Comments of the Digital Radio Mondiale (DRM) Consortium on the TRAI's Consultation Paper dated 10th July 2017 on 'Issues related to Digital Radio Broadcasting in India'

With reference to Consultation Paper No. 7/2017 dated 10th July 2017 from the Telecom Regulatory Authority of India (TRAI), inviting comments on the 'Issues related to Digital Radio Broadcasting in India', I, Yogendra Pal (Tel: 91 98115 72044), Honorary Chairman of the India Chapter of the Digital Radio Mondiale (DRM) Consortium, am pleased to submit the following comments on the questions raised in the paper:

Q 5.1 Is there a need to encourage or facilitate introduction of digital radio transmission at present? If so, what measures do you suggest and in which market?

Comments:

1. We consider it very urgent not only to encourage the efforts of digitising the AIR MW and SW transmissions using the DRM digital standard but also to facilitate its full utilisation and announcement of a roadmap for the complete switchover of radio broadcasting, including the private FM and Community Radio Stations, to digital radio in India. Following comments are made in support of this suggestion:

i. **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 both domestic and 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 – among others, 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 crucial for domestic and overseas coverage today and in future. They 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.

ii. **Digitisation of VHF Band (FM Broadcasting) -** FM provides very good audio quality. Since 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. To cover larger areas, it is uneconomical to provide coverage on FM rather than on MW. Moreover, analogue FM is almost a century-old technology, which is not only spectrum and power hungry but also provides only one audio service per frequency and no added-value benefits for the listeners. Digital radio broadcasting in VHF band provides multiple audio services per frequency, at much reduced power, along with a host of value added services. This is why transmissions in VHF band must also be digitised to utilise these scarce resources (energy, spectrum) optimally, and to provide better and future-ready services to listeners that are in-line with modern media consumption and quality expectations.

iii. **IP Streaming -** Up until a few years ago, some broadcasters hyped the idea that IP Internet Streaming of radio services to mobile devices would soon make all terrestrial broadcasting obsolete. Today, economic reality has prevailed and the idea of phasing out terrestrial broadcast was abandoned. This is due to the fact that IP networks

are designed for point-to-point communication services with each connection creating significant cost for the service provider, the network operator and the listener. In contrast, terrestrial broadcast networks can serve a virtually unlimited number of listeners from a single transmitter at a flat and well calculable cost. In addition, mobile networks and data capacity are paid services and thus network operators are in the position of being gate-keepers between radio service providers and their listeners, whereas terrestrial broadcast is freely accessible by anybody, and transmission infrastructure in control of the broadcasters or the relevant public organisations. Therefore, while IP streaming is well established today and will continue to play an important role in the future particularly for niche or locally un-available services, it cannot replace terrestrial radio broadcast services particularly for freely available services targeting a mass audience.

iv. **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. Mandatory digitisation of cable TV networks in India is the example. Digitisation of the terrestrial radio broadcasting is also inevitable. In fact, way back in 2006, the Planning Commission of India had given timelines for the switch-off of analogue radio and terrestrial TV transmissions in India as well. AIR and DD started taking action in this direction. AIR has chosen the ITU endorsed DRM standard ("Digital Radio Mondiale"), with all technical specifications published and freely accessible to the Indian industry, for the digitisation of its terrestrial radio networks. But the task of migrating AIR's terrestrial broadcast services today is still incomplete. Therefore, it is essential that the full potential of DRM digital radio in MW & SW is soon utilised by configuring the best possible audio quality, finalizing the service selection for each location, and adding value-added services such as Journaline text and EWF (DRM's Emergency Warning Functionality), and a roadmap is provided for the complete switchover of radio broadcasting, including private FM and community radio Stations, to DRM digital in India. This task, demanded to be carried out immediately by the by the Ministry (see below), will require a department-spanning stringent management that also reaching out to the public and the Indian receiver and automotive industry.

2. **Why DRM for India?** - DRM is the newest and most technologically advanced 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 India's needs, with all its diverse coverage demands, at **low energy costs** and with **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.

In January 2017, M Venkaiah Naidu, the then Union Minister for Information & Broadcasting, had congratulated the national public broadcaster All India Radio (AIR) under Prasar Bharati for having successfully completed phase 1 of the national digital radio roll-out: AIR has completed the installation of the nationwide network of 37 powerful medium and short wave transmitters operating in simulcast [3] and/or pure DRM mode, resulting from a significant national investment.

Mr Naidu, while inaugurating the start of AIR's phase 2 of the roll-out, aimed at finalizing the selection of programmes per region, the implementation of all DRM features and the improvement of the content quality provided by those transmitters, which will **ultimately result in the official launch of DRM digital radio services by AIR to the nationwide listeners**, had mentioned:

"AIR has re-invented itself through its digital transmitters based on the International ITU standard Digital Radio Mondiale, fulfilling the vision of 'digital India' laid out by the Prime Minister". [4]

Though DRM has not officially been launched yet as a service to the public, given that phase 2 of the national roll-out of DRM digital radio by AIR has just started a few months ago, the **industry is already showing their commitment and support to be in the market with products once AIR's DRM services will officially launch**.

Probably the most important factor for establishing modern radio listening habits is the **support for AIR's digital radio roll-out demonstrated by the automotive industry**. Mahindra & Mahindra demonstrated their line-fit DRM receiver in car models launched not long ago. [5] Also Maruti Suzuki has launched cars with DRM line-fit receivers. [6] In early 2017, Hyundai joined by announcing two new car models with native DRM support. By late summer 2017 this has grown to a total of 5 models ranging from entry-level products to high-end cars – all radio sets with DRM functionality included, at no extra cost. [7] Many major automotive brands have scheduled the launch of DRM capable car receivers for India in the next two years, almost all of them based on **chipsets developed and produced in India**. [8]

Avion Electronics, a local company, has developed the first fully-featured portable digital radio receiver "Made in India" [9], which is ready for mass production. Substantial orders will only materialise after All India Radio starts continuous communication to their listeners, explaining the availability and benefits of the new DRM digital radio services – a crucial part of the national roll-out process.

Strongly trusting in the commitment of AIR to their imminent public, nation-wide launch of DRM services, India's receiver industry **has to this date invested millions of dollars** in order to be prepared, once AIR will be ready with phase 2 and give the public go-ahead signal. [10] Finalizing this second phase of the roll-out is the absolute next goal for AIR. This will ensure that the DRM roll-out is a true success, as originally requested by Minister Naidu in January and justifies the work already undertaken by AIR. [11]

The car industry has typically a lead time of 4–6 years for launching new technologies in cars. Today significant numbers of cars (tens of thousands) are already on India's roads displaying DRM functionality and benefits, and many more car models are already in the pipeline, as India's industry is proving its commitment to AIR's DRM roll-out plan. **Any major plan change at this stage of the DRM roll-out in India may result in the total loss of credibility of stakeholders, and completely damage the industry's trust in any future radio digitization project.**

Today **India is in a leading position worldwide** by rolling out digital radio on a national level using the DRM standard, with great **cooperation and product export opportunities** into countries all over Asia-Pacific and beyond. Currently in the process of adopting and/or rolling-out DRM for national coverage are countries such as Pakistan [12] (for both local coverage in the FM band and large-area coverage in the AM bands), Indonesia [13], South and Southern Africa [14], and many more. In addition, a huge portion of the world's population is already covered by DRM transmissions on international shortwave.

In the past, several digital radio standards have been thoroughly tested and reviewed by **Indian authorities, and DRM was tested, identified and confirmed to be the best suited option for India's radio digitization needs** (incl. the detailed "Report of the Expert Committee on Prasar Bharati" [15] under Dr Sam Pitroda). 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 Indian Industry can take full ownership and create receiver solution that are relevant to the listeners.

Advantages of DRM for listeners, broadcasters and regulator - This section briefly summarizes the key benefits to all Indian stakeholders of having adopted the open DRM technology for the digital radio in India.

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. [19]

1. **Content:**
    a. DRM can carry up to 4 services per transmission as a flexible mixture of data and (up to 3) audio services

    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, stereo services over SW, and multiple stereo or even 5.1 surround services in the FM band

    c. Thanks to the Journaline advanced text application, DRM makes the broadcast's rich textual information treasure with news, sports updates and much more, in the past only available on the broadcaster's web page, available to all listeners right on the radio sets as part of the radio service – free to air, without the need to pay for Internet access, and simultaneously in a multitude of languages with every DRM transmission

    d. DRM allows the broadcaster to transmit multiple audio and data services in a single transmission, without any extra cost or the need to sign license contracts

    e. 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

2. **Spectrum:**
    a. The ITU approved 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 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

e. In the AM medium wave bands, **DRM supports the 18 kHz channel assignments in India and Asia-Pacific conforming with ITU regulation**, enabling simulcast operation and extended full-digital transmissions with even more services and content

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)

   b. When upgrading an analogue transmitter to full-digital operation, the same or even more coverage than with analogue before can be achieved, while significantly reducing transmission power, 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

4. **Society Benefits**:
   a. DRM supports **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

   b. The **domestic Indian receiver industry** – from chipset to module to receiver manufacturers, automotive brands, and even retailers – are involved and benefit from the whole new market the national roll-out of DRM will create in India, as well as from **international export** opportunities

   c. **Indian 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 India**; this local production of DRM radio receivers for desktops, tablets, laptops, for mobile phones and cars in India can ensure **new jobs and wealth creation**, and provide opportunities in software and R&D development, distribution, retailing and a new kind of journalism

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[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) - ***(See page 2)***

[2] http://www.etsi.org/deliver/etsi_es/201900_201999/201980/***(See page 2)***

[3] DRM simulcast mode: broadcasting a combined digital DRM signal and an existing analogue AM signal from the same transmitter ***(See page 2)***

[4] For example http://www.asiaradiotoday.com/news/drm-holds-round-table-meeting-delhi, http://www.india.com/news/agencies/digital-radio-an-opportunity-to-achieve-connectivity-revolution-naidu-1798517/, http://www.drm.org/india-inaugurates-the-next-stage-of-the-worlds-biggest-digital-radio-roll-out/ - ***(See page 2)***

[5] http://www.radioandmusic.com/biz/mobile-digital/digital-radio/151008-drm-receiver-installed-first-time-indian - ***(See pages 3 and 13)***

[6] http://www.drm.org/wp-content/uploads/2017/04/ABC-DRM-submission-to-Australia-2017-03-29.pdf - ***(See pages 3 and 13)***

[7] http://mailchi.mp/drm/drm-india-chapter-noticeboard-april-1229381 ***(See pages 3 and 13)***

[8] "NXP and Mobis India Deploy DRM Chips and Receivers Designed in India": http://media.nxp.com/phoenix.zhtml?c=254228&p=RssLanding&cat=news&id=2241730 ***(See pages 3 and 13)***

[9] http://www.avionelectronics.in/ - (***See page 3)***

[10] http://www.radiomagonline.com/around-the-world/0020/nxp-and-hyundai-mobis-deploy-drm-chips-and-receivers-designed-in-india/38592, http://drmnainfo.blogspot.sg/2014/10/exclusive-interview-with-indian-drm.html - ***(See page 3)***

[11] http://www.radiomagonline.com/around-the-world/0020/air-launching-drm-conversion-phase-ii/38740 - ***(See page 3)***

[12] http://www.radio.gov.pk/30-Jan-2017/radio-pakistan-starts-work-on-converting-transmission-to-drm-plus-technology-dg-pbc - ***(See page 3)***

[13] http://www.asiaradiotoday.com/news/radio-republik-indonesia-signs-cooperation-agreement-drm ***(See page 3)***

[14] http://www.drmsa.org/ ***(See page 3)***

[15] http://mib.nic.in/sites/default/files/Sam_Pitroda_Expert_Committee_on_Prasar_Bharati_January_2014_-Vol_1.pdf ***(See page 3)***

[16] http://www.drm.org/wp-content/uploads/2013/09/DRM-xHE-AAC-Demo_v2_20130913.avi ***(See page 3)***

[17] http://www.drm.org/specification/***(See page 3)***

[18] http://www.via-corp.com/us/en/licensing/drm/overview.html ***(See page 4)***

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

[20] Interim Report for DRM Mode E Trail in South Africa http://www.drm.org/drm-trial-in-south-africa-interim-report/ http://www.drm.org/wp-content/uploads/2017/08/Interim_Report_for_DRM_Mode_E_Trial_in_South_Africa_draft_1.46.pdf ***(See page 15)***

Q 5.2 Is there a need to frame a roadmap for migration to digital radio broadcasting for private FM broadcasters? If yes, which approach, mentioned in para 4.7, should be adopted? Please give your suggestions with justification.

Comments:

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

There is no doubt that FM analogue radio is a very good standard. It provides stereo audio broadcasting, it is a robust and well established. There are millions of FM receivers and there is demand for the expansion of private FM broadcasting and community radio stations. However, the following two questions need to be answered:

- **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 not sufficient to meet the full demand by Indian broadcasters and the public**.

- 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 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.

So keeping in tune with the vision of the new Government, it's time to plan digital broadcasting in VHF (FM) band also using the already adopted DRM standard and thus benefitting from 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 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 private FM broadcasters, due to the following reasons:

1. The **Full Conversion** seems to be the final goal as, after all, digital standards recommended by ITU are supposed to be delivering exactly to that: give radio a new, digital home and make it part of today's digital ecosystem. But considering that the plan for expansion of analogue FM is already underway, it may be too early to immediately consider a full conversion to digital-only transmissions now.
2. The **Market-based Approach** assumes that the digital frequencies are a batch completely separate from the analogue ones. Tackling them separately would duplicate the phase-three FM auction process already overrunning. Restarting the same process in digital would make the digitisation a very lengthy and confusing process. Going for digital requires new investments and, unless there is a gain and clear benefit for the broadcaster, there might be little appetite to undertake it. In addition, given that in the radio environment, other than for example in the case of digital cable TV, the radio receiver industry operates independently from the broadcasters, a regulatory framework is required to define a common set of rules and technologies that both the service providers and receiver industry can rely on and cater towards. No country, so far, has left this process entirely in the hands of the radio broadcasters.

3. The **"Managed Introduction"** presupposes a transition period from analogue to digital. DRM can ensure the simulcast/transition period until the full conversion to digital is achieved. Giving first choice and encouragement to existing FM-license holders seems a sensible way. This would encourage them to invest in digital. Given that their broadcast infrastructure is relatively new, very often this would mean just minimum investment in hardware with immediate tripling of capacity, at least, to address new niche audiences so far un-served by radio, and to provide added-value offerings.

   The extension of the license (which should be free, or at nominal cost) would be dependent on the broadcaster getting digital services on the air (within a specified period of i.e. 1 or 2 years). This is realistic as the digital signal in DRM is only 100 kHz wide and can be contained within the 800 kHz FM allocation, or it can be placed independently wherever there is a gap in the spectrum (and not necessarily next to the FM frequency). If so wished, the current FM operators could go digital with DRM without disturbance or any significant change in the FM network planning, spectrum allocation or regulation. Besides, most FM operators have new transmission equipment and their analogue transmitters could be upgraded to DRM, or their infrastructure could be used to accommodate relatively easily the new digital components. DRM allows that to happen quite easily, unlike any other existing standard. As DRM allows for up to three programmes on the same frequency (within a single 100 kHz channel), there is enough capacity to duplicate the analogue programmes in the transition period and to introduce additional services with more niche content than the main program, as a way of attracting new listeners and advertisers to radio. If not all two or three programme slots are required by one operator, they could be reallocated to new players, community stations or auctioned for money.

   The goal is to achieve digitisation, increase programme choice, enable new advertising opportunities and create new business. And a workable model is the one that delivers on all these. DRM delivers and can be easily introduced, as the disruption or changes to the current situation is minimal and there will be very quick wins for broadcasters and listeners.

Q 5.3 Should the date for digital switch over for radio broadcasting in India need to be declared? If yes, please suggest the date with suitable justification. If no, please give reason to support your view.

Comments:

Until now only Norway has announced a switch off date, though several countries have declared the criteria that, once fulfilled, would encourage the government to announce the sunset date. In principle, a switch off date for analogue services is a useful tool to concentrate minds, get all digital stakeholders to work together. In general the analogue-digital transition period needs to be relatively short, as the full power- and cost-saving potential of digital radio operation can only be achieved once the migration to full-digital services is finalised.

However, in India the decision about the switch-over date needs to be made keeping in mind the much awaited and already announced plan for expansion of Phase III of analogue FM and the amount of money required to convert all the existing FM transmitters (by AIR, private FM players and Community Radio Stations), as well as the remaining MW & SW transmitters by AIR.

Therefore, we suggest a smooth and non-disruptive migration from analogue-only FM to future digital-only DRM transmissions in the FM band over a period of time, and with full protection for the FM licenses issued to broadcasters as part of Phase-III and previously. During this transition period DRM's simulcasting capabilities and flexibility in terms of using gaps in the FM spectrum while peacefully co-existing with analogue FM services (and, thereby, greatly extending the overall capacity of the FM band) are key success factors.

A description of how a regulatory framework for this transition could look like is outlined in the following clause.

Q 5.4 Is the present licensing framework or regulatory framework is restrictive for migration to digital radio broadcasting? Please explain with justification.

Comments:

As per the existing licensing framework, frequencies are auctioned for transmission of radio programmes in analogue FM only. Yet, as explained above, there is a great need for eventually moving to digital radio broadcasting, to secure the future of radio services in today's media mix. However, any change in the policy regarding analogue FM at this stage would delay the implementation of Phase III of FM expansion and it may be resisted by the stakeholders, particularly the broadcasters.

We would, therefore, suggest that auctions should continue to be made, as per the existing policy, but an additional frequency (absolutely free for, say, 5 years) may also be allocated to each of the successful bidders in VHF band for DRM services, on the condition to implement DRM digital services within a definite period of, say, 1 or 2 years. Failing this, the allocation of the additional frequency for DRM digital should be deemed to be cancelled and will be auctioned-off to third parties.

As per the directives of the Hon'ble Apex Court, frequencies can be allocated only after auction, but as an incentive to the existing licensees for going digital, it is proposed to allocate an additional frequency for digital services to the successful bidders, for some period, as a free license extension.

It is important to understand that DRM digital radio transmissions - at just 100 kHz (actually 96 kHz) bandwidth - can be inserted in the existing FM band in-between existing FM services being 800 or 400 kHz apart. Therefore, instead of competing with frequency slots currently assigned for analogue FM services, the **addition of DRM transmissions enhances the overall capacity of the FM band** without affecting already assigned transmission frequencies for analogue FM services!

Thus, we recommend the following very flexible approach:

1. Complete the allocation of Phase III of private FM auctions (for 15 years permission as per the existing policy) as early as possible. And as an incentive for going digital, allocate an additional frequency (absolutely free for, say, 5 years) to each of the successful bidders in VHF band for DRM services with the condition to implement the DRM digital services within a definite period of, say, 1 or 2 years. Failing this initial setup term or failing to continuously operate the additional digital transmission at any time during the proposed 5 year period, the allocation of the additional frequency for DRM digital should be deemed to be cancelled and available for separate auctioning to third parties.

2. Allocate an additional frequency (absolutely free for, say, 5 years) to each of the existing FM broadcasters in VHF band for DRM services on the condition to implement the DRM digital services within, say, 1 or 2 years period. Failing this initial setup term or failing to continuously operate the additional digital transmission at any time during the special license grant (of say 5 years), the allocation of the additional frequency for DRM digital should be deemed to be cancelled and available for separate auctioning to third parties.

3. Irrespective of whether or not the licensee chooses to use the free additional digital-only, licensed FM broadcasters may be permitted at **any time during their license term** to obtain permission to migrate their main analogue FM frequency to DRM on the existing terms and conditions.

4. Announce that no analogue radio transmissions (including analogue FM license extensions) would be allowed after 15 years or at the end of the current FM license terms, respectively, and develop a policy to renew the licenses of the existing private FM players, as and when these expire, for the maximum period of 15 years from now keeping in view the time for analogue transmissions proposed to be allowed to the successful bidders of Phase III.

5. Within the period of 5 years, develop and announce plans for the allocation of frequencies for DRM digital transmissions in the VHF band for AIR, private FM and Community Radio Stations. Also keep the requirements in view for the All India Highway Advisory Service in DRM digital proposed to be started by the National Highway Authority of India (NHAI).

6. AIR should also develop and announce its plan for DRM digital implementation in VHF bands, as well as the remaining analogue MW & SW transmitters, as per the above proposed 15-years switchover period from now.

7. Develop and announce policy for DRM digital implementation for Community Radio stations also along similar lines.

Along with a switch-over plan to DRM digital radio transmissions, as above, plan and announce the implementation of emergency warning functionality (DRM's EWF) and other value-added services (such as multi-lingual and free-to-air Journaline advanced text services), so that domestic industry can develop their plans accordingly.

Q 5.5 Should single digital radio technology be adopted for entire country or choice of technology should be left to radio broadcasters? Support your reply with Justification.

Comments:

We strongly believe that only a single digital radio technology should be adopted for the entire country and choice of technology should not be left to the broadcasters. We submit the following comments in support:

i. **Cost of digital receivers** - Analogue radio receivers can't receive digital radio transmissions. This is why consumers need to acquire new receivers to receive digital transmissions (Digital receivers, though, do receive analogue broadcasts, too). There are four digital radio standards (three main) in the world but no single receiver can receive the signals of all 4 systems. Attempts are being made (and there is a prototype called Titus II) to produce a multi-system digital radio receiver at least for the openly specified ITU standards, but the costs of such a receiver remains a big issue. What is certain is that no combination of standards can be cheaper and more effective than using one single standard across all bands and for all needs. If different broadcasters decide to go for different standards, this would create complete chaos at broadcasting and receiver level and would immediately increase the price. This is especially true, when an additional standard has to be added to existing DRM digital receivers (desktops and cars) already produced and in circulation, as in India.

ii. **Complex market situation** - Diverse technical broadcasting solutions and receivers will then proliferate creating confusion and hampering the introduction of digital radio, a challenging process when there is already the analogue legacy. In addition, the radio market is very unique (in contrast to e.g. the digital TV cable services), in that the receiver market operates and needs to develop independently of the broadcast services. Therefore, the whole industry needs to be able to rely on common technical standards and trust that those standards will be deployed nationwide. This is similar to the situation in the mobile phone network infrastructure.

iii. **DRM provides solution in all frequency bands** - Theoretically, choice of technology can be considered to be left to the broadcaster if no single system is able to meet the requirements of all the broadcasters. But this is not the case at present. DRM is the newest, most complete, most technologically advanced global digital radio standard, internationally recognised by ITU and ETSI for digitising radio in all frequency bands (both AM and VHF bands). It is capable of fully covering India at much reduced energy costs, while at the same time offering solutions for regional/local and international broadcast services, thereby completely serving the diverse needs of the Indian radio broadcast industry. It is one flexible, single, OPEN standard enjoying the same benefits, no matter which band, mode or frequency is used. It might seem obvious but no combination of standards can be cheaper and more effective than using one single standard across all bands and for all needs. DRM can be used very effectively to introduce new services in either existing or new broadcast bands as proven and documented with the ITU. DRM enables solutions ranging from national coverage to sparse rural audiences through to local coverage for community radio. Any other standard would need a new infrastructure. DRM is the digital radio standard in direct succession to its analogue predecessor technologies AM and FM: It matches existing ITU-conforming channelisation 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, while allowing to for simple upgrade paths for existing broadcast equipment and infrastructure.

iv. **DRM already adopted by India** - India has already introduced digital radio transmission by adopting Digital Radio Mondiale (DRM) and AIR has already made huge investment in rolling out digital radio services in MW and SW bands using DRM. Indian stakeholders have also made considerable investments. During formulation of 12th Plan, AIR had proposed to install 50 DRM transmitters in VHF band also but unfortunately this could not materialise due to paucity of funds.

v. **Industry is gearing up to meet the demand of DRM receiving devices** - Though AIR has not fully exploited all features of DRM or finalized its service line-up on DRM, the Indian **industry is already showing their full commitment and support to meet the demand of DRM receiving devices**. As mentioned, probably the most important factor in changing modern radio listening habits is the **support shown to DRM by the Indian automotive industry**. (Mahindra & Mahindra demonstrated their line-fit DRM receiver in car models launched not long ago. [5] Also Maruti Suzuki has launched cars with DRM line-fit receivers. [6] In early 2017, Hyundai joined by announcing two new car models with native DRM support. By late summer 2017 this has grown to a total of 5 models ranging from entry-level products to high-end cars – all with DRM radio sets included, at no extra cost.[7] Many major automotive brands have scheduled the launch of DRM capable car receivers for India in the next two years, almost all of them based on **chipsets developed and produced in India**.[8]Avion Electronics has developed the first fully-featured portable digital radio receiver "Made in India", which is ready for mass production.)

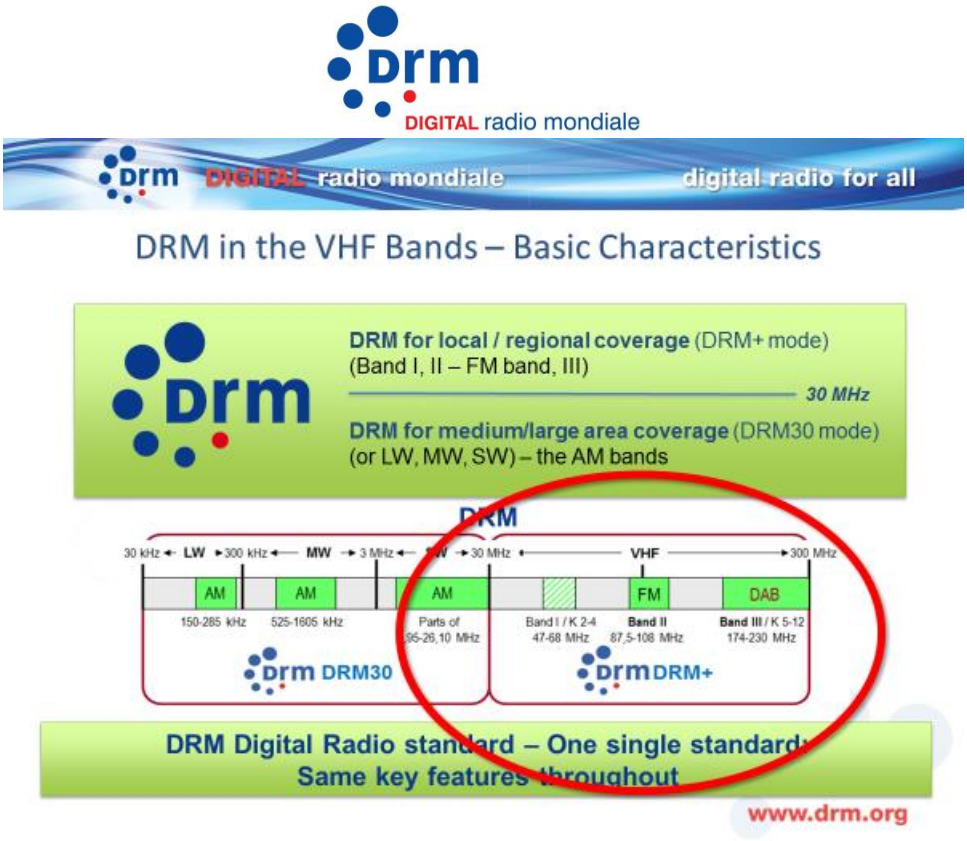
vi. **No single broadcaster has been able to impose/set a digital standard in any country** - Broadcasters are only one (important) segment of the digital eco-system which should include among others: the regulator, government, industry. No single broadcaster has been able to impose or set a digital standard in any country. In most countries (see US or UK) it is the regulator that makes the recommendation, which is then taken up by the government and delivered by broadcasters. Leaving the decision to broadcasters (and FM broadcasters are generally not huge organisations) means they must examine the options and decide for themselves. This sounds a lot like "reinventing the wheel", as the research work would need to be undertaken every time a new FM operator is ready to take the decision. It also creates big uncertainty for the industry and listeners in terms of which technical platform will prevail, thereby increasing cost and delaying receiver availability.

Q 5.6 In case a single digital radio broadcast technology is to be adopted for the entire country, which technology should be adopted for private FM radio broadcasting? Please give your suggestions with detailed justification.

Comments:

Out of the 4 digital systems available for digital radio broadcasting in the world, DRM is the newest, most complete, most technologically advanced global digital radio standard. It is internationally recognised by ITU and ETSI for digitising radio in all frequency bands (both AM and VHF bands). It is capable of fully covering India at much reduced energy costs with all its diverse coverage needs - from the nation-wide large-area MW network to local/regional broadcasting in the FM band, to the international SW services so vital to the Indian diaspora abroad. DRM is one flexible, single, OPEN standard enjoying the same benefits, no matter which band, mode or frequency is used. It might seem obvious but no combination of standards can be cheaper and more effective than using one single standard across all bands and for all needs.

India has already introduced digital radio transmission by adopting Digital Radio Mondiale (DRM). DRM has a similarly flexible and robust solution for the VHF bands (I, II and III) above 30 MHz.



Why was DRM selected by AIR?

SW services - External Services of All India Radio are available in over 108 countries in 27 languages in analogue. AIR's external services are very popular but analogue transmissions suffer from problems like fading, distortions etc. After trial in the year 2007, AIR stared regular broadcast of its external services in DRM in the year 2009 by converted one of its SW transmitters in Delhi to DRM. From Oct 2011, AIR increased DRM SW transmissions to 16 hours/day. Subsequently one more transmitter, of 500 kW power, installed at Bangalore was replaced with a DRM transmitter and its carrying regular broadcasts in DRM. AS per the Reception reports, quality of AIR SW DRM digital transmission if found to be very good. Two more SW transmitters, 100 kW each, are under installation in Delhi at present by AIR.

MW services – AIR has a vast network of 143 MW transmitters giving service to over 98.4% of the country population. All these transmitters were operating in analogue and the quality of analogue reception was deteriorating due to the rapid industrialization. Digital was the best answer. DRM was chosen for the digitization of the MW transmitters. In the intervening period, till digital receivers become available to a sizable population, analogue services can continue alongside the digital service being broadcast from the same transmitter. No additional frequency spectrum is required. The existing infrastructure, such as transmission lines, antennas or mast did not have to be replaced and even the existing transmitters could be converted to digital at a nominal cost.

All other recognised standards only offer partial solutions and require either more spectrum or an entirely new infrastructure or both.

DRM is the only digital available standard for services to overseas listeners - DRM is the only standard which can be used for terrestrial radio broadcasts to listeners overseas. The great majority of international broadcasters, including BBC, Radio France, Radio Romania, Radio New Zealand, Korean Broadcasting Corporation, NHK, Trans World Radio, etc, irrespective of the digital standard adopted for in-house coverage, have adopted DRM for radio services to their overseas listeners.

The reasons for going digital are many. DRM offers a unique set of benefits that make it the only solution for India: excellent sound quality, efficient use of spectrum and energy, more programme choice and access to multimedia content without internet connectivity, special services like emergency and traffic information, new ad and revenue opportunities, a chance to boost the local industry and create jobs, saving time, money by upgrading and using the DRM expertise and products existent already (car receivers, other receivers).

Introducing the same DRM standard also for local coverage (in the VHF band) is both logical and practical, as this will complete the digitisation process across all bands in India by using to the full potential of the standard already chosen, giving the country a common broadcast platform for all its diverse geographical, social and economic needs. In fact as mentioned earlier, during the formulation of 12th Plan, AIR had proposed to install 50 DRM transmitters in VHF band also but unfortunately this could not materialise due to paucity of funds.

DRM for local coverage is the newest and most advanced of the digital audio broadcasting solutions (ITU recommended in 2011) and benefits from progress and updates made by other technologies. DRM for local coverage has been tested thoroughly on all continents and in all bands.

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.

Indonesia has successfully tested the DRM for local coverage in simulcast mode in May 2017.

DRM for local coverage is on the air with excellent coverage, extra services and energy savings in Johannesburg, South Africa. Here a large community station has decided to see exactly what all the possibilities of DRM for local coverage are. The regulator was supportive and the interim report **[20]** they received in July 2017 has very good feedback.

To introduce DRM for local coverage in India, two things are necessary right from the start: a TRAI recommendation and a government statement to the effect that India has adopted the full digital DRM standard (this would then apply to all bands, to the public, private and community broadcast sectors.)

All India Radio (AIR) has already made huge investment in rolling out digital radio services in MW and SW bands using DRM and industry is extending the support. Extending the choice of DRM to the VHF band is the natural progression due to the following reasons:

A) More channels in available spectrum with power saving

Spectrum use of a DRM transmission in the FM band is 96 kHz bandwidth, compared to 200 kHz for analogue-FM.

i. A DRM transmission only requires in the range of 10% to 50% of power compared to analogue FM for the same or even superior coverage – those major annual cost savings alone may already pay for the initial equipment invest.

ii. The DRM signal robustness can be tailored to the specific coverage needs and target environment, allowing for a flexible trade-off between transmission power, content capacity and transmission signal.

iii. All planning parameters explaining required power-level protection between neighbouring frequencies, as well as distance calculations to reuse the same frequency with different programmes are contained in freely available ITU-R documents for network planning (covering DRM and FM signals in the same band, as well).

iv. DRM supports the current FM transmission paradigm with a single transmitter per broadcaster covering a city or region – in this case, the DRM transmissions can share the existing FM antenna installations through antenna combining with FM programmes.

v. To improve coverage, DRM also supports forward-looking coverage scenarios using SFN (Single Frequency Networking), where neighbouring transmitters broadcast the identical content at the same time on the same frequency without causing distortion, but rather improving the reception quality for receivers (in contrast to the FM case, where multiple FM frequencies would be required). This allows for easy application of gap-fillers or small-scale transmitter mash-networks with overall increased reception quality AND reduced power consumption compared to a single-transmitter scenario.

B) Transition from analogue FM to DRM Digital is very smooth

DRM-signals can be introduced in-between existing FM frequencies; and DRM transmissions can eventually be increased in all-digital future.

Example: Assuming that a DRM transmission can be broadcast with 100 kHz frequency space between neighbouring signals, and current FM analogue stations (with 200 kHz bandwidth each) are spaced 800 kHz apart (leaving a 600 kHz wide gap), then at least two DRM transmissions of up to 3 services each can be placed in-between existing FM stations – adding capacity for up to 6 radio services for every single FM station (and without affecting the existing analogue FM broadcasts).

C) Content benefits – DRM Digital has far more to offer than analogue audio broadcasting

i. Each DRM digital transmission contains between 1 and 3 radio services (programmes), compared to 1 in analogue-FM - on top of DRM signals only occupying half the frequency bandwidth of one FM service.

ii. And each DRM Digital service consists of audio plus DRM Text Messages (displaying e.g. current song and artist name), plus Journaline advanced text (allowing stations to bring their rich online/Internet content to the radio sets and to listeners free-to-air, tailored to the audience's interests and with option of multi-lingual offerings) and probably Slideshow (e.g. for album covers).

iii. Additional per-transmission services may include traffic updates for car-radios with navigation systems (TPEG, TMC), EPG electronic programme guides, etc.

iv. The audio transmission in DRM Digital use the latest MPEG audio codec 'xHE-AAC' along with AAC, delivering clear audio in superior stereo quality or even 5.1 surround sound.

D) Benefits for Regulators, Broadcasters, Listeners, Receiver/automotive manufacturers

i. DRM Digital radio is designed to keep the FM landscape largely in place, with current FM networks enhancing their analogue FM signals with a DRM signal each; in this way, broadcasters can (but don't need to) repeat the analogue-FM station in better quality in the DRM signal, plus have the added capacity to better target so-far neglected niche audiences with additional, tailored programmes; at the same time, the capacity of currently overcrowded FM spectrum can easily be enhanced significantly by adding DRM transmissions in-between existing FM frequencies.

ii. Broadcasters benefit from reduced transmission cost, growing audiences (due to being able to address niche audiences with tailored new content), and generate extra revenue sources (through the data applications such as Journaline).

iii. Listener benefit from more variety and relevance of radio services, free access to multi-lingual Internet information provided by each station for their listeners (Journaline), un-distorted audio quality.

iv. For automotive and receiver set manufacturers, supporting DRM both in the AM bands (medium wave, short wave) and now the FM band, in addition, is in many cases a mere software upgrade; there is NO extra license cost involved.

v. Society as a whole benefits from Digital Radio's built-in Emergency Warning Functionality (EWF); EWF is the combination of alarm announcement, audio, Journaline text with detailed multi-lingual instructions (also serving hearing-impaired users) and automatic service switching and even switch-on.

Q 5.7 How issues of interference and allocation of appropriate spectrum allocation can be settled in case the option to choose technology is left to radio broadcasters?

Comments:

For exactly these reasons we do not advocate that broadcasters should choose themselves the digital technology to be used. "A digital Far West" is difficult to police and a place with potential litigious pitfalls. In addition, the regulator loses to a large extend its ability to guide the use of the public frequency resources and guarantee fair coverage to broadcasters through not only specifying frequencies, but also taking into account the relevant issues of minimum distances for frequency re-use, maximum power levels for neighbouring frequencies, etc. as part of a meaningful network planning or at least technical network framework. This kind of planning and technical guidance can only be provided based on a common technical basis chosen for all the users of a spectrum band, as was the case with the analogue AM and FM technologies in the past.

In its simulcast broadcasts in VHF bands in Edinburgh, New Delhi, Johannesburg, Batam – Indonesia (latest trial in May 2017), DRM proved its quality and perfect audibility without creating any interference to existing neighbouring analogue FM services.

In general, all the definitions and values for a proper network planning of DRM services along with analogue FM services in the VHF band-II are available from ITU and have been proven in the field to enable very accurate coverage predictions. The coverage scenarios considered in the ITU document include various terrains and use-cases (such as mobile reception, in-house stationary, portable handheld, etc.). The relevant ITU document is "Recommendation ITU-R BS.1660-5: Technical basis for planning of terrestrial digital sound broadcasting in the VHF band".

Q 5.8 Should the permission for operating FM channel be delinked from technology used for radio broadcasting? If yes, please provide a detailed framework with justification.

Comments:

We are of the opinion that permission for operating FM channels should not be delinked from technology used for radio broadcasting, however, as suggested in reply to Q 5.4, give incentives to the FM licensees (existing as well as those successful in Phase III) for going digital using DRM.

But a national framework needs to be in place (i.e. a clear recommendation for one DRM digital option and not "a free for all". This is necessary in order to set a level starting field and final switch off date should be maintained).

Q 5.9 Should the existing operational FM radio channels be permitted to migrate to digital broadcasting within assigned radio frequency? If yes, should there be any additional charges as number of available channels in digital broadcasting will increase? Please provide a detailed framework for migration with justification.

Comments:

As indicated above, DRM allows for the usage of the allocated FM frequency and existing network planning. This would be feasible, even in the relatively crowded spectrum of New Delhi.

We recommend that FM radio licensees must be allowed to migrate to DRM digital, However, as suggested in reply to Q 5.4, give incentives to the FM licensees (existing as well as those successful in Phase III) for going digital using DRM.

No additional charges have been proposed as an incentive to go digital. To start with, no additional charges would be justified as they could discourage potential digital "pioneers". In the meantime, a plan for going DRM digital in VHF band should be prepared and extra charges could be levied, as a digital market would be thus established and the digital channels would be the only ones available. Then they could be treated like the current analogue frequencies or channels.

Q 5.10 Should the future auction of remaining FM channels of Phase-III be done delinking it from technology adopted for radio broadcasting? Please give your suggestions with detailed justification.

Comments:

The auction of remaining FM channels in Phase III is an ideal opportunity to introduce digital, also. As the stations need to invest in hardware, this could and should be done only once including the DRM option already. If such analogue-digital equipment is acquired, this will encourage the FM stations to test and slowly introduce the digital part, energising the whole FM market. Research (UK, EBU) shows that few listeners that "have tasted digital" go back to analogue.

Research in the UK has shown that even the most successful FM stations which do not innovate in content and technology starts losing listeners and money after five years. In 2017 the digital commercial stations in the UK are delivering over half the listeners (and, therefore, more than the BBC) for the first time ever.

Thus, as indicated above, we are of the opinion that permission for operating FM channel should not be delinked from technology used for radio broadcasting. However, as suggested in reply to Q 5.4, give incentives to the FM licensees (existing as well as those successful in Phase III) for going digital using DRM.

Getting digital signals in VHF on air will also send a strong signal to the receiver industry which could produce standalone receivers and dongles for mobiles relatively quickly. The receiver solutions are there but a serious signal coming from the regulator, the government and the stations is needed first.

Q 5.11 In case future auction of remaining FM channels of Phase-III is done delinking it from technology, should the present auction process be continued? If no, what should be the alternate auction process? Please give your suggestions with detailed justification.

Comments:

As indicated above, we are of the opinion that permission for operating FM channels should not be delinked from the new technology used for radio broadcasting.

The present auction process for Phase III FM licenses should continue without making any changes in the announced policy. The current auction process is over 15 years old and started when the new radio technologies were hardly known. It is, therefore, natural that the process should keep pace with the latest developments. Phase III should encourage the migration to DRM, whether the license has been awarded already or is to be awarded. Those who have a license already should be strongly encouraged to migrate, as a main condition for renewal. Redoing the auction, changing the rules of the game mid-game and doing it retroactively, is not realistic. However, as suggested in reply to Q 5.4, also give incentives to the FM licenses (existing as well as those successful in Phase III) for going digital using DRM.

Irrespective of whether or not the licensee chooses to use the free additional digital-only license to start simulcasting in DRM digital while maintaining an analogue FM service on-air, at any time during the existing term (for the licensed FM frequency) the licensee may be allowed to switch this main frequency from analogue FM operation to DRM full-digital operation on the existing terms and conditions of the license.

Q 5.12 What modifications need to be done in FM radio policy to use allocated FM radio channels in technology neutral manner for Radio broadcasting?

Comments:

We don't have any comments to offer as we are of the opinion that the allocation of FM channels should not be made for radio broadcasting in a technology neutral manner.

5.13 What measures should be taken to reduce the prices of digital radio receivers and develop ecosystem for migration to digital radio broadcasting?

Comments:

As already mentioned above, even though AIR has not invoked all the features of DRM in their digital services on the MW DRM transmitters, the automobile industry in India is already gearing up to include DRM digital reception feature in their audio systems. Three leading automobile manufacturers (Mahindra, Hyundai and Maruti Suzuki) are not only already having factory fitted built-in DRM receivers as a standard feature in some of their models but they are being provided to customers free of charge. As such, the price of DRM receivers produced in India is not an issue in the new vehicles.

From a cost and business perspective, DRM transmission and receiver equipment is easy to calculate and relatively cheap to produce. 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. There are no usage fee or revenue sharing approaches for the DRM technology – neither for broadcasters nor for listeners. Patents allow the original technology developers to participate with a small share in case of commercial deployment of equipment (taken care of by the equipment manufacturers). Those conditions ('IP royalties') are transparently published by Via Licensing 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.

As emphasised by the Hon'ble Minister for Information and Broadcasting, Prasar Bharati and All India Radio have already achieved major first milestones in the continuing national roll-out project for DRM digital radio. And the Indian chipset and automotive industry have proven to contribute their share to this national project for India, through their continuing multi-year and multi-million-dollar investment now showing first results with mass-market DRM enabled cars already on the roads of India, and to be ready with products once AIR will have finished its phase 2 of the roll-out project with final content, DRM features and broadcast configurations on-air nationwide.

The successfully started and now ongoing digital radio roll-out is a major national project excellently run by AIR. However, any change in decision to consider any other digital system than the currently deployed DRM standard at this critical stage in the process would lead to the loss of trust and, therefore, stop of any further support of the chipset and automotive industry. It would create immense confusion among the broadcasters, the international and local industries, as well as the retailers. It would lead to major extra delays of many years, substantially new and increased costs to both Prasar Bharati/AIR and the Indian taxpayer and, ultimately, lead to the postponement of radio digitisation in India for many years to come.

The price of standalone DRM digital receivers is certainly high at present. But let us remember that the DRM standalone digital receiver being produced by an Indian manufacturer is a high-end model with built-in rechargeable battery which works for 10 hours once fully charged, built-in playback feature from an external USB stick, built-in large colour screen etc. Also, the price of these standalone receivers is high because the demand of receivers is limited and the manufacturer intends to recover his R&D and manufacturing costs at the earliest possible date. Once AIR will have publicly and officially launched their new DRM services as part of the currently deployed Phase-II and therefore as market penetration increases, the cost of digital receivers continues to fall. Standalone cheap DAB receivers are now available for 15-25 Euros. We are confident that, with demand, the price of standalone DRM digital receivers would also go down to about Rs 1,000, as we have seen how the price of mobile phones and other electronic products in India has gown down with demand. Also, the manufacturers would come out with cheaper sets with limited features (and this is already being worked on in India and abroad).

It may further be added that radio listenership is mainly in the automobiles. Europe adopted DAB in the early 90's, as that was the only digital system available at that time. US adopted HD radio, which came later, but is not an open standard such as DRM and DAB (but rather a closed-source commercial product by a publicly traded company with the need to maximize revenue for their shareholders). But the data from Europe and the US indicates that it is the automobile industry which has taken the lead in spreading digital receivers. Most of the cars in Europe are now coming with factory fitted DAB receivers and those in US with HD radios. Same is the case with the automobile industry in India which is featuring the latest digital standard, DRM. Not only have car manufacturers launched several models with line-fit DRM enabled radio at no extra cost to the user over the past months, but several more car manufacturers are only waiting for AIR's official launch of their final DRM based service line-up all over India as part of Phase-II of the roll-out. The complete know-how for DRM receiver solutions from chipsets to full radio sets is today not only available but globally centred in India - a major technology lead that must be maintained by carefully managing the next steps towards the official launch of DRM services in India (given that AIR's DRM-upgraded MW/SW transmitter network is now in place and operational).

It may further be added that very often it is said that, unless the DRM reception facility is available in mobile phones, as available in analogue FM, it will not be popular. But one thing needs to be remembered: just now the reception of analogue MW and SW bands is not available in mobile phones either, as you need a big antenna to receive signals on these bands that can't be built in mobile phones. Certainly, the reception of DRM in VHF band is much easier and very feasible in mobile phones, without any extra cost, as in the automobiles. The design of mobile phones with DRM reception and all the required DRM digital radio software is already ready. To bring those devices to market, mobile manufacturers now need to be given a specific and reliable roll-out plan for DRM based services, so that they can prepare their strategies to include the same in the future productions. Geek Synergy technologies Pvt Ltd, a group of young entrepreneurs in Bangalore, who had participated in Digital India contest organized by DST and Intel and placed among the top 10, is working with the global **Huawei** smartphone company to integrate DRM in smartphones, as well as communicating with **Qualcomm** for the best industrial support.

What is important at this stage is to ensure that AIR offers full features from its DRM transmitters, so that consumers see value in their investment when buying a DRM digital receiver. With demand, the prices will start coming down, as we have seen in the other countries which have adopted already digital systems available. In this connection the following suggestions are made:

1. **Introduction of full DRM services by AIR**: exclusive and good-quality audio programmes, multilingual Journaline text news, and in future traffic information and emergency warning functionality must be enabled for the on-air DRM transmissions, so that listeners understand the value of digital radio and start requesting DRM receivers from shops and car manufacturers.

2. Define and announce an **official 'public launch date' for DRM services in India**, at which date AIR will declare the DRM services ready for the mass audience from a content and technical perspective, and start actively

informing the public about the new DRM digital radio services and benefits. This date should be in the near future and must be communicated immediately to the industry, since, so far, the roll-out of DRM services has been virtually kept a secret within the technical departments of AIR.

3. Define and announce a **'sun-set date' for analogue radio transmissions in the longer future** either based on a certain time (as was the case in the TV migration from analogue to digital), or based on certain criteria**.** For example, UK has taken a decision to switch off analogue radio transmissions once the digital radio reception touched 50%. Govt of India must also fix such a sun-set date and it may be announced so that all stakeholders are well aware and take appropriate action.

4. **Involve private FM broadcasters** in the radio digitization of India: As recommended by Dr Sam Pitroda committee, one of the multiple programme slots available with each of the new DRM MW transmissions by AIR shall be offered to private broadcasters, so that listeners see further worth in buying DRM receivers.

5. Announce the plan for **digitisation of the FM band**, by adding DRM digital transmissions by AIR, as well as by private broadcasters – without affecting the current analogue FM services during the transition period. This provides the receiver and automobile industry with the clear message that DRM must be supported for all bands from the beginning. It also allows the mobile phone industry to upgrade their FM radio receivers to DRM reception. The importance of bringing out a white paper by the Ministry of Information and Broadcasting, on the digitisation in VHF band, was again emphasised by the CEO of a leading private FM broadcaster in the seminar conducted by TRAI on 4th May 2017 in Delhi.

6. **Provide incentives**: Govt may consider giving incentives to the receiver industry to quickly increase the number of DRM receivers in the market as it has great potential for "Make in India" and to fulfil the mission of Hon'ble Prime Minister of India. Other incentives should be offered to private broadcasters, to help them migrate from pure analogue FM to adding DRM transmissions without the need for new licenses.

7. Setup work groups to steer the national roll-out project of DRM digital radio:

    a) Create a dedicated group in the Ministry with AIR for all decisions regarding the implementation of phase II of AIR's DRM roll-out.

    b) Also initiate a national stakeholders group with all involved parties represented (from Ministry to AIR and private 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 India, by agreeing and communicating the public launch date, criteria for analogue sun-set, availability of AIR content and receivers, and most importantly the communication to the listeners.

Compared with any other digital radio launch project around the world in the past, the early support of the Indian chipset and automotive industry for AIR's nation-wide roll-out of DRM digital radio has been truly amazing. In no other case have car models, with the nationally adopted digital radio standard being built-in as a default feature, been available to customers even before the on-air content had been finalized by the broadcaster.

The Indian chipset and automotive industries have proven they can contribute their share to this national project for India, through their continuing multi-year and multi-million-dollar investment now showing first results with mass-market DRM receivers fitted in cars already on the roads of India.

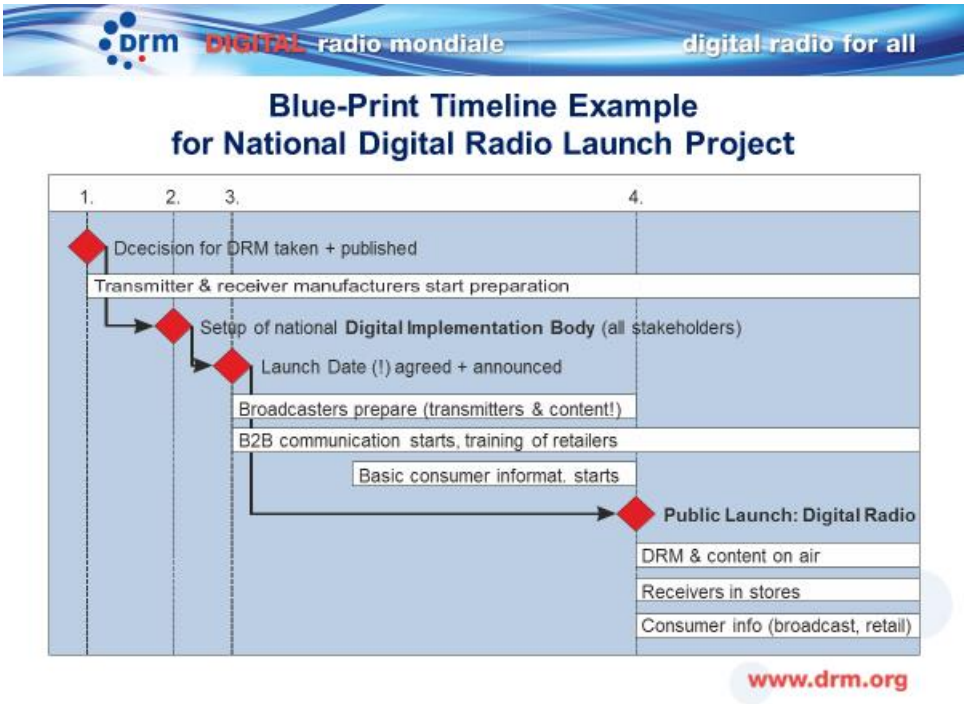
The successfully started and now ongoing digital radio roll-out can be widened with the adoption of DRM for local coverage in VHF bands.

Therefore, going for the extension of the DRM standard to both private broadcasters and FM private operators, is the logical and most effective option. International examples have established and proven the **key ingredients for a successful national Digital Radio launch project**:

- ➔ **Close cooperation of ALL stakeholders to optimally utilise the existing deployment in MW & SW bands and expand to VHF bands**
- ➔ **Working towards jointly agreed public Launch-Date with full features**

In this project, broadcasters should particularly focus on:

1. Transmitter network operational configuration **optimized**
2. **Content diversity** (more programmes) & **new features of DRM** deployed (free multilingual Internet infos: **Journaline text, Emergency warning signals and traffic information**)
3. Content provided in **best possible quality**
4. **Listener education / communication**



Q 5.14 Stakeholders may also provide their comments on any other issue relevant to the present consultation.

- For more information on DRM please visit**:** **www.drm.org**
- To download the **DRM Introduction and Implementation Guide** go to: **http://www.drm.org/wp-content/uploads/2012/10/DRM-Introduction-Implementation-Guide.pdf**
- To contact us at +91 98115 72044 (Yogendra Pal) or write to: **projectoffice@drm.org** **or** **yogendrapal@gmail.com**