Comments by Shri. A.M. Joshi , (ex) -Wireless Adviser [in 1990 to 1996 period] to the Govt. of India, **on the TRAI paper 7 /2017 on " Issues related to Digital Radio Broadcasting in India "**

[Note :These comments are purely in individual capacity, having myself retired more than 20 yrs back ,with no commercial / business interests or affiliations of any kind but solely on account interest in technical developments in the country and as an avid Radio listener for more than 70 years , since my childhood. I am therefore not a *direct* stake holder in the subject. The comments be seen from that perspective.]

Chapter 5 of TRAI paper

Comments on Summary of issues for Consultation

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?

A Introductory Comments:

A.1 Encouragement to Digitalisation, in general, is the need of the hour , in line with the P.M's vision of " Digital India ".
TRAI needs to be complimented for taking the initiative for this *suo moto* consultation on the subject .

As far Broadcasting Digitalisation is concerned, the Govt. will have to play the role of Facilitator to promote low cost Digital B'C receivers, for use by general public, favourable taxation policies and liberal licensing conditions for the B'C Service Providers to make their service economically viable.
Many of these aspects will come into the jurisdiction of other Ministries of the Govt., warranting a holistic approach by the Govt., than restricting it to the domain of the TRAI and/or the Min. of I & B.
It would be better if these are handled in a wider and higher Committee after TRAI and B'C Ministry's recommendations are available.

A.2 As detailed in subsequent answers, there seems to be no *express* urgency to undertake or pursue Digitalisation in Radio broadcasting , taking into account all the relevant factors , except creating an eco-system to have its evolution to take place at its own pace .

B Don't Ignore Satellite Based Digital Sound Broadcasting also:

B.1 The TRAI Paper has considered digitalisation of radio broadcasting only with ref. to *terrestrial* radio broadcasting –which is obviously confined to presently in MW/SW/VHF FM bands for broadcasting in India.

The possibility and advantages of [dedicated] Satellite Digital Audio Broadcasting is totally ignored in this paper .This has been possibly done because none such service exists over India, at present.
However, it is to be realised that at present audio sound channels are presently provided in India in Sat.TV systems of "Dish TV"," TATA Sky" etc. and possibly others also incl. by Cable TV operators.

B.2 More important is to not to forget that a few years back, in late 1990s , the WordSpace India [promoted by WorldSpace,USA] launched and operated a dedicated ,GSO based Digital Audio Broadcasting Satellite to provide ,CD quality sound broadcasting over Australia to Middle East region of the globe. The service became very popular in India, which accounted for 90% of its paid subscriber base. This was due to high quality of dedicated programmes in all major Indian languages, different music types, besides technically excellent audio sound quality with compact sat. Receiver and antenna system.

B.2.1 Like Sat. TV channels at present, which provides All India coverage, with H24 service, the sat DAB service of WorldSpace enabled one to hear one's mother tongue language programmes , even if one is in any part of India .After about 3-4 years of operation , the WorldSpace system , closed globally, due to bankruptcy of WorldSpace, USA .

B.3 Nationally, against the backdrop of this TRAI paper, it would be worthwhile to consider revival of such a system for India, using our own INSAT system, where large no. of Sat. based transponders are available and a very small capacity from the same , would meet the requirement for this type of DAB service. With nation-wide coverage, it would facilitate faster digitalisation of radio broadcasting , provide larger listener base to attract Pvt. operators also, in view of likely more advertising revenue .
Adequate, dedicated frequency spectrum is available for this type of service in ITU's global radio regulations. India, in 1990s took lead to pilot the provisions for the same in ITU's 1992 World Radio Conference.

B.3.1 It is therefore urged that TRAI may strongly recommend to the Govt. to consider this matter for revival of this type of service [with or without INSAT] as a part of Digitalisation of Broadcasting.

B.3.1.1 It is recalled in this context that in mid-2004,the TRAI floated a Consultation paper on this subject as the Amit Mitra Committee in its

report on Private Sector FM Broadcasting had suggested that a Satellite Radio Policy should be laid down by the Government. TRAI in its recommendations on the subject, sent on August 11, 2004 had indicated that this issue would be separately. I could not locate the TRAI's Recommendation and final decision , if any.

B.3.1.2 It is now appropriate to revisit the subject in the context of Digitalisation of Broadcasting after 13 years .

C . Consideration of Terrestrial based Sound Broadcasting services

C.1. For AM [Medium Wave] band operated solely by the Govt., Govt. should complete the migration to Digital, as per availability of resources, obviously, in phases .
AM Band is still the backbone of radio coverage for general public. It is however increasingly getting interference due to manmade Radio Interference [RFI], esp. in crowded cities and towns. Hence, here spending money by the Public Service Broadcaster [viz., AIR /Govt.] should be given priority.

C.2 For SW band, used mainly for external service by the AIR, no need to waste resources for conversion , in view of the perennial problems of signal fading/adj. channel interference & unstable ionospheric propagation leading to poor quality. SW broadcasting for external service has no relevance now in the age of Internet and satellite TV & communication facilities. The same also applies to for AIR links for dissemination of audio programmes/recordings, in the country from a central location to its other stations. This being historically provided by SW links earlier before the advent of INSAT & DoT's long distance Microwave links.

C.3 The main contender band for introduction of Digital Radio is the FM band. This calls for many aspects for consideration before the final approach is decided, as mentioned below and it warrants a holistic view taking into account technical as well as socio-economic and many allied aspects as well

C.4 In India, the full advantages of coverage of the country by FM BC is yet to be realised [due to late policy change for allowing Pvt. Stations] . **The benefit of FM vis-a-vis AM radio [in terms of quality] are yet to be fully enjoyed by most of the population**. It is only in last 4-5 years due to FM Radio chips in Cellphones & to some extent in car radios , it has become widely known and to some extent popular esp. with younger generation. The programme patterns in FM radios are different and are of short durations, unlike in AM [long music concerts, speeches, dramas etc]

C.4.1 It looks that though FM B'C has provided better audio quality than AM to audiences in India, most of the audience, it appears, is not sound quality conscious to the extent that they would feel an urge to buy digital sound radio. The improvement in quality from FM to Digital, though good, is not that dramatic for an average listener, unlike in switch over from B & W TV to Colour TV; in view of prohibitive cost of the digital radios.
Present market cost of DRM receivers to receive AIR broadcasts as well as what could be reasonable, affordable cost [as compared to conventional AM/FM receivers] are commented on in paras 4.35 and 4.37 of the TRAI Paper in a passing remark, but no indicative cost figures are given . Indian consumer market is very cost-conscious as is the general experience and unless the digital B'C receivers are really affordable, this service will not be popular.

C4.2 Detailed, audience-survey based statistical data on use & no. of FM listeners / receivers should be made available to establish *mandatory* and/or *express* need of digitalisation of FM radio service. **No data is given in TRAI paper as regards audience population or DRM receivers in operation after the switch to DRM technology by AIR's 35 MW transmitters.**

C.4.3 Introduction of Digital broadcasting services in other countries [who have long history of FM BC service and who have led the digitalisation] is given in Chapter 3 of the TRAI paper . Annexure III gives statistical data of International scenario on deployment of Digital Radio Broadcasting . If one links this to the number of FM transmitters in a country and the start date of digitalisation , one gets the impression that the pace of digitalisation is fairly slow . I am amplifying this quoting some additional inputs , which I gathered from my Internet search , in preparing these comments. These are detailed below :

C.4.3.1 **Finland launched DAB in 1998, but it was the first country in the world to shut down its DAB digital radio network in 2005**. Presently in Finland there are no DAB broadcasts. Switzerland adopted a law [for voluntary transition] in 2014 for transition to digital radio but expects it to be completed by 2024 . Sweden did not feel to have enough justification for transition to digital. In October 2014, the German Federal State of Saxonia-Anhalt approved a law in order to retain FM broadcasting at least until 2025 .[source: 2015 Article in Radio World]

C.4.3.2 USA [where FM was invented and started in1930s & where FM stations attained peak popularity in 1970s] had by Sept. 2015 , 6,600 FM Commercial and 4090 FM Educational stations .
However, in USA, there seems to be no active interest to switch to Digital Radio from FM Radio and the matter is still under debate in the Congressional Committe. Every Smartphone has a FM Chip but many Carriers are reluctant to activate it.
--[See Article [year 2013] at : https://www.infopackets.com/news/9570/us-wary-about-ditching-fm-radio states that "US Wary about ditching FM Radio "

& --see Article dt 7th Aug. ,2016 at https://www.wired.com/2016/07/phones-fm-chips-radio-smartphone/] Extracts below : Broadcasters and public safety officials have long urged handset manufacturers and wireless carriers to universally activate the FM chip, and recently brought the campaign to Canada. Carriers have little financial incentive to do so because they profit from streaming data, says Barry Rooke of the National Campus and Community Radio Association. But the wireless industry is coming around, and says anyone who wants a phone with FM radio can find one.

FM capability is baked into the Qualcomm LTE modem inside nearly every cellphone, including iPhones. Tuning in on a smartphone is common in the developing world, so it's easier to deactivate the chip then install different modems for different markets, says Paul Brenner, CEO of NextRadio, a radio-tuner app for FM-enabled phones. Manufacturers can activate the chip, but the decision to do so typically rests with carriers. If you're Verizon customer, tough luck. AT&Tand T-Mobile are embracing activation for all Android phones, following a move Sprint made in 2013.

Apple remains the biggest holdout. The company did not respond to multiple requests for comment, but critics say it has little incentive to do anything that might undermine Beats One, Apple Music, **and other streaming services.** Congress has held multiple hearings on the issue over the years and the FCC could require handset makers and carriers to activate FM capability, but it has been reluctant to act by fiat. Agency chairman Tom Wheeler told lawmakers last year "the issue may be resolving itself in the marketplace." Broadcasters aren't clamoring for the government to step in, either. "Mandating or requiring FM chip activation as some sort of public policy imperative is probably not the way to go," says Michael Reskin of National Public Radio, which has long urged carriers to let people tune in on their phones. He believes continued pressure from listeners will prompt manufacturers and carriers to come around. Until then, it's probably a good idea to get a transistor radio, just in case.Every smartphone in the world has an FM tuner built in. But here in the US, just one-third of them actually works, even though the Federal Emergency Management Agency says radio can save lives in an emergency. "We know that if Internet networks or cell phone networks go down, FM still works so long as you have a battery to turn the device on," says agency spokesman Rafael Lemaitre

C.4.3.3 **News from Hongkong Times dt 28th March , 2017 shows that a**ll digital radio transmissions in Hong Kong [where population density is very high, like or more than our Metro cities] will be terminated within six months after the Executive Council deemed it unrealistic to rely solely on public broadcaster RTHK to operate the service.
Digital audio services were introduced in Hong Kong in 2010, with licences granted to three commercial operators in addition to RTHK 2011. However, RTHK is now the only local operator providing digital services after Phoenix U Radio, Digital Broadcasting Corporation and Metro Broadcast Corporation all had their licences terminated. "The retreat of the three commercial digital audio broadcasting operators in a short period of time due to difficulties in their operation and the lack of a critical mass of audience demonstrated the exhaustion of interest in the services,"

C.4.3.4 In Annexure III , TRAI has given International scenario on deployment of Digital Radio Broadcasting . In this Tabulation, also data of countries like USA and China is missing. For nearly 50 % of the countries shown therein, no data on Digital receivers, is given in spite of DAB introduction there , 5- 6 yrs back .

C.4.3.5 Besides , with the advent of Sat. TV channels, Internet ,Internet radio , You Tube / Internet streaming of Audio Recordings etc., the dependence on Radio listening for entertainment /news etc. has gone down considerably even in India . Sound quality connoisseurs are few and they do mind using high cost devices e.g. CD Players, iPod etc. than depend on digital radio programmes.

C.4.3.6 The digital switchover for radio worldwide has been much slower, however. That's largely because while many people are happy to replace televisions now and again (particularly when flat-screen models became more

affordable), **they are more likely to hold on to radio sets for many years**. Radio use is also particularly common in cars, where replacing an analog receiver with a digital one can be prohibitively expensive.

C.4.3.7 India having about 1000 million mobile phones , many of which being low cost type and not smart phones , many poor people heavily use built in FM radio facility to listen Filmi songs and other programmes on FM radio. **They are not much bothered about sound quality use, as such.** Conversion to Digital Radio will affect them and COAI should comment on this aspect. Technically, dual chipsets will can be used and have been developed, but change over from old cell phone sets to new dual chip sets will be a very long drawn affair, in view of very large no. of mobile phones, even in many types of low smart phones . Cost implications are also not precisely known.

C.4.3.8 Attn. is also invited to the Article in LiveMint Newspaper dt 25 th Aug. 2017, which states lack of enthusiasm for Introduction of Digital radio by Pvt broadcasters in India and other reasons .[see at: **http://www.livemint.com/Opinion/0oboBd0yuUDjYqn6NcsPtL/Will-India-embrace-digital-radio-broadcasting.html]**

C.4.3.9 Also see Article in DNA newspaper dt 1st Feb. ,2017 at http://www.dnaindia.com/india/report-government-promotes-expensive-digital-radio-for-public-private-broadcasters-2303914 .
which discusses high cost of DRM receivers , in relation to normal AM/FM receivers and reluctance of Pvt. FM Operators to go in for DRM

C.4.3.10 As per TRAI paper, from the initiation of public DAB in 1995 , to now in 2017 , the same covers 38 countries , having a total population of 418 m . Receiver mass reached is 55 m i.e about 1 receiver per 8 persons . Most of the 38 countries have much higher per capita income being , reasonably rich countries ,compared to India .One can only hazard a guess for reasonable no. of digital B'C Receivers [having quite high cost] to be sold in our country of more than 1 billion population .

D. It is thus apparent that it will be better if Digitalisation of Audio Broadcasting –for Pvt. FM stations- is not asked to be hastily accelerated by compulsion or by mandatory time –frame or as part of licensing condition .
Let sufficient, low cost Digital receivers be available and good enough audience population mass be reached who are interested in the same. This will take considerable time and the PSB operator [i.e the AIR] who has to taken a lead by starting the process has to demonstrate / advertise its impact.

----------End –Response to Question 1 ----------

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.

Adopt Market –based Approach. No need to have a Time Frame nor it does seem to be practicable and relevant to have one, in view of details given above, in comments on the Q. 5.1 as well as if one sees very long period [15 to 20 years or more] of some penetration by digital broadcasting by advanced countries also as per figures given in TRAI Paper .

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.

Does not arise in view of comments on the Q.5.1 & Q.5.2.

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

Yes. TRAI paper in Sec. 4 and in particular para 4.12 discusses these issues. The license conditions should be revised to provide full flexibility in the matter to Service providers .In addition some aspects of "programming, license fee etc." , also make matters difficult for the attracting Pvt. Players .

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.

5.5.1 Chapter 3 of TRAI paper clearly brings out adoption of different standards by different countries .Digital Technology aspects are also discussed in paras 4.16 and 4.17 of the TRAI Paper, related to DAB and DAB+ technologies . The same reg. DRM have also been mentioned but overall in the paper , there is only a passing reference in para 4.17 to DRM being adopted by the AIR .The reasons for AIR choice of DRM over DAB are not amplified in the TRAI paper.

5.5.2 The advantages of DRM technology are apparent and are described in a six page doc.of the DRM.org at http://www.drm.org/wp-content/uploads/2016/06/DRM-The-Digital-Future-of-FM-2014-06-24.pdf Full doc., more than 90 pages is also available on DRM website .

5.5.3 The advantages of DRM described therein are briefly as under :

The simulcast option allows for a smooth transition from analogue FM and MW to an all-digital DRM broadcast. DRM30 and DRM+ modes optimize DRM's baseband (COFDM) parameters for each supported broadcast frequency, while all service layer functionality relevant to listeners is identically available for all broadcast bands.

DRM has received the recommendations from the ITU for worldwide deployment, hence providing the international regulatory support for transmissions to take place. This would also lead to more manufacturers of Radios adopting the same, eventually leading to availability of more and cheaper radio sets.

Both the **DRM** and DAB standard could be considered simultaneously for national adoption and must NOT be seen as mutually exclusive options, as the two standards combined provide complementing solutions and thus allow each broadcaster to choose its most efficient and most cost effective transmission mechanism for satisfying its coverage needs.

Listeners of DRM broadcasts now enjoy also the benefits of the newly available audio codec xHE-AAC, with excellent, undistorted sound .**Modern radio chipsets support both DRM** and DAB+ simultaneously**, which combined with identical service layer components such as data applications, make multi-standard receiver implementations efficient and almost automatic.**

So the choice between DRM and DAB+ should be based exclusively on individual coverage needs and infrastructure cost-efficiency considerations.

As per DRM ,depending on the broadcasters' needs, a simple decision making, considered before opting for a DRM (DRM30/DRM+) and/or DAB+ transmission infrastructure**, be left to the broadcaster .**

Thus, AIR having chosen DRM and made it operational, there is no alternative to the Pvt. Broadcasters, but to give it preferential choice.

5.5.6 In spite of the above benefits of DRM , it is not clear why , China announced in mid- 2016 its own CDR standard [in development since 2011 and trials from 2013 . China hoped CDR broadcasts will be available in more than 560 cities. [See at www.radioworld.com/article/china-presents-its-digital-radio-standard/279175]

Extracts : On the receiver side, the latest generation of silicon chipset, with a footprint comparable to the smallest coin is available in China, and commercial receivers are now available on the market from leading manufacturers. Portable receivers feature a single-board layout, with onboard SoC chipset, SD card reader and USB ports. The form factor is comparable to same-class analog receivers .With a potential market of more than 1 billion people, and a substantial commitment by Chinese authorities toward digital radio, the country may soon boast the highest number of digital radio listeners worldwide, thanks to its own "home-grown" CDR digital solution.

This in turn might affect the Indian scenario of Digital receivers availability and cost, in India as well [as in the Cellphones]

5.5.7 Thus the better approach would be to leave it to the Broadcasters the choice of technology .

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.

As amplified in comments on Q. 5.5 above, leave it to the Broadcasters the choice of technology

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?

By and large there is no scarcity of spectrum for Pvt. FM broadcasters . [See the thousands of stations allocated freq. Channels in the same band in USA vis a vis only 293 in India after 17 years of Pvt.FM licensing.] Addl. Frequency bands can be opened, if justified by actual demand, as was done for the expansion of mobile phone service in India, against the backdrop of acute shortage , initially .

TRAI paper also indicates that even after bidding many FM channels remain unexploited by Pvt. Operators.

Interference problems can be tackled by proper advance planning in AIR Freq. Planning and in WPC wing of the Deptt.of Telecom, who have long experience in this specialised field.

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.

No rigorous specification of technology be specified. Potential Service providers are smart enough to decide on availability of receivers and allied equipments to ensure that they have as large listeners as possible. That aspect, along with AIR's and ITU standards will automatically take care of technology as explained in comments given above to earlier Questions.

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.

Govt. should act as a Facilitator by not binding the hands of FM service providers. A workable approach be found by detailed mutual discussions .

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.

Yes, in light of earlier comments, in detail calling for leaving it the choice of technology to Operators. Administratively, treat it as a fresh, new auction . Additionally, call for suggestions from Broadcasters and or their Association .

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.

I have no comments. Appropriate for potential broadcasters/ bidders to give reply

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?

No comments. Experts in AIR , WPC & Industry have to work out suitable approach and solutions as necessary.

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

No comments, Existing and potential manufacturers to respond.

--- End : Comments by Shri A M JOSHI , dt.29th August ,2017 -----

==========