



RADIOWORLD

HD Radio From the Ground Up

**Why the platform is
now more efficient and
economical, plus a special
look at developments in
Canada and Mexico.**



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July 2016

**A Special Supplement
to Radio World**





HD Radio® Ahead

Digital AM & FM

Nearly **35%** of new vehicles sold will ship with HD Radio technology

On the road to HD Radio broadcasting? Nautel has you **COVERED.**

Maybe you're turning on an HD station for the first time. Or possibly you're increasing the power of your existing digital signal or adding multiplexed channels. Or maybe you just want to know that the investment you're making today can get you to digital someday or even 10 years from now. Nautel has you covered thanks to field proven, high performance HD Radio solutions you can trust. All by a company with a 4 year warranty that has never discontinued support on any product ever. Learn more at Nautel.com/HDradio

Nautel HD-Radio Innovation:

- Invented the **1st** high-power solid-state HD Radio transmitter. Nautel's successful NV Series.
- **1st** with even more HD power thanks to Nautel's patented hybrid peak/crest reduction. We call it HD PowerBoost™
- **1st** to deliver asymmetrical HD sidebands.
- **1st** to deliver MER HD Radio instrumentation.
- **1st** to address HD Radio feed requirements with HD Reliable Transport.
- **1st** to deliver highest hybrid IBOC efficiency with the new HD Spectrum/Efficiency Optimizer

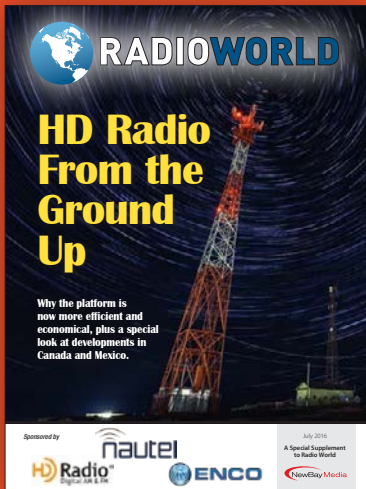
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By Jeff Jury

HD Radio From the Ground Up



Paul McLane
Editor in Chief

Readers who have been following specific aspects of the HD Radio tale over time may lose sight of how far the technology has come overall, especially in the crucial car listening environment.

From a business standpoint it's not startling anymore to read an announcement, for instance, from iHeartMedia that WOR(AM) in New York, including Mets play-by-play, can now also be heard on the HD-2 of WAXQ(FM); or that its station 93.1 The Fox WTFX(FM), serving Louisville, Ky., will be "[moving to HD Radio](#) with additional digital listening opportunities, effective immediately." HD Radio

on the FM band is part of the U.S. radio industry's fabric now.

But what should someone who has watched from a distance and now wants to get started know? Basic questions and groundwork have evolved, and engineering questions that applied five or 10 years ago are probably not as relevant today. Further, the HD Radio rollouts in Mexico and Canada are at much different stages than in the United States.

We thought it would be a good idea in this latest Radio World eBook to review how a station gets started with HD Radio, what the costs and decisions that it must consider are. We talked to HD Radio veteran implementers and proponents, and learned that the current generation of tools makes it easier to get a potent digital signal on the air. We also turned a spotlight on HD Radio efforts in Canada and Mexico, for readers who may be contemplating this conversion and to help U.S. readers better understand what's happening on the dials there.

This is Radio World's [23rd eBook](#). As always I want to hear from you about possible topics or improvements. [You know where to reach me.](#)

Going HD? It's Now More Efficient, Economical

Current generation of tools makes it easier to get a potent digital signal on the air

by Scott Fybush

In the early days of HD Radio — say, a decade or so ago — adding digital radio to an existing FM plant involved lots of compromises. Transmitters were inefficient and wasted plenty of energy as excess heat; maintaining time alignment between digital and analog required constant attention; and digital signals didn't cover as much territory as a typical analog counterpart did.

By 2016 that has changed dramatically.

"When you're buying something today, you're getting the benefit of everything we've learned over the last 10 to 15 years," says Alan Jurison, senior operations engineer at iHeartMedia.

From more efficient transmitters to better processing to built-in time alignment to improved STL systems, the

current generation of HD Radio systems can make it much easier to get a potent digital signal on the air and keep it running smoothly.

LOSSY TRANSMITTER SYSTEMS? REJECTED

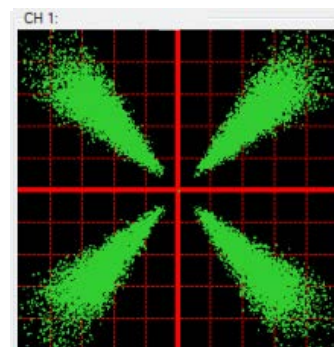
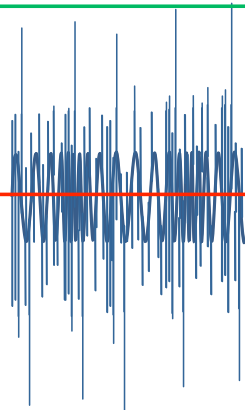
One big advantage to today's HD Radio transmitter systems shows up when the power bill arrives: They're far more efficient than the first few generations of transmitters were.

"In the last few years in particular, with the advent of LDMOS (laterally-diffused MOSFET transistor technology) and improved PAPR or peak-to-average power reduction, you can achieve higher efficiency and a lot more digital injection out of a given power transmitter," says Gary Liebisch, eastern regional sales manager for transmitter manufacturer Nautel.

OFDM Peak-To-Average Reduction Algorithm

Peak Power

Average Power



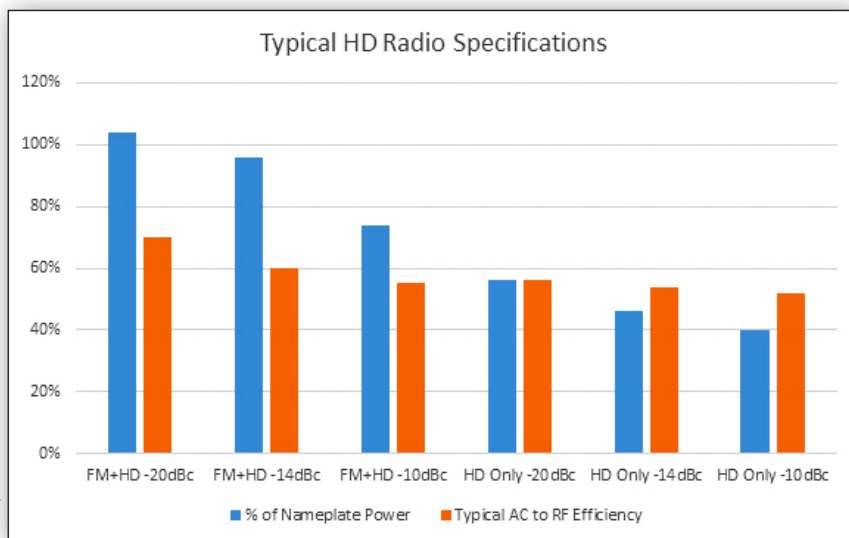
OFDM creates large signal peaks

- ☐ Reduces efficiency of transmitter
- ☐ QPSK constellation uncompromised

Peak-Average Ratio Reduction (PARR) technology reduces OFDM peaks

- ☐ Improves overall transmitter efficiency
- ☐ Allows trade-offs of noise of QPSK constellation and efficiency

Transmitter efficiency can be improved by peak-to-average reduction algorithms.



Today's transmitters can provide more efficiency and power under a range of conditions due to developments such as Nautel's HD Power Boost and HD Spectral Efficiency Optimizer. The chart shows the typical efficiency and total HD+analog power as a percentage of nameplate power of Nautel's GV series in various configurations.

How much more? Compared to early high-level injection systems that used a separate digital transmitter and wasted 90 percent of the digital power as heat into a reject load, "you can now get 90 percent of your analog nameplate power and still do -14 (dBc). Ten years ago it was more like 66 percent," he said.

That's a big deal for broadcasters considering a single transmitter for both analog and digital, because it means they can get more digital power from a smaller transmitter instead of having to buy an oversized transmitter just to get enough power for analog and digital together.

Today's broadcasters are also focused on higher digital power levels. Instead of the -20 dBc that was the original HD Radio standard, resulting in digital power levels that were just 1 percent of analog power, regulators in the United States, Canada and Mexico now allow levels as high as -10 dBc (10 percent of analog power).

"At -10 dBc, coverage of digital can be in excess of what the analog coverage is at that point," said Jeff Detweiler, executive director of broadcast engineering at DTS Inc., parent company of HD Radio.

"Of the 10 stations now on the air with HD Radio technology in Canada, the majority are running -10 dBc at this point. In Mexico, probably an equal number are at -14 and -10," he said.

Even for stations without an immediate plan to go up to -10 dBc, today's efficient transmitters make it easy to plan for the future, said Roz Clark,

senior director of engineering, radio for Cox Media Group. "I would design a transmitter and antenna system to support up to -10, even if I would most likely run it at -14 for energy consumption reasons."

KEEPING IT ALL COOL

Improved efficiency pays dividends, whether via a single-box solution for both analog and digital or whether a new digital transmitter is being added to an existing analog facility.

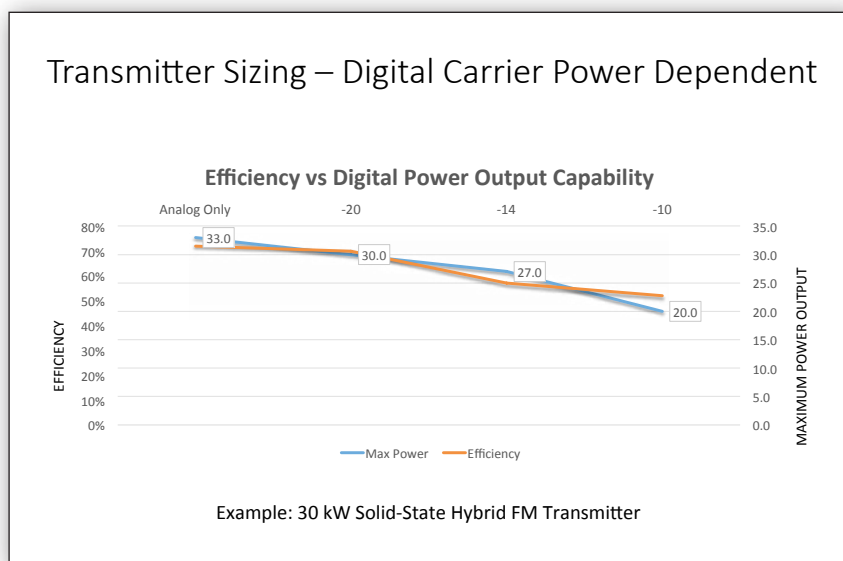
For those situations, today's HD Radio engineers agree that the choice of an antenna system is critical: The closer a station can get to single-point transmission of analog and digital, the better. Even though the FCC allows the

use of separate digital antennas at different heights on a tower (or even on an adjacent tower), the consensus is that at -14 dBc or higher, those separate antennas can cause undesirable digital-to-analog interference.

Greater Media VP of Radio Engineering Milford Smith says one new tool in his arsenal is the ERI 788 analog-digital combiner.

"This allows for the efficient combining of digital and analog through a unique filter design they use," he said. "As opposed to high-level combining, this allows for the efficient combining of digital and analog through a unique filter design they use. For a station that has an existing analog plant and doesn't want to go to

Transmitter Sizing – Digital Carrier Power Dependent



Hybrid transmitter power output capability is dependent upon digital sideband levels. Even for stations without an immediate plan to go to -10 dBc, today's efficient transmitters make it easier to plan.

nautel GVSeries - THE Choice for HD Radio®



Nautel's GV Series is the culmination of years of Nautel digital/analog transmission innovation.

Nautel's field-proven, high-power FM architecture is mated with advanced RF technologies, the award-winning AUI and a new Spectrum/Efficiency

Optimizer to set a new standard for digital performance, efficiency, serviceability and unmatched functionality.

Highest Hybrid IBOC Efficiency

With the GV Series Nautel has charted new ground for digital transmission efficiency. Traditionally, digital hybrid modes have displayed much lower efficiency compared to analog-only broadcasting. The GV addresses the need for analog/digital hybrid efficiency as well.

HD Spectrum/Efficiency Optimizer

The Spectrum/Efficiency Optimizer dynamically optimizes digital transmission parameters to achieve optimum spectral performance and efficiency. Digital efficiencies have improved by up to 15%. High digital efficiency can result in tens of thousands of dollars savings over the life of your transmitter.

Spectrum/Efficiency Optimizer	
Optimization Enabled	<input type="button" value="Yes"/>
Reduce Digital Power If Failing	<input type="button" value="Yes"/>
Reduce Power Set-Point If Failing	<input type="button" value="No"/>
Desired Mask Delta	<input type="text" value="-1.0"/> dB
Mask Delta To Reduce Power	<input type="text" value="0.0"/> dB

70%
at -20 dB

60%
at -14 dB

55%
at -10 dB

MER HD Radio Instrumentation



Nautel's award-winning AUI enables real-time measurement of MER including the ability to diagnose issues such as interference with the MP3 carriers near the analog signal due to FM analog signal over-modulation. Measurements follow the new NRSC standards and require no external equipment.

Learn more at nautel.com/MER

Try Nautel's Exclusive HD Radio Calculator



Calculate a proposed IBOC power increase using Nautel's exclusive Asymmetrical IBOC Sideband Elevated Power Calculator from Cavell Mertz.

Try the HD Radio Calculator at rftoolkit.net

HD PowerBoost™ GEN⁴

Nautel's award-winning HD PowerBoost GEN⁴ is a revolutionary technology that increases HD Radio power output while increasing efficiency, and addresses the FCC HD injection level increase ruling. It uses an intelligent peak to average power ratio (PAPR) technique to squeeze more hybrid power from any given transmitter and increase hybrid-mode efficiency.

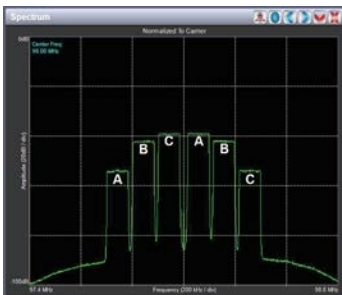
Learn more at nautel.com/HDPowerboost

More IBOC Power at Any Nameplate Level

Nautel's GV Series offers more IBOC power than any other transmitters available today. In a single cabinet, Nautel GV transmitters can provide up to 36 kW of analog power with a -14 dB injection level and up to 26 kW with -10 dB injection. In fact they can even make their nameplate power at -16 dB. (e.g. a GV30 can make a full 30 kW of analog power with digital carriers at -16 dB).

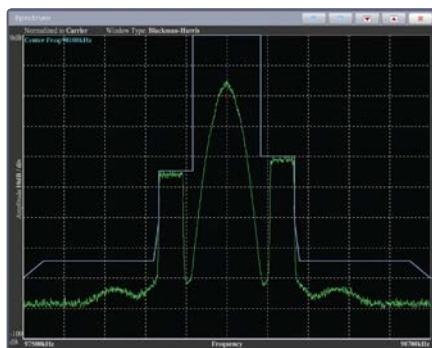
Pushing HD Radio Transmission Boundaries

HD Multiplex



This new experimental technology is a spectrally efficient and energy efficient means to implement all-digital radio utilizing a multiplexed implementation of iBiquity's Gen⁴ HD

Radio™ transmission technology. It enables the placement of up to 15 audio streams or stations within 600 kHz of signal bandwidth or up to 9 audio streams in 400 kHz of signal bandwidth. [Learn more at nautel.com/HDMultiplex](http://nautel.com/HDMultiplex)



Asymmetrical Sidebands

If interference issues prevent the use of increased IBOC injection levels on both sidebands, broadcasters can use Nautel's award-winning asymmetrical HD Radio transmission capability to increase only one sideband while leaving the other at levels that do

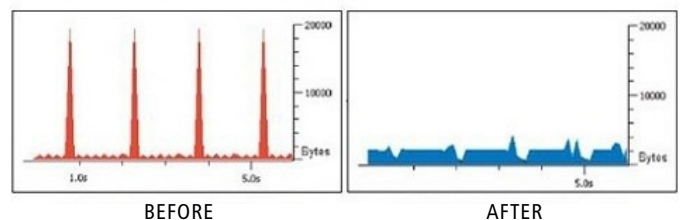
not cause interference with adjacent stations, and still achieve maximum coverage of their digital signal.

Learn more at nautel.com/AS



HD Reliable Transport

This software solution helps eliminate IBOC audio drop-outs. It is applicable to every HD Radio deployment and allows various multiple exciter configurations to be implemented, such as main standby exciters, multi frequency networks, single frequency networks and satellite distribution applications.



the expense of changing to a low-level combined transmitter, you're on the air at any digital power level with nothing more than the transmitter and 788 combiner."

Regardless of the transmitter configuration, cooling has become a critical piece of the equation.

"What you're really buying now (when you buy a new transmitter) is high-end IT equipment," says Jurison. That means planning to put in the same sort of heavy-duty cooling systems you might find in a data center — and the same sort of remote control and monitoring, too.

"Treat your transmitter building as if it were something on Mars," said Clark. "You want to know everything about it before you ever get out there. Have it self-heal, so if it knows something's going wrong, it will fix itself."

Clark says any new transmitter installation or major retrofit should include a robust UPS system, too.

"With modern transmitters and the technology required to support a modern transmitter plant, random reboots during energy blips aren't healthy for anything," he said.

And especially in humid Florida, where he's based, Clark says it's worth considering the new generation of liquid-cooled transmitters from manufacturers such as GatesAir.

"If you're building your shelter from scratch, you can design your air conditioning to be relatively minor compared to air-cooled," he said.

There's one more efficiency to be had at the transmitter site: Detweiler notes that the licensing fees broadcasters pay to DTS (formerly iBiquity) for HD Radio technology have dropped more than 50 percent, with FMs now paying \$10,000 for an initial license to use the system.

TIME ALIGNMENT SMOOTHED OUT

Once a broadcaster has sorted out the intricacies of the transmitter plant, it's time to pay attention to the audio that's going through it. For years, that meant constant tweaking of the time alignment between the HD-1 digital audio and the analog audio, which is delayed to match the digital stream once it's passed through the encoding and decoding process.

That's created ongoing problems for listeners, who don't understand the details of encoding delays but do notice when the HD Radio in their new car is making the audio of their favorite station jump back and forth as they pass in and out of digital coverage range.

Detweiler says it's more than just getting the time alignment precise; experience has also shown that it's vital to get the processing sounding as similar as possible between analog and HD-1 digital.



HD Radio time alignment is demonstrated here using DaySequerra diversity delay control at KUVU(FM) in Denver.

"There's nothing more disconcerting during a blend than large swaths of bandwidth increase, image increase and program density," he said.

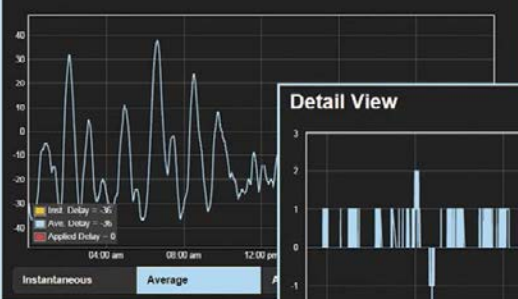
Fortunately, years of experience have taught today's engineers how to fix most of those problems. The consensus? Start with a single processor that has both analog and HD outputs, to create a consistent sound.

"We used to believe that the backup audio processor you had laying around the station could be pressed into service for digital, but that came at a price," Detweiler said. "The filters all had different group delays characteristics, resulting in different time shifts in the audio, which gave you a moving target in the blend. What we're recommending now is to use a common processor with dual output. Take your pick, they're all great."

Whether it's integrated into the processor or an external device, there are plenty of vendors now offering technology that can automatically monitor time alignment and can fix it when it starts to drift.

GETTING FROM HERE +38/-34 Samples

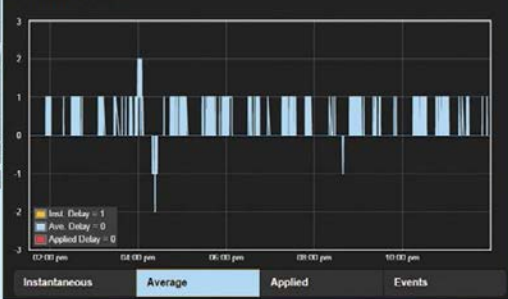
Detail View



Typical FM/HD1 drift over a 24 hour period.

TO HERE ±2 Samples

Detail View



Corrected FM/HD1 audio within ±2 samples within 24 hour period.

Courtesy: Inovonics

An image from Inovonics demonstrates the effect of a Justin 808 HD Radio Alignment Processor in an FM air chain.

External boxes such as the Inovonics Justin 808 or the DaySequerra M4DDC have largely solved the alignment issue, engineers say; and the recently announced acquisition of Orban by DaySequerra may lead to new implementations of that technology, too.

There's now consensus about what was once another controversy, too.

"It's desirable to co-locate your importer, exporter and exciter engine," Detweiler says. "That allows them to share a common timebase."

And when you co-locate all that HD functionality, you should do it all at the transmitter site whenever possible.

"Everyone needs to throw out the whole idea of having your exporter at the studio," Jurison said. "It was a myth, it never worked. You need to make sure your exporter and processor are at the transmitter site."

Jurison says there's another benefit to installing updated digital processing, even for listeners without HD Radio receivers: "In the process, you'll make your analog plant sound like a million bucks."

STLS MOVE BEYOND 950 MHZ

Putting all that equipment out at what's often a remote transmitter site may mean thinking in new ways about those old studio-transmitter links. While manufacturers have made improvements in the data capacity of traditional 950 MHz RF links, today's engineers often are looking up the spectrum to find ways to get more data back and forth between studio and transmitter.

"A lot of HD requires IP services from the studio," says Clark, and that often means the use of new radios that operate under Part 101 licenses.

"They provide a very large pipe in terms of data handling capability, up to 150 Mb per second on some of those links," Smith said. "This becomes important when you have multiple stations at a transmitter site, or even when you have a single station with HD 2 and 3 and various data add-ons. The additional capacity is almost

a requisite in most cases unless you choose to rely on T1 and other data circuits."

At Greater Media, Smith says those Part 101 systems are providing other forms of flexibility, too: In several markets, they've built them out into SONET ring systems that create links from each site to the next, building layers of redundancy that can survive the loss of any individual link.

Jurison says robust links from the transmitter back to the studio matter, too, when you've just invested in expensive HD gear up at the tower.

"This brand-new transmitter has a rich diagnostic system in it, so you're going to want to have good bandwidth for that and for the processor you just spent a bunch of money on," he said.

But don't turn off that older Starlink or Intraplex just yet, either, Clark says — they're part of a complete backup plan.

"I believe in maintaining those licensed 950 MHz channels. There are some very good products out there, and generally speaking, if you have a good 950 path it's going to be very reliable," he said.

A-E GIVES LISTENERS A BETTER EXPERIENCE

There's something else to consider, too, beyond the audio that your station is putting out. Today's HD Radio broadcasters are visual, too, using technology such as The Artist Experience to send song and album titles and artwork to a growing number of receivers in cars and homes.

"These are all things broadcasters are doing that keep us relevant in the dash," Jurison said. "If you pair your phone with your car radio, it's already got the cover art and the artist. So if you're not doing that as a broadcaster, you look bad."

Most current automation systems can easily interface with Artist Experience, he says. "There are a couple of major products on the market that can get you started and can help you manage your metadata from the automation system to licensing to publishing through the HD system."

Said Smith, "If one has not been in a new car with a higher end audio system, one needs to do that to get an appreciation for how much things like Artist Experience are essential for terrestrial broadcasters to maintain parity."

Even something as simple as transmitting a station logo now matters, says Detweiler.

"You're starting to see manufacturers use station logos as the preset buttons in the dashboard, which maintains brand identity," he said.

[Comment on your own HD Radio experiences.](#) ■

HD R

Expa



**OVER 33
MILLION**

HD Radio Receivers
Available Across
North America

APPROVED FOR
EXPERIMENTAL
LICENSES IN 2015

CANADA

10 **plus 16**

HD2/HD3/HD4
stations

Stations on air

USA

2,300 **plus 1,750**

HD2/HD3/HD4
stations

Stations on air

95% OF AMERICANS
LIVE IN AN AREA
REACHED
BY HD RADIO
BROADCASTING

HD RADIO IS ALREADY
IN 4 of MEXICO'S
TOP 10 MARKETS

MEXICO

54 **plus 47**

HD2/HD3/HD4
stations

Stations on air

HDRadio.com

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Radio™ Technology

Standing Across North America



Alpine, Clarion, Denon, Kenwood, Onkyo, Pioneer and Sony are shipping HD Radio receivers in Canada

1 out of 5

NEW CARS SOLD IN CANADA COME EQUIPPED WITH HD RADIO RECEIVERS

Available from these automakers in Canada:

Audi
BMW
Cadillac
Dodge
Ford
Hyundai



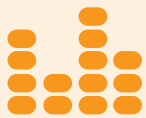
Infiniti
Jaguar
Jeep
Land Rover
Lexus
Lincoln



Mazda
Mercedes
Mitsubishi
Ram
Scion



Subaru
Tesla
Toyota
Volkswagen
Volvo



A new HD Radio receiver is sold in the U.S. **every 3.5 seconds**

Over 100

DIFFERENT VEHICLE MODELS COME EQUIPPED WITH HD RADIO TECHNOLOGY

Available from these automakers in the USA:

Acura
Alfa Romeo
Audi
Bentley
BMW
Cadillac
Chevrolet
Chrysler
Dodge



Fiat
Ford
GMC
Honda
Hyundai
Infiniti
Jaguar
Jeep
Kia



Land Rover
Lexus
Lincoln
Mazda
Mini
Mercedes
Mitsubishi
Nissan
Porsche



Ram
Rolls Royce
Scion
Subaru
Tesla
Toyota
Volkswagen
Volvo



Home and portable HD Radio receivers are available in Mexico from Sparc, Alpine, Kenwood, Insignia, Pioneer and Sony

Over 52

DIFFERENT VEHICLE MODELS COME EQUIPPED WITH HD RADIO TECHNOLOGY

Available from these automakers in Mexico:

Buick
Chevrolet
Chrysler
Dodge



Fiat
Ford
GMC
Infiniti



Jeep
Lincoln
Mazda
Mitsubishi



Mercedes
Ram
Toyota



In Canada, Early Adopters Await Events

Stations operating under experimental licenses are boosted by availability of receivers

by James Careless

The last couple of decades have been bumpy ones for efforts to implement new broadcast radio technology in Canada.

AM stereo crashed and burned here in the early 1990s, snuffed out by a lack of listener interest and no widely available/affordable radios, especially for cars. Next to flame out was Eureka-147 Digital Audio Broadcasting, the European-based digital radio standard rolled out in major Canadian cities a few years later. Despite superior audio quality and reliable coverage provided by Canadian DAB radio in the L-band (1452–1492 MHz), the same factors that overcame AM stereo — listener apathy combined with a paucity of affordable radios — killed this digital medium.

Public and private broadcasters in 2010 pulled the plugs on 73 licensed DAB stations in Montreal, Ottawa, Toronto and Vancouver.

A group of brave broadcasters is trying again to update the Canadian airwaves by launching HD Radio stations in a limited series of markets. The difference this time is that HD Radio-enabled AM/FM receivers are available “in about 30 percent of new cars sold in Canada now,” said Chris Sisam, vice president for Corus Radio’s stations in eastern Canada. “Add the fact that the United States is supporting HD Radio — which was not the case with DAB — and the impetus is there for more car makers and radio manufacturers to offer HD Radios to Canadians.”

The number of Canadian HD Radio stations — 10 — pales to the 124 AM and 580 FM stations on Canadian airwaves as of last August (numbers from the Canadian Radio-Television and Telecommunications Commission, April 2016).

These 10 stations are “running as many as three additional signals on the other HD channels per station,” said Chris Byrnes, president of Byrnes Communications Inc. It owns and operates radio stations in Canada and



Chris Byrnes at the CIHR(FM) facility.

New Zealand, including the Canadian HD Radio station CIHR(FM).

“CJSA Toronto were first to launch HD Radio in Canada followed by my station CIHR(FM) Woodstock,” Byrnes said. “Corus have HD operational in Hamilton (CING), Calgary (CKYR), and Vancouver (CFMI). CFMS 105.9 The Region



Modulation monitor shows an HD signal for a Corus station.

was next to launch in Markham, followed by Durham Radio from Hamilton (CHKX) who have country on HD1 and Smooth Jazz in HD2. At the end of June Rogers launched HD in Toronto (CKIS) and Vancouver (CJAX), and Bell Media have turned on HD in Vancouver on CHQM." All are FMs.

These HD Radio stations are operating under experimental licenses granted by the Canadian federal government.

"What happens from a licensing point of view beyond 2017 is unknown at this point," said Byrnes. "Hopefully the Canadian regulators will look kindly on those broadcasters who have invested in HD Radio."

All of the broadcasters interviewed for this article say they have been promoting their HD Radio services aggressively on air and online.

WHY THEY ADOPTED

The proximity of most Canadians to the U.S. border plays an important role in this process. Having the U.S. onside and HD Radio-enabled AM/FM receivers available in North American-made cars means that Canadian listeners can finally hear lots of these signals off-air.

This last point matters because "HD Radio is definitely an automotive play," said John Coldwell, Corus Radio's director of radio technology for eastern Canada.

"Although many people still listen to portable and tabletop radios, car radios are where the audience is."

Corus Radio has pragmatic reasons for launching HD

With a million cars in Canada already able to receive HD Radio, and more on the way, this is an excellent time for broadcasters to try out this new technology.

— CORUS RADIO'S CHRIS SISAM

Radio stations in three of its Canadian markets. "Our goal in launching them is to provide FM-quality channels for our AM stations in these cities," said Sisam. "This allows us to clear up interference and audio quality issues for these AMs."

One station that has benefitted is Corus' CFMJ(AM) "Talk Radio AM640" in Toronto. "Our AM signal can have a hard time penetrating office buildings and cars in the built-up downtown core," said Assistant Program Director Scott Guest. "With our AM640 signal now being carried on the HD2 channel of CING(FM) in nearby Hamilton — whose footprint covers all of Metro Toronto on 95.3 FM — downtown listeners can pick us up reliably and with much better-sounding audio."

Rogers Radio is also using HD Radio to enhance the sound of its Toronto and Vancouver AM stations. "From an

audio perspective, the NEWS and Sportsnet brands are delivering better quality audio through their FM/HD channels,” said Julie Adam, senior vice president of Rogers Radio. “All content, including commercials, simply sound better in HD. There are also some additional features like album art and graphics that we can add to the FM station display to enhance the listener experience.”

Byrnes Communications decided to upgrade CIHR(FM) Woodstock to HD Radio for reasons of both perception and performance.



Julie Adam

The audio quality of HD at 64 kbps on a well-produced song is noticeable, and there is no static or hiss.

— CHRIS BYRNES

“HD Radio helps radio to be cool again, not only because of the improved audio quality, but also because HD Radio provides a much richer customer experience via the vehicle dashboard, displaying album art and allowing listeners to tag songs and interact with the radio station,” said Byrnes. “The audio quality of HD at 64 kbps on a well-produced song is noticeable, and there is no static or hiss. I think the quality improvement between FM and HD is as significant as the difference between AM and FM.”

As a radio consultant who also owns and operates radio stations — “I think I am the only one who does this in North America” — Chris Byrnes is particularly curious to see if HD Radio can succeed in Canada when DAB and AM stereo failed. This is why he reconfigured CIHR (104.7 Heart FM) to simulcast its FM feed on CIHR HD1, and formatted an ‘80s-90s oldies station at 32 kbps on CIHR HD2.

“The ideas that work we tell our clients about, and the ideas that do not work so well, we try and learn from,” said Byrnes. “As broadcasters we need to innovate and try new things, or radio will continue to lose market share

and revenue will follow.”

Enhanced services are part of the appeal. Paul Brenner, president of the Broadcasters Traffic Consortium, said Corus Media stations were among the earliest HD Radio experimental licensees in the country and the first on-air with HD Radio Data Services. He said the potential return on investment for traffic, weather, fuel services and other information was appealing to Corus.

“The Broadcaster Traffic Consortium has worked with Canadian broadcasters since 2010 for traffic services, and

I can tell you that other broadcasters share Corus’ ideology. DAB’s failure in Canada proved to these same broadcasters that additional audio channels and improved sound quality were not enough for consumer adoption or ROI.”

THIRD TIME THE CHARM?

With the CRTC waiting until the end of 2017 to decide whether or not to make HD Radio a formal part of Canada’s radio landscape, pioneering Canadian HD Radio broadcasters are taking a financial risk by launching their stations now.

Corus Radio’s Chris Sisam isn’t worried. “With a million cars in Canada already able to receive HD Radio, and more on the way, this is an excellent time for broadcasters to try out this new technology,” he said. And listeners like HD Radio: “Almost immediately the station started receiving phone calls and emails from listeners who were hearing Heart FM in HD and loved the quality,” said Chris Byrnes.

Rogers’ Julie Adam echoed those comments. “This technology is still early in adoption in Canada, but the listener response we have received so far has been positive,” she said.

As for the future of HD Radio in Canada?

“Ultimately, as an industry I think we’re going to have to decide whether we believe this is a part of our long-term future (and if it is), then work together as a broadcast community to make HD Radio succeed,” said Adam. ■

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In Mexico, IMER Explores HD Radio

A conversation with Miguel Fernández Arias,
DOE of the Mexican Radio Institute



Miguel Fernández Arias is director of engineering of the Mexican Radio Institute or IMER, the acronym for Instituto Mexicano de la Radio.

Miguel Fernández Arias, holding plaque, received the AMITRA Engineer of the Year Award in 2014 at the 27th International Congress of Broadcast and Telecommunications in Mexico, organized by the Mexican Association of Broadcast Engineers and Technicians (AMITRA). LBA Group International Business Development Specialist Alberto Blanco, formerly of LBA Group, presented the award.

by Paul McLane

Radio World: Please describe the role of the IMER in the Mexican radio environment.

FERNÁNDEZ: The Mexican Radio Institute is the public radio of Mexico, the state radio group with the largest number of stations nationwide.

RW: Describe the scope of HD Radio implementation in Mexico to date.

FERNÁNDEZ: It has a presence in 21 states. The signal reaches four border states of the United States, as well as populations of Guatemala and Belize, through 23 stations on AM and FM, and a radio station on the Internet.

In addition, the IMER has 39 digital HD channels that allow it to be at the forefront of technology, expand its radio offering and reach new audiences — through simultaneous transmission of some of its stations and with new musical programming on HD3 channels Jazz Digital, Interferencia and Musica del Mundo, in which various themes of social interest are explored.

RW: In general how has the country's experience with HD Radio been so far? What do broadcasters like or dislike?

FERNÁNDEZ: In general it has been a good experience, as it substantially improves sound quality and gives the listener the ability to have more content and programming options; however development of this new technology is being limited by the lack of receivers in the market, and this is what broadcasters do not like — lack

of receivers on the one hand, and on the other they have not seen the possibility of new business with HD2, HD3 and HD4 channels. In Mexico broadcasters can rent these digital channels to third parties.

RW: Have broadcasters been able to “monetize” their use of HD Radio?

FERNÁNDEZ: Not yet, because at the moment they are familiarizing themselves with the technology from the operational and technical points of view.

RW: Do many listeners have HD Radio-capable digital receivers? What has their response been?

FERNÁNDEZ: As I mentioned there are few receivers in the market. The IMER, together with DTS Solutions, developer of this technology, are giving away digital receivers to listeners in order to arouse their interest. They're doing promotional campaigns of digital radio throughout the country, trying to explain everything about this new radio experience; we have had a very good response.

RW: In the United States, broadcasters have sought higher digital power and asymmetrical sideband operation to resolve various technical issues. What about in Mexico? What kind of experience with interference and power levels have the broadcasters encountered?

FERNÁNDEZ: We haven't experienced such problems to date, perhaps because there are not many stations in digital format yet. Moreover we are taking care with modulation rates, allowing harmony between stations.

No.	Siglas	Frecuencia	Grupo	Ciudad
1	XHRED	88.1	Grupo Radio Centro	Ciudad de México
2	XHFAJ	91.3		
3	XEJP	93.7		
4	XERC	97.7		
5	XEQR	107.3		
6	XERFR	103.3	Grupo Radio Fórmula	
7	XEDF	104.1		
8	XHIMER	94.5	IMER	
9	XHOF	105.7		
10	XHIMR	107.9		
11	XHGU	105.9	Megaradio	Ciudad Juarez
12	XHH	100.7		
13	XHUAR	106.7	IMER	
14	XHFG	107.3	Uniradio	Tijuana
15	XHTY	99.7		
16	XHUAN	102.5	IMER	
17	XHFMTU	103.7	Multimedios	Monterrey



Mexican stations listed are using Artist Experience; images at right represent stations that send station logos to listeners' receivers.

RW: Are organizations making good use of the HD2/HD3 capabilities of HD Radio? In what way?

FERNÁNDEZ: In the case of the IMER, HD channels are being used. We have been focusing on the production of content of social, cultural, educational and entertainment values, in order to disseminate information and raise public awareness about different issues that motivate staff and social welfare through institutional campaigns, series, programs and special transmissions.

RW: What kind of questions do you receive from prospective HD Radio broadcasters that we can share with readers?

FERNÁNDEZ: The main questions are how complicated the operation of digital radio and additional channels is; how expensive implementation is; and where to get radio receivers.

The answers are easy because digital operation is not technically complicated. The cost of implementation depends a lot on how it intends to operate — there are three ways to do this — and what kind of infrastructure does the station have, because if we start from zero, yes, it is expensive.

For the acquisition of the receivers, we refer them to the URL www.SparcRadio.mx. [SPARC Radio is a subsidiary of HD Radio parent company DTS, marketed by Grace Digital, and is a source of HD Radio receivers.]

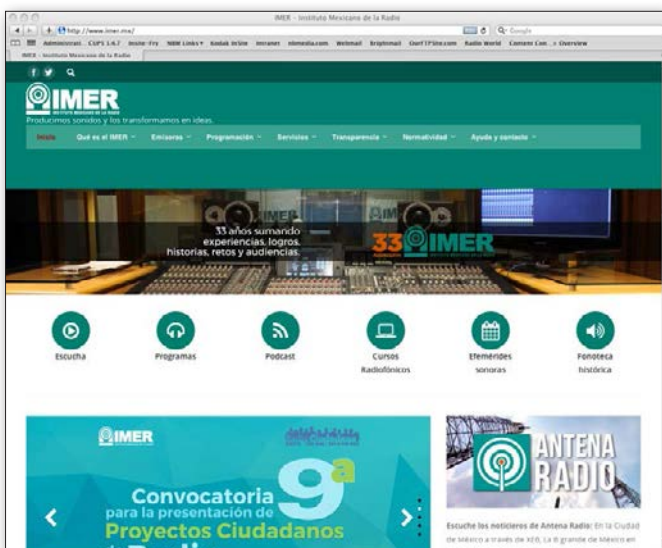
RW: The North American Broadcasters Association recently met in Mexico City. What did participants there learn about HD Radio?

FERNÁNDEZ: The meeting was very important. The benefits of the technology were presented; recipients and vehicles available on the market were demonstrated. Personally, I was involved with a brief technical description of the installation of digital stations.

RW: What else should radio engineers know about HD Radio?

FERNÁNDEZ: First of all, transmissions do not work with MP3 audio files; these must be in WAV format or with very low compression. Importing and exporting operations are based on software, but the hardware is computer-based, so if they are not expert in this area, they should be accompanied by a computer-savvy engineer. Once that is under control, the rest is easy. Also, be careful where studios and transmission plant are co-located. Digital radio links can be unreliable, especially if there is too much radio noise. This can cause headaches.

Translation assistance by Ulises Cabrera of NewBay Media. ■



The home page of IMER, the Mexican Radio Institute.

Commentary: Don't Look Now But ...

Jeff Jury writes that the momentum of HD Radio technology keeps growing

by Jeff Jury

The author is general manager, automotive at DTS Inc.

If you're wondering what's been happening with HD Radio, the answer is short and sweet: a lot.

While many consumers may still be learning about these new channels that they come across in their cars, the radio industry is aggressively working to ensure any mystery associated with HD Radio content is very short-lived.

While the rise of web-based digital platforms from the likes of Spotify, Pandora and others may be commanding mainstream consumer attention, HD Radio technology has been quietly and, more importantly, rapidly increasing its presence and impact across North America of late. The acquisition of HD Radio by audio pioneer DTS Inc. no doubt shows the belief in the format's bright future. AM/FM radio, after all, represents how 67 percent of people who consume music in their cars, which is more than owned music, Internet radio and satellite radio combined.

28 MILLION VEHICLES

To get an idea of this growth, look no further than the United States. Without doubt, the U.S. radio and automotive industries have embraced the value of HD Radio technology from the get-go. As people spend more and more time in their cars, which are often recognized as one of the best places to experience music at its best, the enhanced value proposition of broadcasting in HD Radio technology is appealing on many levels.

For radio stations, offering interactive capabilities such as tagging and bookmarking, unique program and artist info, album art or emergency info alerts, HD Radio serves up a viable competitive platform as web-based digital radio providers gain more consumer mindshare and market share.

More than 2,300 stations have converted to using HD Radio technology in the U.S., including 98 of the

country's top 100 stations. These stations collectively are offering more than 3,875 individual channels. Since 2011, listenership to multicast channels has grown more than 350 percent, based on Nielsen data.

Automotive manufacturers recognize its value for these same reasons, identifying the benefits of HD Radio technology in offering a more comprehensive suite of digital features in an increasingly digitally dominated culture.

HD Radio technology is quietly and, more importantly, rapidly increasing its presence and impact across North America of late.

Today, 11 percent of cars on the road in the U.S. are equipped with the technology, representing more than 28 million vehicles. All 36 major auto manufacturers with a presence in the U.S. are shipping vehicles equipped with HD Radio receivers. More than 200 vehicle models offer HD Radio receivers, an increase of 151 percent since 2010. Additionally, HD Radio comes standard in more than 100 models, a 216 percent growth since 2010.

Consumers now expect the same interactive features and digital capabilities from their vehicles that they have become attached to with their beloved mobile devices, and HD Radio is providing exactly that. The fact that the auto manufacturers are on board is obviously critical, but equally important will be more and more radio stations that begin to use HD Radio channels to deliver a listener experience that's not only as compelling, but also unique to their standard channel offering.

This is already starting to be the case, with stations seeing HD Radio channels as a means to diversify their offering with unique areas of emphasis. For example, some HD Radio channels might offer access to live concerts or artist interviews that are within the genre



of their standard stations. Other stations are offering material from local artists within their given market. Obviously, the balance is one of offering something that is complimentary to, yet doesn't cannibalize, the value of their standard channel offering.

MOMENTUM

While domestic acceptance and expansion has been significant, HD Radio's increased momentum extends beyond U.S. borders into its North American neighbors, Mexico and Canada.

South of the border, Mexico is demonstrating an equally impressive commitment to HD Radio, dating back to 2011 when HD Radio became the country's official digital radio standard. Currently, 54 stations are broadcasting with HD Radio technology, delivering 47 additional content choices for Mexican listeners bringing the total offering to more than 100 channels. Formats include AM Simulcast, World Culture, News/Talk, Educational, University Talk and more.

Fourteen automakers are shipping vehicles to Mexico

equipped with HD Radio receivers, comprising 52 vehicle models offering the technology. And it's not merely reserved for in-car access. Out-of-car receivers are now being produced for Mexican consumers from leading audio brands including Pioneer, Kenwood, Alpine and Sony.

Mexico and Canada are getting on board in a big way in terms of both adoption by radio providers, as well as the automotive industry. While they have not progressed as far as the U.S., the rate of acceptance and uptick in terms of radio stations and automakers is on par, or even greater, than that of the U.S. when HD Radio technology was launching domestically.

In 2015, the Canadian Radio-Television & Telecommunications Commission

began approving experimental license requests for broadcasters interested in converting to HD Radio technology.

As of July 2016, 10 stations in Canada have converted to digital broadcasting, offering 16 HD channels that cover formats such as 80s, South Asian, Farsi, AM Simulcast and Jazz. Twenty-two auto manufacturers are shipping HD Radio-equipped vehicles into Canada, from the likes of long-standing powerhouses Ford, Mercedes, Dodge, Cadillac and Toyota, as well as emerging brands like Tesla, to name just a handful. In addition, Alpine, Clarion, Kenwood, Pioneer and Sony are producing out-of-car receivers.

Exactly how far can North America go with HD Radio technology? With emerging features to be offered that will further enhance the radio listening experience, consumers will assuredly determine that it's not stopping anytime soon. And if the rest of the world is anything like North America, we may one day get to a point where HD Radio technology is the standard, and the terms "analog AM and FM" are the stuff of history. ■

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