

Telecom Regulatory Authority of India (TRAI)

Consultation Paper

*Spectrum Requirements of National Capital Region
Transport Corporation (NCRTC) for Train Control System
for RRTS Corridors*

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Response Submitted by:

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PREAMBLE

The Delhi Metro Rail Corporation Limited (DMRC) was registered on 3rd May 1995 under the Companies Act, 1956 with equal equity participation of the Government of the National Capital Territory of Delhi (GNCTD) and the Central Government to implement the dream of construction and operation of a world- class Mass Rapid Transport System (MRTS).

The Delhi Metro has been instrumental in ushering in a new era in the sphere of mass urban transportation in India. The swanky and modern Metro system introduced comfortable, air conditioned and eco-friendly services for the first time in India and completely revolutionized the mass transportation scenario not only in the National Capital Region but the entire country.

The DMRC opened its first corridor between Shahdara and Tis Hazari on 25th December, 2002. Subsequently, the first phase of construction worth 65 kilometres of Metro lines was finished two years and nine months ahead of schedule in 2005. Since then the DMRC has also completed the construction of another 125 kilometres of Metro corridors under the second phase in only four and a half years.

Presently, the Delhi Metro network consists of about 391 Km with 286 stations. The network has now crossed the boundaries of Delhi to reach NOIDA and Ghaziabad in Uttar Pradesh, Gurgaon, Faridabad, Bahadurgarh and Ballabhgarh in Haryana. With the opening of the Majlis Park to Shiv Vihar and Janakpuri West - Botanical Garden Sections, new age trains equipped with the Unattended Train Operation (UTO) technology have been introduced. These trains operate with the Communication Based Train Control (CBTC) signaling technology which facilitate movement of trains in very short frequencies. This network also includes the NOIDA - Greater NOIDA Aqua Line. The Aqua Line has been constructed by DMRC on behalf of the NOIDA Metro Rail Corporation and is also being operated by DMRC currently. In addition, the 11.6 kilometre long Rapid Metro also connects with the Delhi Metro network at Sikanderpur station of Yellow Line. The Rapid Metro provides connectivity within the satellite city of Gurugram.

The Airport Express link between the Indira Gandhi International Airport and New Delhi has now propelled Delhi to the league of global cities which have high speed rail connectivity between the city and the airport. The DMRC today has over 300 train sets of four, six and eight coaches.

The Delhi Metro has also contributed tremendously on the environment front by becoming the first ever railway project in the world to claim carbon credits for regenerative braking. DMRC has also been certified by the United Nations (UN) as the first Metro Rail and Rail based system in the world to get carbon Credits for reducing Green House gas emissions as it has helped to reduce pollution levels in the city by 6.3 lakh tons every year thus helping in reducing global warming.

DMRC's COMMENTS ON ISSUES MENTIONED IN THE CONSULTATION PAPER

1. In which band, spectrum should be assigned to NCRTC for their LTE-R technology-based Train control system for RRTS rail corridors?

Response

From details available/provided in the consultation paper, it is seen that that spectrum has been allocated to Indian Railways (IR) in 700 MHz (5 MHz (paired)) inter-alia for its requirements pertaining to deployment of:

- a) ETCS Level-2,
- b) MC PTT + Voice
- c) IoT based asset monitoring services,
- d) Passenger information display system and
- e) live feed of Video Surveillance of few coaches at a time

It is also observed that NCRTC has submitted its request for allocation of spectrum for its requirements pertaining to deployment of:

- a) ETCS Level-2 Signalling System,
- b) Mission Critical Voice
- c) IoT based asset monitoring services and
- d) Video surveillance from the train for captive use

From the above it is observed that the end objective of requirement of spectrum of both the organisations being same, therefore it is but natural to consider allotment of spectrum to NCRTC in the same band i.e. 700 MHz as has been allocated to IR.

Allotment of spectrum in the same band 700 MHz for all the organisations i.e. IR , NCRTC (RRTS) & Metro Railways would also result in:

- a) increased coverage resulting in requirement of less BTSs which would result in reduced capex cost.
- b) Vendor ecosystem is already available in 700 MHz band for Radio Access Network and User Equipment (Train Radio, Handheld and Fixed Radio Terminals).

c) allocation of spectrum in the same band for all the organisation (i.e., Indian Railways, RRTS & Metro Railways) will lead to economies of scale in manufacture of equipment.

2. How much spectrum in the spectrum band(s) suggested in response to Q1, should be assigned to NCRTC to meet its requirement for its RRTS LTE-R based network?

Response

Considering the applications for which spectrum is required for RRTS and Metro Railways i.e., Mission Critical Voice, Mission critical Data and Video requirements are same as that of Indian Railways., a min. of 5 MHz spectrum in 700 MHz band should be considered for allocation to NCRTC & Metro Railways.

Notwithstanding the above, globally other Railways and Metros in South Korea and Dhaka Metro have been allotted 10 MHz or higher for setting up similar mission critical LTE networks.

3. Do you see any challenge, if the same spectrum is assigned to different RRTS/metro rail networks, operating in geographically separated areas/corridors in the country? If yes, kindly provide details and possible solutions.

Response

There appears to be no challenge, if the same spectrum is assigned to different RRTS/Metro rail networks, operating in geographically separated areas/corridors in the country.

With this principle, specific spectrum bands of 5 MHz or as per requirement, can be identified for RRTS and Metro Railways. Only in metro cities where multiple Metro Railways operate viz. MMRDA/MMOCL in Mumbai and DMRC / NMRC /Rapid Metro in Delhi NCR, additional spectrum bands would be required to cater for different Metro Railways.

4. In case more than one RRTS Metro/ rail networks are to operate in overlapping geographical areas, will it be appropriate for RRTS Metro/rail networks to share the Radio Access Network (RAN) in the overlapping areas using Multi-Operator Core Network (MOCN)? Any other feasible mechanism for using same spectrum in overlapping areas may also be suggested with detailed explanation. Kindly justify your response.

Response

On the issue of exploring spectrum sharing between IR & NCRTC, DoT in the consultation paper has inter-alia stated that:

“With regard to NCRTC's request for assignment of spectrum in 700 MHz band, DoT has decided that as in the case of Indian Railways, NCRTC also carries passengers and spectrum will be used for mission critical safety applications of signalling and train control, therefore, separate spectrum may be required since the services involve safety of life.”

Further, Ministry of Railways has also inter-alia advised NCRTC that *“due to strong possibility of interference in safety and security application and throughput requirements, Indian railways is not in agreement to share the limited spectrum allotted for captive use.*

From the above it is observed Indian Railways & DoT both are in agreement of not sharing of spectrum between Indian Railways & NCRTC on Safety & security considerations.

Considering the fact that both RRTS & Metro Railways also require the spectrum for Mission Critical Safety Applications similar to that of Indian Railways, it is advised that the spectrum between RRTS & Metro Railways should also not be shared. It is worthwhile to note that DoT has also inter-alia not agreed to sharing of spectrum between NCRTC & Indian Railways and has decided to allocate separate spectrum to NCRTC.

Accordingly, as suggested in response to Ques. No. 3, it is suggested that specific/separate spectrum bands of 5 MHz or as per requirement, can be identified for allocation to RRTS and Metro Railways. In metro cities where multiple Metro Railways operate viz. MMRDA/ MMOCL in Mumbai and DMRC / NMRC /Rapid Metro in Delhi NCR, additional spectrum bands may be considered for allotment to cater for different Metro Railways operating in the same geographical area.

5. **In case it is decided that RRTS Metro/rail networks may share the Radio Access Network (RAN) in the overlapping area using Multi-Operator Core Network (MOCN),**
 - a) **Whether it should be included in the terms and conditions for assignment of spectrum that the assigned spectrum may have to be shared with other RRTS/Metro rail networks to whom government decides to assign the same spectrum frequencies on sharing basis?**

Response

As detailed in response to Question(s) 3 & 4 above , and considering that DoT has also not agreed to sharing of spectrum between NCRTC & Indian Railways , it is not advisable to share the spectrum between RRTS & Metro Railways.

- b) **Whether certain guidelines for coordination mechanism need to be issued or it should be left to the mutual agreement between the RRTS/Metro rail network operators mandated for MOCN RAN sharing? In case, guidelines need to be prescribed, kindly suggest the points to be included in the guidelines.**

Response

Not Applicable in view of response to Question 5(a) above.

- c) **Whether commercial arrangements between two RRTS/Metro rail networks for RAN sharing needs to be regulated or left to the mutual arrangement?**

Response

Not Applicable in view of response to Question(s) 5(a) & 5(b) above.

- d) **Whether any other conditions need to be prescribed for such RAN sharing? Kindly provide detailed justifications.**

Response

Not Applicable in view of response to Question(s) 5(a) & 5(b) above.

6. **What should be the permission/licensing regime for operation of wireless networks for NCRTC and other RRTS/metro rail networks? Kindly justify your response with justification.**

Response

For RRTS and Metro Railways also, the same policy as adopted for Indian Railways for permission/licensing pertaining to Operation of wireless networks, may be made applicable.

7. **What should be the broad terms and conditions, which may be included in the Permission/License. Kindly provide detailed response with justification.**

Response

Same terms and conditions as adopted for Indian Railways for permission/licensing of Captive wireless networks may be made applicable for RRTS and Metro Railways.

8. **Would it be appropriate if the spectrum be allocated on the same analogy as Indian Railways, for the same reasons as argued by DoT? If not, what should be the spectrum charging mechanism for spectrum that will be assigned to NCRTC? Kindly provide detailed response with justification.**

Response

As the use case of RRTS and Indian Railways is identical, hence the spectrum allocation to RRTS & Metro Railways including the charging may be made on the same Terms & Conditions as that of Indian Railways.

9. **Whether the terms & conditions and spectrum charges that will be applicable for NCRTC, should be made applicable to the other RRTS/Metro rail networks that may come up in future? If no, what terms & conditions and spectrum charges should be made applicable for the other RRTS/Metro rail networks? Kindly justify your response.**

Response

It is a policy matter. However, for all Captive Wireless networks like Indian Railways, RRTS and Metro Railways, similar terms and conditions and spectrum charges as applicable for Indian Railways can be made be applicable.

10. **Any other issues/suggestions relevant to the subject, may be submitted with proper explanation and justification.**

Response

Notwithstanding the above responses, it is brought out that if the government as a policy decides on spectrum sharing using sharing of Radio Access Network (RAN) in the overlapping area by way of Multi-Operator Core Networks (MOCN), then the sharing should be made applicable amongst all user agencies including Indian Railways , RRTS & Metro Railways and should not be limited only between RRTS & Metro Railways as the spectrum is proposed to be used for similar Mission Critical & Safety applications by all the stake holder railway organisations viz. IR, RRTS & Metro Railways.