

RADIOWORLD INTERNATIONAL EDITION

# Global Digital Radio

An overview of the latest digital radio developments around the world

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# Global Digital Radio



Digital radio continues to evolve at a rapid pace worldwide. India's public broadcaster, All India Radio, AIR, is currently managing the second phase of its adoption of the Digital Radio Mondiale standard, while Norway's national and urban local stations are in the process of moving to DAB-only transmission.

Marguerite Clark Editor in Chief

Other countries are at various stages of digital radio implementation. This newest eBook, "Global Digital Radio," takes a look at which countries are opting for which standard, how each region is preparing for the transition, ways in which digital radio can pave the way

to the connected car and how digital radio's emergency warning functionality can provide relief in times of disaster.

It also offers details on planned FM switchoff dates and requirements, potential benefits of each standard, receiver status, possible transition challenges, and how countries are embracing digital and forging their unique paths forward. In addition, we invited a number of thought leaders to offer perspectives on where digital radio is heading.

Radio World has published 34 eBooks exploring the many facets of radio station and network operations including mobile reporting, studio/transmitter links, visual radio, studio apps, social media, consoles and more. Find them at <u>www.radioworld.com/ebooks</u>.

Let us know how we can make these handy reference guides more useful to you.

— Marguerite Clark

# DAB Makes Steady Progress

The standard is now reaching worthy results in terms of both regulatory interest and consumer uptake

#### **By Lawrie Hallett**

**LONDON** — Digital Audio Broadcasting — <u>DAB and</u> <u>DAB+</u> — has enjoyed mixed success since its introduction back in the early 1990s.

On a country-by-country basis, various strategies have been pursued in relation to establishing the technology. Some jurisdictions have been a great deal more proactive than others, and some have enjoyed considerable levels of uptake by the general public. Although it is sometimes

difficult to correlate the degree to which deliberate policy approaches affect the public's relative enthusiasm for the standard, the provision of additional services, for which analog carrying capacity would not be available, does appear to be one constant in most success stories about DAB.

#### **DEGREES OF SUCCESS**

Ahead of the curve by some margin is Norway, which expects to have switched off all but the smallest of FM services across the country before the end of this year. Switzerland has also announced a

formal timetable for so-called "digital switchover" (DSO), expecting to complete the process over a slightly longer timetable, by 2024.

Population coverage in Denmark, Germany, the Netherlands, Norway, Switzerland and the United Kingdom already well exceeds 90 percent; and it exceeds 75 percent in Italy. Permanent national or regional services are being rolled out in Belgium, the Czech Republic and France.

At the other end of the scale, however, there remain some European countries that have yet to embrace the standard to any material degree, though their number is reducing.

National trials are also underway in Hungary and Latvia,

with more localized trials taking place in Austria and Slovakia. In the Republic of Ireland, the public service broadcaster, RTE, operates a five-transmitter multiplex reaching just over 50 percent of the population and two regional trial commercial multiplexes are also operational.

Of course, the DAB standard is not used at all in some parts of the world, most notably the Americas and the United States in particular. However, according to WorldDAB, the body responsible for the promotion of the technology, well over 400 million people can now receive



some of the 2,000+ DAB services operating in nearly 40 countries.

Some 55 million domestic DAB receivers had been sold by the end of last year, including around 14 million for in-car use. In Europe, 60 percent of new car sales are in countries with operational national DAB multiplexes.

#### **RECEIVER SALES**

As a result, all major car manufacturers now offer DAB-capable in-car entertainment systems (ICE). Nearly all new cars sold in Norway (98 percent) and in the U.K. (87 percent) come with DAB and DAB+ capabilities as standard.

As market penetration increases, the cost of DAB

Wolter, DAB Italia

receivers continues to fall, with designs available for as little as €14, below US\$20. Major manufacturers provide DAB+ capabilities in all their designs and have done so for a number of years.

In Norway, almost all services are now delivered using DAB+, and the popularity of this more recent version of the DAB standard is also increasing in countries such as the U.K., where it is used for some services on Sound Digital, the second national commercial multiplex, launched last year, as well as for services on some of the current small-scale localized trial multiplexes.

Although the majority of countries are not yet proactively pursuing concrete DSO dates, this does not mean that preparatory moves are not being made for such a change later.

Unlike Norway, many countries prefer "market lead" approaches to the process, setting digital listening targets as a prerequisite for mandating the digital switchover process.

For example, Denmark, which has enjoyed a range of DAB services for a number of years, plans to transition all of these to DAB+ this year and intends to decide its DSO strategy once digital reception accounts for 50 percent of all listening (that figure is now somewhere below 40 percent).

#### **DEFINING DIGITAL**

The definition of "digital listening" does tend to vary, though, from country to country, and it should not always be seen as synonymous with an equivalent uptake in the use of DAB.

For example, the U.K. defines "digital listening" as including listening to radio services via digital television platforms (satellite and terrestrial) as well as via web-based streaming services. However, government has also put into place a further protection for consumers, requiring that coverage of national DAB services (both BBC and commercial) must be equivalent to FM before any DSO process can begin.

Although the process of introducing DAB has made the greatest progress where it originated in Europe, the technology is also making inroads elsewhere.

In the Asia Pacific Region, the greatest success story for DAB is undoubtedly Australia, where DAB+ receivers are now available in almost a guarter of all households. DAB is available in five state capitals and new services are launching within the year for Canberra, Darwin and Hobart.

Across the country, some 3.5 million people listen via a DAB+-capable device. Fellow Antipodean New Zealand continues to operate the trial multiplexes that have been



The Plan de Corones transmission site in the Italian province of South Tyrol.

broadcasting there since 2006, and which are now delivering DAB+ services.

In China, four local multiplexes, carrying nearly 20 services between them, operate in the capital, Beijing.

#### WORLDWIDE GROWTH

In the Middle East, Kuwait launched permanent DAB+ services in 2014. Coverage of the current 15 DAB+ services on the national multiplex is already at 90 percent

Continued on page 6

#### **GLOBAL DIGITAL RADIO**



and is expected to reach 100 percent later this year, with two further stations also joining the single-frequency network.

Short-term trials have also taken place in nearby Bahrain, while in the United Arab Emirates plans are underway for the introduction of commercial DAB+ services in 2018.

State-run Turkish Radio and Television is operating trial DAB multiplexes in Istanbul and Ankara, each carrying five simulcast services and between them reaching some 18 percent of the population. Across the Mediterranean in Tunisia, North Africa, a trial multiplex is operational, carrying a dozen DAB+ services.

Perhaps because of the success of DAB in various major European markets in particular, more recently other countries around the world have begun to investigate its potential through trial transmissions.

South Africa launched a short-term DAB+ trial in March, carrying some 20 services. Other trials are also progressing in Indonesia and Malaysia, while plans for the introduction of DAB are being explored in other countries, including Thailand and Myanmar.

It is perhaps an indication of how much progress has been made recently that it is now difficult to cover all DAB developments in a single article. However, this overview of the state of the standard clearly shows how much DAB receivers come in all shapes and sizes, with prices now as low as €14. Pictured here is a Sangean digital radio receiver.

progress has been made since its launch toward the end of the previous century.

The road for DAB may have had more bumps than had been expected, and the broadcasting world is a very different place from what it was over 20 years ago. However, the standard does now appear to be reaching some worthwhile destinations in terms of both regulatory interest and consumer uptake.

Lawrie Hallett, the technical director of Future Digital Norfolk Limited, reports on the industry for Radio World from Norwich, England. He previously worked on community and digital radio policy at Ofcom.

# **DRM Digital Radio Finds Its Place**

With its adoption in India, the DRM broadcasting standard has found a firm foothold, and continues to expand globally

#### **By James Careless**

**NEW DELHI** — Right now, public broadcaster All India Radio is operating 35 medium-wave (AM) and two shortwave radio transmitters using the Digital Radio Mondiale broadcasting standard, in an ambitious bid to rollout pristine digital radio services to the nation. In doing so, India has made DRM into the world's third viable digital radio broadcast standard, alongside DAB/DAB+ and HD Radio.

"Both of AIR's shortwave transmitters are broadcasting in pure DRM mode," said Yogendra Pal, former additional director general of AIR and head of the Indian chapter of the DRM Consortium, the global organization promoting the DRM standard. "Out of 35 medium-wave transmitters, two are working in pure DRM carrying two audio services each in digital, and all the other 33 transmitters are working in simulcast mode. As of March 7, AIR has issued orders to operate 25 of the medium-wave DRM transmitters in pure DRM for one hour daily."

AIR's ultimate goal is to convert all of its medium-wave

DIGITAL RADIO MONDIALE

A DRM radio-equipped Hyundai car on display at the 2017 BES Expo in New Delhi in February.

transmitters to DRM-only service. This will occur once the penetration of DRM receivers in India is sufficient to justify shutting down analog medium-wave transmissions. (A guick primer: The first mode of the DRM standard, DRM30, works in the bands below 30 MHz and is designed for large coverage areas. The second mode is called DRM+; it covers the RF spectrum above 30 MHz and Bands I, II and III up to 240 MHz.)

For the DRM Consortium, whose members include many of the world's major radio broadcasters and equipment manufacturers, India's adoption of DRM justifies the group's years of hard slogging. This is because AIR is the first major broadcaster to embrace DRM as an operational standard.

"The DRM rollout in India is guite spectacular," said DRM Chair Ruxandra Obreja. "The first phase of the project was the installation of DRM-capable transmitters. Now we are entering a second phase where better sound, value-added nonaudio services, and receiver manufacturing are being seriously pushed and promoted."

> DRM's success in India is the standard's greatest victory to date. But it is not the only one.

#### INDIA

With an estimated 1.2 billion people currently being served by AIR's radio broadcasts, the decision to adopt DRM as India's digital radio standard was made after the broadcaster's deliberation and testing of DRM and DAB transmission systems.

"AIR selected DRM based on this technology's ability to deliver clear, full-range digital audio on medium wave, FM and the interference-ridden shortwave bands," said Pal, the retired AIR executive who helped spearhead India's DRM rollout.

Given the popularity of AIR's global SW services — "available in more than 108 countries in 27 languages in analog,"

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Pal said — plus AIR's "vast network of over 140 analog medium-wave transmitters giving service to over 98 percent population of the country," selecting the DRM digital radio standard made good sense for India's public broadcaster.

The fact that DRM-enabled medium-wave transmitters can also simulcast in analog medium wave cinched the deal. "Until DRM digital receivers are available to a sizable population, analog medium-wave services can continue along with digital service from the same transmitter," Pal said. "No additional frequency spectrum was required, existing infrastructure such as transmission lines and antennas masts did not have to be replaced — and even the existing transmitters could be converted to digital at a nominal cost."

AIR bought a number of new DRM-capable transmitters from Nautel, which was major news for the Canadian transmitter manufacturer.

"Nautel is proud to have supplied 11 100 kW NX100, 10 200 kW NX200, and six 300 kW NX300 DRM-enabled medium-wave AM transmitters to AIR; comprising the world's largest digital radio deployment to date," said Chuck Kelly, Nautel's Asia/Pacific Regional sales manager. "Nautel has [since] received a follow-on order from AIR for another four NX100s, and two NX200s."

In India, the push is now on to get affordable, domestically-made DRM receivers into the marketplace, and the hands of Indian radio listeners. "One Indian domestic manufacturer has already developed a standalone DRM



From left, Ruxandra Obreja, DRM chair; George Ross, TWR, Guam; and Alexander Zink, Fraunhofer IIS/vice chair DRM, show DRM reception on mobile devices and the Titus II software-defined radio receiver.

#### receiver," said Pal.

"Some automobile manufacturers have also incorporated DRM reception facility in their built-in audio systems," he added. "Our domestic receiver industry sees a very good opportunity in meeting domestic demand as well as making DRM radios for export."

The price of India's domestically made first DRM/ MW(AM)/FM receiver, the Avion Electronics AV-DR-1401, is US\$189. Compared to the cost of conventional MW/ FM radios, this is quite expensive in a country where 29.8 percent of the population is below the poverty line, according to the CIA World Factbook.



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"The price of standalone DRM digital receivers is certainly a concern at present," Pal acknowledged, "but I am sure that prices will go down very fast with demand, as we have seen in the deployment of any new technologies in many other fields. The eventual availability of a DRM reception facility in cellular phones will further boost the popularity of DRM digital services."

"The one surprising and pleasing development is the incorporation of DRM receivers into cars in India," said Obreja. "For instance, Hyundai has brought four new DRM-equipped models out since the beginning of 2017, and sales have already counted into the thousands. These models include line-fit DRM receivers at no cost to the buyer. Hyundai is the third Indian car manufacturer to offer DRM radios as standard equipment, with a lot of other brands working on launching cars with incorporated digital receivers."

#### PAKISTAN

Unlike India, Pakistan's public-operated Pakistan Broadcasting Corp. (Radio Pakistan) is interested in possibly deploying DRM first on the FM band, and then



PBC's Senior Broadcast Engineer Ghulam Mujaddid sets up a GatesAir FM transmitter along with RF Mondiale DRM+ equipment for lab testing in Islamabad, Pakistan.



A screenshot of PBC's DRM+ professional receiver showing a live DRM+ test transmission in Islamabad, Pakistan.

eventually medium wave. In fact, the country has already begun DRM+ field tests in the FM band, at its Islamabad headquarters. PBC's decision to do FM first is due to the country's large and growing urban population, and the fact that this technologically progressive audience is also more affluent than its rural counterpart.

"The literacy rate is much higher in the metro cities, as well as its buying power of new digital DRM receivers compared to rural areas," said Ghulam Mujaddid. He is PBC's senior broadcast engineer, a member of PBC's DRM Steering Committee and an observer member of the DRM Consortium's International DRM Steering Board. "It is also worth mentioning that the upfront equipment cost required for the transition in DRM+ for FM transmitters is much lower as compared to DRM30 for AM transmitters."

Pakistan's current broadcast spectrum allocation explains why the country chose DRM over DAB.

"DAB uses Band III (174 MHz to 240 MHz), which is already occupied by the Pakistan Television terrestrial network and some other departments," Mujaddid said. "DRM+ works in Band II (88 MHz to 108 MHz), which is already the established band for FM broadcast. So it is quite easy and smooth for us to use the same FM band while transitioning to the DRM+ standard."

The fact that India is rolling out DRM also influenced Pakistan's choice of DRM over DAB. Broadcast compatibility with your next-door neighbor counts.

At present, PBC has 20 FM transmitters that are fully capable of DRM+ broadcasting across the country, and plans to buy 20 more DRM+-capable transmitters in the 2017–2018 financial year. PBC already has 10 kW, 100 kW and 400 kW MW/AM transmitters that are fully capable of supporting DRM30 standard broadcasts.

The fact that PBC can operate its existing and new transmitters in dual DRM/analog mode was a big selling point in DRM's favor. "In contrast, DAB transmitters do not support analog and only work in the digital mode,"

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said Mujaddid. "We can't run both modes from a single DAB transmitter." Cost also gave DRM the edge over DAB: "FM transmitters, which normally transmit analog signals, can easily be converted to DRM+ by just adding a small piece of hardware to it," he said.

Although PBC is eager to start rolling out DRM+ and eventually DRM30 as well, it is no rush to shut down FM and medium wave. "There is no specific date for the rollout to be completed; it all depends on the factors and challenges we have already discussed," said Mujaddid. This said, "PBC is determined to rollout digital radio standard in the country to provide efficient and better programs to the people of Pakistan."

#### **INDONESIA**

Since 2015, Radio Republik Indonesia, the country's public broadcaster and member of the consortium, has shown renewed interest in the full DRM standard, after less-than-satisfactory DAB+ listener feedback and DAB+ receiver sales in Jakarta and Batam Island.

"Together with the DRM Consortium, RRI has carried out a successful DRM30 [medium wave] trial in the spring of 2015 in Bogor, 60 kilometers from Jakarta where the DRM signal could be also received," said Obreja. "This was followed by a similarly successful trial and demonstration in cars and on mobile devices during the General Assembly of the ABU in October 2016 [in Bali]."

In May 2017, RRI and DRM Consortium experts demonstrated how a high-power FM transmitter on the island of Batam could be converted to DRM (for local coverage) and then run without interference, with a more than satisfactory coverage in simulcast mode.

"The president of RRI and other high officials see DRM





The Batam Island, Indonesia, FM transmission site that was upgraded to DRM for testing.

as a serious potential solution for covering this country of 220 million and 17,000 islands," Obreja said.

#### BRAZIL

Since 2012, Brazil has had two reasons for wanting to deploy DRM. First, the country is forward-minded when it comes to digital broadcasting. Second, when the national government "made a public call for digital radio standards to present themselves to be tested in Brazil, DAB did not attend," said Marcelo Goedert, owner of the Brazilian audio equipment firm Audio Fidelity Produções Ltda. "So, it was never officially considered for Brazil." Add the fact that Brazil is a very large country — "any digital radio solutions have to consider long distance transmissions via medium wave and shortwave," said Goedert — and "DRM was the right choice."

Unfortunately, the ongoing economic and political crisis is delaying Brazil's adoption of DRM as the country's digital radio standard. In the interim, DRM field tests are underway. Specifically, DRM30 signals have been test-broadcast by Empresa Brasil de Comunicação (EBC), Brazil's public broadcaster, on 9.740 kHz shortwave since the end of October, 2016; with the latest tests as recently as May-June 2017.

"We are using a low-power 150 W DRM transmitter installed at the Rodeador Site in Brasília, the capital in the center of the country," Goedert said. "The aim of this test is to assess the behavior of the equipment, signal quality and system stability. Because of the low power, there were initially not any high expectations of large coverage but, despite all this, the signal has been detected all

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Avion Electronic:



The robustness of the Batam Island DRM signal is shown in this in-car measurement take during the trial.

around Brazil — and there were some intermittent signals received in New Zealand."

During May and June, EBC resumed experimental DRM transmissions from Rodeador Park, the Rádio Nacional transmission site near the Brazilian capital. Different antennas and frequencies were tested, and reception reports from places more than 1,000 km away were received, despite the low power used. The transmissions are being carried by Brazilian Digital Radio Association (ABRADIG) in partnership with EBC.

As for sourcing DRM equipment, Brazil has a domestic transmitter manufacturer, BT-Broadcast Transmitters, that makes DRM transmitters to sell locally and to other countries. "Receivers for the test are coming from India," said Goedert. "Since we don't have digital radio yet, no company has started manufacturing in the country yet."

Even if Brazil adopts DRM, many obstacles to a successful rollout remain.

"The main challenge for Brazil is the governmental delay in establishing parameters for digital radio," Goedert said. "The other challenge is the diversity of Brazilian radio. We have around 10,000 radio stations divided into private, public, educational and community, all with different interests and priorities. It is very hard to find an agreement on radio policies and technical standards."

#### **AFRICA**

There is interest in DRM in South Africa, where a successful DRM30 trial was carried out in 2015 by Radio Pulpit. Currently, the BBC and Radio Kofifi/Wecodec are conducting a DRM+ trial in Johannesburg.

"First results are very good, with excellent coverage

via DRM+ at low power," said Obreja. "South Africa is on the brink of choosing its radio digital standard. Or the country might go for a combination of DRM and DAB+ in order to cover its diverse topography and meet the needs of big urban centers like Johannesburg and smaller places, as well as of big radio players and community stations like Kofifi."

Other southern African countries have expressed interest in adopting DRM, with Mozambique, Botswana, Zambia and other nations taking their cue from South Africa. "Nigeria is broadcasting in DRM and some north African countries like Algeria, plus countries in the Middle East are also interested in DRM, have acquired DRM transmission equipment and are keen to use it," Obreja said.

#### **A BRIGHT FUTURE**

Collectively, these countries and their interest in DRM underscore how this digital radio technology has found its place on the world stage. No longer is DRM an engineer's pet project, it is now a credible broadcast standard.

Having achieved this result, the DRM Consortium's task now is to capitalize on DRM's momentum and use it to attract other nations to the standard.

"Wider take-up and use of DRM remains the goal," said Ruxandra Obreja. "This goes in parallel with increasing the volumes of sold or integrated receivers that should establish digital radio as the norm and bring radio where it belongs: as the ultimate integrator and ubiquitous glue for all new and old digital platforms."

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

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# HD Radio in North America

Broadcasters need to reinforce the medium's place in the dashboard to ensure a vibrant future

## **GUESTCOMMENTARY**

#### By Rick Greenhut

The author is director, Broadcast Business Development at <u>Xperi Corp</u>.

**COLUMBIA, Maryland** — More than 2,500 radio stations in North America have upgraded to HD Radio technology, creating some 4,200 individual channels of digital broadcast content by adding HD2, HD3 and HD4 programming.

In fact, 79 percent of all radio listening in the United States alone is to stations that have already converted to



digital. Almost 90 percent of the U.S. population lives within the signal coverage of a digital radio station. Thirty-seven auto manufacturers offer more than 230 vehicle models with HD Radio receivers, with half of those models offering them as standard equipment.

There are close to 40 million HD Radioequipped cars on the road in North Ameri-

ca, with another sold every three and a half seconds. Today, nearly 45 percent of all new cars sold this year will have HD Radio. In several U.S. markets, almost one in four cars are fitted with HD Radio. Nationwide, almost 15 percent of all the cars in America have HD Radio receivers.<sup>1</sup>

Let's survey the radio landscape two, five and 10 years



Fig. 1: HD Radio Technology by the Numbers

out to best position ourselves for radio's future. Here's what we see occurring in the wider world, and how to take advantage of these inevitable changes.

#### **IN TWO YEARS**

In 2017, more than 79 percent of all U.S. radio listening is to stations broadcasting with HD Radio technology, and that number keeps growing. For that reason, it is vital that stations pay strict attention to the quality of their digital signals. That means monitoring time and level alignment between analog and digital,

Nearly 45 percent of all new cars sold in the U.S. this year will have HD Radio.

ensuring the scrolling PSD (Program Service Data) text isn't "stuck," and that Artist Experience images of album art and advertiser logos match program content.

HD Radio is here, now, and as an industry we need to deliver a world-class digital listening experience today and prepare for tomorrow. Ensuring the best possible user experience is vital to radio's continued viability as we move from today's cars equipped with Advanced Driver-Assistance Systems (ADAS), to autonomous and then (eventually) driverless cars.

#### **IN FIVE YEARS**

Worldwide, the connected car is the ultimate goal of virtually every automaker. Being able to deliver more than just audio requires the capability to combine existing overthe-air broadcast technology with the ability to simultaneously move data. Our DTS Connected Radio platform enables that future on a global basis.

Here's where broadcasting's one-to-many business model makes radio the obvious choice for sending data. As an industry, we already have the distribution network in place to reach cars on the road. Adding an Internet connection to supplement this provides two-way communications capability.

Today, more than 750 HD Radio stations in the U.S., Canada and Mexico get paid for leasing a small portion of their digital bandwidth to traffic service providers for data. It's new revenue that a station generates invisibly, inde-

#### The Connected Car: A Global Solution

The holy grail for automakers is having just one "universal" audio/data appliance that receives both HD Radio broadcasts in North America as well as DAB/DAB+ digital radio transmissions in Europe and the Pacific Rim, along with analog AM and FM.

For that reason, we've developed DTS Connected Radio, a way of moving data in the background. This international solution for over-the-air broadcasting merges radio with the interactive benefits of Internet connectivity. Platformagnostic, it enhances and improves multiple broadcast platforms with a richer and more consistent user experience, coupling a receiver's tuner and an IP connection.

Radio's ability to deliver curated audio entertainment while pushing essential data in the background ensures we remain relevant. Stations best positioned to monetize these new opportunities will be those who have already invested in their digital broadcasting infrastructure and are ready and able to begin delivering the data that tomorrow's cars will require.

- Rick Greenhut

pendent of audio content. In the next five years we expect these opportunities will increase.

#### **NEXT STEPS**

It is generally agreed that in the next 10 years the vast majority of automobiles rolling off the assembly lines will, at a minimum, have ADAS features and be connected to a wider data infrastructure providing some or all the benefits of the V2V (Vehicle to Vehicle) and V2X (Vehicle to Infrastructure) data needed for autonomous vehicles.

Driverless cars will just be starting to appear on the roads, and there will be an ever-growing need for a robust, cost-effective data pipe into cars to ensure they are constantly updated with road conditions, traffic, weather and other safety and navigation information. Radio must become a key part of that infrastructure if we expect to continue to remain relevant.

The next obvious step for our industry is for radio stations to further cement radio's place in the dashboard by becoming an indispensable provider of data to cars.

By paving the way to the connected car, we can ensure a vibrant future for broadcast radio.

<sup>1</sup> Source: Xperi Corp, The Nielsen Corp, IHS and NADA. Listening data based upon Fall 2016 Nielsen Nationwide data.

# DAB+ Offers Opportunity

Lets stations launch new services, build brands and reach new audiences

## **GUEST**COMMENTARY

#### By Patrick Hannon

The author is president of WorldDAB.

LONDON — DAB digital radio continues to go from strength to strength, with over 53 million receivers sold, more than 2,000 regular DAB services onair across 38 countries, and new trials starting in Asia, Europe and the Middle East.

The reasons for choosing DAB are clear. It is an open digital radio standard that has been adopted internationally; and listeners, regulators and public and commercial broadcasters have embraced its benefits.

#### INNOVATION

For consumers, DAB offers new services and improved sound quality. For policy makers and regulators, it secures the future of radio. This is important not just for cultural and democratic reasons but the fact it's freeto-air, with no gate-keepers, and a medium that can be relied upon in emergencies.

For broadcasters, DAB provides an opportunity to innovate and build new audiences — launching new services, building brands and reaching audiences that simply would not have been possible on capacity-constrained FM.

Broadcasters' fears about the threat of increased competition appear misplaced. Evidence from the United Kingdom, where commercial market leaders Global and Bauer have both increased market share over the last 10 years (though organic growth and acquisitions), demonstrates that incumbents have significant advantages over potential competitors.

The key to success in DAB is to take a proactive, innovative approach, and the biggest threat is to ignore the opportunities of DAB — leaving the door open to more agile competitors and new entrants.

WorldDAB

European Union governments are now working together to accelerate rollout of DAB in Europe, building cross-border links to develop a European consensus about radio's digital future. Norway has commenced the digital switchover (DSO) process, which will complete at the end of 2017, and Switzerland will implement its own DSO between 2020 and 2024.

The next wave of markets are close behind: the U.K. is soon expected to hit 50 percent digital listening, and Germany just announced the winners for its second commercial multiplex.

#### **RECEIVER ADVANCES**

In France, new cities will see DAB+ coverage this year, Italy has been running a significant marketing campaign on the back of expanded coverage and the Dutch launch of DAB+ in 2013 has been the most successful

# The biggest threat is to ignore the opportunities of DAB.

yet, with high sales of digital receivers. In Asia Pacific, Australia leads the way with 3.6 million DAB+ listeners, Indonesia launched trial DAB+ services in Jakarta in April 2016 and Thailand plans to start digital radio trials in the next year.

The prices of DAB receivers continue to fall, with devices available from just €14 and those with a color screen have dropped below €50 (about US\$56). All major car manufacturers are fitting DAB in their vehicles; in Norway 98 percent, the U.K. 87 percent and Switzerland 66 percent of new cars come with DAB/DAB+ as standard. The range of adaptors to convert cars already on the road continues to grow, as more and more drivers are converting their cars to DAB.





Pure's Highway 600 DAB car system features a standalone control/ display unit.

The European Broadcast Union has called for the adoption of digital broadcast radio across Europe, and in May the German Ministry of Economics and Energy (BMWI) announced that the Federal Cabinet has proposed an amendment to the Telecommunications Act, which would require future high-quality radio receivers to be capable of receiving standardized digital signals. At the time of writing this act has already passed its first reading.

Broadcasters and industry are engaging with the EU about measures to encourage the development of digital radio across Europe — for example, by proposing regulation that new radio receivers (consumer and automotive) should be capable of receiving FM and digital services. This would ensure that citizens across the EU are able to buy future-ready radios wherever they live.

This year we're seeing trials in several new markets in Eastern Europe, the Middle East and Asia Pacific. With WorldDAB members sharing their experiences of deployments and how to establish legal and regulatory frameworks, there is a clear path to success that countries planning digital radio rollout can learn and benefit from.

To find out more on DAB deployments around the world and the latest developments, visit the <u>WorldDAB</u> website.

#### **Digital Switchover Gains Ground**

On Jan. 11, Norway made history as the first country to start the digital switchover process from FM to DAB+, with all national stations making the move by the end of this year.

Listeners in Norway are able to access over 30 national stations on DAB+, compared to just five on FM. The first reports on listening and receiver sales have been positive and in line with expectations. Over one million cars in Norway have DAB radio and 73 percent of Norwegian listeners tune into digital radio every day as of June 2017. Local broadcasters will continue on FM at least until licenses are due for renewal.

Switzerland is the next country to switch off FM services, starting DSO in 2020 and completing by 2024 at the latest. The north Italian region of South Tyrol is also starting its FM switch-off in 2017. In the United Kingdom, the government will review the next steps for digital radio when its criteria for coverage and listening criteria are met — expected to be achieved by the end of 2017 or early 2018. Other countries are taking the lessons from Norway and starting their own discussions about potential DSO scenarios.

A commitment to digital switchover has significant benefits for broadcasters, manufacturers and listeners. It provides certainty on the future and allows broadcasters and radio manufacturers to plan and invest accordingly.

> In Norway, public broadcaster NRK covers 99.7 percent of the population with DAB, while commercial radio covers 92.8 percent.



# Considerations When Transitioning to Digital

Cost, backwards compatibility and frequency availability are just a few of the issues to ponder when implementing digital radio technology

## **GUESTCOMMENTARY**

#### By Chuck Kelly

The author is regional sales manager Asia/Pacific for <u>Nautel</u>.

#### HACKETT'S COVE, Nova Scotia — The imple-

mentation of digital radio technologies on a global scale is not a simple equation.

Many factors play a part as each region and country chooses its standard. These include issues such as backwards compatibility with existing analog receivers and spectral masks, the availability of frequencies in larger markets, the short- and long-term costs of broadcast infrastructure conversion, receiver availability and cost, the practicality of a transitional hybrid approach and the roadmap for future all-digital broadcast. It is also important to consider the effects of each option on the financial health of the public and private radio broadcasters involved.

#### **THE OPTIONS**

Traditional medium-wave and FM bands offer many advantages. They provide good building penetration and portable/mobile performance, while a wide range of equipment both for the receiver and transmitter end are available at low cost.

Most importantly, however, these frequencies are already allocated to broadcast in most regions of the world. It's hard to beat the cost efficiency of medium wave and FM broadcasting, especially as compared to satellite, internet or cellular broadcasts.

In some countries, the lack of available frequencies has led to one or more new bands being allocated, and DAB or DAB+ has been implemented. But this decision may have drawbacks in many parts of the world.

Suppose you own an FM station and the decision to implement DAB in your area is made. Now you must buy a spot in the multiplex, but you can't just stop broadcast-



ing in FM because digital receivers aren't sufficiently available on the market and it may be years before you can shut it off. That means your transmission cost is increased.

Meanwhile, in many cases, DAB coming to a market has brought with it new competitors to your station. The advertising pie in your market didn't increase in

size, and the slices each station makes are smaller. Thus along with increasing expenses, revenue will most likely decrease — not a healthy prospect.

This is not the case with alternative in-band technologies Digital Radio Mondiale and HD Radio. Each standard has its advantages, and despite geographic, political and revenue model differences, they are remarkably similar technologies. Both DRM and HD Radio can be used to upgrade existing analog transmitter systems to digital, both are well proven and accepted by international standards bodies and both utilize the existing medium wave and FM bands.

#### **IN-BAND TECHNOLOGIES**

HD Radio FM is a hybrid approach, where sets of digital sidebands are added to either side of the analog signal, and the whole thing fits in a spectral mask that meets standards in most countries. If you have an analog-only radio, you will continue to hear the FM analog signal as before, but if you have a new HD Radio receiver, you will hear the analog signal in addition to a higher-quality digital representation of that analog signal, plus (option-ally) several more digital stations.

In DRM+, the VHF version of DRM, a narrower digitalonly signal is broadcast, which fits into the small blank spaces in market dial and potentially can have more than one channel.

The primary difference is in receiver availability. There are tens of millions of HD Radio receivers in the market, albeit mostly in the United States, and millions more being sold every year. The economies of scale mean

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# Ofcom Plans Development of Localized DAB

Regulator weighs introduction of additional localized DAB capacity

#### By Lawrie Hallett

**NORWICH, England** — Expecting to complete its current localized (small-scale) digital audio broadcasting trials during 2018, <u>Ofcom</u>, the British broadcast radio regulator, has begun work on the development of a licensing regime for the permanent introduction of more such services across the United Kingdom.

While the 10 experimental multiplex licensees continue to broadcast, Ofcom and the relevant government department, the Department for Culture Media & Sport, are now planning public consultations about future licensing.

The trials helped prepare the ground for the successful introduction of dedicated new legislation to accommodate the long-term licensing of targeted DAB and DAB+ services. These will broadcast to communities and markets that are not compatible, in terms of scale or economic capacity, with the pattern of wide-area DAB as provided by established local and regional multiplexes.

#### **TRIAL OBJECTIVES**

The 10 trial multiplexes currently operating were implemented to test the technical and economic viability of DAB as a platform for smaller-scale, localized, commercial and community radio services. Previously, there was no obvious, economically viable route for such stations to access digital broadcasting platforms, something of a problem for politicians and regulators wanting to migrate as many broadcast radio services as possible to digital platforms.

From a technical perspective, the various trials are all considered to have been successful. Single-transmitter services, using open-source encoding and multiplexer

#### **)** Continued from page 18

that HD Radio cost is quite reasonable, not much of a premium over an analog-only radio. Car receivers, portable and home receivers are available and HD Radio in cellphones is just beginning to be available.

DRM+ radios, on the other hand, are not being produced in mass-market quantities at present, and the costs are still quite high.

Most receivers made for HD Radio FM also support medium wave, although HD Radio on medium wave has not been as successful as it has on FM. Again, the analog signal has digital subcarriers on both sides but with medium wave, only a single digital channel is carried, the digital representation of the analog signal.

While the HD Radio medium wave signal meets the FCC spectral mask, it does cause interference to adjacent stations, and many stations have turned it off. Outside of North America, medium wave has little penetration. DRM on the contrary uses the whole channel for the digital signal and doesn't encroach on adjacent frequencies.

#### **ALL-DIGITAL RECEIVERS**

Another key point is that ITU Region 2, which consists of the Americas, has 10 kHz frequency steps, while Regions 1 and 3 (the rest of the world) operate with 9 kHz steps. HD Radio is optimized for 10 kHz steps, and DRM is equally comfortable in either.

An additional consideration is the longer-term question: When will digital receivers allow for all-digital operation? Nautel has developed HD Multiplex, which allows up to 15 stations to be transmitted on a single HD Radio FM transmitter. These signals can be received on most current HD receivers, bringing significant advantages in spectral efficiency, operation cost and radio's ability to compete with a multiplying number of new formats available over the internet.

Ideally, the millions of new receivers being produced each year would include both HD Radio and DRM. While this isn't without some challenges, chipsets are today available that support both, and it would permit broadcasters to select the technology that best fits their market for both medium wave and FM.

software, have run reliably from the outset and the trials have also allowed the development of increasingly robust open-source multiple transmitter networks, as well as providing a greater understanding of how onchannel DAB repeaters can be used in practice.

Analyzing the trials to date, there are perhaps two key issues for consideration in terms of future development of the sector. First, and perhaps most critically, the trials have identified the issue of radiated signal levels as being a major concern, in particular because of weak signal levels within buildings resulting in poor reception.

Some of the low-cost transmitter sites being used are located in residential areas, resulting in a limit to the maximum power level that can be radiated without the risk of damage to the reception of other DAB multiplexes.

To date, Ofcom has been exceptionally cautious in this respect, initially limiting the trial multiplexes to an operational radiated power level of 100 W per transmitter, although some have since been granted a 3 dB power increase (to 200 W ERP).

By using higher gain transmission antennas, it is possible to increase radiated power levels to this degree without unwanted impact on other local DAB services. However, trial operators highlight the importance of achieving "equivalence of service" — delivering similar levels of signal field strength within their service areas, as compared to those provided by other DAB multiplexes operating locally.



Pictured is an Ofcom experimental DAB transmitter, including Intel NUC Linux computer multiplex Open Digital Radio software; Ettus Research B200 software-defined radio RF source and a Swox Telecom SwissDAB 250 RF DAB amplifier.

#### **KEY ISSUES**

Currently, the process of introducing additional relay or "filler" transmitters is administratively complex and time-consuming for operator and regulator alike. Developing a more flexible system that allows greater freedom to enhance signal strengths within service areas will doubtless be a key requirement from operators responding to the forthcoming consultations.

One possible solution might be to instigate a so-called "polygon perimeter" model. Adapted from current international DAB planning protocols, this would allow transmitters of below a certain power to be added to a DAB network with only minimal pre-clearance being required.

Provided that limits on maximum field strength at the perimeter of the coverage polygon are not exceeded, this could be done on a "light touch" permissive basis, with the regulator only becoming materially involved in the details when complaints about suspected interference occur.

Second, a significant result of the trials has been the surprising uptake of DAB+ services across many of the trial multiplexes. The number of older DAB receivers in the market, which are incapable of resolving DAB+ signals, does not seem to have materially affected use of the more recent standard.

Because this more recent DAB

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standard is considerably more efficient in terms of spectrum use, it allows a single DAB multiplex to accommodate a much larger number of audio services. Whereas stereo DAB services typically require a data rate of 128 kbps, an



equivalent DAB+ service requires only 48 kbps to deliver similar, or marginally improved, audio quality. For mono DAB a typical 80 kbps service needs only 32 kbps for delivery in DAB+.

Economically, because a multiplex carrying DAB+ services can deliver a larger number of services, it follows that the operational costs associated with transmission can be more widely dispersed, allowing the charge per service to be reduced.

#### **LEGISLATION AND REGULATION**

DAB+ therefore makes access to the platform more cost-effective for individual broadcasters. For multiplex operators it has the added advantage of providing extra financial stability through the creation of a more widely distributed income stream.

A significant result of the trials has been the surprising uptake of DAB+ services across many of the trial multiplexes.

At least two trial multiplexes (Brighton and Manchester) are now transmitting using only DAB+, while others (including Portsmouth and Norwich) are moving in the same direction. For listeners, this means investing in new DAB+ capable receivers to take advantage of additional services, but since almost all DAB radio designs have had this capability since around 2010, this "legacy" issue is rapidly becoming less of a concern.

The success of the localized trials certainly helped push forward the introduction of legislation to take the operation of such services forward on a permanent basis. Earlier this year, and with considerable cross-party support, "The Broadcasting (Radio Multiplex Services) Act, 2017" completed its way through the U.K. Parliament. This legislation creates a framework licensing structure that will provide for the effective operation of localized digital radio multiplexes.

Kevin Foster, the member of Parliament behind the new law, believes that because existing U.K. DAB ser-

vices are either national or county-sized, the new tier of DAB will help fill the "real gap between all that and what most people recognize as the third layer of radio: community radio."

He added that without the new localized legislation, "If a

community radio station is looking to serve a small community, that might be viable via FM ... the jump to DAB is impossible owing to the current licensing structure and the revenues that it would have to produce."

The legislation allows the coverage of new localized DAB multiplexes to be defined in relation to the geographical size of current larger local (typically countywide) DAB operations. It also provides the option for Ofcom to require that new multiplexes operate on a noncommercial basis and allows it to implement rules that would prevent those with existing interests in national or local DAB multiplexes being involved in their ownership.

However, such issues will doubtless be central to Ofcom's public and industry consultation, which is expected to influence the precise nature of how such services will be introduced on an permanent basis.

Stating that "the current licensing system has not kept pace with the development of technology," and that as a result, "a different option is needed for smaller-scale radio stations," Foster believes that his legislation is about giving stations "an option for digital; it is not about forcing them on to digital."

Responding for the government, Matt Hancock, then the minister for Digital and Culture, agreed that the legislation is "about adding a capability, not turning off analog." He suggested that, if all goes well, the legislation should be operational before the current trial licenses expire next year.

#### **INTERNATIONAL OPPORTUNITIES**

The key international implication of these recent developments in the U.K. is the degree to which it suggests that, contrary to earlier expectations, DAB (and DAB+) services can indeed provide a platform across all scales of traditional analog broadcasting, from the national, right through to the hyper-local, and that at the very local level this can be achieved in a cost effective manner.

Various manufactures have already begun to develop lower-cost infrastructure suitable for such operations and localized trials of smaller-scale DAB operations are already being planned and implemented in other jurisdictions.

The digital opportunities for smaller-scale broadcasters look set to expand as a result.

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# When Digital Is More than Just Radio

The emergency warning functionality of digital radio can save lives but to do so it needs to be implemented

## **GUESTCOMMENTARY**

#### by Ruxandra Obreja

The author is chairman of Digital Radio Mondiale.

LONDON — Digital radio can be a friend indeed. People often consider an emergency to be something such as leaving one's mobile at home, forgetting to put the cat out or to lock the door. But these are just annoyances.

In reality, an emergency is a frightening thing, whether natural or man-made. It is the story one finds in a "breaking news" column, and can be a cyclone, tsunami, earthquake, flood, extreme weather, Ebola, drought or terrorist attack. An emergency happens every day, somewhere in the world. Over the last three to four decades, up to 2 million people have lost their lives in disasters, while the economy in the developing world has probably lost some \$2 billion.

Emergency warning is on the agenda of the UN and ITU and has been the subject of serious debates, declarations, frameworks and plans. World Radio Day 2016 was dedicated to this topic, and the Asia-Pacific Broadcasting Union held an important conference (3rd ABU Media Summit on Climate Change and DRR) on disaster risk reduction recently in Bangladesh.

It all seems worthy but somehow remote — until you are involved in a real disaster and can see how emergencies weaken infrastructures, frighten people and break social links.

Most of us may expect to be informed of a disaster by mobile phone or TV. But, during a disaster, the first dominos to fall are often mobile and TV towers.

During the cyclone that affected Haiti in October last year, for example, there were areas that remained cut off for two days, as the country's already fragile infrastructure collapsed. The one true friend that remains active and close to the people affected by a disaster is radio.

In Las Vegas at the NAB Show this spring, NAB Presi-



dent/CEO Gordon Smith reminded us all that one of the key obligations for broadcasters is "to provide a lifeline during emergencies and keep our communities safe."

Radio can provide real, verified information, as opposed to frightening rumors and can thus alleviate concerns for the people affected. It can also help

reunite loved ones and the return to "normality."

The role of radio in emergencies is well documented and, in some countries, the medium is already part of a national disaster plan. The role of radio as a lifesaver has gained strength over the years as the medium's popularity has also increased.

Digital radio, with its enhanced emergency warning functionality, can be a game-changer.

According to Nielsen, more than 90 percent of United States residents listen to AM or FM radio each week. This means a greater percentage of people listen to the radio than watch television or use a computer or smartphone. And this is before any emergency has been declared.

Industry monitor Rajar reports that in the United Kingdom, 48 million adults listen to more than 1 billion hours of radio programs each week. Radio is booming and truly ubiquitous, and while many merely look at its ad revenue potential, the emergency warning capability of radio is more significant. Taking this one step further, digital radio, with its enhanced emergency warning functionality, can be a game-changer.

The recently announced closure of Australian public broadcaster ABC's shortwave services has brought emergency warning to the country's agenda, as some are

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complaining that Western and inland sparsely populated areas of this "continent" could be deprived of the emergency functionality of radio.

Shortwave is seen as obsolete and replaceable by satellite and other options. Shortwave in analog might be viewed as old-fashioned, but through the use of DRM, it becomes louder, clearer, greener — a powerful regional and national tool in the emergency warning toolkit. Digital shortwave allows uniquely wide coverage and

enables the dissemination of information in several languages, transmitting texts, maps and information that analog cannot offer. It can be a lifeline to people in lifethreatening situations or with disabilities.

Digital radio still needs to assert its crucial role during emergencies.

Digital shortwave and medium-wave services are also capable of broadcasting from outside the affected areas and target just the region and the people suffering from a disaster. This is a huge advantage as it gets over the "all masts are down" issue and limits information to those areas that need covering rather than create blanket coverage that could result in mass panic.

By adopting digital radio, a country has a built-in emergency warning system, as long as the government, the industry and all the involved agencies know about it and are happy to explore this great asset. In the case of a



disaster, the emergency warning functionality, common to DRM and DAB/DAB+ digital radio standards, turns on the radio, selects the appropriate frequency and channel, and broadcasts loud, audible informaton, supported by text and graphics, including maps.

Moreover, because of the digital receiver's "intelligence," a listener traveling in an area covered by DRM, DAB+ or FM for local coverage will automatically receive the best signal available. Once the local frequency options are exhausted, the digital receiver may then switch to DRM in medium wave or shortwave. Digital radio thus extends the emergency warning functionality to larger areas and provides more services than analog.

It is still a sort of secret however that this very useful emergency warning functionality is embedded in DRM, and the industry unfortunately has not been asked to make receivers that can also double as emergency warning devices. Digital radio still needs to assert its crucial role during emergencies so that this extraordinary functionality is fully understood and put to good use. Then digital radio, like a faithful guard dog, can really be a person's best friend.

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