Digital Radio Mondiale Consortium (DRM)

SUBMISSION to The Independent Communications Authority of South Africa

Answers to Questions on ICASA's Digital Sound Broadcasting Consultation

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Digital Radio Mondiale Consortium

On ICASA's Digital Sound Broadcasting Consultation

Question 1
Is there a need for the introduction of DSB technologies in South Africa? Motivate your answer

Digital Radio - Due to the inherent advantages of digital broadcasting, broadcasters world over are adopting high quality digital delivery systems, with TV leading the way. Digitisation of the terrestrial radio broadcasting is also inevitable for all the reasons mentioned already in your paper: better audio quality, more capacity, spectral and energy efficiencies, data carriage and other extra services and benefits marking a superior and more cost-effective service than that of the 100-year old analogue radio.
Digital radio is the immediate, free-to-air way to offer information, education, health and hazard warning to the entire South African population, giving it the advantages of ICT before broadband can be rolled out to the whole country.

DRM is the newest, most complete, open, and internationally recognised standard (by ITU and ETSI) for digitising radio in **all frequency bands** (both AM and VHF bands). No matter which band is used (shortwave, medium wave, band I, band II or band III) DRM is ONE digital broadcasting system that share the same characteristics and benefits.

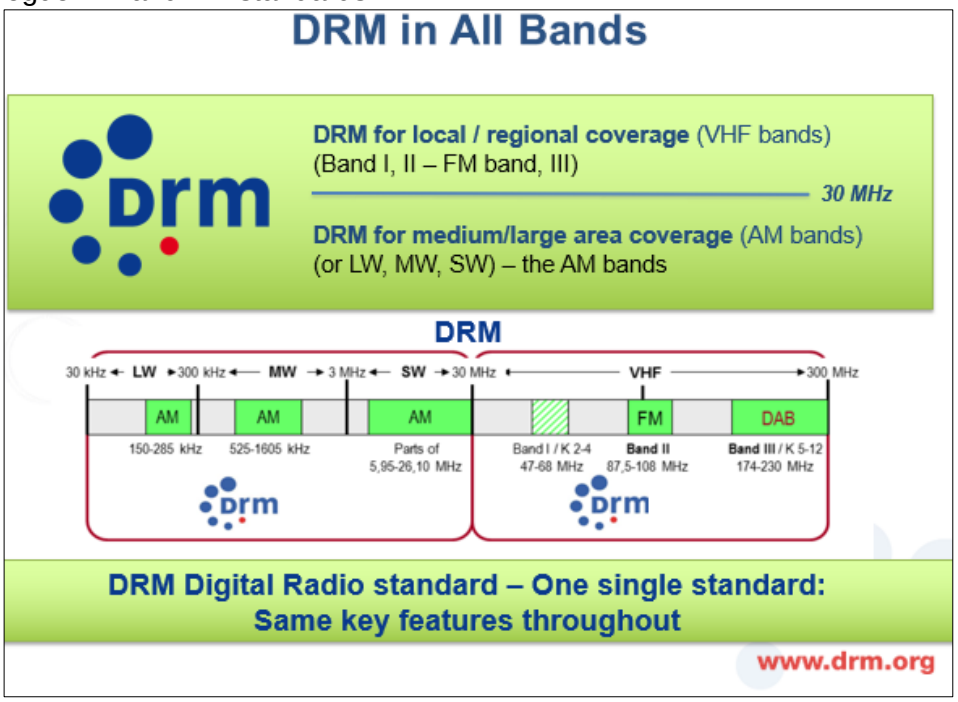
DRM, no matter whether bellow or above 30 MHz is able to improve spectrum efficiency and management, as it can serve all the coverage needs of any country, without gaps from local and regional services to national and international, whatever its size and geography, at much reduced energy costs. **This makes it an obvious choice for South Africa.**

DRM can help deliver the **mandate of the South African government as per the ECA Act,** which emphases universal access to information, innovation, R&D, efficient use of radio frequency spectrum, non-discriminatory access to broadcasting, development of public, commercial and community broadcast services etc.

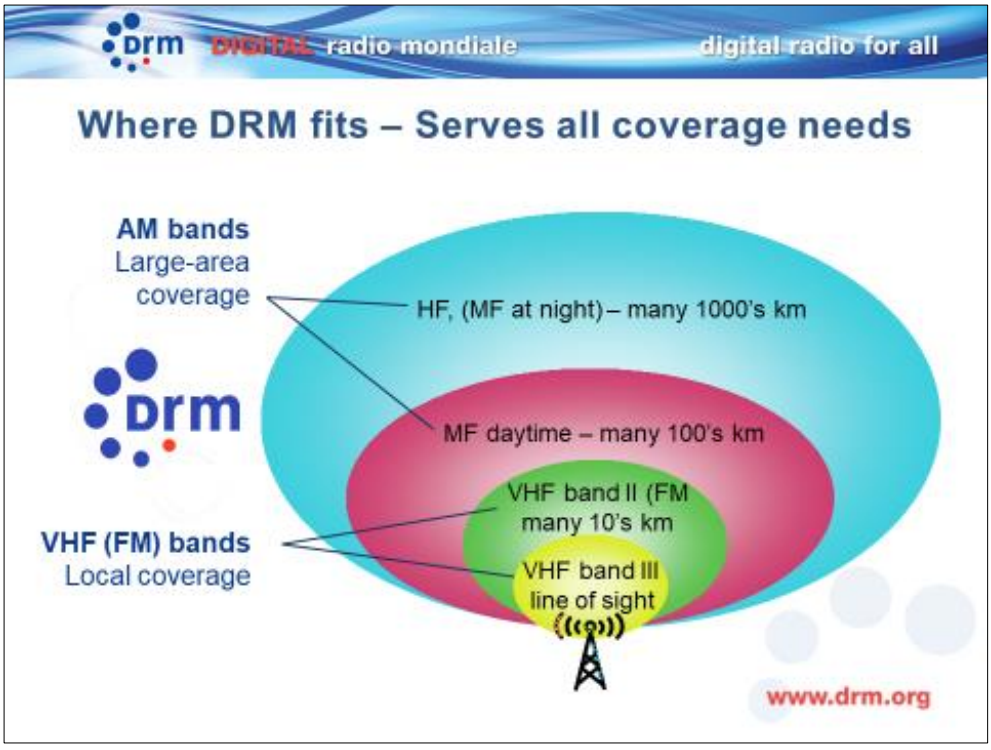
It is in the spirit of the ECA that broadcasting should reach every single citizen with information, emergency warnings, education and entertainment, irrespective of where they live or who they are. DRM delivers genuine **green broadcasting** and has a unique **value chain for all stakeholders in South Africa**: listeners, manufacturers, broadcasters and regulator.

And there are also very **specific benefits** for the country. DRM in general and some of its applications, like the **text information service Journaline**, has a particular relevance for the needs of South Africa. It can enable the activity of the **Department of Education** keen to bridge the city - rural divide and help the marginalised semi-urban and urban areas, the **Department of Weather** (helping marginalised groups like the fishermen in Western Cape), the **services catering for the disabled, blind, deaf, children with dyslexia and the elderly** – 10 million people.

DRM offers a **soft and workable transition** as is compatible with all the radio broadcasting bands as well as with the existing channelization and frequency plans, and thus a direct successor technology of the former analogue AM and FM standards.



The following image illustrates clearly the capabilities of the DRM standard to be used in all frequencies for a variety of coverage scenarios



There is a need to encourage the efforts of digitising radio transmissions in the AM bands but also to facilitate the full utilisation and the adoption of a roadmap for radio broadcasting including the public, private FM and Community Radio Stations, to the DRM digital in South **Africa for the benefit of all its citizens wherever they live**. The digital sound broadcasting plan should be holistic and not patchy, it should not favour just big metros or rich media players.

The following additional information is made in support of this suggestion:

a. **Digitisation of MW & SW Broadcasting** - Conventional radio broadcasting has been on MW (Medium Wave) and SW (Short Wave) bands – MW used mainly for domestic coverage and SW for overseas services. These bands are reserved exclusively for radio broadcasting. MW transmitters deliver excellent coverage for long distances as the signal propagation is along the earth's surface. SW signals can reach very long distances as signal propagation is using the ionospheric layers. Almost all the broadcasters in the world have been using MW and SW bands for free-to-air broadcasting. In-band transmissions use Amplitude Modulation (AM) and being in the analogue mode this results in quality degradation – on MW, due to noises generated by industrialisation and on SW, due to signal fading caused by changes in the position of ionospheric layers. Thus, MW and SW bands are very important for domestic and overseas coverage and must be digitised not only to provide excellent sound quality but also a number of other value-added services, as outlined in the subsequent paragraphs.

b. **Digitisation of VHF Band (FM Broadcasting)** - FM provides very good audio quality but its transmission is by line-of-sight propagation. Therefore, FM transmitters have a limited coverage area and are thus generally used for local broadcasting and/or for community radio. Moreover, analogue FM is almost a century-old technology which is not only spectrum and power hungry but also provides only one service per frequency. Digital broadcasting in VHF band provides multiple services per frequency, at much reduced power (60-80%), along with a host of value added services. Therefore, transmissions in VHF band must be also digitised to utilise these scarce resources (energy, spectrum) optimally.

Question 2
Do you think the list of technical standards to which the DSB equipment must conform are exhaustive? Motivate your response and suggest other equipment technical standards?

For DRM there are extensive ITU and ETSI recommendations (see references in next question)
The DRM Consortium provides internal receiver profiles, and this are to be found in the DRM Handbook http://www.drm.org/DRM_Handbook_2018.pdf.

Question 3
In the absence of a policy directive for providing standard for DSB, should the Authority provide licences for other DSB technologies? Please motivate your answer

The Authority should provide licenses for both flavours of DRM (DRM for wide coverage, below 30 MHz or DRM30 and DRM for local coverage, above 30 MHz or DRM+).

DRM is the most technologically advanced and newest global digital radio standard. It is **internationally standardized by ITU**[1]and **ETSI**[2] for digitising terrestrial radio broadcasts in all frequency bands (both AM and FM bands). It is capable of fully serving South Africa's needs, with all its diverse coverage demands, at **low energy costs** and rich and freely accessible features set.

DRM is the digital radio standard in direct succession to its analogue predecessor technologies AM and FM. It **matches existing ITU-conforming channelization and frequency regulations**, and maintains **full ownership** on the technology, its deployment, product development and roll-out in the hands of the Indian government and industry.

The DRM technology incorporates and its development is based on the experiences and lessons learned from previous approaches.

It utilizes the **latest and most efficient audio codec "MPEG xHE-AAC"**, which ensures the highest possible audio quality equally for speech and music content, including for very robust transmission signals.[3] This allows DRM to provide FM-like quality and optionally stereo transmissions even on large-area medium wave services, and up to 5.1 surround sound services in the FM band.

Every DRM transmission can carry **up to 3 audio programmes** along with a set of **accompanying and stand-alone data services** – while, for example, in the case of DRM in the VHF bands it is consuming only half the bandwidth (96 kHz) of a single analogue FM service.

It also leaves the broadcaster in control of its content and coverage area without the need of intermediary platforms, operators and keeping thus costs to the minimum.

DRM – just like AM and FM technologies – is an **open and fully published standard,** no elements of it are owned or controlled by a single company. As a result, the South African Industry can take full ownership and create receiver solutions that are relevant to the listeners and much cheaper and relevant for South African than those imported ones.

There is no use-fee or revenue sharing approaches for the DRM technology – neither for broadcasters nor for listeners.

DRM provides a wealth of features that set digital radio services apart from their analogue AM and FM predecessors. All those features are part of the DRM technology.[4]

[1] ITU-R BS.1514-2, System for digital sound broadcasting in the broadcasting bands below 30 MHz (https://www.itu.int/dms_pubrec/itu-r/rec/bs/R-REC-BS.1514-2-201103-I!!PDF-E.pdf) and ITU-R BS.1114-9, Systems for terrestrial digital sound broadcasting to vehicular, portable and fixed receivers in the frequency range 30-3000 MHz (https://www.itu.int/dms_pubrec/itu-r/rec/bs/R-REC-BS.1114-9-201506-I!!PDF-E.pdf)

[2] http://www.etsi.org/deliver/etsi_es/201900_201999/201980/

[3] http://www.drm.org/wp-content/uploads/2013/09/DRM-xHE-AAC-Demo_v2_20130913.avi

[4] DRM Introduction & Implementation Guide v2: http://www.drm.org/wp-content/uploads/2013/09/DRM-guide-artwork-9-2013-1.pdf

1. Content:

a. DRM can carry up to **4 DRM services per frequency** as a flexible mixture of **data** and **up to 3 audio programmes**; in DRM digital FM this happens **on a bandwidth of 96 kHz only**.

b. DRM ensures clear sound with the latest MPEG audio codec technology xHE-AAC, enabling multiple stereo programmes in FM quality on a single MW transmission. Thanks to the Journaline advanced text application, DRM can address millions of people in South Africa which are deaf. Journaline adds to the broadcasters' free to air audio programmes rich textual information with news, sports updates and much more, simultaneously in a multitude of languages with every DRM transmission. In the past all these were only available on the broadcasters' web pages.

c. DRM allows the broadcaster to transmit special or even B2B data applications such as traffic services, without extra cost or the need to sign license contracts.

d. DRM has as its inborn feature the Emergency warning Functionality (EWF) by which a digital receiver is also a disaster alert mechanism with both audio and text in different languages (also addressing the needs of the disabled and especially hearing- impaired). DRM can save lives.

2. Spectrum:

a. The ITU DRM standard provides identical functionality on all broadcast bands from large-area coverage in the AM bands to local/regional coverage in the FM band, ensuring optimized and low-cost receiver design

b. DRM is the only digital radio ITU standard to also cover national medium wave and international shortwave transmissions

c. Designed for worldwide operation, DRM operates in the **existing AM/FM spectrum channelization**, preventing the need to change existing spectrum planning

d. DRM supports **simulcast** operation, with a single transmitter broadcasting both an analogue and a digital DRM signal side-by-side, to bridge the transition period until the digital receiver population is strong enough

3. Broadcast Efficiency:

a. **Existing analogue transmission equipment (both AM and FM) can be upgraded to DRM** operation, reducing initial setup cost (depending on hardware manufacturer/model).

   This is not possible in other standards where all the transmission equipment needs to be completely new, thus increasing the set-up costs significantly. In DRM there is also no need for large and expensive multiplexes which restrict the flexibility of broadcasters to transmit programmes to their areas and audience of interest. Multiplexes force broadcasters to cover the same area.

b. When upgrading an analogue transmitter to full-digital DRM operation, the same or even more coverage than with analogue can be achieved, while significantly **reducing transmission power (60-80%),** enabling **green and cost-optimized broadcast networks** for the future

c. DRM allows for a **flexible** trade-off between transmission power, coverage requirements and content capacity, to always enable the most economic operation for any given coverage scenario

Question 4
South Africa through its international agreements at ITU and SADC level agreed on DAB+ and DRM systems. Please indicate which other digital sound broadcasting technology(ies) if any should be considered for South Africa? Please motivate.

As these are the only two open standards recommended internationally for ITU Region 1, there is no need to consider any other standard.

The only other international standards mentioned in the consultation are the still experimental RAVIS, meant for Russia in particular, and HD/IBOC used in Region 2. HD is a proprietorial system, mainly used for VHF Band II, with limited use and success in AM. The advantages of open standards, as compared to proprietorial standards cannot be stressed enough.

In this context it is worth stressing that DRM is the most advanced standard to-date, incorporating the experiences and lessons learned from previous approaches. It utilizes the **latest audio codec "MPEG xHE-AAC", which ensures the highest possible audio quality** even for very robust transmission signals. [16]

From a cost and business perspective, DRM transmission equipment and receivers are easy to calculate and cheap to produce by manufacturers: Firstly, **given that DRM is an open standard, no 'license' (or 'permission to use proprietary technology') is required**. All aspects of the DRM technology are published and freely accessible, and no single company or entity owns the DRM technology. [17] There is **no use-fee or revenue sharing approaches for the DRM technology** – neither for broadcasters nor for listeners. Patents allow the original pool of technology developers to receive a small share of the revenue when there is commercial deployment of equipment (taken care of always by the equipment manufacturers and not by the listeners). Those conditions ('IP royalties') are transparently published by Via Licensing [18] and equally accessible to everyone. Once the technology patents expire (typically 20 years after the technology was initially developed), even the small IP royalty payment of manufacturers **ceases and the DRM technology is completely free** to be deployed by anyone.

Truly global technology phenomena such as AM, FM, the Internet, TCP/IP, UMTS, WiFi, USB, HTML or mp3 demonstrate that standards must be published and openly accessible, making the technology freely available for everybody to build solutions and for the services based on that technology to thrive – even if small IP royalties are charged in the initial years to allow the original technology owners to, at least, recover their development efforts and cost.

DRM – just like AM and FM technologies – is an **open and fully published standard, no elements of it is owned or controlled by a single company**. As a result, the South African Industry can take full ownership and create receiver solution that are relevant to the listeners.

Question 5
To use the spectrum efficiently, the digital sound broadcasting network can be planned on a Single Frequency Network. Do you think that it would be applicable for purposes of digital sound broadcasting? Please motivate.

SFN is one of the great advantages of digital radio as compared with analogue radio. In DRM, SFN can be used successfully whether below or above 30 MHz, making the reuse of the same frequency one of its great advantages. How it really works is that two or more transmitters can transmit the same content (same bit) at the same time on the same frequency (which would lead to interference in analogue). This results not only in spectral efficiency but also delivers at reception level clear advantages: i.e. better reception, even if no direct line of sight to transmitter is available, because RF signal comes also from different directions (transmitters) available and this delivers a SFN gain. Then there are no distortions from reflections and multi-path anymore (guard interval).

Question 6
6.1 Should the Authority consider one or more mux operator(s) for DSB? Please motivate.

DRM has the great advantage that it uses the existing channelization without any need to wait for band III to become available, though DRM delivers great benefits in band III too. It also leaves the broadcaster in charge of its own existing infrastructure (which in most cases can be upgraded to digital), its content and coverage area. No mux needed. The mux solution means the introduction of an intermediary between broadcaster and listener, of a new operator and platform delivering to the same coverage area with the same power and clearly introducing another element of cost.

Where muxes cannot be completely filled, the active participants in this “co-op model” need to share the full cost whether the mux carries 18 channels or 3.

There are cases in which a mux can be beneficial though. The question will always be what needs to be achieved and at what cost. Here are some questions that might offer additional guidance:

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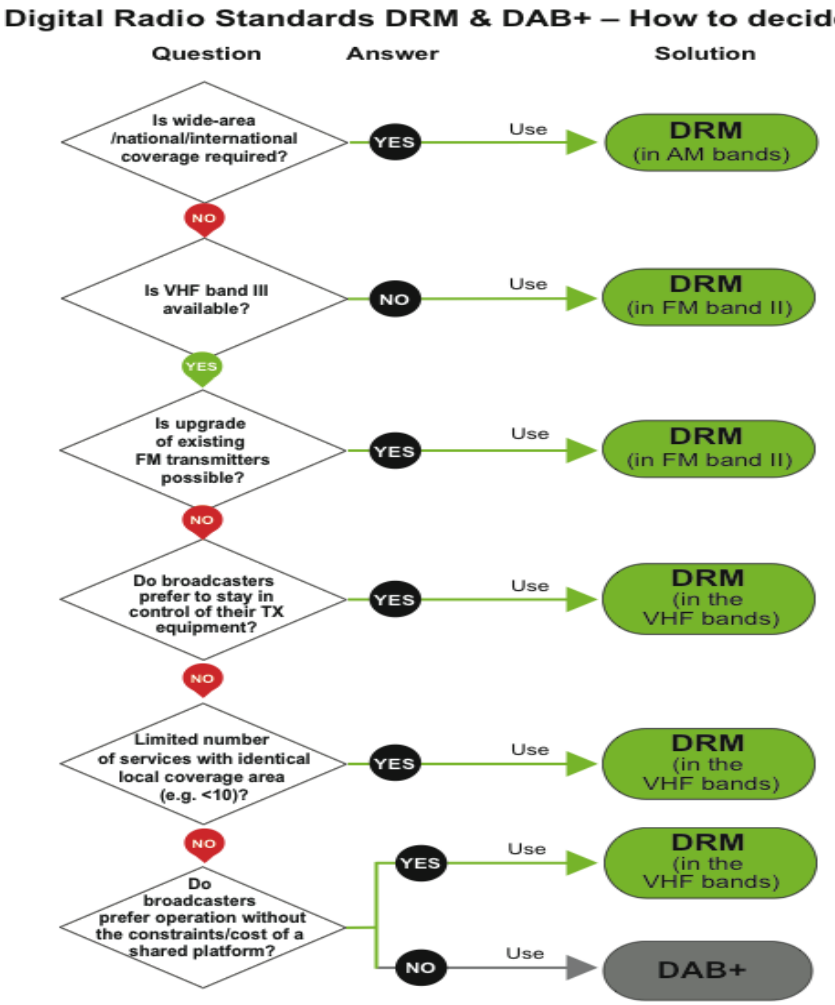


6.2 Would you propose a total switch – off of the traditional analogue AM and FM sound broadcasting? Please motivate.

Digital broadcasting is what it says: digital. Radio itself is though a legacy platform that does not have the advantage of starting from scratch (like mobile telephony) or being able to deliver a big digital dividend (like digital television).

Therefore, a transition period will always be necessary to introduce the advantages of digital sound broadcasting and migrate the existing listeners and gain new listeners to the new digital platform. But this transition period should be as short as possible, since the cost of maintaining both analogue and digital on air can be quite high.

DRM allows for simulcasting in AM and FM and can provide a path to gradual digitisation in keeping with the demands and financial possibilities of broadcasters. A switch off date needs to be set, though, as this concentrates the minds and efforts and does not stretch the project into uncertain times.

We strongly feel that, owing to the following reasons, there is an urgent need to frame a national roadmap for digital radio broadcasting in all bands. This includes the AM and FM band for public, commercial and community broadcasters, too:

The following questions might need to be answered:

- Could **AM/mediumwave** in digital deliver efficient coverage over mountainous, sparsely populated areas, delivering information and education to populations and small communities that would be otherwise cut off from the advantages of modern world? Could digital AM deliver to the fundamental requirement of equal access to information by all South African citizens?

- **Is there sufficient FM spectrum available to meet the demand of all broadcasters?** FM Band is from 88 MHz to 108 MHz i.e. 20 MHz bandwidth. One single FM channel needs 200 kHz bandwidth. So, theoretically, there can be a maximum 100 FM channels in the full FM band. But, unfortunately, neither is a full band available for broadcasting nor can two adjacent channels be broadcast without some guard band. Same FM frequency can be repeated only after about 400 to 600 km, or with a frequency separation of several hundred kHz. Although FM broadcasting is popular, the possibilities for extending the FM coverage in its band of 88-108 MHz remain limited. **Therefore, available FM spectrum is often not sufficient to meet all demands.**

- And then **is analogue FM broadcasting the most efficient solution?** In addition to stereo audio content, analogue FM enables the broadcast of a very low bit data channel. Analogue FM, an early 20th century technology, is a successful standard but, in truth, it has reached its spectrum, coverage and improvement limits. **It might be a good solution for here and now but not a strategic choice for the future, with increasing expectations of the public regarding audio quality, service and language diversity, and added-value services tying radio in with modern media consumption**. This, in time, has to be and will be accompanied and, eventually, replaced by the digital, compressed, enhanced features of digital radio. Using only 50% spectrum, digital (DRM) in VHF band is able to offer multiple services on a single frequency, 5.1 surround sound quality and a number of value added services along with significant transmission power savings.

As recently demonstrated by the finalised Wecodec trial digital can deliver where analogue seems to have reached its limits. In the report of the Wecodec DRM for FM trial we see that:

1. Co-existence of DRM for local coverage (DRM+) and FM in VHF Band II: Johannesburg Example

One of the main objectives of the development of DRM in mode E (DRM+) was the possibility of a close placement of the DRM for local coverage (DRM+) signal to an FM signal so that it can be flexibly configured depending on the existing use of spectrum. In this way, DRM for local coverage DRM+ may be introduced into the FM frequency bands.

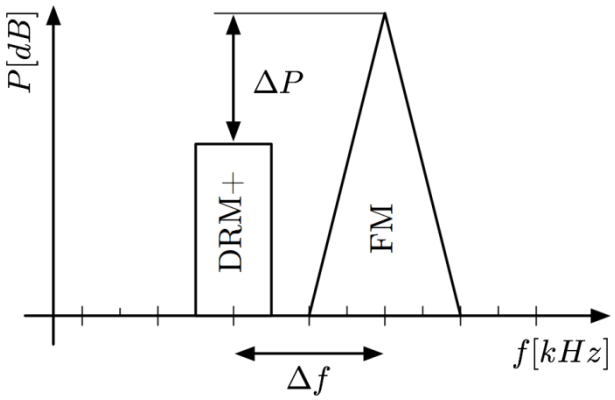


Figure1: Example configuration for DRM robustness mode E and FM signal

Figure A1-1 illustrates how the DRM for FM (DRM+) signal can be placed very close above or below the existing FM signal. To guarantee the respective protection levels and audio quality of the FM signal, the carrier frequency distance Δ*f* and the power level difference Δ*P* of the FM and the DRM+ signals have to be planned accordingly. Δ*f* can be chosen according to a 50 kHz channel raster. Δ*f* >= 150 kHz is recommended. ΔP can be varied flexibly; however, a ΔP > 20dB is recommended for the minimum Δ*f* = 150kHz according to previous evaluations.

Looking at the heavily congested FM spectrum in Johannesburg, a proof of DRM for FM not interfering with adjacent FM stations, would demonstrate the feasibility of the standard.

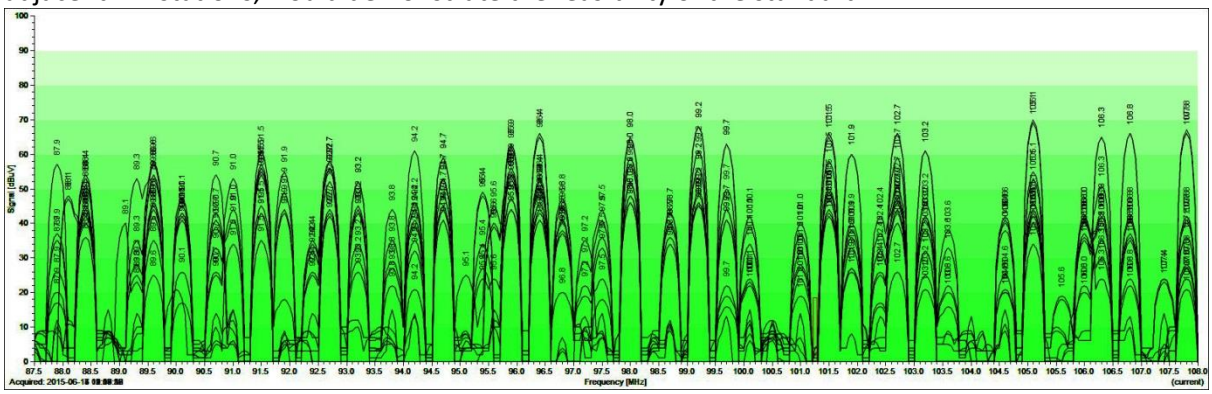


Figure 2: Overlay of Scans of the FM Spectrum in various parts of Johannesburg

Figure A4-1 confirms that there would be no space for another FM station in Johannesburg except for perhaps one or two low-power community radio stations with a very limited coverage area.

However, if one gap, as the one that we have identified for our trial, would work for DRM+ without interference in both ways, it would prove that there will be suddenly plenty of available digital spectrum in the FM Band, namely 16 allocations (marked in red) in the figure below:

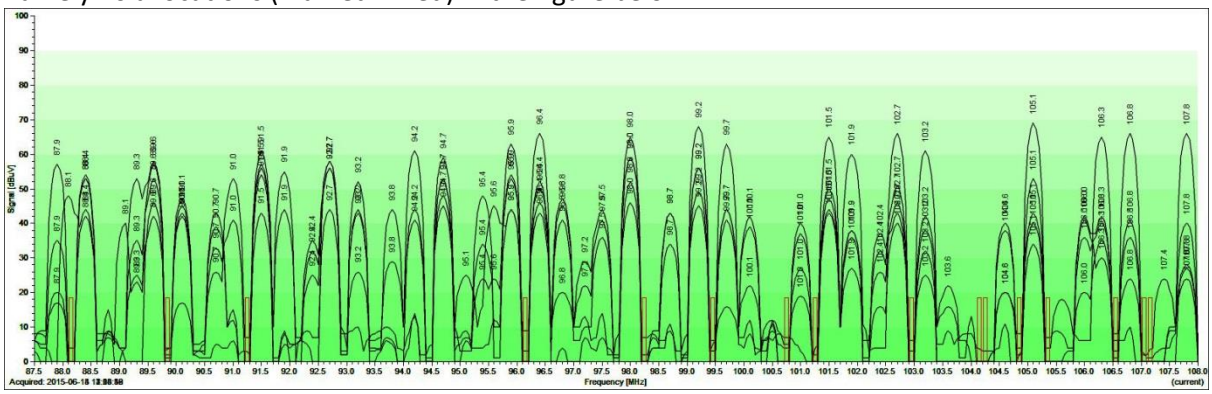
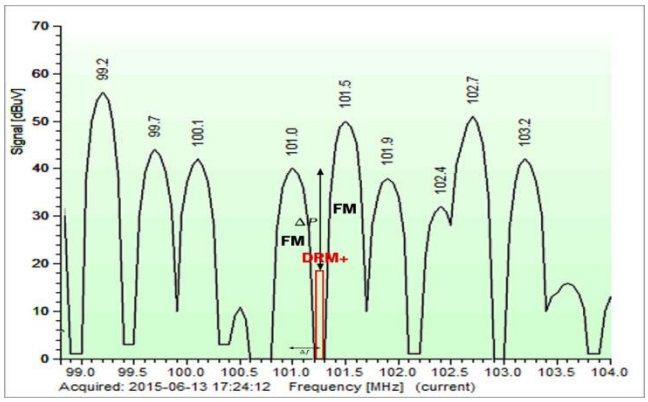


Figure 3: Possible DRM for local coverage or **DRM+ Allocations in the FM Band in Johannesburg**

Considering at least 3 sound services per DRM signal, in this scenario up to **48 additional sound services could be added to the current FM spectrum in Johannesburg**. If going down to 200kHz@-10dB this number would increase even more.



As a good candidate for such a frequency we have identified the frequency 101.25MHz. It is situated between 101.0MHz (RSG Pretoria, 33kW ERP, distance: 56km) and 101.5MHz (RSG Johannesburg, 38kW, 3km distance) with a delta f of each 250kHz as shown in figure A4-4:

Figure 4: Our DRM for local coverage **DRM+ allocation for the trial**

None of the intermediate frequencies (101.2-101.4) are used otherwise within a radius of 160km.

Wecodec was broadcasting the FM signal from Rahima Moosa Hospital, Coronationville and placed their DRM for FM transmitter (provided by BBC World Service) at the same location. “This allowed a precise comparison of the coverage of our own FM signal (Kofifi FM 97.2) with the DRM coverage.”

And the results about coverage and lack of interference were more than encouraging, were excellent. “Technically, the current Johannesburg trial gave results with regards to coverage (4QAM and 16QAM) compared to FM, in both urban and rural environments. Also, we got evidence that there was no interference between DRM in VHF and FM in a real live broadcasting environment.” (Wecodec Final report, April 2018)

It becomes therefore clear why the DRM standard can meet the needs of all South African citizens owing to the following salient features:

1. Equally supporting all terrestrial radio broadcasting bands, including MW, SW and VHF bands (with the FM band II included alongside band I and band III). The audio quality offered by DRM is equally excellent on all the transmission bands: MW, SW or VHF

2. Robust signal unaffected by noise, fading or other forms and interference in all bands

3. **Clear and powerful sound quality** with facility for stereo and 5.1 surround

4. **More audio content and choice**: Up to three audio programmes and one data channel on one frequency

5. **Extra multimedia content**: Digital radio listeners can get multimedia content including audio, text, images and in future even small-scale video, such as:

    a. Text messages in multiple languages

    b. Journaline – advanced text-based information service supporting all classes of receivers, providing anytime-news for quick look-up on the receiver's screen; interactivity and geo-awareness allowing targeted advertising

    c. Electronic Programme Guide (EPG), showing what's up now and next; search for programmes and schedule recordings

    d. Slideshow Programme accompanying images and animation

    e. Traffic information

6. Automatically switch for **disaster & emergency warnings** in case of impending disasters in large areas, automatically presenting the audio message, while providing detailed information on the screen in all relevant languages simultaneously. Great potential to become the surest and widest means of alerting the population to emergencies.

7. DRM in VHF bands uses **less spectrum** than current stereo FM broadcasts, whilst additionally deriving the potential benefits of **increased robustness, reduced transmission power, increased coverage** or **additional services**: While analogue FM transmissions carry a single audio service within a bandwidth of at least 200 kHz, a DRM digital radio signal carries up to 3 audio services along with value-added services in better-than-FM quality within only 96 kHz bandwidth for the on-air signal.

8. DRM supports multi- and single-frequency network operation (MFN/SFN). SFN operation allows multiple transmitters to cover a common area on a single frequency, which allows for new and more efficient network designs by extending coverage areas with additional synchronized transmitters as required and solving typical network problems such as signal outages due to shadowing by using small-power gap-filler transmitters. In contrast, analogue FM services required additional individual FM frequencies for each additional transmitter in the network, as otherwise the signal in the overlapping coverage areas would be destroyed.

9. DRM supports the automatic **hand-over to other frequencies and even other networks** (AFS – Automatic Frequency Checking & Switching) once the receiver leaves the coverage area of the currently tuned transmission, and thus keeps the selected service tuned as long as possible while on the move without the needs for any user interaction.

10. DRM is fully compliant with the frequency allocations of the current AM, FM and its analogue transmissions. And using **DRM's simulcast operation** mode, it guarantees for a smooth transition from analogue FM services to future DRM-only operation by initially inserting the

new digital services in the existing FM band without affecting the already existing analogue transmissions.

11. Depending on the models and makes of FM transmitters in operation today for analogue services, the equipment can easily and cost-efficiently be upgraded to DRM digital operation. And even if dedicated low-power DRM transmitters are added in addition to existing FM analogue transmitters, the existing FM transmission infrastructure consisting of antennas, combiners and sites can remain in operation and is simply extended with the new additional DRM signals.

We consider Managed Introduction is the best approach for digital radio broadcasting by public, private and community broadcasters.

Question 7
Should the Authority adopt the strategy used in other international markets of licensing DSB services in the primary markets first and then a nationwide rollout? Please motivate.

Please see above. A “spotty” or “primary first/secondary later” markets rollout is in danger to super serve first those who have a wealth of information means, live in rich enclaves with IP, satellite, digital TV access. This can create or perpetuate first class - second class broadcasters and listeners, maintain for an indefinite time an analogue-digital mixed economy. This is to the disadvantage of the listeners, whether at home or on the move and to that of the industry. It is also an expensive model.

BRICS countries like India have opted for the DRM solution to cover as much of the territory and population (currently about 600 million people) rather than go for the metros only.
In our view the nationwide rollout needs to be created right from the start and then gradually implemented jointly by all the stakeholders committed to a launch-date of DSB and also to a switch-off date of analogue.

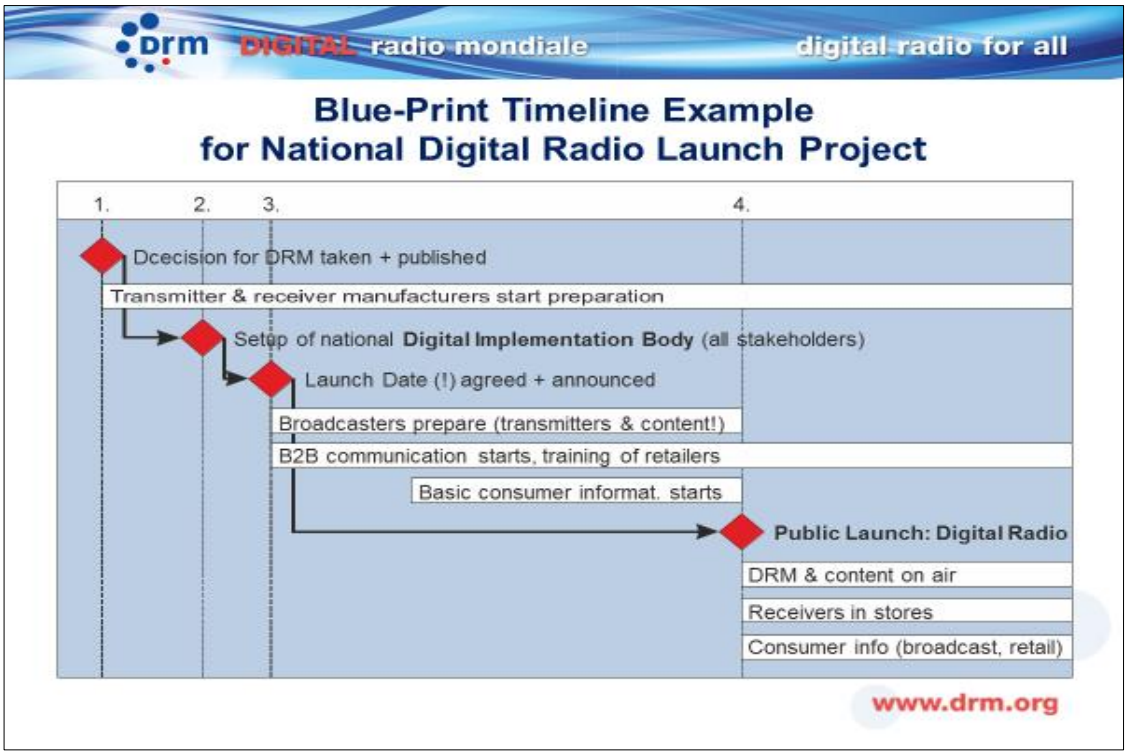
A firm programme with a tight schedule is the only way to deliver, otherwise there is the danger to start here and there, or even abandon a project without visible finality and benefit. A solid framework is required not only by broadcasters and listeners but also by the industry whose planning cycles can be quite lengthy (in the automotive industry often between 4-5 years for example). In our vision, there are clear steps that need to be followed and in which ICASA has a crucial but by no means the only role.

The international experience suggests a few steps. At this initial stage it might be useful to set up work groups to steer the national roll-out project of DRM digital radio:

a. Create a **dedicated working group** in the Ministry and ICASA with SABC for all decisions regarding the implementation a national DRM roll-out.

b. Initiate a **national stakeholders group** with all involved parties represented (from Ministry to SABC and private and community broadcasters, to receiver, chipset and automotive industry, to retailers). This group should meet periodically to steer the progress of rolling out DRM digital radio in South Africa, by agreeing and communicating the public launch date for digital radio services to consumers, possibly criteria for the analogue sun-set, and most importantly the **communication to the industry and the listeners**.

The following graphic shows a blue-print that was successfully followed by other national transitions to and introductions of digital radio services. It shows the major milestones and tasks, but of course needs to be adjusted to and detailed based on the requirements and framework of South Africa.



Question 8
Can the current sound broadcasting market afford new DSB licensees in community, commercial and public service? In your answer, explain your reasons and/or choice for any of your submission.

a. The migration from analogue to digital radio, in terms of the ENA Act, will ensure that no South African community can be marginalised during the transition. Only the DRM standard, by its exceptional and unique operational flexibility and usage of all the frequency bands, can ensure the fulfilment of this major government requirement.

   The DRM mediumwave trial undertaken by Radio Pulpit and now on the way of becoming part of an official ITU RG6 document and the 2017 WECODEC/Kofifi DRM in the FM band trial in Johannesburg (see final report), was a pioneering initiative in South Africa, demonstrating that marginalised communities could get access to modern radio technology. It demonstrated technically also that DRM in the AM and FM band can co-exist with analogue (simulcast) without any interference even when the FM band is apparently totally full.

b. **Community stations and other commercial broadcasters** using DRM are able to focus on their coverage areas they wish to target with the languages understood by their listeners. Therefore, many communities in South Africa can benefit from dedicated programmes broadcast

with content which is of interest to them as well as in their local dialect/language. DRM uses UNICODE to facilitate this.
There are millions of **disaffected people** in South Africa, which can benefit from the modern digital radio technology offered by DRM: deaf, blind and people with dyslexia. DRM brings communities together in South Africa both with its audio as well as text information capabilities. The rural and marginalised, semi urban and urban areas can benefit from all the modern features of the DRM standard. **DRM can carry relevant digital information on jobs, health, education, and other news**.

c. DRM supports the **EWF – Emergency Warning Functionality**, allowing for the quick and widest-possible alerting of the public in cases of pending disasters: DRM receivers supporting EWF automatically re-tune to the emergency broadcast or even automatically switch-on from standby; the emergency broadcast consists of both audio (providing the information highlights in the main language), plus Journaline text information, which provides information to non-native speakers thanks to multi-lingual instructions, serves the hearing-impaired, and provides detailed background information and instructions for on-demand look-up on the receiver set. The rollout of a sufficient ICT network infrastructure to bridge the digital divide is a national priority in South Africa. Therefore, DRM with Journaline may be utilised by the Department of Weather, which faces the challenges of drought in the Western Cape and of frequent floods. DRM helps also fisherman at sea with useful information in case of emergencies.

d. The domestic South African industry – from chipset, module, and receiver manufacturers to the automotive brands and event to retailers – will be involved in and benefit from the whole new market opportunities and jobs which the national roll-out of DRM will create in South Africa, as well as from international export opportunities to the entire continent and possibly beyond.

e. Local manufacturers greatly benefit from the open and freely available specification of the DRM standard, as already demonstrated by in-country chipset and portable/car receiver developments; everybody can start producing DRM capable solutions without asking anyone for a license to acquire secretive and undisclosed proprietary technology components – the most sincere form of knowledge transfer and digital empowerment for South Africa; this local production of DRM radio receivers for desktops, tablets, laptops, for mobile phones and cars in South Africa can ensure new jobs and wealth creation, and provide opportunities in software and R&D development, distribution, retailing and a new kind of journalism

Countries Using DRM already

a. **India is the largest digital radio roll-out in the world today** using the DRM standard. All India Radio (AIR), the public broadcaster, has installed **35 new medium wave transmitters and 4 short wave transmitters** in the country so far (and their numbers are increasing). These transmitters are already operational and **cover some 600 million people with digital DRM signals**. About one million cars with line-fit receivers are on the road as of May 2018, a spectacular increase, even when taking note of similar developments in more advanced European countries. Of course, the significant number of Indian people exceeds by far the number of people living in Europe. South Africa has the opportunity with DRM to achieve a similar success, due to the standard's technological flexibility. See the DRM website[5] for details on India**.**

5 http://www.drm.org/drm-india-page

Recently (February 2018) the Indian regulator has made recommendations for the **digitisation of FM**, which based on the technical framework indicates in our view that DRM is the only standard of choice also for future digitisation of local FM services.

b. At the moment **Pakistan** is using the VHF mode of the DRM standard in a transmitter placed at the PBC headquarters. It aims to roll it out to 20 FM transmitters, while also tackling the AM mode. Pakistan has decided on DRM for local coverage first. (Bangladesh is testing DRM 24hrs a day from several sites, in medium wave.

c. **Indonesia** has successfully tested the DRM for local coverage in simulcast mode in Batam in May 2017 and the full report is published by ITU (ITU-R Contribution WP6A/306) and available on the DRM website as well (**http://www.drm.org/what-is-drm-digital-radio/drm-field-trials/**).

d. Vietnam has successfully tested DRM for medium wave in April 2018.

e. Bangladesh, China, Taiwan, Japan are also using DRM.

f. Hungary in Europe has installed a powerful DRM 2-Megawatt mediumwave transmitter – (audio can be received as far as Malaysia)

g. Russia has chosen officially DRM and several broadcasters are interested in DRM for FM.

h. FCC as part of the "Code of Federal Regulation" officially mandates the use of DRM for any US short wave transmission (October 2017): https://www.gpo.gov/fdsys/pkg/CFR-2017-title47-vol4/xml/CFR-2017-title47-vol4-sec73-758.xml.

i. DRM and its exceptional benefits as well as its data carriage possibilities mean it is being used by the German navy, by the US Coastguard.

CONCLUSIONS

DRM is made for South Africa and could become, easily, the South African digital standard. DRM suits the country's technological, spectrum and socio-economic needs. It would also align the country with the BRICS countries, which are testing, implementing or looking to implement DRM.

Extending the choice of DRM in South Africa in both the AM bands and the VHF bands would ensure that each South African citizen (regardless where she or he lives) gets access to information, education and entertainment being thus connected to the 21st century through the familiar medium of radio.

The reasons have been presented already:

- More channels in available spectrum with power saving
- Smooth transition from analogue FM to DRM Digital Content benefits – DRM Digital has far more to offer than analogue audio broadcasting meeting the specific requirements of a big country with many and sometimes conflicting needs and requirements
- Benefits for Regulators, Broadcasters, Listeners, Receiver/automotive manufacturers

In this process the DRM Consortium is ready to support at every stage and give best, unbiased and full technical support.

- For more information on DRM visit**:** **www.drm.org**
- To download the **DRM Handbook,** go to: http://www.drm.org/DRM_Handbook_2018.pdf
- To contact us write to: **projectoffice@drm.org**