



DIGITAL radio mondiale

Digital Radio for All

**Digital Radio Mondiale (DRM) Submission to
ACMA Five-year spectrum outlook 2022–27
and 2022–23 work program
Draft for consultation**

INTRODUCTION

The not-for-profit international DRM Consortium appreciates and supports your assessment that “evolving digital transmission technology and changes in viewer and listener behaviour are altering the modes of delivery and, consequently, changing the broadcasting demand for spectrum”. We note with satisfaction that ACMA is supporting new technology trials and, as such, we are also fully behind any such endeavour and keen to share the findings of the DRM30 and DRM+ trials for radio. (In some cases, the DRM on-air signal configurations for transmissions below 30 MHz have been sometimes referred to as “DRM30”, and those for transmissions above 30 MHz as “DRM+”. However, in both cases the terms refer to the same single DRM standard with its common feature set, regardless of the actual broadcast frequency. We often refer to DRM30 as DRM for AM and DRM+ as DRM for VHF).

Confronted with the global challenge of scarcity of spectrum for new uses, ACMA is aware and appreciates the characteristics of the radio broadcast bands, as well as the tremendous properties these continue to offer broadcasters to deliver programmes over, sometimes, very large distances and areas or in difficult terrain.

A CLEAR ROLE FOR DRM IN THE LINKED-UP AUSTRALIAN MEDIA LANDSCAPE

Despite the progress made with other digital platforms and conversion to Analogue FM IN Australia over the past 10 years, we feel that DRM is the key to delivering the still elusive **full country, digital and modern coverage required nowadays**. Even with the progress registered in the big metros recently, full digital coverage is hard to achieve just with localised and expensive solutions.

AM and LF BANDS

DRM was seen as an efficient and modern way to replace the analogue LF and AM transmissions. When we consider the spectrum scarcity for new uses and appreciate the characteristics of the radio broadcast bands, we recognise the tremendous properties these continue to offer broadcasters to deliver programmes over, sometimes, very large distances and areas or in difficult terrain. Digitising these bands with a system such as DRM offers extensive coverage and many more benefits to the audience and broadcaster.

For example, in one of the countries we know of there are about 32 low power FM transmitters (each with a radius of about 40 kilometres) so about 20% of the country is covered. Apart from the electricity costs for these FM transmitters, there are other operational costs to do with staffing, service, and maintenance. In the future one single DRM short wave transmitter using a near vertical incidence and a power consumption of 6kW could offer, at least, two very good audio services (plus

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data) and 100% territorial coverage. 8 million households in cities and remote areas could be covered and the support costs would be considerably reduced.

Where medium wave frequencies and sites exist multi-channel (therefore multi-language, too) DRM broadcasts can be offered at improved quality, with reduced energy bills and running costs. Unlike analogue, DRM allows one frequency to be used repeatedly for the same service over a large area (a single frequency network or SFN), making more efficient use of the spectrum. DRM can transform the quality of the services on the AM bands to be clear and free of any of the interference and distortion. DRM provides text information and images, to complement programmes offering, thus an enhanced experience to the listener.

The large coverage afforded by AM makes it available in sparsely populated areas where commercial players have less interest, as their return on investment and ads would be minimum but where the social and community value of the services remains socially and politically significant.

Recommended by ITU, DRM digital broadcasting has been proven to work excellently in the shortwave and medium wave bands. These bands remain key for international broadcasting delivering services without constraints of local 'gatekeepers'. The radio markets are still there, the need for good quality audio with data enhancements is there.

Radio Australia currently is only available from 13 FM re-transmitters in the Pacific and via satellite while China is increasing its footprint in the region. Australia's view is virtually unheard, whereas China Radio International is using all the old RA frequencies. Meanwhile Radio New Zealand Pacific has been transmitting DRM since 2005. They use it as a programme source to retransmitters including the Cook Islands 3000 km away. This is more than the furthest distance between the centre of Australia and the coast.

VHF BANDS

DRM as an all-band, open, green standard offers excellent spectrum utilisation and genuine savings. DRM can work in AM and VHF and deliver up to three audio channels and one data channel for one frequency used in analogue. DRM offers extra digital benefits that are the same and can be enjoyed across all bands.

These were demonstrated during the India DRM+ or DRM for VHF trial which highlighted also the extra spectrum saving options offered by DRM. The DRM+ trial carried out in India 2021 has delivered excellent results, recorded on a variety of receivers, including some fitted in cars. The same unit has been made available in Australia recently. This is a unit that can support one standard – DRM or a combination of standards - DRM and DAB+.

In Delhi, the trial demonstrated excellent results when transmitting a single DRM signal, multiple pure digital DRM signals side-by-side from the same transmitter ("Multi-DRM" configuration), and also

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using DRM’s simulcast option by putting on air both an analogue FM and a digital DRM signal from a single transmitter.

The Multi-DRM option proves DRM’s highly economic potential when it comes to frequency and equipment upgrades: a single FM-band transmitter with a bandwidth of 600 kHz can transmit 6 independent DRM signals (blocks) carrying up to 24 DRM services, e.g., 18 audio and 6 multimedia services. These can represent up to 6 independent broadcasters who remain in full control over their individual content and signal configuration.

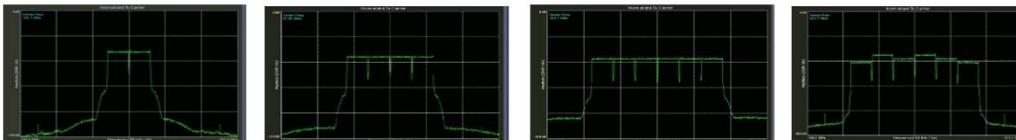
In Jaipur, the DRM Consortium showed on a separate antenna on the same tower for the first time in a live on-air environment, how multi-DRM configurations with 4 and even 5 DRM blocks (each capable of carrying up to 3 audio services and one multimedia service like Journaline), can perfectly and efficiently use the white-spaces in-between two existing analogue FM services, while not affecting the reception of those ongoing FM services at all.

DRM services can be broadcast from the same ‘Common Technical Platform’ (CTI) in use today, housing multiple FM transmitters with a shared site and antenna.

However, DRM takes this concept a step further by also turning the FM-band transmitter itself into a shared resource. This approach, ideal for the quickest introduction of digital services in the FM band without affecting the existing analogue services, not only minimises the one-time equipment investment for broadcasters, in addition to the significant power cost savings. It also opens the door, for example, for broadcasters to provide many regional services from across the country from every local transmitter site by installing a single FM-band transmitter.



Pure Digital – Multi-DRM configuration



Test case	Transmitter		Signal Configuration and Receiver Tuning Frequency (MHz)												
	Center (MHz)	Power (W)	100,35	100,4	100,45	100,5	100,55	100,6	100,65	100,7	100,75	100,8	100,85	100,9	100,95
Test case 1: "Multi-DRM Showcase A"	100,65	200						100%	100%						
Test case 2: "Multi-DRM Showcase B"	100,65	600	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Test case 3: "Multi-DRM Showcase C"	100,65	100	25%	100%	100%	50%	100%	100%	50%	100%	50%	25%			
Test case 4: "Multi-DRM Showcase D"	100,65	100	100%	100%				100%				100%			

Colour code: DRM analogue FM

Up to 6 DRM signals (18 Audio + 6 Multimedia Journaline services) side-by-side from the same transmitter

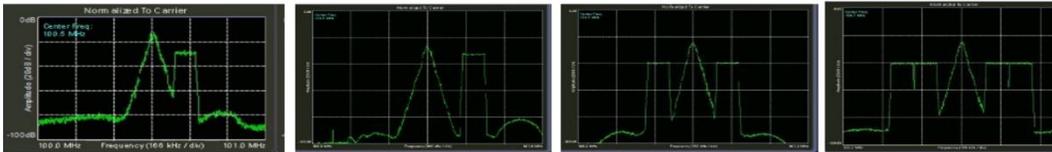
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Simulcast DRM operation

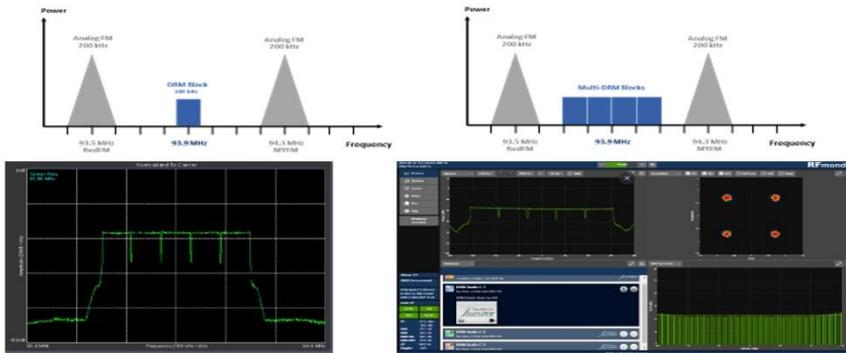


Test case	Transmitter		Signal Configuration and Receiver Tuning Frequency (MHz)												
	Center (MHz)	Power (W)	100,35	100,4	100,45	100,5	100,55	100,6	100,65	100,7	100,75	100,8	100,85	100,9	100,95
Test case 1: "Simulcast Showcase A"	100,5	1100				FM			10%						
Test case 2: "Simulcast Showcase B"	100,5	1100				loud processed FM			10%						
Test case 3: "Simulcast Showcase C"	100,5	400				equal			equal						
Test case 4: "Simulcast Showcase D"	100,5	400				FM			10%	10%					
Test case 5: "Simulcast Showcase E"	100,7	400							FM			10%			
Test case 6: "Simulcast Showcase F"	100,7	400							10%	10%		FM		10%	10%

Colour code: DRM analogue FM

Both analogue FM service and up to 4 DRM signals (12 Audio + 4 Multimedia Journaline services) from the same transmitter

DRM in analogue-FM white spaces



Up to 5 DRM signals (15 Audio + 5 Multimedia Journaline services), from a single transmitter, in the white space of 600 kHz in-between the 2 existing analogue FM services (10 kW each)

During the DRM demonstration, it was obvious that the DRM standard used in the FM band is backward compatible and the receiver ecosystem for both AM and FM band services, is ready.

The DRM receivers in operation during the trial all supported DRM in both AM and FM bands. They comprised car receivers (line-fit and customer installed receiver upgrades), DRM reception on mobile phones and tablets, portable and desktop radios, as well as professional monitoring receivers.

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As shown in India, DRM also allows for the full utilisation of the “white” spaces, so the number of programs, audio and data channels can go up to 18. This compares most favourably with the only 8 DAB+ transmission channels available in most populated areas of Australia and the perceived poor coverage area of DAB+ compared to DRM particularly in regional and remote areas.

We urge ACMA to consider these opportunities when converting from AM to FM and enhancing coverage of commercial, national and community services where spectrum is available.

CONCLUSION

Some of the advantages of digital radio and DRM are obvious and have been often mentioned:

RADIO IS FREE TO CONSUME

- **5G mobile services demand spectrum in the higher bands** (and a small base station every 900 m and each with its own electricity supply. The telcos claim 98 % coverage of the Australian population; however, this is only 27 % of the land area for now) **while,**
- **The radio broadcast bands have unique properties for covering large areas**
 - 100% geographic coverage is possible
 - Coverage of remote and areas affected by disaster is possible

RADIO IS EFFICIENT

- **Power efficiency**
- **Spectrum efficiency**
- **Use of the same transmitter sites / Topographic efficiency**
- **DRM and DAB systems are COMPATIBLE and almost licence free**

Therefore, we urge ACMA to consider and support DRM in all bands to achieve:

- **Full country coverage**
- **Give a chance to all players in the market and not just the commercial broadcasters**
- **Offer a digitisation option to smaller, community stations with simple and green paths to digitisation**
- **Offer important services like multi-language programmes and key features like the Emergency Warning Functionality, essential for a country afflicted by the numerous and severe floods, bushfires, cyclones and droughts.**

Do all the above with DRM in all bands saving spectrum and energy.

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