pedestrian offering, this is a mic you can take a few swings at

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PRODUCT GUIDE

Ultrasone Offers HFI-700 HSD Headset

Ultrasone's HFI-700 HSD combines its S-Logic technology and a DPA 4088 directional microphone. The company bills it as "the ultimate broadcaster's headset."

The microphone portion of the headset uses a miniature head-worn mic. The DPA 4088 (cardioid) or DPA 4066 (omni) is joined to the headphone with an articulating mount and disconnect. The six-foot cable terminates to a fan out with a 1/4-inch stereo plug for monitoring and a 3-pin female XLR for the mic. 5 V –50 V phantom power is required for the mic. Custom cable length and connector termination are available.

The headphone portion of the HFI-700 HSD uses S-Logic to enable low distortion and driver positioning that the company says lets the user listen at lower sound pressure levels, which reduces fatigue and protects ears.

The HFI-700 HFD retails for $750.

For more information, visit www.ultrasoneusa.com.

Neumann

▶ Continued from page 27

and still find it singing. Announcers and voiceover talents will appreciate the efficacy of its bass response, which is robust and smooth at any distance with little proximity effect apparent. This is an intentional effort on the part of the designers, and they pulled it off well. The BCM 705 is designed for close miking.

Another nice aspect was the efficacy of the internal pop screen. Without muddying the waters at all, it was hard to make this mic "pop" even as I discussed "purple primates picking out a plethora of pettish past participles" with myself. (I received several strange looks in the hallway that afternoon).

An optional windscreen (WS 47) is available for really aggressive "pronouncers."

The BCM 705 exhibits the characteristics of a hypercardioid although the pattern response isn't exceptionally deep in rear rejection. At 180 degrees my voice dropped from peaks of 0 dBm to roughly -14 dBm, whereas at 90 degrees my voice was down to -18 dBm. This is because of the openness of the surrounding grille.

Designers utilize this encasement to be coupled with the rear entrance port of the capsule, which is part of the maintenance of a smooth on-axis bass response in the microphone. The capsule itself is a redesigned version of the Sennheiser MD 431 capsule, which is noted for its lack of coloring off-axis audio. The BCM 705 exhibits this feature as well.

Product Capsule:
Neumann BCM 705
Dynamic Microphone

Thumbs Up

- ✓ Effective internal pop screen
- ✓ Transparent response
- ✓ Size won't block copy stand
- ✓ Rugged, removable headgrille

Thumbs Down

- ✓ No roll-off switch

Price: $799

CONTACT: Sennheiser Electronic Corp. in Connecticut at (860) 434-9190 or visit www.sennheiserusa.com.

The particular studio I used for this test has a few computers running at floor level (an all-too-common irritation) and it was interesting to hear how the 705 performs in its sensitivity to off-axis ambient noise. While I didn't find anything extraordinary about the BCM 705's rejection of the room noise, for the most part it seemed to perform comparable to mics of its class.

The BCM 705 hangs from its rubber-encased shock-mount, which supports the assembly at three points. This provided adequate isolation from vibrations traveling up the boom itself, but surprisingly some rumble found its way onto the encasement via the microphone cable. This can be remedied by utilizing a light diameter pigtail should vibration become a problem.

The BCM 705 is consistent with what engineers and broadcasters have come to expect from a Neumann product. It is manufactured to comply with professional standards and excels at the task it is required to perform, voice announcing.

The sound is natural and open. In the near field it boasts a pleasantly smooth and consistant frequency response from below 40 Hz through the upper limits of the human voice. It does not come equipped with a roll-off switch, which may irritate some although I don't believe it needs one. If you are looking for a dynamic microphone designed to transmit an authentic and natural tone, the Neumann BCM 705 delivers the goods.

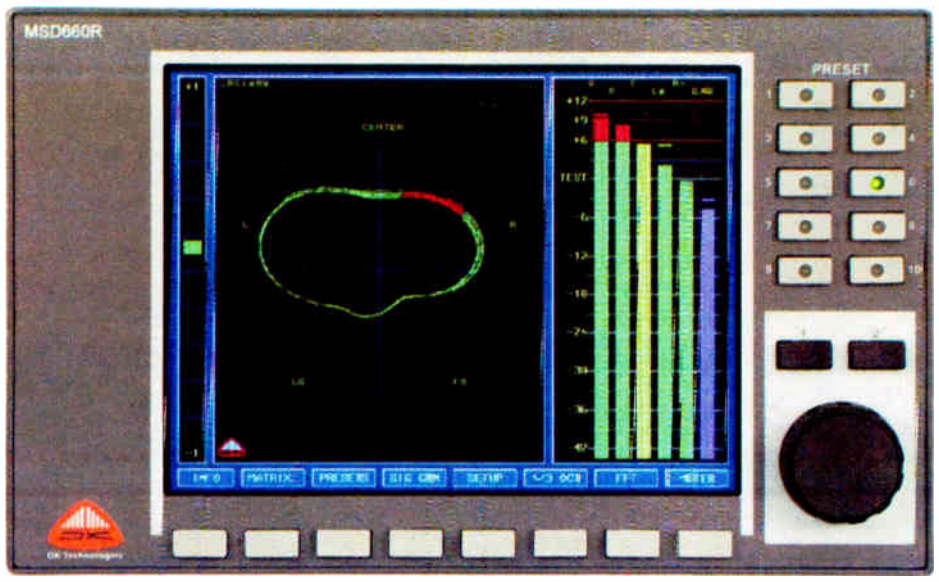
Charles Dubé is chief engineer for University of Massachusetts' WFCR(FM) in Amherst, Mass. He can be reached at cld@wfcr.org.

PRODUCT GUIDE

MSD660R Saves Space Via Cat-5 Cable

The MSD660R from DK-Technologies is a metering device aimed at broadcast and post-production applications. It is suitable for analog, AES, SDI and HD-SDI signals. The company says the modular design eases future changes and upgrades.

The main part of the instrument is placed in the machine room and is connected to the control panel by way of a standard Cat-5 Ethernet cable that runs a distance of 100 feet. Because only a control panel is located in the control room, the company notes that cables can be kept to a minimum.



The MSD660R offers an encoder knob that also works as volume control, a feature familiar to users of DK-Technologies' PTO660M master stereo and surround sound meter. Its output can be used to feed active speakers, with volume control supplied by the encoder knob. Formats include stereo, 5.1, 6.1 and 7.1 surround sound. The outputs can be controlled in analog and digital, meaning active speakers with an AES input can be fed and controlled directly.

For more information, including pricing, contact DK-Technologies in California at (800) 421-0888 or visit www.dk-technologies.net.

HHB FlashMic Mixes Condenser Capsule, 1 GB Memory

HHB Communications' FlashMic DRM85 digital recording microphone combines a Sennheiser omni-directional condenser capsule with 1 GB of flash recording memory; the company says it is suitable for broadcast voice recording applications.

WAV linear or MPEG 2 encoded audio files can be transferred via USB to PC or Mac computers for editing and onward transmission. A Date/Time stamp is stored along with the file, with the internal real-time clock set and synchronized by the host computer.

The FlashMic is powered for more than six hours by a pair of standard AA batteries, with the remaining battery power displayed along with the time, level and status information in a backlit LCD on the microphone body. A visual warning alerts the user to the need to change batteries.

Users can operate the FlashMic out of the box using default settings, or create and store nine custom configurations using the supplied Mac/PC GUI software. Parameters include Audio Mode, AGC On/Off, Record Level, Pre-Record Buffer (0-10 seconds) and High-Pass Filter On/Off. Expert Mode allows variable parameters to be accessed from the FlashMic body.

The company says FlashMic offers quality recordings, with a frequency response of 20 Hz to 20 kHz and less than 0.1 percent THD at 16-bit/48 kHz. Recordings can be played back under independent level control on headphones connected by way of a socket on the base of the unit.

For more information, contact HHB's U.S. distributor Sennheiser Electronic Corp. in Connecticut at (860) 434-9190 or visit www.sennheiserusa.com.

USER REPORT

WHTQ Puts HD-R Dibrid on the Air

Dielectric's Combiner Offers Variable Coupling Coefficient, Allows User to Route Tx Directly to Antenna

by Steve Fluker
Director of Engineering
Cox Radio

ORLANDO Multicasting, surround sound and other data services are but a few of the evolving technologies that have brought excitement to the industry and led most major broadcasters to convert their stations to HD Radio over the next few years.

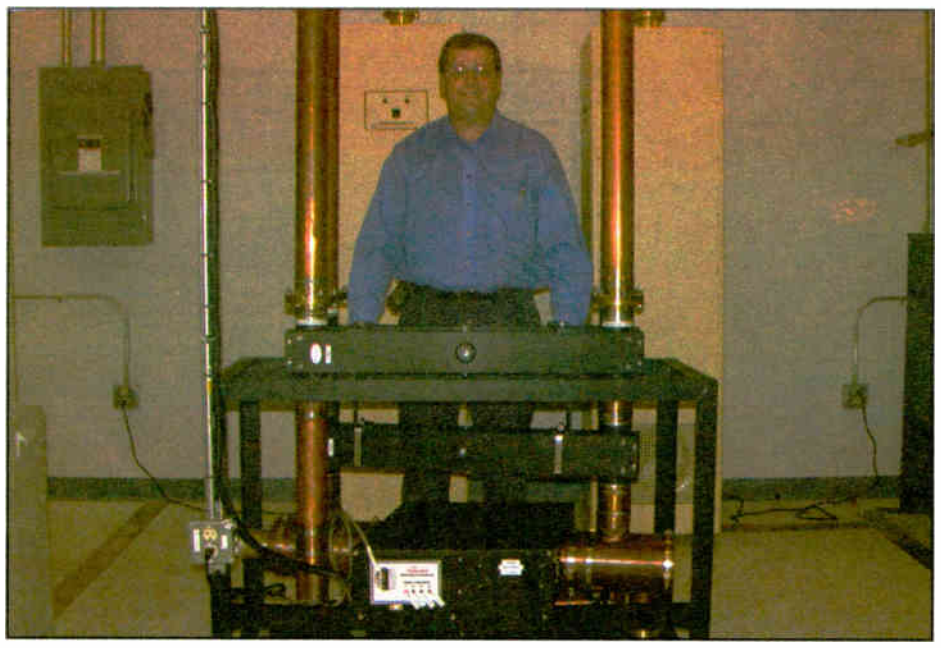
While these commitments have been made, decisions on just how to implement HD are still up in the air. Perhaps the biggest decision is choosing the appropriate combining system for your radio stations.

One of the newer combining methods rapidly gaining in popularity is the Split-Level Combiner system, sometimes called Mid-Level Combining. (Split-Level Combining has patents pending. I hold the primary patent, and Harris holds improvement patents and trademark.)

When it came time to select a combining system for my FM stations here in Orlando, I selected the Split-Level system for the several advantages it has over the standard high-level combining.

With the Split-Level, I can achieve a higher efficiency and lower heat output. Plus, because both transmitters carry a portion of the analog carrier, the radio station stays on the air without a glitch even if one transmitter fails.

The next step is choosing the appropriate hybrid for your system. With Split-Level combining, the 10 dB hybrid used for the high-level method is replaced with a value set between 3 and 9 dB, depending on your transmitter configuration. Standard models come in a choice of 3, 4.7 or 6 dB values and you choose the one closest to your needs.



Steve Fluker stands with the Dielectric Dibrid.

As an improvement to this, **Dielectric** has introduced a hybrid, called the Dibrid, which has a variable coefficient between 3 and 10 dB. Typically the value is set at the factory, but it can be changed in the field if necessary by connecting it to a computer via a serial port. This flexibility will allow you to maximize the efficiency of your combining system instead of settling on something because it was the closest you could get.

Stay on the air

The Dibrid is the system I chose for WHTQ(FM) in Orlando, and I quickly found there's much more to it than just the variable coupling coefficient.

This hybrid also allows the user, through motorized controls, to route either of two transmitters directly to the antenna, eliminating the power lost to the reject load and giving the user the most power possible during maintenance times.

In my case, I have an analog transmitter producing 24 kW of analog power and a digital transmitter producing 10 kW of analog along with the 340 watt HD signal. If I were using a standard fixed-value hybrid, my station would be operating at about 50 percent power if I took down the digital transmitter.

That's okay, but if the analog transmitter goes down, such as when changing a tube, my station's power would drop to just below 10 percent — on the air, but not where I would like it to be.

By using the Dibrid hybrid, I can set the analog transmitter to Antenna mode, allowing me to turn off the digital transmitter and stay on the air at over 70 percent power. If I need to take down the analog transmitter, I can route the digital transmitter directly to the antenna and stay on the air at 30 percent power. On top of that, the control system used for the Dibrid has the ability to reduce the HD power to maintain the proper output ratio, giving an added boost to the analog power.

The bottom line is I'm now on the air at 38 percent power — a much better scenario than the 10 percent power I would realize with a fixed hybrid.

Another benefit is that while one transmitter is routed to the antenna, the second is routed directly to the reject load, giving me the chance to work on the transmitter — turning it on and off — without affecting the on-air signal.

Best of all, when I'm ready to go back on the air at full power, I simply turn on both transmitters, then select the Combined

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Dibrid

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Transmitter mode and watch my output power climb back up to 100 percent. I never leave the air.

Another fear when choosing between Split-Level or High-Level combining is what happens if your reject load fails. I have the reject load at one of my FMs located outside of the building. When Hurricane Wilma was approaching, I was afraid the load might get damaged by the winds, even though I had it bolted down to the cement. If you are using a fixed hybrid and this reject load does fail, you're off the air — period.

With the Dibrid, you can route either transmitter directly to the antenna, eliminating the use of the reject load and thus getting you back on the air. You can even replace the reject load without going off the air.

When working with the Dibrid, you can choose from a couple of controller panel options to suit your needs. These controllers can be operated remotely and some will automatically switch modes should a transmitter fail.

While one transmitter is routed to the antenna, the second transmitter is routed directly to the reject load, giving me the chance to work on the transmitter without affecting the on-air signal.

The Dibrid is a bit on the expensive side, but considering the benefits, it's well worth the cost. One day off the air during drive time — while you're fumbling, trying to find transmission line pieces to bypass the hybrid — and you've made up the difference in cost.

Split Level Combiner is trademarked property of Harris Corp., patents pending.

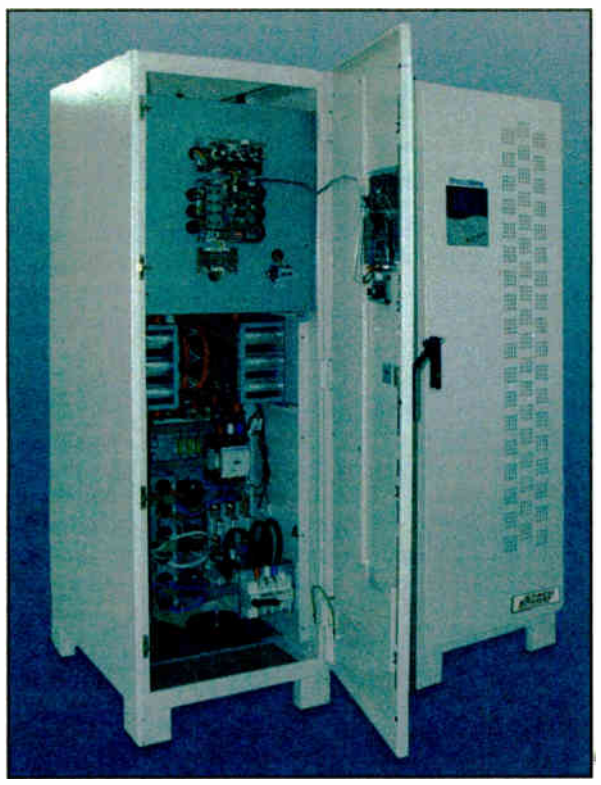
For more information, including pricing, contact Dielectric Corp. in Maine at (207) 655-4555 or visit www.dielectric.com.

TECH UPDATE

StacoSine Corrects Harmonic Orders

Staco Energy Products says its StacoSine line of active harmonic filters dynamically correct a variety of harmonic orders.

StacoSine uses power electronics to monitor a non-linear load and dynamically correct harmonic orders from the second to the 31st. Through an injection and cancellation process, the sine wave is restored and distortion is reduced to less than 5 percent THD, meeting IEEE-519 standards.



StaceSine technology moves power from the AC source to its DC electronics platform, then back to the AC source, to cancel out harmonics and equalize the sine wave. The process cancels high-frequency output current. while it determines the value of injected load current.

StacoSine is suitable for operation at levels that continuously adapt to rapid load fluctuations, and industrial and commercial environments.

Models are available for 208–480 VAC, three-phase installations with an adaptive system frequency of 45/65 Hz, and 120/420 VAC control power. Equipment ratings are from 25 to 200 amperes. Wall-mount or freestanding NEMA 1 enclosures are standard, with NEMA 12 or 3R enclosures available. Optional communications packages and user-specific requirements can be accommodated.

The company says that unlike "passive" harmonic mitigation technologies that require intensive site data collection, power quality surveys and computer-generated studies, StacoSine can be installed with minimal analysis. They are available as standalone systems or can be integrated into other power quality and power distribution equipment.

For more information, including pricing, contact Staco Energy Products in Ohio at (866) 261-1191 or visit www.stacoenergy.com.

USER REPORT

Starlink Tackles Texas Terrain

Clear Channel Cluster Project Addresses Connectivity Using Moseley Starlink T1 STL

by Brett Gilbert, CSRE CBNT
Manager, Engineering and IT
Clear Channel Radio
Waco/Temple/Killeen, Texas

WACO, Texas In August of 2004 Clear Channel began looking at consolidating the two-station operation in Killeen, Texas into the Waco facility some 59 miles away.

While the consolidation had been discussed before, it now became evident that the time was right to take the path many other broadcasters in the area had chosen: treating the central Texas area as one large metro area.

Moving the operations of the two stations from Killeen proved a unique challenge. The stations wanted to maintain their strong local presence in the market, as they do a large number of remote broadcasts each week from the Killeen and Temple areas. This requirement made it necessary for the STL system to provide not only program audio, but also several audio backhauls to the Waco studios.

In addition, we would have to maintain a facility with studio/on-air capabilities (to meet FCC LMA requirements), a sales office and local staff, which would require network and telephone connectivity. The studio request lines also would need to be routed to the Waco studios.

The first and most critical task would be designing the STL/TSL/Intercity system. Central Texas is a challenging area to work with due to geography and lack of unified telecommunications. The Killeen region is in a low geographic area, which makes line-of-sight paths from Waco to Killeen difficult. Worse, the two cities are served by different telephone companies.

Due to terrain, my initial thought was to use conventional T1 lines to get the necessary audio feeds to and from Waco and Killeen. But neither telephone provider could provide a T1 at a reasonable cost. The costs were so high that even the most elaborate RF-based system would be quickly paid off by the high monthly rates. To make matters worse, neither company wanted to work together, even to get a simple service quote.

Brett Gilbert with the Starlink

I thought, "If I ever got the circuits working and one failed, how long would we be without service while the two companies fought over who needed to repair the circuit?" Also, we were still lacking a cost-effective method for request lines in Waco because neither company could provide an enhanced calling area encompassing both metros.

At this point I decided to contact Gil Garcia, my regional engineering manager, for suggestions. He recommended contacting Bill Gould at **Moseley** about its Starlink T1 STL using unlicensed 5.8 GHz radios. He had used them in other markets with great success. After my initial conversation with Bill I realized the system he was proposing could encompass our needs.

Four T1s

Finally, the pieces began to fall into place. The system would be based on the Moseley Starlink SL9003T1 chassis using Stratex 5.8 GHz spread-spectrum radios to provide a four-T1 backbone between the sites.

We could dedicate one T1 to each station's Starlink chassis, which would contain an uncompressed stereo channel for the transmitter, an uncompressed stereo backhaul channel for two RPU receivers and a compressed stereo backhaul channel for off-air monitors. The third T1 would be used for networking our two telephone switches, and the fourth T1 would link our two computer network switches for LAN/WAN connectivity.

At this point we had a concise plan for tackling our site connectivity issues but we still had obstacles to overcome, the first being at the Waco studio site.

Located 200 feet from our studio building is a self-supported tower that holds our STLs, RPUs and an FM broadcast antenna. In the past, lightning had been a severe problem and numerous attempts at improving grounding, electrical bonding and surge arrestors had never been 100 percent successful.

In order to protect the delicate equipment in the studio building interconnected to the 4XT1 radio located in the tower building, we would have to choose an isolation approach.

I decided to specify fiber between the tower and studio buildings. A quick Internet search turned up TC Communications, a California company, which had the right product, a quad T1/E1 fiber modem. Instead of running a wire line, a non-conductive fiber link would carry the four T1s safely between buildings.

The second issue was the Texas terrain.

The 5.8 GHz system has a limit of around 30 miles and it must have perfect line of sight. System losses would be critical, but fortunately the Stratex radio did have the advantage of a split indoor unit and outdoor RF unit interconnected by a DC cable and Cat-5 cable.

This virtually eliminated transmission line losses in the system allowing us to use smaller dishes with less wind loading and obtain longer distances. This cut installation costs and time dramatically.

To get the signal from Waco to Killeen required three links. The first hop would use a 16-mile path using four-foot dishes to the first repeater site in Moody. The second hop would use a 26-mile path using 6-foot dishes to the second repeater site in Nolanville. The final path would be only five miles long using two-foot dishes to the Killeen/Harker Heights office/studio location.

The system was configured using two separate but identical Starlink T1 STLs, one for each station. With uncompressed channels used for the RPU back-hauls, latency is minimal, which allows off-air monitoring of breaks when on remote. We use compressed channels for the air monitors in Waco, so we utilize Henry Engineering Moni-Switch boxes and Behringer UltraFX Pros for monitoring while the mics are open to eliminate delay effects in the headphones.

At the Killeen location we maintain a fully duplicated operation complete with an operational studio, automation system and satellite receivers. From the initial stages we knew we would have to provide program origination capability from Killeen. I designed in manual, automatic and remote override capabilities for the origination of local programming to meet FCC requirements, which was critical to meeting the requirements for the two stations.

Additionally, the staff could use the Killeen facility in an emergency, as they had in the past.

Transparent

To connect phone lines between the two sites we utilized Samsung telephone switches using the company's T1 network system. We choose Samsung because we had a Samsung system in Waco and we would be able to reuse our sets and cards with the newer switch. Employees can call from either location by dialing a three-digit extension as each site operates as one unified system.

Additionally, each station's request lines and hotlines have dedicated CO ports in Killeen and dedicated analog ports in Waco. Their operation is transparent to the air staff and their listeners.

The computer networks are linked by Cisco routers in each city. Waco and Killeen can now share the same T1 WAN connection back to corporate.

This eliminated one of the two T1s we initially had before the consolidation project. With our LAN/WAN connectivity to the main site we have redundant programming via our automation system using Prophet Systems' Offsite Backup, which not only gives us the content for locally originated programming but redundancy in case of a link failure.

I would like to thank to Gould and his associates for putting together a successful wide-area audio/data/voice network. The system went on-line in late February and it has been reliable. It came together easily and was almost 100 percent plug-and-play.

I am considering requesting a similar system for two of our FMs to replace their existing analog STLs when we decide to make the conversion to digital radio.

For more information, including pricing, contact Moseley in California at (805) 968-9621 or visit www.moseleysb.com.

USER REPORT

Big Pipe Walks on Water for Apex

Broadcaster Taps BE's Multichannel STL To Replace Dedicated Lines Over Waterways

by Bruce Roberts
Chief Engineer/IT Director
Apex Broadcasting

CHARLESTON, S.C. Charleston has got to be one of the best places in the country to live, with all of its islands, waterways, bridges ... and did I mention water?

Every STL hop in Charleston must go over some body of water. While this is not a huge problem for wireless, the cost of dedicated lines from Ma Bell gets quite crazy when crossing these waterways.

We have been studying the options for a good audio and data link between our studio and transmitter site for about a year. We are fortunate to have our three FM transmitters located at one tower site. For us it made good sense to look for a multichannel system to handle our audio and data needs.

Media transport

The **Broadcast Electronics** Big Pipe range consists of microwave radios and data-conversion network interfaces that work together but may be used independently based on application.

The microwave radios operate in the 5.3 GHz or 5.8 GHz frequency bands, and come with integral or external antenna connectivity, selected based on path length.

The microwave radios interface to the site Network Terminal equipment that is configured with a number of plug-in Service Interface Modules, or SIMs. Modules are hot-pluggable for easy installation, upgrade or repair.

With our configuration of Big Pipe, we can transfer up to four channels of AES digital audio and two channels of analog audio to the tower site. We also have two analog channels that return from the tower site to the studio we will use for RPU (Marti) return audio.

In addition to filling our audio needs, we have an Ethernet 10/100 link that is basically like a six-mile Cat-5 cable we can use to extend our network. We have a T1 at the studio and we have a DSL at the tower site that we use for our streaming computers. We plan to extend the DSL back to the studio and bring the stream computers to the studio site.

We also will have backup Internet access at the studio via the Big Pipe Ethernet link, and two available RS-232 ports, which I am thinking of ways to utilize as well.

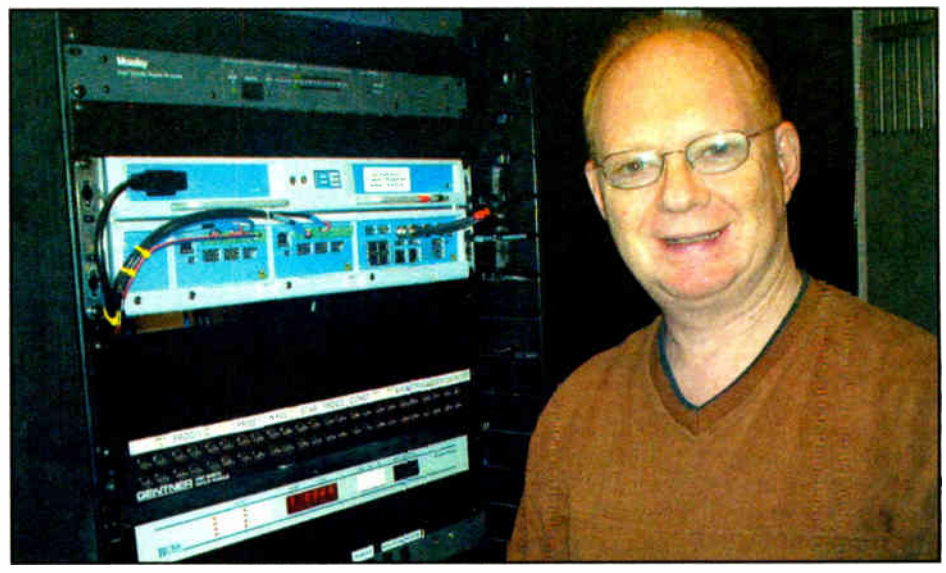
Big Pipe sounds great, and we are pleased with the quality.

The big thing I was concerned about was what latency would be like. I did a test by sending audio from the studio to the tower, then sent it back to the studio. This would be twice the delay, as it would be going both ways on the Big Pipe. Then I set up to listen to both the send and the return audio. I was shocked to see that delay was almost non-existent. None of the air staff noticed a difference in the latency of the Big Pipe from our old STL system.

Our old system was a 1980s compressed digital audio system. The improvement in audio is apparent across the audio spectrum.

Instillation was straightforward and support was available to answer questions we had along the way.

For more information, including pricing, contact Broadcast Electronics in Illinois at (217) 224-9600 or visit www.bdcast.com.



The Author and Apex Broadcasting's Big Pipe

USER REPORT

Intraplex Deployed in Lone Star State

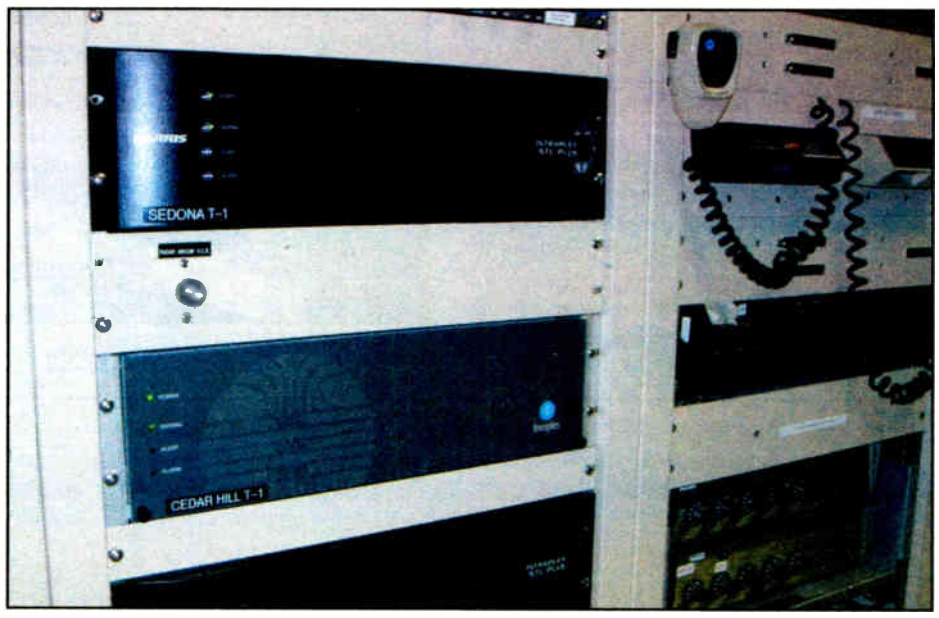
Susquehanna Uses Multiplexer to Communicate With Seven Sites Using T1, E1 Combo

by Robert Chickering
Engineering Manager
Susquehanna Radio Dallas

DALLAS Funny, although I don't think of the Intraplex as my STL, those three letters still conjure up both distant and recent memories of 950 MHz links that got your audio to the transmitter, with or without distortion and artifacts.

I think of Intraplex as my transmitter link. Intraplex multiplexers give me more than bidirectional audio.

Intraplex provides equipment that communicates bi-directional on a land-line T1 using the provided 1.536 Mbps bandwidth. The multiplexer chassis divides that down to 24 64 kHz time slots. The multiplexer can provide stereo 32 kHz or 44.1 kHz audio with some slots left over for serial communications, LAN connections, PBX extensions, voice grade audio or compressed audio. If 24 slots are not enough in this HD Radio world, you can install E1 spread spectrum radios for 32 64 kHz time slots



Susquehanna Radio Dallas has Intraplex systems to Sedona, Ariz., KPLX(FM) in Cedar Hill, Texas and KLIF(AM) in Northlake, Texas.

Intraplex systems offer linear audio cards with analog and digital I/O and an apt-X compressed card system that takes only four time slots for 15 k stereo audio ... these cards sound great.

The thing I like the most about Intraplex is the scalability and user configuration of its systems. Intraplex has cards to do anything you can imagine, provided you have enough time slots to work with. The equipment also is tough.

While the earliest Intraplex systems offered program audio modules and T1 multiplexing systems for broadcasters, the equipment was soon adopted for government and military operations due to its ability to also carry voice and data modules, robustness and low failure rates. Since acquiring Intraplex in 1998, **Harris Corp.** has supplied systems to NASA, the armed forces, the FBI and the INS through government contractors, in addition to its work in the broadcast industry.

Susquehanna Radio Dallas uses Intraplex systems to communicate with seven transmitter sites using a combination of T1 and E1 systems. We also have an Intraplex T1 system to Sedona, Ariz., for offsite programming.

The Sedona application allows me to send and receive stereo audio, LAN and an off-site PBX extension. It's pretty cool dialing four numbers on my PBX and having it in Arizona.

The transmitter sites have linear PT353 cards delivering 32 kHz and 44.1 kHz linear digital audio. I also have LAN extensions at all my sites. We also use the RS-232 card for serial remote control communications. We have a day/night site communicating via the LAN cards for automated day/night switching. Users can do a lot with these systems.

Intraplex systems offer linear audio cards with analog and digital I/O and an apt-X compressed card system that takes only four time slots for 15 kHz stereo audio. I'm somewhat picky when it comes to audio compression algorithms, but these cards sound great. We use them on our AM stations and audio return channels for RPU receivers, mainly due to stacking algorithm issues. Using these cards leaves a lot of room on your system for other services, such as voice and data.

The chassis comes standard with redundant power supplies and communicates with a CM 5 or CM 7 card that is essentially the modem. These cards have great diagnostics and error correction. Documentation for the system is excellent and with a little practice you can configure and move cards as needed.

The linear and compressed audio cards offer options like single-channel operation and bandwidth limitation of 7.5 kHz. This is helpful if you need only one channel and can save some time slots for a faster LAN connection.

The LAN cards are a must for all systems. Not only can we find that PDF for our transmitter while at the site and save that log to our network, but we also can use our LAN cards to transfer audio to an off-site backup ENCO Systems workstation.

We have four workstations at the four main transmitter sites with current audio from the studio ENCO system. This is nice to have for peace of mind in the event disaster strikes.

The main advantage to the T1 systems through Intraplex is expansion. You can start with a single audio channel and build up to bidirectional multichannel audio and control.

Sure beats that ol' 950 link.

For more information, including pricing, contact Harris Corp. in Ohio at (513) 459-3400 or visit www.broadcast.harris.com.

TECH UPDATE

APT Has WorldNet Oslo For HD Radio, 5.1 Apps

APT says the WorldNet Oslo is suitable for 5.1 contribution and distribution applications, FM, DAB and HD Radio applications and transporting content over an E1, T1 or IP link. On a typical STL configuration, six 15 k stereo duplex programs can be delivered over one E1 or T1 circuit.

APT says WorldNet Oslo has two primary advantages: failsafe options that facilitate audio availability under extreme circumstances, and the incorporation of Enhanced apt-X for delivery of audio with 48 kHz sampling frequency and 24-bit word resolution at a low coding delay.

A WorldNet Oslo frame transports up to 12 fully duplex audio channels, or 24 audio channels in simplex mode.

Available options for the WorldNet Oslo include an IP transport card, and Quad Encoder and Decoder modules offering four simplex channels per card.

The company says using a Quad Simplex Card along with a fully duplex stereo card provides a 5.1 solution for broadcasters wishing to transport multichannel audio.

Additionally, the Ethernet interface can be used for WAN/LAN data transfer.

For more information, contact APT North America at (800) 955-APTX (2789) or visit www.aptx.com.

USER REPORT

KFNW Likes Kintronic Phasors

by Gary L. Ellingson, CPBE
Chief Engineer
KFNW(FM)
Northwestern College Radio

FARGO, N.D. Phasing equipment represents a considerable investment for broadcasters. Even more important, phasing equipment needs to work reliably for years controlling the operating parameters for a directional antenna system. Any compromise on the equipment used may set up unfortunate engineers for years of frustration in maintaining an array.

Upon opening the box from **Kintronic Labs**, customers can examine the layout of components, precision interconnections and routing, conservative ratings on components and excellent fit and finish on the cabinetry. Things such as removable panel shelving to hold the necessary bridge equipment when servicing shows that this equipment was designed by engineers who have had to service and install phasing equipment. That factor alone can mean a lot in the middle of the night when the array goes south.

The phasor itself is laid out well, with clearly marked controls and intuitive positioning. The cabinetwork will please discriminating engineers, and the number of service entrances and drop-down shelving make maintenance more realistic.

Controller wiring is facilitated by pullout drawers of labeled parts and terminal blocks that actually match the schematics. Everything is in full view, with plenty of front-panel status lamps tracking every contactor action. Installation wiring can be harnessed easily to the drawers making for a functional and neat installation. Dual redundant power supplies, both fused and short-circuit protected, again demonstrates the company's real-world approach.

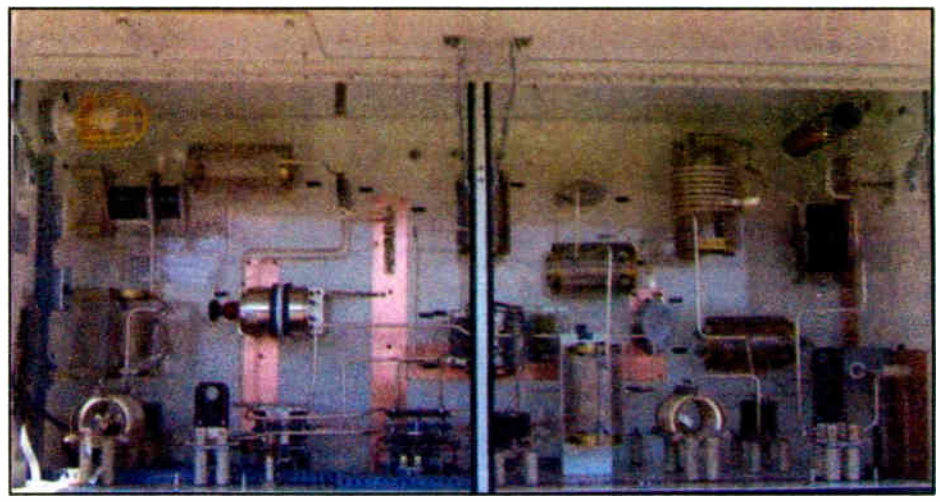
But let's say the consultants have arrived from afar and nothing tunes anywhere near the predicted values. What now?

This actually happened on our recent installation in Sioux Falls, S.D., though it had nothing to do with Kintronic.

The geographical site for our five-tower array was an installation challenge, some of it marshy and swamp-like with an overall gently rolling contour. It was a tower installer's nightmare. The rolling contour resulted in tower base differences varying as much as one meter in order to make the elevation at the top of each tower uniform. This caused real problems in the inline array and tuneup proved impossible.

A set of cold bridge measurements was taken with actual empirical values and sent to the engineering team at Kintronic. Days later a box of components arrived with instructions on where to mount and where to substitute and the array tuned up as it should. A combination of actual experience in directional antenna systems and some sophisticated computer modeling equipment cannot be beat when facing the challenges of directional antenna systems.

For more information, including pricing, contact Kintronic Labs in Tennessee at (423) 878-3141 or visit www.kintronic.com.



KFNW's Kintronic Labs phasor. Ellingson was pleased with 'the layout of components, interconnections and routing, conservative ratings on components and excellent fit and finish on the cabinetry.'

Upcoming in Buyer's Guide:

Jan. 18--Logging, Profanity Delays & Timeshifting

Feb. 15--Portable Audio & Newsgathering

Products & Services SHOWCASE

USER REPORT

D616G Aids in Ionospheric Study

BAE Systems Picks Continental Transmitters For Array Devoted to Atmospheric Research

by Steve Floyd
BAE Systems Chief Engineer
HAARP Research Station

GAKONA, Alaska The ionosphere is the canvas on which the Aurora Borealis, or Northern Lights, is painted on the night skies of the far north. But those undulating tapestries of color are merely byproducts of the greater forces stored in the Earth's upper atmosphere, where atoms are ionized by energy from the sun's radiation, often called the solar wind.

Ionospheric research has significant value in radio science activities such as high-frequency signal propagation prediction and modeling, underground and underwater radio communications, satellite communications and even in technologies that don't yet exist, like ground-penetrating radar.

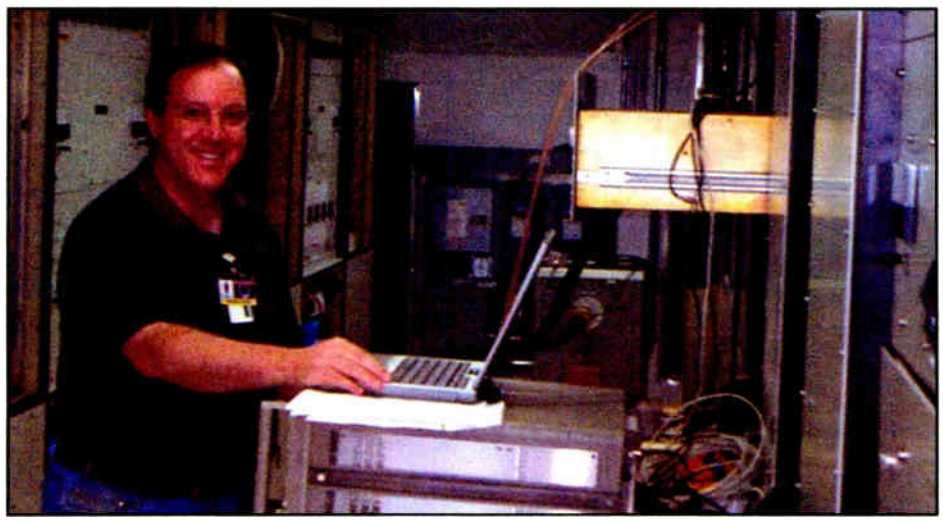
That's why, in the early 1990s, the U.S. government launched the High-Frequency Active Auroral Research Program, a planar array of 180 radio transmitters and antennas dedicated to upper-atmospheric and solar-terrestrial research.

Northern Exposure

The HAARP facility is located near Gakona, Alaska, an opportune location to accomplish pioneering ionospheric research. Tt this latitude, the Auroral Oval, a ring of magnetic currents naturally running through the ionosphere around the North Pole, is directly overhead a high percentage of the time.

BAE Systems Advanced Technologies division in Washington, D.C., is the prime contractor designing, installing and operating the HAARP facility.

When the HAARP project was launched, an evaluation of several transmitter manufacturers revealed that **Continental Electronics Corp.** was the best equipped to meet our needs, not only in terms of design experience and manufacturing capability, but also in terms of the company's willingness to work with us to design and build a unique HF radio transmitter.



Steve Floyd checks the transmitters from his laptop.

The HAARP transmitter is required to provide low-distortion AM, FM, Pulse and CW modulation modes of operation, an automatic output impedance matching section (antenna tuner) and extremely low harmonic and spurious content. Given the remoteness of the facility and the extreme environmental conditions in Alaska, the reliability and overall build of the transmitter also were important.

The engineers at Continental understood the overall technical requirements of the HAARP HF transmitter long before anyone else really did, and they designed a transmitter remarkable in its performance and durability.

The 180-element transmitter portion of the HAARP system supplies a dual 10-kW RF output to each of the crossed dipole antennas, which are organized in a 36-acre planar array to accomplish radiated power beam focus and beam steering.

The transmitters operate within a continuous frequency range of 2.8 MHz to 10 MHz, which lies in the HF portion of the RF spectrum, although HAARP only operates in authorized frequency bands on a non-interference basis to other users.

In each custom HAARP transmitter, Continental employed two Eimac 4CX10,000D ceramic/metal tubes connected in push-pull and operated in class AB1, grounded grid, for a high degree of linearity in each of the two independent 10 kW outputs. They are configured as dual 10 kW output systems in order to feed the crossed dipoles on each 80-foot tower, establishing control of E-Field polarization. Each 10 kW amplifier side is solid-state up to the 1 kW power level.

Due to the system's high effective radiated power, the HAARP transmitter was required to have an extremely low harmonic and spurious output of –80 dBc in the HF spectrum, –120 dBc in the VHF spectrum and an incredible –150 dBc in the 88 to 200 MHz band (–dBc is dB down from maximum CW power).

The Continental Electronics transmitter meets this requirement; this is an incredible performance level given that a standard broadcast transmitter is rated at –60 dBc in this emissions area.

We are housing the transmitters in 30 heated shelters located within the antenna array, under the elevated antenna ground screen, with six transmitters per shelter. The transmitters are air-cooled by a common blower in each shelter, with heated exhaust air mixed with outside filtered air to maintain a +55 degrees Fahrenheit cooling air input temperature.

Construction of HAARP began in 1993 with 18 transmitters installed, and then expanded to 48 transmitters installed and operating in 1998. The facility is undergoing its final expansion, with 132 additional transmitters in production at Continental in Dallas and subsequent installation at the HAARP site.

By the time we are finished in late 2006, we will have 180 of the Continental Electronics model D616G transmitters operating in a 180-antenna phased array with a maximum ERP of about 96 dBW.

Continental Electronics has been exceptional in all stages of the HAARP project. They not only had the experience for meeting our specifications but were able to anticipate potential problems and build their transmitters to avoid them. In fact, at some extreme beam-pointing angles the voltage standing wave ratio (VSWR) presented to some transmitters is a terrible 6-to-1, and the transmitters withstand this with ease.

For more information, including pricing, contact Continental Electronics Corp. in Dallas at (214) 381-7161 or visit www.contelec.com.

USER REPORT

Family Life, Shively Design Antenna

by Jim Travis
Chief Engineer
Family Life Network

BATH, N.Y. A while back we needed a directional antenna. Family Life Network had been granted a construction permit for a 4 kW directional pattern with the prospect of going to 11 kW directional in the near future.

A friend of mine, Mark Humphrey, told me I should look into **Shively Labs** for the antenna. We arranged a trip to Bridgton, Maine after exchanging a few phone calls and receiving information sheets from the plant.

The antenna was on the test range and it was a perfect time of year in May, when the road had just been opened for travel up to the summit of nearby Mount Washington. This was before the fire and Marty Engstrom was still working on the mountain. Mark had arranged for a visit with Engstrom on Mount Washington for a tour of the radio and TV facilities.

Six years later I have just taken delivery of my fourth antenna from Shively Labs. The same people are still there from when I first visited the factory and test range. While the antenna is on the test range, they fax test patterns to me and call me to discuss the results. We then decide if the areas of importance are fulfilled while still protecting the null areas.

In need of direction

The project at hand this summer was for a directional antenna for Carbondale, Pa. I originally filed for a frequency for Carbondale in 1998 and was granted a construction permit in October of 2004. In June of 2005 a college station in Scranton moved their frequency. That enabled us to move our site to a location close to Scranton.

The directional FM antenna design process benefits if we can design a site from scratch. Tower size and orientation are just as important as the antenna.

The pattern was going to be tight but we were pleased with the potential for a signal in downtown Scranton.

A directional antenna was necessary so we called Shively. The directional FM antenna design process benefits if we can design a site from scratch. Tower size and orientation are just as important as the antenna. The coordination of the tower and antenna is a huge advantage to the outcome of the project.

Shively ran some tests on the pattern, which helped in determining the necessary tower to produce the one I wanted. I was able to design the tower to meet the antenna design, not the other way around. Using a 6810 and orienting it to the face as well as mounting it according to the test patterns went a long way.

In this case, our main concentration of population was in the deepest null area. When I first contacted Shively with my request, the company said the pattern was a little tough to build. After some conversation back and forth, we thought to lower the power in the main lobe in order to broaden the pattern and get what we wanted in the null.

Shively is willing to spend the time on paper and on the test range to accomplish desired results.

I have Shively Labs working on an interesting project for our station in Arcade, N.Y., WCOF(FM). The structure we are using is a previous Western Union tower consisting of two bridged towers 260 feet in height but separated by 30 feet.

Because of the close proximity of the second tower, the effects to the pattern were important. An advantage to using Shively for this project is that its test range uses scale models of the tower sections and antennas.

In the situation of the dual tower structure, it was easier to perform the test on scale models. Two tower sections with a 42-inch face width could have been cost-prohibitive if done in full scale. Using the scale models allows more available time for the actual testing, which in turn produces more possible patterns from which to choose.

For more information, including pricing, contact Shively Labs in Maine at (207) 647-3327 or visit www.shively.com.

USER REPORT

Bext Enables AM Synchronous Operation

Spurious Emissions, Expensive Repairs Prompt WAPA to Choose a Different STL Solution

by Jorge G. Blanco-Galdo
Operations Manager
and Wifredo G. Blanco-Pi
Licensee and Chief Engineer
WAPA Radio Network

PUERTO RICO Five years ago we made a good decision. We changed to **Bext** STLs from a previous STL brand. We have replaced 15 STL transmitters and 15 STL receivers. You might wonder why we made such a huge investment.

We are electrical/broadcast engineers in Puerto Rico. Twenty years ago we began experimenting with synchronous AM stations. We now successfully operate two main stations: WAPA(AM) 680 kHz, San Juan, Puerto Rico; and WISO(AM) 1260 kHz, Ponce, Puerto Rico; and three high-power experimental synchronous stations on 680 and 1260 kHz, all of them licensed to main cities around the island — WA2XPA, Arecibo on 680 kHz, and WI2XSO Mayaguez and WI3XSO Aguadilla, both on 1260 kHz.

The **Bext** system has permitted us to improve and expand the signal of our all-news network island-wide without investing millions of dollars to buy other stations. Even better, the three synchronized stations are unattended.

Synchronicity

We achieved good frequency synchronization using a 10 MHz reference signal received from the Naval GPS Satellite at all five transmitter sites. The 10 MHz reference signal was transformed into the operating frequency of the stations. Audio synchronization was achieved using audio delay equipment to compensate for the delay introduced by the microwave links.

The concept of synchronization is an excellent one, but to make it work you need reliable, quality STL and TSL links. Our previous STL brand just kept failing. Almost every day we had to rush to fix one of those old STL transmitters or receivers.

Some typical frequent troubles were the open plate/air dielectric capacitors failing because of dirt, and also the expensive proprietary final power transistors we could only buy from the original STL manufacturer — the last one cost me $350, labor not included. The old brand of STLs also was unstable and didn't have a reliable 10-watt output power. Spurious emissions were frequent too.

And one must also keep in mind how time-consuming it is to look for crystals and tune the units every time you have to change frequency on non-frequency agile STLs like the ones we used to have.

It became clear to us we needed a better alternative. After researching what other equipment was available on the market, we chose Bext and began replacing our old STLs with its STLs.

Bext frequency agile STLs have proven to be reliable — the power output will be exactly where you set it when you come back. No problems with unstable frequency or spurious emissions; no need to replace crystals; and you don't have to open the equipment to change frequency. You can change the frequency of operation in seconds from the front panel, with no need to tune anything.

The front panel also includes the necessary readouts for modulation, power and status of all internal functions, and the direct digital display showing the operating frequency is definitely a plus. Also the user easily can calibrate modulation and power from the front panel.

The connectors are marked clearly on the rear panel. **Bext** STLs can operate on 120 V or 220 V, and with the most recent models you don't have to set the voltage selector — they have a full-range AC power input that will take in, and work with, any voltage from 110 V to 245 V.

They also have a 24 V DC input capability if you want to power them from a DC source instead, or connect a battery to allow the unit to keep working during an AC power outage.

For more information, including pricing, contact Bext in San Diego at (619) 239-8462 or visit www.bext.com.

TECH UPDATE

Stabiline SEG Converts Incoming AC to DC

Superior Electric says its SEG Series Stabiline true regenerative online UPS provides protection against power problems like surges, noise, sags and brownouts by converting the incoming AC utility voltage to a regulated DC voltage. From this DC voltage, a new AC voltage is regenerated, providing a regulated power source to the equipment.

The company says this solid-state generation function differentiates a true regenerative online UPS from other line-interactive and off-line designs, which leave sensitive equipment connected to dirty utility power until the UPS has time to sense the utility (high or low) voltage levels and switch to the inverter.

SEG Series UPS models include Input Power Factor Correction, which reduces the amount of current demanded from the building's wiring system. Additionally, the series incorporates microprocessor technology that enables internal UPS control and management.

With the supplied software, SEG Series UPS models support unattended shutdown, management, data logging and self-diagnostics. The software supports Windows 95, 98, NT, 2000, Novell Netware and Linux.

An optional SNMP/HTTP agent board is available by providing remote management and monitoring over an Ethernet LAN, WAN or the Internet using a 10BaseT-type connection. The SNMP/HTTP agent installs via an available option port.

SEG Series models support the addition of optional external battery/charger packs, and can be configured for use as international voltage and frequency converters with a factory modification and the addition of an external input transformer.

For more information, including pricing, contact Superior Electric in Connecticut at (860) 585-4500 or visit www.superiorelectric.com.

USER REPORT

PLFM-100 Card Drops In on WFJV

When the Station Found Itself With a Damaged Exciter, the Chief Turned to JT Communications

by Frank Vela
Chief Engineer
WFJV(FM)

CRYSTAL RIVER, Fla. WFJV(FM) operates with a small budget. Both the purchase of new equipment and the flexibility of funds fall into the same limitations. When this happens, compromises have to be made. These can become troublesome when we are making crucial decisions.

Once I had just finished an air shift at WFJV and while driving through town I noticed the station had gone off the air. I assumed there was a power interruption and it would be restored in a moment. The station did come back but with an abnormal amount of noise mixed with its audio content.

A quick change of direction, and I was racing to the transmitter site.

The station was popping on and off the air during the 10-minute drive, which seemed more like 10 days. When I finally reached the transmitter site I found that the PLL board was going out of lock. The board was not easily repairable because it used surface-mounted components.

After a drive back to the studio, I contacted the manufacturer of the exciter and explained the situation. They told me I would have to ship the exciter to them, and I nearly gasped when they told me the cost to repair — and that it would be two weeks before we would get it back.

With no exciter available to borrow, WFJV now had a serious problem.

JT Communications of Ocala, Fla., offers the Model PLFM-100 exciter module, a drop-in upgrade board that replaces the modulated oscillator, PLL logic and pre-RF stages of an exciter. It produces +20 dBm (100 mW) into a 50-ohm load, is frequency agile and operates at 12 VDC. The manufacturer provides the instructions for installation, operation, schematic and parts list for the unit. I called the company and after speaking with Jim Trapani, I decided to purchase the card.

The PLFM-100 card arrived quickly and the instruction manual directed me to install the card into the last PA amplifier stage. We removed the old PLL board and drilled new holes to match the holes to the PLFM-100. We then connected the power and RF connections to our exciter.

After all the adjustments mentioned in the instruction manual were completed, power was turned on. Within two hours we were back on the air sounding better than before.

The signal-to-noise ratio was actually better than that of the original PLL board. A look at our composite signal on an oscilloscope revealed that our modulation was louder due to our old exciter actually producing LF tilt on the processed waveform. The PLFM-100 resulted in a flat, controlled waveform, which allowed us to re-evaluate our processing chain.

This was the cost-effective way to go. Although the part list uses common components, service is easy, as integrated circuits are on sockets; and spare parts are available readily. I recommend the PLFM-100 to any station that needs an upgrade or retrofit.

For more information, including pricing, contact JT Communications in Florida at (352) 236-0744 or visit www.jtcomms.com.

USER REPORT

ERI Tapped for New Master Antenna

Hancock Building FM Broadcasters Select ERI for Replacement Antenna, Support for Tower

by Keith Warner
Chief Engineer
Bonneville International Corp.

CHICAGO In 1970 when it was first installed on the John Hancock building in Chicago, the Alford master antenna and combiner were cutting-edge technology for FM broadcasting. This was one of the first major combined FM antenna systems in the country, designed by the company that had built the master FM system for the Empire State Building.

Considering the antenna is mounted on the 12-foot-diameter tower pylon that supports the tower, it performed quite well.

During the 1980s the Hancock FM broadcasters started to realize there were better options, especially in comparison to the new FM antennas that had since been mounted on the Sears Tower. We started to research replacement antennas, but at the time were stopped from purchasing one because there was no more available tower space on the Hancock building. We couldn't put a new antenna in the existing space without excessive downtime, which was unacceptable to the stations.

Movin' on up

Fast-forward 15 years, and the FM broadcasters were now negotiating new leases with the building, and negotiating for a space for a new master FM antenna on the towers 200 feet higher than the present antenna.

When the group of stations got together to discuss antenna plans, after we had a lease for the new spot on the tower, everyone agreed on **ERI** for the antenna manufacturer.

Most everyone in the group had positive experiences in the past with ERI, and was impressed with the ERI full-scale test range, for documentation of real-world antenna performance.

I don't think that at this time anyone was considering the mechanical and tower design and manufacturing capabilities of the company — just thinking of the good antenna performance ERI had provided for them in the past. This turned out to be one of their most important contributions to the project.

We now had a manufacturer and a place we had leased for our antenna, but there was nothing there to which to mount an antenna. Under the terms of their lease, tenants who had left the building had removed their antennas, which also were structural parts of the tower. The remaining tower topped out about 75 feet below the height at which our antenna was to be mounted. We needed a 75-foot tower to be constructed 1,300 feet above ground.

Thomas B. Silliman, P.E., president and CEO of ERI, and the author on top of the Hancock building.

To complicate matters, three television antennas were to be mounted above the FM antenna location.

At this time the building and the television stations above us also hired ERI to be the tower designer, manufacturer, structural engineers and installation supervisors. This was turning out to be a much larger job than a simple FM antenna. After numerous mechanical studies, it was decided the bottom section of the tower could not be reinforced enough for the new loads as was originally thought, and needed to be replaced — another job for ERI.

After many months of design studies and permit applications, we finally had a design approved. ERI patiently did numerous load studies, as it seemed each time we applied for a permit, the city would ask for something else. ERI came through with everything we needed for permitting. When the installation finally started, ERI played a great role in interfacing with all of the trades involved and the manufacturers of the television antennas.

The antenna we purchased is a two-level, three-around, dual-feed, cog Model COG320P-2. However it is mounted to a structure designed by ERI to be a structural piece of the tower, to support three television antennas above us, and with a hollow center section to allow transmission lines to pass through our aperture to the upper antennas without affecting the FM pattern, which was tested on ERI's range.

ERI also provided the power divider and a 6-inch patch panel to allow either half of the antenna to be used in an emergency, and a 9-inch motorized coax switch to switch between the new ERI antenna and the former master antenna, which was kept as an auxiliary.

Near the antenna's installation time, Robert Rose of ERI approached me with an idea to give the antenna separate digital and analog feeds, both connected to the same elements but which would radiate in opposite circular polarizations, to accommodate HD Radio. We sent the elements back for retrofitting and another range test. Finally our antenna was installed and operational, and ERI was there to do the final testing and tuning.

Case in point

Once we were broadcasting we agreed the coverage was improved from our old antenna, with many less dead and multipath areas. But one example really shows the improvement.

One of the radio stations had a terrible reception area — right where the PD lives. (Why does this always happen?) The problem was so severe they were shopping for a location to place a booster. After the new antenna went online, the problem area went away and they dropped the booster idea.

During 2004 the stations were beginning to install HD Radio, and we were ready for it. Stations chose different ways of implementing digital, and I believe we were the first location in the country to be broadcasting HD Radio by three different methods into the same antenna: low-level combined, high-level combined and back-fed through the combiner into the antenna's digital input.

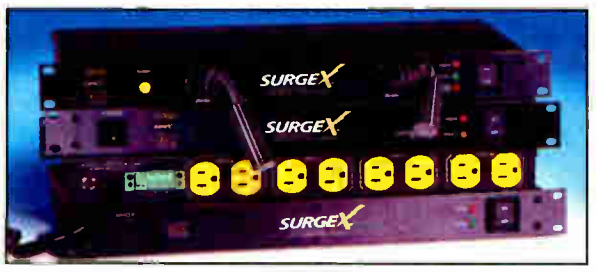
For this installation at a landmark site, ERI not only provided an excellent FM antenna solution, but did the tower design, load studies, manufacturing and field installation supervision for a complex multiplayer job with skill and patience. We are about to sign a contract with them to replace the original 35-year-old antenna we are using as an auxilary with a new ERI.

For more information, including pricing, contact ERI in Indiana at (812) 925-6000 or visit www.eriinc.com.

TECH UPDATES

SurgeX Adds Advanced Series Mode to 1 RU Units

SurgeX says it has reengineered its 1 RU surge protectors and power conditioners to feature an Advanced Series Mode surge suppression and power conditioning technologies such as Impedance Tolerant EMI/RFI filtering, SurgeX ICE inrush current elimination and COUVS catastrophic over/under-voltage shutdown.



The company says Advanced Series Mode technology is the latest generation of its Series Mode circuitry, which uses an inductor as the first surge suppression component to intercept and contain destructive surge energy. It does not rely on metal-oxide varistors as a sacrificial component, and creates no ground-wire contamination or common-mode surges.

There are five 1 RU models: the SX1115, SX1115-RL, SX1115-RT, SX1120-RT and SX1215, all of which incorporate Advanced Series Mode and Impedance Tolerant EMI/RFI filtering. RT and RL models also feature SurgeX ICE inrush current elimination and COUVS catastrophic over/under-voltage shutdown.

The company says SurgeX ICE handles problems typically encountered when powering up large power amps and multicomponent systems, smoothing out inrush current spikes to prevent blown circuits. COUVS shutdown turns off within a half-cycle of an over-voltage event, won't false trigger on transients and restores power when line voltage has returned to normal.

SX1115 surge suppressors are 15-amp load-capable. The SX1120-RT accepts 20-amp loads, and the SX1215 is for 240-volt applications. Each model has eight grounded AC receptacles on the rear panel, with six switched and two always on. Both R and RT models also provide a front-panel courtesy outlet.

Additionally, the SX1115-RL has two Neutrik XLR connectors for Littlite gooseneck lamps to provide dimmable illumination of equipment racks in studios. The SX1115-RT has a remote turn-on capability for use in integrated power distribution systems.

For more information, including pricing, contact SurgeX in Pennsylvania at (215) 766-1240 or visit www.surgex.com.

AzEP SureShot Has Antenna Tracking, GPS Time

The SureShot II-Microwave from **Arizona Engineered Products** is a solid-state computer-based antenna positioning system that uses an internal GPS module and an external antenna-mounted sensor module to orient an ENG microwave antenna toward a fixed receiver site.

The company says it is suitable for mobile microwave applications. Positioning accuracy is

SureShot II

typically +/- one degree horizontally and vertically.

Receive site coordinates are stored in nonvolatile memory and are used in conjunction with truck location data from the GPS module to calculate aiming information. SureShot then controls the antenna's pan/tilt to position the antenna toward the selected receive location.

As an option, SureShot can provide continuous antenna tracking capabilities to enable signal relay to or from an airborne platform.

The system displays GPS-accurate time on its LCD panel. Because many stations also like a large digital clock in the vehicle, the GPS clock output option equips SureShot with a standard output to control the clock. AzEP also can provide the digital clock, and says the installation is plug-and-play.

For more information, including pricing, contact Arizona Engineered Products at (520) 891-5858 or visit www.azep.us.

HVPSI Surge Arresters Use One MOV Per Pole

The Surge Protection Device or Secondary Surge Arrester from **High Voltage Power Solutions Inc.** is a Metal Oxide Varistor-based hardwired unit, often referred to as a lightning arrester.

It is suitable for protecting electrical equipment from the effects of voltage transients caused by lightning, utility switching, insulation arcing, electrical motor cycling and other large or sudden changes in the electrical power flow on incoming AC power lines.

The HVPSI surge arresters use a single MOV per pole to reduce potential load balancing/sharing problems during operation. When a surge causes the voltage on the AC system to exceed its normal value, the arrester "clamps" or holds the voltage. The transient energy generated during the spike is absorbed or diverted until the surge passes. The company says the devices require no maintenance or "resetting" following a surge.

For more information, including pricing, contact HVPSI in Dallas at (972) 248-7691 or visit www.hvpowersystems.com.

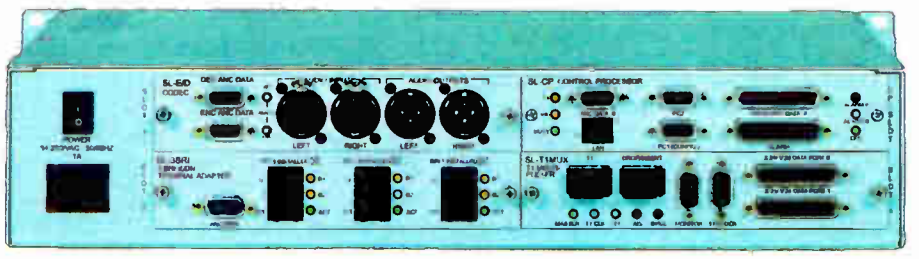
SuperLink Produces MPEG Audio for Internet

The SuperLink from **Musicam USA** is a rackmount STL and audio/data gateway that connects to T1, E1, ISDN, X.21 and V.35 transmission networks.

It produces single- or multichannel MPEG 3 audio for Internet or I/P network streaming when used with a separate server; and supports uni- and bi-directional transmission of up to four mono or two stereo audio programs plus multiple data channels.

SuperLink streams audio over LAN, WAN, DSL or ATM. Audio may be received over T1 or E1 and streamed via SuperLink.

It also supports Musicam-enhanced MPEG Layer 2, MPEG Layer 3, G.722, J.41 (384 kbps mono), J.57 (for near-zero compression, near-zero delay transmission via E1) and multiple modes of T1 linear audio. Remote control and control code updates are by way of I/P or RS-232.



SuperLink Rear Panel

The company also offers its Musicam TEAM E1 audio multiplexing transmission system, which it says provides a universal audio transmission system for E1 leased lines. Modular construction and support of linear and multiple audio coding standards make it suitable for STL use.

Features include up to 12 mono or six stereo programs over one E1 line; linear, uncompressed, low-delay audio for STL; MPEG Layer 2 and Layer 3; integrated automatic functions; six open slots for combinations of the following plug-in modules: encoder, decoder and X.21 module.

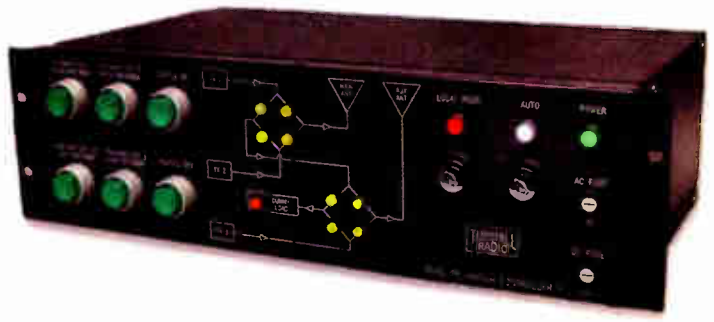
SuperLink and TEAM support the J.42 algorithm and multiple sample rates and data rates for PCM (uncompressed) linear audio, as well as MPEG 2, MPEG 3, G.722, J.41 and J.57.

The company says a new Windows remote control program is available for SuperLink and TEAM; a free download can be found on its Web site.

For more information, contact Musicam USA in New Jersey at (732) 739-5600 or visit www.musicamusa.com.

Tunwall TRC Series Protects Tx, Test Loads

Tunwall Radio says its TRC series controllers protect transmitters and coaxial switches by way of a timed sequence that removes RF power, moves the switch and verifies the position before RF power is restored. There also is protection for a test load, as the controller's load interlock circuit does not allow the off-air transmitter to operate unless the load's air or water is running.



TRC-2

The TRC controllers feature a front-panel flow chart graphic with indicators that clarify RF connections. Graphics and labels are engraved into the anodized aluminum panel.

The TRC-1 is an FM or AM non-directional controller. It is suitable for one coax switch or 120 V AM contactor, two transmitters, one antenna and a dummy load.

The TRC-2 is an FM or non-directional AM dual controller. It is suitable for two coax switches or two 120 V AM contactors, two or three transmitters and two antennas.

The key switch selected auto function will transfer to the aux transmitter upon failure of the main transmitter. The dummy load ready light works with the load interlock logic for automatic load protection. Coaxial switches or AM contactors are connected to the 9-pin amp connector. Remote control, transmitter and load connections are to the barrier strip terminals. Cable tie mounts are provided for terminal strip wiring.

The TRC-3, a three-switch controller, is for combined FM transmitter systems. It is suitable for three coax switches, one antenna and a combiner/injector. Logic for a third transmitter is programmed on this controller. The key switch selected auto function transfers to separate transmitter 1 or 2 mode if either fails.

The TRC-3 also can be used with a fourth switch accessory controller for combined transmitter systems with two antennas.

For more information, contact Tunwall Radio in Ohio at (330) 995-9642 or visit www.tunwallradio.com.

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Orban 2000 Digital Audio Processor In service 16 month- works perfectly. Will pay shipping. $2400 Visa/MC Bob May 660-885-6141

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WANT TO SELL

Arrakis Digilink Gemini 1, DL-DHA2 TS-8C – In operation until recently. Call Robert 417-883-9180 for pricing.

Now available, radio automation for the Linux operating system. Schedule music, voice track, create shells, auto or announcer assist mode, set intro and ending cues, hit the vocal every time with your voice tracks, execute exact time events, join networks, and more. Visit digitaldevelopment.net and click on RADIO AUTOMATION for screen shots. The software is free, there is a small duplication fee. For more info call 406.665.1832.

Audio Vault 100 System with 5.2 upgrade, 2 New Audio cards plus spares, new power Supply, AV100 server, On Air Computer, 2 Production computers and more. Best offer. Two Rivers Comm. Inc. (301) 365-1955.

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RCA 77-DX's & 44-BX's, any other RCA ribbon mics, on-air lights, call after 3PM CST, 972-271-7625.

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WANTED: Diecast AMPLIPHASE logo from top front of 1955-1966 vintage RCA 50kw AM transmitters BTA-50G, BTA-50H or 50H1. The logo is cast aluminum or stainless, about 3 feet long. Also if you have the RCA 'meatball' logos (each TX had two, one on either side of the AMPLIPHASE name) I'm interested in those too. Please contact Bob Savage, WYSL 1040, Box 236, Avon, NY 14414-0236, (585) 346-3000, savage@wysl1040.com.

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Top 100 Market NEast AM daytimer, low dial position, low expenses, good population coverage. Stick value $495,000. salesgroup@beld.net or 781-848-4201.

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Potomac FIM-41, in good condition, with recent calibration. Rich Biby 540-882-4290 or rich@biby.net for price

Need 1 3" 0-3 RF Amps Blackface meter in any condition. Mainly need scale and housing. Resoring transmitter for possible amateur radio use. Price open. Call bill robinson 601-693-1441

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Call Claudia Van Veen, at 703-998-7600 ext. 154, to reserve space in the next issue. Use your credit card to pay, we now accept VISA, MASTERCARD and American Express.

www.rwonline.com

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Family owned company with all the tools and resources seeks chief engineer for its Knoxville, TN cluster of five FM's. The successful candidate will possess 3 years radio broadcast engineering experience and have a passion for quality audio performance. This position requires a thorough knowledge of FCC rules and regulations; current knowledge of analog and digital technologies as used in FM broadcast operation; computer proficiency–hardware and software; working knowledge of digital automation systems (Scott Studios preferred) and studio equipment; complete expertise in the entire broadcast chain- audio to RF; and be able to direct building and facilities maintenance. The candidate must also have good interpersonal skills with the ability to manage capital projects. Send letter and resume to Human Resources, South Central Radio Group, PO Box 27100, Knoxville, TN 37927 or email to HYPERLINK "mailto:hrknox@sccradio.com" hrknox@sccradio.com.

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◆READER'S FORUM◆

Clear Channel: Consolidation Scapegoat?

I wasn't going to respond to the Clear Channel shareholder letter or the initial responses thereto, but seeing Ed Dulaney's comments (*Reader's Forum*, Oct. 12) inspired me to make a point I think is often missed.

I've spent most of my vacation time over the last 10 years driving Radio World contributing writer Scott Fybush around the country. In that time, we've met with people from nearly every major broadcast group in the country — mostly engineers, but a good number of programming and management people as well.

I cannot think of anyone in those shops who was less than courteous to us. Most were committed and passionate broadcast professionals — and that includes the Clear Channel employees.

> **Clear Channel is in the position it is because management took advantage of an opportunity that was, post-Telecom Act, open to anyone. ... Had things turned out differently, we might be complaining about ABC or Greater Media today instead.**

Dulaney is correct that opponents of media consolidation pick on Clear Channel unfairly. As the largest commercial broadcaster in the country, Clear Channel is an easy target. Rarely do commentators consider why. Simply put: Clear Channel is the company it is today because of the Telecommunications Act of 1996.

The Telecom Act, in case we've forgotten, eliminated nationwide ownership caps for broadcast licensees, in effect, changing the economics of station ownership overnight. (It would have had this effect even if the existing, post-duopoly market caps had remained in place.)

Clear Channel is in the position it is because its management, and that of its predecessor companies, took advantage of an opportunity that was, post-Telecom Act, open to anyone. Its position only seems unapproachable today because the company did its engineering homework and beat out the competition to buy the best signals. If things had turned out differently, we might be complaining about ABC or Greater Media instead.

Dulaney's letter touches on another issue that is frequently conflated with the consolidation question, but is really only a partial and indirect consequence: diversity of formats (or perceived lack thereof).

I would invite readers to consider what many small and medium markets were like in the 1980s: two or maybe three CHRs (at least one all-automated), a country station or two, perhaps a heritage AM barely hanging on with full-service AC or oldies, an album-rocker or two, a full-time news-talker if you were very lucky. There was no golden age of format diversity.

I grew up in just such a market; it seemed exciting to me because I was a CHR listener and there was real competition for my ears. I don't think my parents ever touched the tuning knob in 12 years living there.

Arguably, there are more formats available now in most markets than there ever have been. But we must keep in mind that most listeners are not media professionals.

The fact that I am able to distinguish among adult-alternative, modern AC, college alt-rock and modern rock formats does not mean that a 60-year-old banker who just lost his favorite classical station can do so. Thus, this line of argument is not likely to convince the people who complain about a lack of format diversity; they simply can't hear the differences that are so important to us.

I'll readily admit I can't distinguish Spanish-language music formats.

Dulaney is incorrect in his repetition of the oft-heard mantra, "If there were a market for (insert specialty format here), someone would be doing it." Managing a radio station, like managing most other sorts of companies, is an exercise in balancing risk and reward. There may very well be a market for a full-time polka station, perhaps even enough to be profitable.

But thanks to consolidation — back to the Telecom Act again! — most commercial stations are now owned by large and often publicly-held companies. It is not enough for a station to be profitable; managers have an obligation to their ownership to maximize the value of their assets, and for most owners that means maximizing profits.

That's not to suggest that management always makes the right choices: the format fads that have swept the country over the past decade, only to be replaced with the next format fad a year later, are evidence enough of that.

To put it concretely, with examples from my current home market: Bob Bittner can put whatever programming he likes on his station; he has no one to please but himself. But the management at the Clear Channel, Entercom and Infinity clusters have no such luxury. Not only do they have an obligation to operate in the public interest, for whatever that's worth today, they have a more immediate obligation to their shareholders.

If there is blame to be assigned here, it should correctly be laid at the feet of Congress for making large media companies possible. If you believe that some level of consolidation was inevitable, like me, at least be thankful that most of the people in this business are still radio people at heart — and start worrying about the next generation.

Garrett A. Wollman
Co-creator and Editor
TheArchives@BostonRadio.org
Framingham, Mass.

Equipment ID

I thought someone might be able to identify some of the equipment in these photos. They were all taken circa 1935 at WTRC(AM) in Elkhart, Ind., where my dad Kenneth N. Singleton was chief engineer. The station is still there and was owned by the newspaper. The Elkhart Daily Truth, with studios downtown in the Elkhart Hotel.

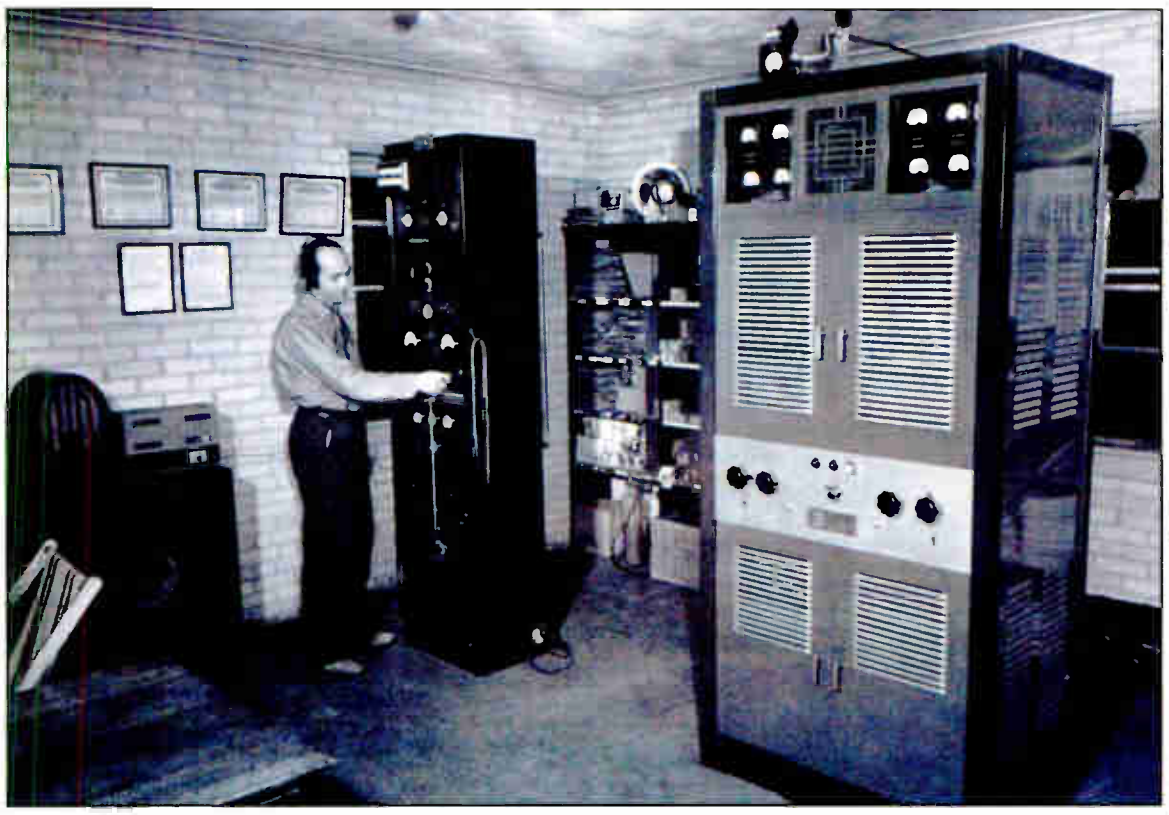
I also have some recordings made around that time. The disks are almost unplayable now, but I did manage to get some of them dubbed to digital audio files, but have not had time to clean them up.

To share comments about these photos, please e-mail me at *radioworld@imaspub.com*.

Tim Singleton
General Manager
WEKU(FM)
Richmond, Ky.

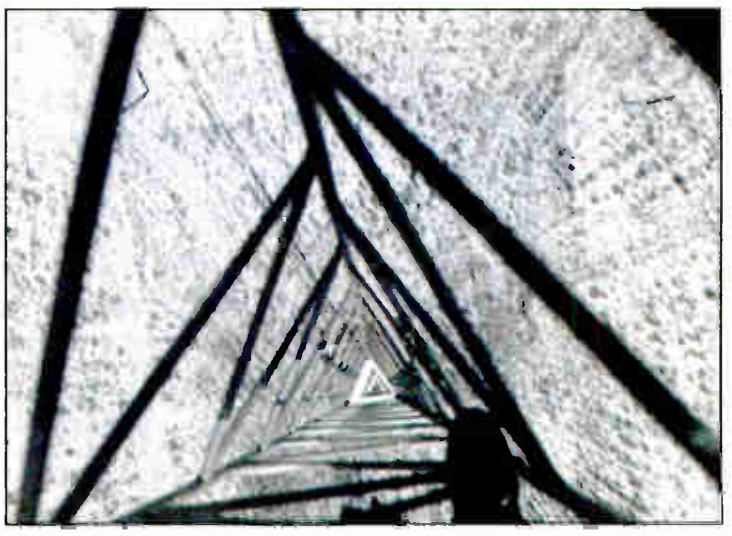
A photo of the outside of the transmitter building on Oakland Avenue.

View from the tower

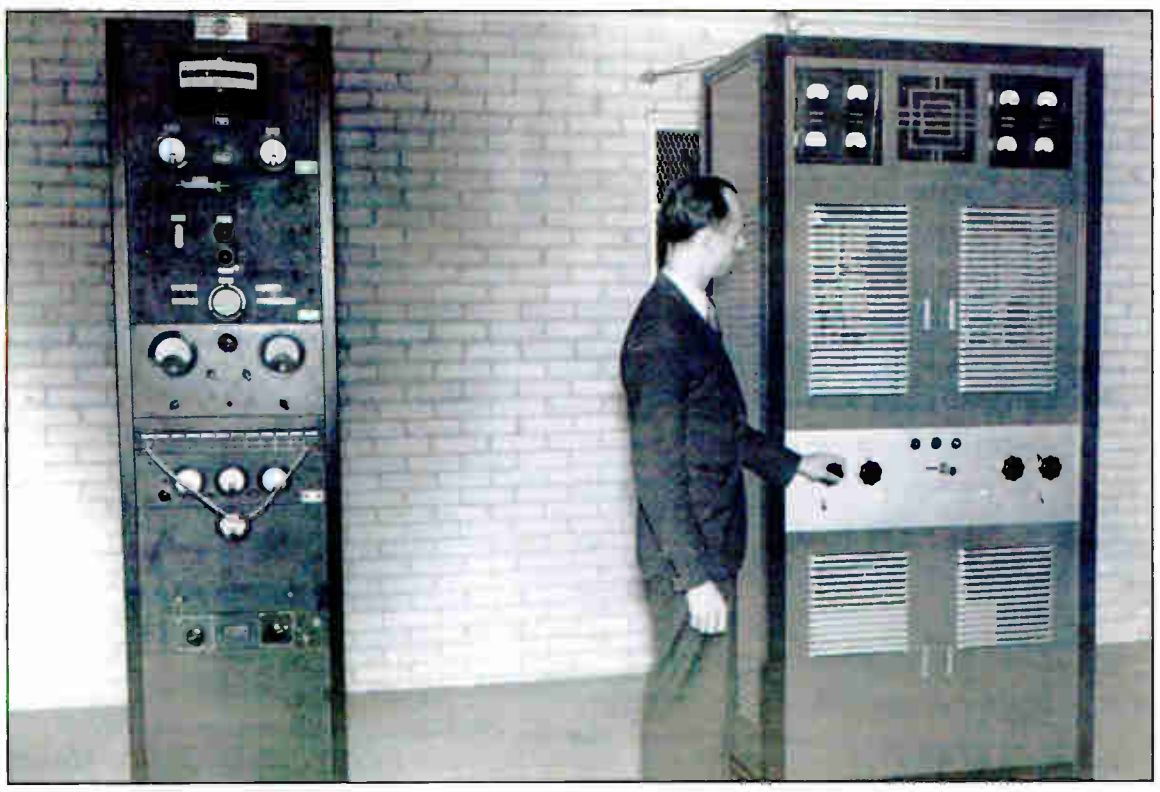


The interior of the transmitter building, with Singleton's father at the rack.

Singleton's dad, second from left. The woman is the studio musician, Ethel Geiss. The identities of the other three gentlemen are unknown.



Another view from the tower



Singleton's dad at the transmitter, make and model unknown. Singleton assumes this was the inauguration of broadcasting because of the cleanliness of the building (compare to above photo).

How to Submit Letters

Radio World welcomes your point of view on any topic related to the U.S. radio broadcast industry.

Letters should be 100 to 300 words long; the shorter the letter, the better chance it will be published in full. We reserve the right to edit material for space. Longer commentaries are welcome but may not reach print as quickly.

Include your name, address and contact information, as well as your job title and company if appropriate.

Send letters via e-mail to *radioworld@imaspub.com*, with "Letter to the Editor" in the subject field; fax to (703) 820-3245; or mail to Reader's Forum, Radio World, P.O. Box 1214, Falls Church, VA 22041.

INDUSTRY COMMENTARY

In the U.K., Radio's Third Golden Age

Digital Offers 'One-to-One' Programming And a Chance to Galvanize Creativity

by Ralph Bernard, CBE

Ralph Bernard, CBE, is the chief executive officer of GCap Media, the United Kingdom's largest commercial radio group.

The following is an abridged version of a lecture given by Bernard entitled, "Motivated to Broadcast: The Third Golden Age of Radio," in London at the Royal Geographic Society, Oct. 5, 2005.

Radio is the simplest, purest and, I think, noblest form of electronic entertainment and, a hundred years after its invention it is still our widest-consumed and best-loved form of communication.

We are in the midst of a media revolution in which some have predicted the demise of that most elegant of all media, the wireless. I would argue the opposite is true. Multichannel TV, the Internet, the iPod and the mobile phone are additional ways of consumers being entertained and informed and not simply alternatives to radio.

The revolution is creatively led and is a competition-driven revolution, powered by changes and developments which could not have been dreamt of even just 10 years ago but which, unmistakably are leading radio to a third golden age.

The 'personal touch'

Throughout radio's three golden ages, the new ideas, the concepts that really rocked the boat, have come from the edge, from left field. For a mainstream player there is no incentive to come up with disruptive ideas. Doing something different, something risky, is not something that big players welcome, indeed they often accidentally crush such ideas at the outset.

In the first golden age of radio, in the 1920s, broadcasts from overseas — from Luxembourg, Hilversum and Normandy — added something extra alongside the familiar programs of the BBC. Those overseas imports were the first example of creativity coming from the edge of the mainstream.

With the arrival of television in the 1950s, radio's first golden age started to fade, but in the 1960s the second golden age arrived with creativity that came not from overseas but from the sea itself, from pirate broadcasters moored just outside territorial waters. That piece of creativity coincided with the invention of the transistor and its inclusion in the transistor radio.

It was 1964 and the second golden age of radio was in full swing, with pirates playing pop music, pioneering new and unstuffy ways of communicating with the public.

The third golden age of radio is driven by the arrival of digital and, as radio has always exploited the personal experience of listening, that one-to-one experience will be at the heart of radio's success in the digital future.

The human contact, the touching of one mind by another, leads to a level of satisfaction that's far in excess of the pleasure you get from listening to a pre-selected, no-surprises procession of tunes on an iPod. The personal touch is increased by the fact that the greater choice offered by digital radio means the station you listen to will fit your tastes more exactly.

The radio of the digital future will be your kind of music, presented by your kind of people.

DAB digital radio now gives listeners everything they ever loved about radio, but adds so much more. With digital radio, it's the range of programs from both the BBC and the commercial broadcasters that are attracting new audiences.

And, something listeners find even more remarkable, once you've acquired a digital radio this extraordinary range of programs is absolutely free. No subscription or dial-up charges. In fact it's just like the radio used to be, but much better sound and with more choice.

Research shows that digital radio is already the number one way to listen to the radio in digital homes. Despite all the fuss about listening through the TV or listening on the Internet, digital radio listening already exceeds both of these.

What we learned from the first two golden ages was that listeners want something fresh and different, but they also want things that are familiar around them. It is equally important to consumers that existing local stations go digital, so while there is spectrum space being made available for new stations, we must be careful that we do the right thing with it.

Just as the overseas stations injected creativity from the edge of the mainstream in the 1920s and 1930s, and the pirates and commercial radio brought innovation in the '60s and '70s, new digital stations are bringing forward radio like we've never heard before.

There are the traditional stations of course, but there are also programs for the older market; there's a classic rock channel, there are black music and black interest channels, Asian channels, stations for gay people and stations for children like Capital Disney and Fun Radio.

The creativity involved in the programming for these new stations is exciting producers everywhere. For the first time there is spectrum space, allowing digital programming to offer many more channels than analog spectrum. This means that channels that used to have be all things to all people need not worry about catering for everyone on one station; they can really target specific new audiences that haven't had a place on the radio before.

An example from the GCap stable is Chill, a station that takes a sequence of cool and chilled tracks to create a very specific mood that's proving a hit with listeners. Another example is Our Kind Of Music, a jazz, American musicals and "songbook" station we're trying out.

These two stations are the result of individual passion and creativity which we took and nurtured within GCap. Radio needs to celebrate people of new ideas and to encourage more creativity.

By the end of 2009, industry forecasts predict more than 20 million digital radios will have been sold — equivalent to a household penetration of more than 40 percent of the U.K. That's a more than 15-fold increase in the number of radios — a true golden age is on its way.

Making the switch

So how long before we have total U.K. conversion from analog to digital? Analog switchoff for radio is a real challenge. Commercial radio may need government help to transfer all broadcasters from analog to digital. So far income streams from analog radio have funded digital development, so effectively commercial radio's shareholders are paying for it all at present.

A recent independent report into digital radio switchover prepared by former Culture Secretary Lord Smith explored the possibility of using the licence fees from the national commercial stations to provide grants to assist with switchover. This simply reuses money produced by commercial radio to help with the transition to digital.

There is an indication that the government could consider using part of the BBC licence fee to help commercial television with the cost of converting viewers to digital. If assistance is going to be given in television, I think that greatly strengthens the case for assistance to be given in radio.

New stations and new ideas for satisfying listeners are emerging all the time, engaging new listener populations that haven't had a reason to listen to the radio before. Thanks to podcasting, the doors to broadcasting are now open to all with a computer, a microphone and a pair of headphones.

In analog there was little opportunity to experiment, but in digital, the seeds of creativity can be nurtured from idea to full-blown radio service. It's a creative path that's not been open to us before. The responsibility — for the BBC and for big companies like GCap — is to make sure we pick up those ideas and provide the finance and technical backup to make them a reality.

In the next few years, the BBC and commercial radio will be launching new digital radio stations and consumers will be able to listen on a wide range of devices. But with ubiquity and choice comes responsibility.

It is up to us broadcasters to make the programs we produce interesting, relevant, different and compelling in the way we've enjoyed for many years in analog radio. The comfortable pair of slippers that is analog radio will still be comfortable and will still be slippers in radio's digital third golden age, but they'll be treading somewhat new territory.

User Report Update

On behalf of the Specs Howard School, thanks for publishing my user report ("Audioarts D-16 Meets Specs," July 6).

Since the article was written, we have installed 14 additional Audioarts D-16 consoles with more planned. We constructed six additional "practice" studios earlier this year, all with D-16 consoles, for a total of 21. We also have three Radio Systems Millenium consoles in service. Counting the radio stations, we have 25 audio studios, and a production studio equipped with two ENCO workstations. I didn't even mention we have video and television, too.

As you may guess, our school is a testing ground for equipment subjected to daily use and abuse by students. Despite this wear and tear, both the RS and Wheatstone products have been maintenance-free. If the equipment holds up under our roof, it will likely hold up in any environment.

It's true — thousands of our graduates scattered throughout the country read your publication. But your advertisers also will benefit from the type of feedback we provide through publications such as yours.

Bob Burnham
Chief Engineer
Specs Howard School of Broadcast Arts
Southfield, Mich.

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