Counter-Comments of the Digital Radio Mondiale Consortium (DRM.org) on Comments to TRAI's Consultation Paper No 14/2024 dated 30th September 2024 on 'formulating a Digital Radio Broadcast Policy for private Radio broadcasters'.

11 November 2024

Introduction

Almost all responses and comments are unanimously of the same opinion that a single standard selected to digitize the FM band in India is advantageous for listeners, broadcasters, government and the whole industry. This can easily be explained by the fact that broadcast radio (analogue or digital) is a network technology, in that it requires the buy-in from broadcasters as well as receiver and car manufacturers, and thus all stakeholders need to agree on and operate on a single, common technical platform to be successful. The mere fact that DRM is already on air in India, including for applications not supported by HD Radio at all, allows for only one conclusion: DRM is the obvious solution to enable digital radio services in India also in the FM band.

We agree with the following comments who made their endorsement for DRM and open digital radio standards explicit:

- DRM Consortium
- HFCC
- WorldDAB
- HT Media / Fever FM
- OptM
- Indian DX Club International
- Inntot
- Ittiam Systems
- CML Micro
- Dolby
- Elements Innovation UK
- Fraunhofer
- German DRM Platform
- Gospell Digital Technology
- IZT
- RF2Digital
- RFmondial
- Starwaves

- WECODEC
- Liu, Haochun
- Rao, Dr. Thamminana Krushna

We agree with the submissions by the following organizations or individuals who do not explicitly mention DRM but provide arguments which eventually lead to the conclusion that DRM should be used:

- Association of Radio Broadcasters for India (AROI)
- Consumer Protection Association
- FICCI
- IMI Indian Music Industry
- NXP
- Sadhu, Sharad

In addition, we essentially agree with the comments by the following organizations, although we do not agree with how the arguments presented could lead to the conclusion of recommending HD Radio for the digitization of the FM band in India:

- Xperi
- National Association of Broadcasters (NAB), CIRT, Inovonics Broadcast, JVCKENNWOOD, Pioneer, PnpNetworks, MB India, Noise, CoE

Clarification on our response to Q17

We received the feedback that our answer could be interpreted such that charging should be per service/programme. This is not the case.

As suggested in response to Q16, to give impetus to the digital radio broadcasting and a powerful incentive to broadcasters to invest in digital radio infrastructure, we propose the following:

- The use of a single DRM block (transmission content) with regard to content and configuration should be left to each broadcaster. This includes the robustness and modulation parameters, metadata per service, bitrates and technical parameters for audio and data service coding, number and configuration of multimedia services (such as the advanced text application Journaline), etc.; and, last but not least, the decision how many audio services should be carried in this DRM block.

- Multiple audio programmes carried within a DRM block may still be chargeable individually through a programme license (after a launch phase).
  However, if the same audio programme/service is provided with identical content

simultaneously on the digital service and the existing licensed frequency via analogue FM, then no additional annual fee for the digital service may be charged.
An exception to this rule should be multimedia (non-audio) services such as Journaline, and EWF Emergency Warning Functionality programmes (if provided by other broadcasters than AIR) – those should be non-chargeable in any case.

- To encourage and incentivize the rollout of attractive and exclusive digital radio services by broadcasters, we recommend not to charge any digital audio programme fees for the initial years (e.g. 5 years till the end of the FM license period). This approach acknowledges the fact that listener numbers on digital receivers will be marginal to start with, until the digital reception infrastructure and the receiver population get sufficiently developed.

Response to Comments by Xperi

"business opportunities for broadcasters"

DRM creates business opportunities for the local industry in India as it is an open standard, which can be fully implemented by any manufacturer without dependency on license contracts or access to core technology elements controlled by a single commercial company. This is true for broadcast equipment, receiver technology and equipment, mobile phone, car and other manufacturers. In addition, broadcasters deploying the open DRM standard have full control over any aspect of their transmission, including the number of services, data applications, interfaces, etc. – without the need to ask for technology access or pay additional licences; which in turn can lead to a thriving supporting industry such as playout system integration, ad management and broadcast service providers.

"unparalleled audio quality"
"Enhanced Audio Quality: Comparable to CD quality for FM and FM quality for AM."
"HDC – HD Radio CODEC"

DRM is the only digital radio standard that uses the most recent and efficient audio codec of the MPEG AAC family: xHE-AAC, which is supported natively by billions of mobile phones, tablets and PCs.
In addition, DRM offers not only stereo services in a better-than-FM quality in the AM bands (MW, SW), but also better-than-CD and up to 5.1 surround quality in the FM band.
In contrast, HD Radio is based on the HDC audio codec: "HDC is a proprietary codec based upon, but incompatible with, the MPEG-4 standard HE-AAC."[1] HE-AAC is two generations older and thus far less efficient than the latest xHE-AAC audio codec generation.

[1] See https://en.wikipedia.org/wiki/HD_Radio

"HD Radio technology aligns with India's vision of a digitally empowered society, ensuring that radio remains a vital medium for information, education, and entertainment. This transition enhances the listening experience and fosters a more inclusive and connected nation."

We believe that only an openly standardized technology such as DRM with full and unrestricted access to all its components by all stakeholders is suitable for these purposes.
In particular, for information, education and entertainment purposes, its built-in advanced text service Journaline will meet the requirements of India's diverse cultural and linguistic landscape, and natively supports the many different scripts used across the country through full Unicode support.

"Simulcasting Capability: Allows simultaneous broadcast of analog and digital signals."

DRM offers simulcast capability.
Due to its flexibility, DRM can even replicate the exact spectrum shape of an HD Radio transmission from a single FM band transmitter: two digital blocks of 100 kHz with an analogue FM service at the centre – but in case of DRM offering capacity for up to 6 digital audio services, 2 digital multimedia services such as Journaline, and an independent analogue FM service; (in contrast to HD Radio's 4 digital audio services, of which one needs to be identical to the analogue FM service). DRM therefore does support, but not mandate, the option to place one analogue FM signal and two digital blocks side-by-side.
However, while for HD Radio this hybrid spectrum configuration is basically static and fixed, DRM offers many additional ways to configure the on-air signal to match and optimally serve each country's and each location's specific requirements: In the case of a single transmitter simulcast, DRM could for example add two digital blocks on each side of the analogue FM signal of the simulcast transmission signal and thus carry up to 12 audio services plus 4 Journaline multimedia services in addition to the FM service within 600 kHz; or it could add only a single digital DRM block to the analogue FM signal, to restrict the overall bandwidth required to only 300 kHz (instead of the 400 kHz fixed width of HD Radio).
In addition, DRM blocks can be placed in white-space gaps anywhere in the FM spectrum and in-between existing ongoing FM services (thereby not occupying capacity that could be used for additional analogue services during the transition period); and even combine the transmission of multiple DRM blocks side-by-side from a single FM band transmitter, thereby ensuring that the infrastructure cost to upgrade an existing CTI site to DRM digital radio the lowest possible and shared by all broadcasters (Multichannel DRM).
All this is enabled by DRM's powerful AFS feature (Alternative Frequency Signalling), which links all alternative frequencies to receive a given radio services so that a receiver can switch seamlessly between them – even across bands (FM, MW, SW) and standards (DRM, analogue FM, analogue AM).

"Multicasting: Broadcast multiple audio channels on a single frequency (HD2, HD3, HD4) allows for more efficient use of spectrum Radio operators provide innovative content and are able to reach specific ethnic and language populations with unique programming."

While HD Radio is certainly more spectrum efficient than analogue FM (with a theoretical capacity of 4 digital audio services plus one FM service within 400 kHz), DRM offers the far more efficient use of spectrum overall; i.e. in a 400 kHz signal bandwidth in simulcast mode, DRM can carry up to 6 digital services plus 2 Journaline services in addition to one analogue FM service.
And if operated in full digital mode in future, the same 400 kHz signal bandwidth can carry 4 distinct DRM blocks with a capacity of up to 12 audio services plus 4 Journaline multimedia services.
In essence, DRM carries up to 4 digital services within a bandwidth of only 100 kHz per DRM block, in contrast to 400 kHz minimum for a single HD Radio signal.

Response to Comments by India Cellular & Electronics Association (ICEA) and AROI

We essentially agree with the arguments put forward (by one or both of the contributors):

- single-standard digital radio technology across the country
- technology should be proven, implemented, and have compatibility across various device ecosystems
- robust enough so that it can be implemented on its merit without government intervention by the device ecosystem
- consistent user experiences across the country
- compatibility
- economy of scale
- Incentives for local production
- Building a Design Ecosystem

In our view, the open DRM standard is the only standard that fulfills all these requirements.
We would like to outline the following points in particular:

- The suggestion to introduce a single digital radio standard for the country – only DRM come into consideration as it is already adopted and deployed in India, and continues to be the only standard fulfilling all of India's coverage requirements. Extending the same single Indian standard to digitize also the FM bands seems the logical conclusion.
- Development of *a Design Ecosystem* and *local production* will be most successful if an open standard is chosen: only DRM fulfils this requirement. In fact, DRM receiver chipsets, developed and designed in India, are being exported for the world market and specifically also drive Chinese DRM receiver models and DRM in cars. DRM is a true success story for cutting-edge technology Made in India for the world market.

- We second the comment that support in mobile phones is crucial for the success of the digitalization of the FM band. DRM with its bandwidth of only 100 kHz is the only digital standard supported by current mobile phone and built-in FM tuner designs without requiring dedicated or special hardware or chips, as existing FM front-ends may be configured to capture the DRM on-air raw signal. Android apps to take care of the full-featured DRM decoding from such a raw signal are available in Indian app stores (Google, Amazon, Huawei) today, proving the claim made above and ready for native integration by mobile phone manufacturers after India has taken a decision on digitizing the FM band. In addition, these apps allow to even upgrade existing phones (via external USB tuner), so early adopters have access to today's and future DRM transmissions in India at very low cost.
- Of course, it is understood that different receiver product categories have different lead times before products will be available to consumers. But beyond that there is no need for a phased approach in DRM receiver ecosystem development as proposed by ICEA, to ensure a smooth transition for different product categories.
  In this context it is crucial to understand that **DRM desktop radios** in India today already support DRM in the FM band.
  The tuner chips used in **car radios** are already DRM FM-band capable, so that support for DRM in the FM-band often is a mere software upgrade to the existing head-end solution without hardware redevelopment. This results in a quickly available receiver basis for FM-band broadcasters, with DRM being available at no extra cost to car buyers and already over 60 lakh cars on the road in India today.
  And finally, **mobile phone** manufacturers benefit from DRM's bandwidth compatibility with existing ultra low-cost FM-tuner front-ends, and – if the selected tuner provides access to raw on-air information – implementation of full-featured DRM radio as a default feature on future smart- as well as feature-phones is a mere software app integration. Special chipsets for receiving DRM transmissions in the FM band are NOT required, and thus existing phone board designs can continue to be used. PoC for a low-end mobile phone with integrated DRM reception was presented during BES 2024 in Delhi.

  DRM is an open technology and if manufacturers or technology providers are specialized in the area of one of these categories are encouraged to start contributing to a rich choice of brands and classes of receivers in all categories.

In summary, the arguments and requirements expressed by ICEA and AROI in our view clearly lead to the conclusion that DRM is the technology best suited to serve the members of the Indian Cellular and Electronics Association as well as the Private Broadcast Industry of India.

Counter-comments on the Comments by National Association of Broadcasters (NAB), CIRT, Inovonics Broadcast, JVCKENNWOOD, Pioneer, PnpNetworks, MB India, Noise, CoE

We essentially agree with the comments put forward, but not with the resulting conclusion drawn.

We would like to point out that the date mentioned for the introduction of HD Radio in the United States was 2002. At this time, DRM (particularly for the FM band), was still in development, given that DRM is the latest digital radio technology that benefitted a lot from lessons and improvements from all its predecessors. This early decision in the US created a legacy and lock-in effect for US broadcasters, and ultimately made it impossible for them to compare and eventually benefit from the DRM standard at the time. This situation is different in India today, which now can choose the solution best fitting the country.

The positive arguments in favor of digital radio are equally true for DRM.

Today, DRM is being adopted and rolled-out in major countries across Asia; including the recent policy publication of the Indonesian regulator, Pakistan's roll-out of DRM and China's government request to all domestic manufacturers and international importers to support DRM in the country – in addition to all major domestic car brands having cars with DRM radio functionality on the road in India based on AIR's AM-band DRM services.
Therefore, it seems that car radio manufacturers claiming that they have only implemented the HD Radio technology in their products so far based on market demand clearly have strong North American focus of business and may be missing a great market opportunity based on the requirements of Asian and African countries. However, world market suppliers within India over the past years have built up an excellent domestic know-how and industry around DRM receiver chipsets and solutions and are ready to serve the domestic as well as international markets.

Comments on the Comments by Centre of Excellence, CDAC Noida

Comments for answers to Q1

We welcome and do not question CoE's finding that HD Radio chipsets are mature and of high quality, given its long history and roll-out in the US.

To develop a full picture and be ready to in addition serve the Indian (and wider Asian and African) industry in future, we encourage CoE to get in contact with equivalent solution providers for DRM chipsets as well.

DRM is a mature and proven standard, that has compatibility across devices like Bluetooth speakers and mobile phones.

Bluetooth speakers including full-featured DRM reception (in the AM as well as FM bands) are available from companies such as Gospell GR-228BP, GR-226BP and GR-224BP demonstrate today the perfect symbioses of DRM radio reception and Bluetooth speaker design. In addition, low-cost tuner modules such as the CML DRM1000 will make it very affordable to enhance any consumer media device with DRM reception going forward.

For mobile phone integration, DRM offers the unique technical benefit of its spectrum bandwidth of only 100 kHz (half of an analogue FM channel). Therefore, existing FM tuner front-ends as built into many mobile phones today, are capable of tuning to and digitizing DRM signals without any hardware modification or board re-design. If those FM tuner front-end chips are properly selected to forward the raw on-air signal in digital form, the Android apps to decode the DRM signal and all its features are already available in app stores today. This software can easily be integrated as a default feature in future mobile phones sold in the Indian market to receive DRM FM-band signals natively; and it can be downloaded by interested users today to upgrade virtually any existing Android phone to full DRM reception when a USB tuner.

In addition, DRM is an open standard, allowing freedom for innovation and development without reliance on proprietary technology. In India, significant advancements have already been made to tailor DRM tuner and receiver solutions for both domestic and global markets, aligning well with the needs of diverse broadcasting environments. Indian start-ups like Inntot and OptM alongside global players with their DRM know-how centered in India have innovations and know-how for both transmission and receiver solutions. India is the hub for exporting DRM technologies and not just manufacturing.

DRM not only supports a scalable, cost-effective receiver ecosystem, but also aligns with India's goals for technology independence and global competitiveness in digital broadcasting.

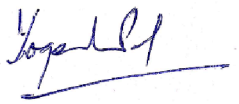
Counter-comments on the Comments by NOISE / Nexxbase Marketing

Global audio standards have taken leaps and bounds. xHE-AAC is the most recent and best audio code of the MPEG AAC family and is available in billions of devices already. DRM is the only digital radio standard that uses xHE-AAC. Owing to this DRM delivers much more audio coding efficiency in comparison to HD Radio. DRM being an open standard, has enabled innovative solutions both by Indian startups (Inntot, OptM) and also international companies like NXP, Mobis, CML Micro, and StarWaves. Incorporating these solutions will certainly meet global audio standards.

Support for DRM radio reception as part of Bluetooth speakers as already implemented by competitors, will broaden NOISE's market appeal and potential to the big-population countries of Asia and Africa.

The DRM Consortium is at your disposal for further questions. Please contact us via projectoffice@drm.org or yogendrapal@gmail.com

Submitted for kind consideration, please.



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