

Response to AROI Comments on TRAI Consultation Paper

Question 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?

AROI Comments

The private FM Radio industry in India currently operates under the Phase 3 policy regime of Ministry of Information & Broadcasting, Government of India, wherein radio stations are operated in analogue mode out of auctioned and allocated frequencies.

The radio stations are listened in through cheaply available fm receivers or as a free feature in mobile sets. This is totally a free to air media, and can be rightly called the only poor citizens source of infotainment in India.

The radio operators pay a large amount of money for the frequencies and the right to run radio stations, basis professional assessment of markets, revenues and potential listenership. The only revenue source is advertising, and advertisers pay basis an assessment of relevant listenership of a radio station.

Right now digital receivers are negligible in numbers and very costly. A DRM receiver is over 10000 Rs and HD receivers about 2500 Rs. Since radio is a poor citizens media in India with mass listenership, a affordable price would be about 100 Rs which is the price of analogue receiver. At these high prices, only a miniscule percentage of population in India can afford these digital sets.

Response to Comments

To make sure that affordable digital radio receivers are available in the market, the digital radio broadcasters and the digital radio manufacturers have to contribute. This assessment is based on the experience gained in digital radio markets in many countries of the world.

Digital radio broadcasters have to put out regular digital radio services for the digital consumers, even in the simulcast mode, as proposed by AROI. The digital radio services have to be designed to attract digital radio listeners (and also the advertisers). This is one of the main factors that will compel digital listeners to buy digital radio receivers. Particularly in the case of simulcasting, the digital portion of the broadcast must include new and exclusive content and make best use of the quality and feature benefits of digital radio, to give consumers enough reason to demand to buy digital radio set.

The other factor is that “Make in India” digital radio receivers should be readily available when simulcast services are put out. At least one Indian made full capability DRM digital radio receiver is already under production in India under the brand name Avion.

With both these measures, the selling price of the digital radio receiver will quickly reach an optimum value.

The automotive industry is already providing DRM reception in several car models at no extra cost to the consumer.

Therefore we recommend that the analogue transmission of allocated FM frequencies of private FM radio stations be delinked from any digital radio transmission that may be planned. At most a simulcast analogue cum digital transmission option can be provided to the radio operators.

Response to Comments

The digital simulcast is the way to go forward for digital radio in India. DRM digital radio system provides good simulcast facilities in the FM band within the allocated FM channel. With this, three additional radio channels can be operated within each allocated FM channel spectrum. Simulcasting provides several value adding benefits and catalyses the growth of receiver population.

Question 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.

AROI Comments

Firstly a framework for availability of affordable digital radio receivers that can be bought or given to say 90 percent of population, needs to be developed.

Response to Comments

Digital radio broadcasters will have to offer regular digital radio programs for the digital radio listeners. This can very well be done using the In-Band mode with the DRM system (simulcast, as proposed by AROI). The digital radio programs will stimulate purchase of digital radio receivers. "Make in India" digital radio receivers should be readily available when simulcast services are put out.

This is why the availability of both convincing and exclusive content as well as affordable receivers need to be well time aligned for a successful launch, as can be achieved by agreeing on an official "Launch Date" for the public availability of digital radio services in the FM band and as outlined in the comment provided by the DRM Consortium.

In the interim at most, in addition to analogue broadcast, digital broadcasting could be an additional simulcast option. However, since cost of content is high, it is unlikely that any private radio station will find it viable at such low listenership base.

Response to Comments

As noted in 5.1 above.

Therefore we recommend that FM should remain separate from DRM, HD or any other digital transmission. The two should not be combined.

Question 5.4

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

AROI Comments

The rights and investments made by FM radio operators needs to be protected under any new regime proposed.

At most, the radio operators could be allowed to additionally run digital stations within their allocated frequency at no additional cost (simulcast option).

Response to Comments

The digital simulcast is the way to go forward for digital radio in India. DRM digital radio system provides good simulcast facilities in the FM band within the allocated FM channel. With this, three additional radio channels can be operated within each allocated FM channel spectrum.

Question 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.

AROI Comments

To achieve affordable digital receiver sets for all, a mass demand would need to be created, which can happen if only one standard is used.

Response to Comments

We believe that the DRM digital radio standard (in the AM and FM bands) is the best suited to India for this purpose. The system standard uses the most efficient audio coding technology, xHE-AAC, which means better quality of digital radio audio and music, better signal strength and more number of services in the same radio channel. Together, the DRM standard covers all the radio bands used in India, the Medium Wave (and also Shortwave) band, the FM band and also the VHF Band III (for future use).

Question 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?

AROI Comments

The policy should provide for auction and allocation of a frequency and let broadcasters use any technology to exploit the frequency.

Auctions and allotment will need to be on frequency basis and not stations basis. The operators should be allowed to simulcast both analogue and digital within the allocated frequency, at their option.

Response to Comments

The digital simulcast in the DRM system operates in the FM band within the allocated FM channel. With this, three additional radio channels can be operated within each allocated FM channel spectrum.

The music royalty payable on digital broadcast should be covered under statutory licensing provision of copyright act.

Content restriction on FM radio broadcast should be expanded to allow sports, news and current affairs.

Reserve prices are best avoided and the market should be allowed to determine the prices through an auction process. The results of auctions of batch 1 and batch 2 of Phase 3 auctions clearly indicate that for many towns, reserve prices were overpriced and therefore no bids were received for these stations.

Question 5.13

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

AROI Comment

An assessment of measures required can be done basis results of current and proposed digital simulcast options on an annual basis. On basis of increase in penetration of digital receivers acquired, the authorities and the industry can then decide the best way to provide affordable digital receivers @ Rs 100 or less so that poor citizens get the benefit of the technology.

Response to Comments

To make sure that affordable digital radio receivers are available in the market, the digital radio broadcasters and the digital radio manufacturers have to contribute, as noted in 5.1 above.

Already today car manufacturers in India support DRM reception in their car radios in several models at no extra cost to the consumer. And DRM reception in the FM band on mobile phones can be enabled by simply installing an app without any hardware changes if supported by the mobile phone manufacturers. These examples show that DRM reception will be widely available

even at no extra cost to the consumer – apart from stand-alone desktop radio sets referred to above, which will become more and more affordable with quantities.

Response to Broadcast Engineering Society (BES) Comments on TRAI Consultation Paper

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?

BES Comment

Yes. If radio is to remain analogue it wouldn't have a future in an increasingly digital world. Just as televisions, mobile phones and cameras have all gone digital, it does not make sense to leave radio out.

Suggestions: a) Since the digital radio technologies such as DAB, DRM, DRM+, HD IBOC (In-band on-channel) etc. are still under trial in many countries and are not yet proven like FM, it should be sufficiently experimented in our country before putting into large scale use/complete switch-over.

Response to Comments

Most digital radio standards are now field proven. In respect to DRM in the AM and VHF bands, the first large scale DRM AM field trial and test transmission took place in Bangkok in 2004. This was followed by trials in New Zealand (2005), Vietnam (2006), New Delhi (2007), Sri Lanka, Indonesia (2015 and 2016, and DRM in the FM band in 2017). Numerous DRM based services are on air currently, with an estimate of half the world population covered by DRM transmissions through the AM bands, DRM test transmissions in the FM band in Pakistan (with the announcement to expand those services as well as introduce DRM services in the AM bands), and DRM demo services in the FM band in South Africa. Thus DRM in all relevant frequency bands is a proven technology.

b) In the absence of good quality receivers that are affordable and widely available, there are no incentives for broadcasters to broadcast in digital format, which in turn discourages the investments by receiver manufacturers.

Response to Comments

As in the case of introduction of any new technology (laptops, mobile phones, DTV etc), the receiver (or device) population is not available on Day 1 of the services launched by operators. The same is the situation with digital radio receivers.

Digital radio broadcasters have to put out regular digital radio services for the digital listeners. This will motivate digital listeners to go to the market for digital radios. The content on the digital platform must be attractive and contain exclusively available services, along with fully exploiting the benefits of digital radio.

Digital radio receiver industry in India is already up and running. The first Indian developed and made DRM digital radio was marketed in year 2016. Currently, this radio receiver, marketed

under the brand name Avion, offers DRM digital radio reception in all the radio frequency bands in India. More are expected to follow.

The automotive industry in India has already launched several car models with DRM reception built-in at no extra cost, and more manufacturers are ready to launch their products once AIR's DRM services will officially be launched to the public.

(Note: Keep in mind that with the Minister's address in January, AIR has entered phase II of the national rollout of DRM services just a few months ago. While phase I focusing on the setup of the transmitter infrastructure was successfully finalized, AIR's current effort is on finalizing the content offerings with a final services selection, improved audio quality and advanced services such as the Journaline multilingual free-to-air text service. Eventually phase II will lead to the official launch and announcement of DRM services to the public, at which time the receiver industry needs to and will be ready, as already started and outlined above.)

c) Permit the private broadcasters to share the DRM setup of AIR in the MW band at the payment of carriage fee after selection through auctioning with minimum reserve fee

Response to Comments

This is obviously a very positive step. Already digital radio channel capacity is available with All India Radio in many coverage areas. Some of it can very well be shared for the use of private FM broadcasters. With the use of the DRM digital radio system (and in particular due to using its xHE-AAC compression), AIR can offer 2 audio programs plus text service from each of the single channel Medium Wave radio transmitters. Thus a considerable amount of additional capacity will become available which may be put up for use by others. If this happens, this step will be a major boost to the development of digital radio in India.

d) Permit carriage of news by these private players

e) Allow Tax holidays for these players, i.e. no revenue sharing for a period of 5 years (only for digital broadcasting)

f) Introduction of DRM+ / HD IBOC in FM band in category A+, A & B cities to increase the channel capacity for niche radio channels including community radio, campus radio etc. through separate auctioning (delinked from existing FM channels) with minimum reserve fee and with the benefits listed under b), c) & e) above.

Response to Comments

DRM digital radio system provides good simulcast facilities in the FM band within the allocated FM channel. With this, three additional radio channels can be operated within each allocated FM channel spectrum. Simulcasting provides several value adding benefits and catalyses the growth of receiver population.

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

a) Since the digital radio technologies such as DRM, DRM+, HD IBOC, DAB etc. are still under trial in many countries and are not yet proven like FM, it should be sufficiently experimented in our country before putting into large scale use or planning for digital switch-over.

Response to Comments

As in 5.1 above

b) Even in countries like UK digital radio is being experimented over 20 years and the switch-over has still not happened. Hence we need to be cautious in planning for digital radio switch over.

c) But for the better usage of spectrum that could offer more radio channels in each city, digital radio does not offer major benefits to common listeners who are happy with the current FM.

Response to Comments

Indeed, DRM digital radio offers much more to the listeners than more radio channels. These include improved signal strength, very robust reception even in adverse reception conditions (such as in mobile and car radios), very high quality of speech and music, auto station selection and emergency warning function. In addition, it offers an innovative “Electronic Magazine” type text (Journaline) for instant look-up of relevant information is delivered along with radio broadcasts (and can include services such as local weather, traffic forecasts and parking information, sports background reports and real-time score tables, and all the way to up-to-the-minute departure and arrival times of airports). In addition to the radio program itself, this bouquet of accompanying information can be provided in multiple languages simultaneously. This feature, along with additional radio programs to target niche audiences, opens the door for broadcasters to tap into whole new revenue streams.

Digital radio provides substantial savings in transmission power, so much that the cost of a new transmitters can be offset against savings in power bills in a few years’ time, while saving setup cost due to sharing the existing and established FM transmission infrastructure and sites.

Response to ENIL (Radio Mirchi) Comments on TRAI Consultation Paper

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.

ENIL (Radio Mirchi) Comment

Yes, there is a need to lay down a clear roadmap for the move to digital transmission in the country. This roadmap will act as a catalyst for product manufacturers to launch new and cheap receivers.

Clearly, the first route, “Full Conversion”, is unacceptable to us. After collecting thousands of crores of rupees from FM broadcasters in recent rounds of auctions and renewals of Phase-2 licenses, how can the government even consider switching FM off? This route will completely jeopardize the financial investments made by FM broadcasters.

That brings us to the other two options listed – “Market-based approach” and “Managed introduction”. Both these approaches are better than the first one; and the government could consider both.

It should however be remembered that it is primarily in the government’s interest to achieve complete transition from analog to digital transmission. It recovers precious spectrum which can be used to generate auction revenues in the future. It can offer more services, and serve public interest better. And, it can also make a lot more annual license fees when radio revenues expand. Keeping all this in mind, we would suggest a fourth option “Co-opting private broadcasters”.

Under this option, the government would give digital spectrum free to private broadcasters. Additionally, it would also reimburse fully any additional cost that the private broadcaster incurs in offering digital services. It could do this by first setting off these expenses against the annual license fees it collects from FM broadcasters. If costs of providing digital service are higher still, the government could pay that separately to FM broadcasters.

The government must realize that its priority should be to build a large base of digital radio receivers. And this is not possible unless there are adequate number of private services possible. Without private broadcasters, it is impossible to expect that average citizens will buy radio receivers. Further, the government must hugely subsidize these radio receivers by exempting them from all forms of taxes.

Response to Comments

Full participation of private FM broadcasters in the envisaged digital radio broadcasting roll out project is most imperative. This will result in a large number of attractive digital radio services operating in each of the coverage zone. This is very important because this factor alone will

motivate purchase of digital radio receivers. In turn, this factor will help reduce the cost of the digital radio receivers.

The roles of private players and government are different. The government should provide free spectrum and full reimbursements for costs to broadcasters. It should also develop the right ecosystem to encourage people to buy digital radio sets. As part of its efforts, it must also ensure that car stereo systems come inbuilt with digital radio. Most importantly, it must encourage or even compel telecom handset manufacturers to have digital radio receivers in their phones. Private radio broadcasters will provide digital services that encourage people to buy digital receivers.

Response to Prasar Bharati Comments on TRAI Consultation Paper

Consultation Issue 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?

Prasar Bharati Comments:

Digital Radio Transmission needs to be introduced and encouraged in India. Measures that can be taken could be:

* There should be national digital radio mission to support digital radio broadcasting in India and, to achieve this, a digital radio innovation fund should be created to:

* develop indigenous digital radio standards

* develop receiver chip sets

* encourage support to start ups in the digital radio field

* mandate Mobile manufacturers and car infotainment manufacturers to integrate digital radio reception facility in their products

* Allow Private players in the digital radio sector so that diverse content is offered to the consumers. This will facilitate better marketing of digital radio platform and ensure better availability of affordable radio receivers in the market

We should encourage innovative and flexible business models wherein the cost of receivers is subsidised for the consumer e.g. car manufacturers bundling radio broadcast services free of cost for initial period of say one year or so.

Response to Comments

While the development of a national (indigenous) digital radio standard is a laudable objective, in practice it needs a huge amount of resources, both technical research (and testing facilities) and financial support. In addition, it would need a considerable amount of time (several years) to develop such a standard. If more than one such standard(s) are envisaged to be developed, the time and resources would multiply proportionately.

If India adopts a unique digital radio broadcasting standard, it will remain isolated from rest of the digital radio broadcasting world. This would impact several areas such as professional broadcasting equipment, developments in technologies in digital radio broadcasting, receiver developments, price reduction due to global economies of scale, and even developments in apps and add-on services that may be used in digital radio.

It also needs to be kept in view that so far India has not developed any broadcasting standard system but has adapted / adopted international standards in respect of radio and TV broadcasting.

In view of this, development of a new digital radio broadcasting standard is not a viable approach to follow.

Adoption / adapting a suitable digital radio broadcasting standard would, therefore, seem to be the best way forward. For this purpose, one of the established system standards may be used as a base standard with any local requirements to be included in the system adaptation process.

In India, radio broadcasting is current done in 3 frequency bands, Medium Wave, FM and Shortwave. Medium Wave radio covers large populations and geographical areas where the population is wide spread. This provides the backbone of radio broadcasting in urban and rural India. FM radio is focused on dense population centres such as major cities and other cities. Shortwave radio is also used as a national backbone. In addition, shortwave radio services serve other countries with Indian radio programs.

In the event of a single digital radio broadcasting standard, it is imperative to select / use a standard which is equipped to serve all the three areas; Medium Wave, FM band and Shortwave band.

We believe that the open and ITU endorsed DRM digital radio standards (covering both the AM and VHF bands) is the best suited to India for this purpose. The system standard is based on the most efficient audio coding technology, xHE-AAC, which means better quality of digital radio audio and music, better signal strength and more number of services in the same radio channel. The DRM standard therefore covers all the radio bands used in India, the Medium Wave (and also Shortwave) band, the FM band and also the VHF Band III (which may be used extending radio services in the future). The DRM standard is capable of introducing local features.

In respect of development of domestically grown receiver chipsets, this is again a long term project. However, currently the digital radio receiver industry for DRM is already up and running in India. The first Indian developed and made DRM digital radio was presented in year 2016. Currently, this radio receiver, marketed under the brand name Avion, offers DRM digital radio reception in all the radio frequency bands in India.

The global radio receiver chipset industry for DRM is currently concentrated in India, driven the Indian automotive industry's demand to eventually upgrade all radio sets with DRM reception – and the first of those DRM-ready car models have already been launched and are on the road in India today (adding DRM reception as a free feature to the radio sets, without any cost to the consumers).

Consultation Issue 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 justifications.

&

Consultation Issue 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.

Prasar Bharati Comments:

* Single Digital technology should be adopted as most of the major international markets have adopted a single digital radio technology. Some of the examples are HD Radio in US and North America, ISDBT-tsb in Japan, DAB/DAB+ in Austria, Germany etc.

* Adoption of single technology enables economy of scales and facilitates faster development of ecosystem including rich bouquet of services and availability of affordable receivers.

* Whilst selecting a standard/technology, a comparison of the Number of Channels per Transmitter and the Operating Costs for the Broadcasters is to be analysed and the appropriate technology providing 'Maximum Channels per Transmitters with Minimum Operating Cost' is to be preferred. The cost of initial investments and the requirement of multiple equipment installations are also important criteria. In this context the possibility of up to 16 Radio Channels per DAB+ Transmitter and up to 44 Radio Channels per DVB-T2 Transmitter also should not be ignored.

Response to Comments

Given the large geographical size of India and the large population that needs to be covered by digital radio services, and the diverse radio coverage requirements from national to local, it is of utmost importance that the most efficient digital radio technology / system standard be selected / adopted in India.

Efficiency needs to be measured as:

(1) the efficiency of spectrum usage per radio channel

(2) transmission power required per program channel for the same coverage area

(3) flexibility of locating digital radio channels; as against being forced to always bundle a large number of channels at the same location (but of course being able to where it is required). This aspect is very important for two reasons. Radio is a local medium and should be locally broadcast. Bundling of many radio channels and transmitting from a 'central' location takes away the local touch. Secondly, for bundling of radio channels, the broadcasters require additional end links to carry the program to the transmitting location.

The DRM system meets all these requirements of efficiency, lowest transmission power per radio channel and flexibility in location of the transmission facility in the target area. In addition, this is the only digital radio standard that provides efficient and reliable coverage in both Medium Wave and FM radio bands. And the only digital radio system that provides shortwave digital radio. There is no other system that does this.

(4) mobile / car reception. Reception in automobiles is more difficult to achieve than stationary reception. The DRM system scores in this also as its signals are very robust and do not fade with time or location within the designated coverage area.

* However, while adopting a particular technology standard, its suitability for Indian conditions needs to be ensured.

* We must have a framework which facilitates evaluation of emerging technologies by providing suitable platform for demonstrations, field trials etc. for ensuring smooth rollout of new services like digital radio with responsibility casted upon the OEMs for ensuring desired performance parameters.

* Preference should be given to indigenous innovators/ integrators/ manufacturers, thereby promoting objectives of 'Make in India', 'Start-up India' and 'Digital India'.

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

Prasar Bharati Comments:

Affordable digital receiver is the key for success of digital radio broadcasting, along with diverse and differentiated content.

Response to Comments

There are two main requirements to ensure affordable digital radio receivers are available in the market.

(1) Digital radio broadcasters have to put out regular and high-quality digital radio services for the digital consumers. The services need to attract digital consumers and also the digital advertisers. For this purpose mostly new exclusive content and new content genres have to be offered by digital radio broadcasters right from the start, and the advanced features enabled through digital radio need to be embraced and fully exploited. This will compel digital listeners to go to the market for digital radio receivers. If the digital radio content is the same as that on the analogue radio (as is happening at present), the uptake of digital radio receivers will only be marginal.

(2) Readily available "Make in India" digital radio receivers is the other important factor. As pointed out earlier, at least one Indian made full capability DRM digital radio receiver is already available in the market, having its development and production facilities in India.

With both these measures operating well, the selling price of the stand-alone digital radio receiver will reach an optimum value quickly, while digital radio reception in cars is already available at no extra cost to the consumer at all (with more manufacturers lined up for market launch of such solutions once AIR's efforts in phase-II of the national DRM roll-out focusing on content, features and quality will be finalized).

For the sustainable broadcast/communication framework for supporting all emerging digital technologies and the services and businesses supported by them, the National Broadcast/Communication Backbones must step in to provide strong foundation. It is essential to ensure that these national broadcast/communication backbones are supported with adequate funding.

Response to Reliance Broadcast Network Limited Comments on TRAI Consultation Paper

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

Reliance Comments:

- * Both government and private broadcasters should start digital transmission by adopting a common technology.
- * Both must adopt methods to educate the mass about digital transmission. This will gradually increase the demand and decrease the radio receivers' price in next three to five years.
- * Currently, we must focus on supply of the radio receivers to increase the demand.

Response to Comments

This assessment is based on the experience gained in digital radio markets in many countries of the world.

To make sure that affordable digital radio receivers are available in the market, the digital radio broadcasters and the digital radio manufacturers have to contribute.

Digital radio broadcasters have to put out regular digital radio services for the digital listeners. This will motivate digital listeners to go to the market for digital radios. The content on the digital platform must be attractive and contain exclusively available services, along with fully exploiting the benefits of digital radio.

The other factor is that "Make in India" digital radio receivers should be readily available when simulcast services are put out. At least one Indian made full capability DRM digital radio receiver is already under production in India under the brand name Avion.

The automotive industry in India has already launched several car models with DRM reception built-in at no extra cost, and more manufacturers are ready to launch their products once AIR's DRM services will officially be launched to the public.

With both these measures, the selling price of the stand-alone digital radio receiver will reach an optimum value quickly, while digital radio reception in cars is already available at no extra cost to the consumer at all.

Response to ZEE Network Comments on TRAI Consultation Paper

1. Introductory Comments

However we would like to state that the consultation paper seems to give an impression that there is an overwhelming and compulsive need to move towards a Digital Radio ecosystem. The consultation paper also does not dwell in detail about the ecosystem of Analog AM and FM radio receivers present in India and the impact of Digitalization in terms of legacy devices.

We regret that in a consultation which is about strategy and policy for Radio in India prevalent for a number of years, there should also have been a mention of the ecosystem of devices by which services such as radio are being received. Most of over 600 million phones (Smartphones and feature phones) in India have FM receivers built in, which is a prime driver of their usage. Secondly, these phones via the 3G/4G connectivity have IP based radio stations available at virtually no cost. The need for AM receivers is on a constant decline, and the trend is unlikely to get accentuated. With any possible introduction of DRM or any digital technology NOT supported by smartphones, it is likely that the ecosystem will move towards increasing use of streaming radio services.

Response to Comments

Listening to radio on phones with built-in FM receivers does not pose any cost for reception of FM radio programs.

In contrast, mobile phones with 2G/3G/4G connectivity do incur significant costs for reception of IP based radio stations. Cumulatively, this cost can be a significant amount on a monthly / yearly basis.

Analog / digital radios, on the other hand pose no reception costs. These radios do not face any network congestion constraints and are totally buffer free within the coverage area.

In addition, free-to-air services enabled by terrestrial radio broadcast services make radio a truly all-inclusive medium for the whole population, without building access barriers or introducing gate-keepers.

It is also a known fact that the DRM technology introduced by All India Radio / Prasar Bharti have had virtually no subscribers and receivers for the same are not available. Hence the processes for such services cannot be solely technology driven, but also need be driven by user demand.

Response to Comments

Digital radio broadcasters have to put out regular digital radio services for the digital consumers (even in the simulcast mode). The digital radio services have to be designed to attract digital radio listeners (and also the advertisers). This is one of the main factors that will compel digital listeners to buy digital radio receivers. Only content and features exclusively available on the digital radio platform eventually lead to the demand of listeners for buying new digital radio sets.

Judging the success of AIR's DRM services is misleading. Only with the Minister's address in January 2017, AIR has entered phase II of the national rollout of DRM services just a few months ago. While phase I focusing on the setup of the transmitter infrastructure was successfully finalized, AIR's current effort is on finalizing the content offerings with a final services selection, improved audio quality and advanced services such as the Journaline multilingual free-to-air text service. Eventually phase II will lead to the official launch and announcement of DRM services to the public, at which time the receiver industry needs to and will be ready, as already started and outlined above.

We believe that the DRM digital radio standard (in both the AM and VHF bands) is the best suited to India for this purpose, with better quality of digital radio audio and music, better signal strength and more number of services in the same radio channel. Together, the DRM standard covers all the radio bands used in India, the Medium Wave (and also Shortwave) band, the FM band and also the VHF Band III (for future use).

We note that a mention has been made on the use of DAB services in Europe in support of moving to Digital technologies in India. However the consultation paper fails to mention that the DAB services operate in the L-Band.

Response to Comments

DAB operation in the L band was extensively tested in Canada and actually on-air in some European countries. But it was not found to be efficient cost effective and therefore abandoned in favor of lower-frequency services providing better coverage efficiency.

In India the Terrestrial and S-band as well as L-Band spectrum are virtually unused, and there has to be a well-defined future plan on the potential use of these bands before disturbing the present large ecosystem of devices operating in the FM bands.

We feel that the approach of TRAI is unrealistically holistic which ignores the realities in the global vis-à-vis Indian markets and the overall direction of the markets towards IP.

4.9 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?

There are many factors which agitate against the introduction of "Digital Radio Transmission Services" in the Indian markets. These are summarized as below:

(i) DRM has failed as an alternative Digital radio Technology

DRM was first rolled out in 2003, in Shortwave bands with a promise of FM like quality and fade free reception. However it has failed to live to its promise. The main problems were the high cost of receivers, low battery life, unavailability of receivers in commonly used devices such as mobile phones, feature phones or smart phones. The very processing technology that allows improved operations using the more complex DRM waveform costs more and consumes more power than

the standard AM receiver. A quick look at standalone DRM receivers over the past decade shows almost a dozen companies entering the market, only to retreat when the promise didn't materialize.

Response to Comments

Considering the different nature (and mode) of shortwave broadcasting, coverage of specific areas depends on various physical effects in the Ionosphere and along the huge transmission paths. This applies equally to all physical signals, whether analog or digital. However, once a signal is available, the reception robustness and audio quality to be achieved with DRM is significantly beyond what analog shortwave could deliver. We believe that some of the comments, if not all, are out of context.

In India, currently 34 transmitting stations of All India Radio put out digital radio transmissions, either in full digital or in simulcast mode. More transmitters are being transformed into DRM digital radio transmitters.

Digital radio receiver industry in India is already up and running today. The first Indian developed and made DRM digital radio was presented in 2016. Currently, this radio receiver, marketed under the brand name Avion, offers DRM digital radio reception in all the radio frequency bands in India. More are expected to follow.

The automotive industry in India has already launched several car models with DRM reception built-in at no extra cost, and more manufacturers are ready to launch their products once AIR's DRM services will officially be launched to the public.

A review of the rollout of the DRM radio stations indicates that the rise of the Internet has influenced many broadcasters to cease their shortwave transmissions in favor of broadcasting over the World Wide Web.

Response to Comments

Some of the shortwave radio broadcasters have indeed added Internet streaming services to include those who make use of Internet listening. It gives them a broader reach for their services. But irrespective of this added and complementary distribution platform, there are many shortwave radio broadcasters (mostly using DRM) and there is shortage of available frequencies. India is among the major shortwave broadcasters in the world, along with BBC, VoA, Indonesia, Pakistan, Japan, Korea and many others.

The rollout of DRM globally as indicated in figure below, shows that most of the rollout has been in Europe. In other continents DRM was stillborn. The Ecosystem of receivers has virtually died out as there are no willing buyers.

Due to the disadvantage of DRM as a digital radio technology, its use is restricted to some car radios which have no limitation of battery life.

Despite the availability of Digital HD radio in the US, AT&T in 2015 directed its cellphone suppliers to activate FM radios in all mobile Android phones to gain approval for use on its network.

If DRM technologies are excluded then the focus moves to other technologies such as the DAB, DAB+ etc. As already pointed out these technologies are used in the bands which lie in L-Band or those above 2 GHz. In India there has been no allocation of such bands.

At present, we recommend that the normal bands for FM, which could be alternatively used for digital broadcasting should be left undisturbed.

4.21 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.

While we are not in favor of a changeover to Digital Broadcasting, we believe that at present the HD Radio with Hybrid IBOC present the best case for India. Using the HD Radio, it is possible for FM radios to co-exist, which we believe is the best case for India in view of its demographics, legacy receivers, variations in audience capabilities in buying expensive receivers etc.

Response to Comments

In the comment, no specific reasons have been provided for one system to be the best case for India. As a case in point, the open DRM digital radio standard is specifically tailored for the FM band for in-channel operation. It has superior performance, both in the static and mobile reception environments. DRM co-exists with the FM channels and provides additional channels for more digital radio.

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

There cannot be any artificial measures. The reduction on cost can happen only with volumes as in the case of feature phones and smartphones.

India with its large base has a high potential for a larger volumes if Digital radio receivers are incorporated in Smartphones. This in turn will be possible only with the development of technologies to reduce power consumption and preserve battery life. At the same time digital Radio cannot gain merely because it is Digital. It needs to bring in better programming, quality and feature such as rights management protected music store.

Response to Comments

Digital radio receivers in Smartphones are certainly a way forward for the mobile environment.

For quality listening, home and car environment, digital radios will still be preferred.

However, DRM reception in the FM band on mobile phones can be enabled by simply installing an app without any hardware changes if supported by the mobile phone manufacturers, or by

attaching a receiver dongle to the phone for legacy devices, as has been presented at IBC 2017 in Amsterdam.

In addition, the other factor is that digital radio broadcasters will have to offer regular digital radio programs for the digital radio listeners. The digital radio programs will stimulate purchase of digital radio receivers. "Make in India" digital radio receivers should be readily available when simulcast services are put out.

This is why the availability of both convincing and exclusive content as well as affordable receivers need to be well time aligned for a successful launch, as can be achieved by agreeing on an official "Launch Date" for the public availability of digital radio services in the FM band and as outlined in the comment provided by the DRM Consortium.