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Subject: COAI Response to the TRAI Consultation Paper on "Spectrum Requirements of National Capital Region Transport Corporation (NCRTC) for Train Control System for RRTS Corridors"

Dear Sir,

This is with reference to the TRAI Consultation Paper on "Spectrum Requirements of National Capital Region Transport Corporation (NCRTC) for Train Control System for RRTS Corridors" issued by TRAI on June 9, 2022.

In this regard, please find enclosed COAI response to the said Consultation Paper.

We hope that our submission will merit your kind consideration and support.

Kind Regards,

Lt. Gen. Dr. SP Kochhar
Director General

Cc:

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COAI Response to the TRAI Consultation Paper on
"Spectrum Requirements of National Capital Region Transport Corporation (NCRTC) for Train Control System for RRTS Corridors"

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1. We thank the Authority for giving us the opportunity to provide our comments on the TRAI Consultation Paper on "Spectrum Requirements of National Capital Region Transport Corporation (NCRTC) for Train Control System for RRTS Corridors".

2. Spectrum is the key resource for telecom services and availability of adequate spectrum across low (sub-GHz), mid and high range bands at affordable price is crucial for sustainability of mobile networks, good quality of service and customer experience. Spectrum allocation impacts the growth of mobile services and its associated benefits to the overall economy.

3. It is well-established by multiple credible agencies such as the World Bank, London School of Economics, NERA Economic Consulting and Indian Council for Research on International Economic Relations (ICRIER) that spectrum can be an extremely powerful engine of socio-economic growth, with strong quantitative relationships firmly established.

4. **Necessity of Spectrum Roadmap**:

   a. The NDCP-2018 has recognized that Spectrum is a key natural resource for public benefit to achieve India's socio-economic goals, ensure transparency in allocation and optimize availability and utilization. Some of these provisions are given below:

      i. *Developing a transparent, normative and fair policy for spectrum assignments and allocations.*
      ii. *Identifying and making available new Spectrum bands for Access and Backhaul segments for timely deployment and growth of 5G networks.*
      iii. *Making available harmonized and contiguous spectrum required for deployment of next generation access technologies.*
      iv. *Coordinating with Government departments for freeing underutilised/ substitutable spectrum, and its assignment along with unutilised spectrum for efficient and productive use.*
      v. *Optimal Pricing of Spectrum to ensure sustainable and affordable access to Digital Communications.*
      vi. *Monitoring efficient utilization of spectrum by conducting systematic audits of the spectrum allocated to both commercial and government organizations.*

   b. It is important to have a clear Spectrum Roadmap for both short and long term (at least 10 years) including Quantum of Spectrum and timelines for availability of the bands. For all Spectrum needs in India, NFAP provides a broad roadmap showing spectrum earmarked for various technologies. However, there is a need to define a clear roadmap to cater to ongoing demands of various stakeholders, or if any in future, especially from users from various segments of Railways such as Indian Railways, Rapid Rail, Metro or any other such users.

c. Even TRAI in its Recommendations on 'Auction of spectrum in frequency bands identified for IMT/5G' dated April 11, 2022 has mentioned the need for spectrum roadmap stated as below:

> *"Considering that there are certain additional bands which are already identified by ITU for IMT services and few additional bands are under consideration in WRC-23 for IMT identification, the Authority recommends that DoT should explore the possibility to make these bands available for IMT services at the earliest* ***and come out with a spectrum roadmap for opening up of new bands for IMT to meet the future demand. At least a 5-year roadmap on spectrum likely to be made available for IMT in each year and likely date/month of auction should be made public. Such a spectrum roadmap will provide certainty, enable the bidders to take informed decisions and may also encourage new entrants."***

d. Even in this case, earlier the demand came from Indian Railways (IR), now from NCRTC and in future other demands may also come from other users. It is thus important to have a clear roadmap for the understanding of all stakeholders that whether separate spectrum will be made available to such organisations and if yes, then what bands will be made available for their usage without pulling out spectrum from IMT bands.

5. **Identification of Spectrum Bands for IMT**:

a. It is pertinent to note that for any spectrum band to be identified for IMT usage, it has to go through a rigorous cycle of detailed deliberations at a global level within the ITU. For years altogether, these bands are discussed, deliberated, sharing studies are conducted, consensus amongst various stakeholders and regions are built and then that band is identified for IMT. Once a band is identified for IMT, the same has to go through another rigorous cycle within the 3GPP for standardization so that harmonization and economies of scale are achieved in a particular band. This would help in realizing the actual potential of the band and also providing the socio-economic benefits.

b. Regarding spectrum for mobile services in India, it is pertinent to note that the NFAP-2018 has already identified various spectrum bands for IMT, which are based on ITU and 3GPP deliberations and agreement by the Indian Administration at these international forums.

c. It is disheartening to see that after various activities as enumerated above, once the band is identified for IMT, various stakeholders keep coming up with their own demands in these particular bands, rather than looking at non-IMT bands, which are capable of meeting their demands.

6. **Protection of IMT Bands**:

a. In order to realise the potential benefits of digital economy, India should plan timely availability of sufficient and affordable spectrum for mobile services, considering that these are key factors for most of the critical and high bandwidth applications. Therefore, it is important that key spectrum bands are not only identified but also earmarked and protected for IMT.

b. 700 MHz band is extensively used for commercial mobile services globally and a comprehensive eco-system is available for this band. Many countries have already deployed 5G/ IMT in this band.

c. TRAI itself in its Consultation Paper on Auction of Spectrum in frequency bands identified for IMT/5G dated 30th November 2021 had noted:

The 700 MHz (3GPP band plan B28) band is being adopted as a prime coverage band for deployment of LTE/5G technology.

As per GSA report10 on "Low Band Spectrum for LTE and 5G: May 2021", 205 operators were investing in LTE across the key 700 MHz bands. Among these, 145 operators have been identified as investing in APT 700 MHz spectrum (Band 28 and Band n28: 703–748 MHz/758–803 FDD), including 139 with licences, of which 66 have launched commercial LTE or 5G services in the band. Three operators have launched both, 55 have launched LTE and eight have launched 5G.

As regards device ecosystem for APT 700 (Band n28) band, as per the report published by GSA11, as of May 2020, there were 2,531 LTE devices out of which 57.5% accounted for phones and in May 2021 this has increased to 3,463 LTE devices out of which 51.03% accounts for phones. In case of 5G, as per May 2021 report, there were 270 announced devices and out of which 58.10% accounts for phones.

d. In India, 700 MHz band has already been identified for IMT. Given the importance of this band, it has also been identified as one of the key bands for deployment of 5G in India by the 5G High Level Forum constituted by DoT.

e. 5G is designed to serve various use-cases by deploying it over a wide range of spectrum bands. For instance, sub-GHz bands are essential for providing coverage, while mid-band and high-bands are primarily used for increasing the capacity of the network. All the bands have a complementary role in a 5G network for efficient designing of the network and to deploy various use cases supported by 5G.

f. 700 MHz band with its developed ecosystem is the prime choice of operators for their 5G/ IMT usage in the sub-1 GHz band.

g. It is important to understand that in India, out of 45 MHz (paired) of 700 MHz band, 10 MHz (paired) has already been assigned to MoD and 5 MHz (paired) to Indian Railways. The remaining 30 MHz is already grossly inadequate. Thus, it would not be appropriate to fragment the band any further by giving away another 5 MHz to RRTS.

h. We appreciate that the Authority has also noted this concern in their present Consultation Paper, which is given below:

"As per the 3GPP band plan B28 adopted by India for 700 MHz band, 45 MHz (paired) spectrum can be utilized in this band. However, 10 MHz (paired) spectrum has been earmarked for government use and 5 MHz (paired) spectrum has been assigned to Indian Railways for LTE-based public safety and security services (train signalling system for

safety and security) across the railway track. Therefore, 30 MHz (paired) spectrum is available for commercial purpose in each of the 22 LSAs in this band. In case 5 MHz (paired) spectrum is earmarked for NCRTC and other RRTS/metro rail networks pan India, only 25 MHz (paired) spectrum will be left for commercial use. One view could be that since 700 MHz band is a prime coverage band for 5G, the remaining spectrum may not be enough for the TSPs for commercial purpose."

i. With regard to the statement on this spectrum band not been picked up by operators in the previous auction, it is submitted that availability of 'adequate spectrum' at the 'right price' is central to the growth of the telecom sector. Right price means that prices should be at a level that should ensure financial sustainability of the mobile industry and affordability of the services. When the TSP participates in an auction, they have to evaluate both availability and pricing of a spectrum band before making a bid on it. The pricing of 700 MHz has been extremely high till date. Also, the availability of all the bands put up for auction do affect the overall pricing. Reduction in availability in one band may artificially end up inflating the price of other bands. Also, it may be noted that commercial terms of offering the 700MHz band through auction to TSPs is different than being offered to Railways.

j. During the 5G trials being conducted by the TSPs in the past year, one of the operator had tested certain rural use cases using 700 MHz band. This clearly shows that the TSPs are interested in utilizing the 700 MHz band for 5G/IMT, hence entire 30 MHz (paired) should be made available to the TSPs. Just because the spectrum, having extremely high reserve price was not picked up in one auction does not mean that such precious spectrum band should be given to other non-telecom licensee entities by way of administrative allocation. Globally as well as in India, there is a clear precedence that TSPs buy spectrum over a period of years, for augmenting their capacities and provide more enriched services to consumers. In case of 4G also, the spectrum was purchased in 2021 auction as well indicating that if spectrum is not bought in first auction, it does not diminish its requirement in future.

7. **<u>Efficient Utilization of Spectrum</u>**:

a. We reiterate that in India, out of 45 MHz (paired) of 700 MHz band, 10 MHz (paired) has already been assigned to MoD and 5 MHz (paired) to Indian Railways. The remaining 30 MHz is already grossly inadequate. Thus, it would not be appropriate to fragment the band any further by giving away another 5 MHz to RRTS. This would make insufficient spectrum available for IMT services thus making it inefficient.

b. It is critical for policymakers to carefully consider the options of spectrum assignment to various entities and consult stakeholders to ensure that they most efficiently utilize the spectrum without undermining other TSPs.

c. In case of RRTS, it is amply clear that the spectrum allocated to Indian railways can cater to the needs of RRTS. TRAI after careful evaluation while recommending 5 MHz in 700 MHz band to IR clearly stated that this may be given to other entities in other areas. The recommendation is given below:

"As Indian Railways would be using the assigned spectrum along its railway track network and stations only, DoT may explore the possibility of assigning the same spectrum in other areas for area-specific limited use to other entities for captive use. However, it should be ensured that there is no interference to the Railways' network from such use."

d. It is pertinent to note that the demand from NCRTC was also for the same spectrum based on TRAI recommendations. The Authority in the Paper has also captured that NCRTC had engaged a group of eminent experts to conduct a feasibility study for co-existence of two separate LTE networks of NCRTC and IR in the same band. It is also important to note that this was the same expert group which was engaged by Indian Railways to study the feasibility of use of LTE technology on IR.

e. The report clearly stated that **co-existence is possible**. Relevant extract from the report is given below:

> The experts studied the NCRTC RRTS network alignment and deployment strategy. The report concludes "that both NCRTC and IR can use the same entire 5 MHz bandwidth for their critical operations in majority of the places without affecting the IR network, even with no coordination with IR, by employing the techniques which have been detailed in the report. However, minimal coordination during the network planned stages in certain locations NCRTC can benefit both, thus enabling the use of the entire bandwidth in all places. Even in the highly unlikely scenario of having any interference, other scheduling methods, transmit beamforming along with signal processing at the receiver using multiple antennas etc. are available to solve the problem. The ETCS operation can be performed with high reliability along with MCPTT and also CCTV surveillance data transfer can be done in majority of the corridor".

f. In view of the above, we are surprised and unable to understand that despite such a Report being given by eminent experts, what is the requirement of giving additional / separate 700MHz spectrum to NCRTC. As stated above, the NDCP also clearly states that it has to be ensured that spectrum is being efficiently used. However, giving away additional 5 MHz from 700 MHz band to NCRTC, neither the spectrum that is with IR, which can be used by NCRTC will be efficiently utilized, nor the remaining 700 MHz for IMT will be efficiently utilized.

g. It is pertinent to mention here that under the clause 11 (1)(a) of TRAI Act, 1997 as amended by TRAI Amendment Act 2000, the efficient management of available spectrum is one of Authority's primary functions. Hence, we request the Authority to ensure that such an important commercially sensitive spectrum in 700 MHz band, which has for long been identified for IMT in India and with developed global eco-system both on retail and network side, should not be further fragmented and the spectrum and spots in 700 MHz band already allocated to Indian Railways should be used for NCRTC requirements elsewhere. Further, the Authority is requested to recommend to DoT that 5 MHz spectrum of the 700 MHz spectrum band withheld from the Auction should be added in auction pool.

h. Furthermore, the argument of interference at some potential places within IR and NCRTC systems is not tenable as it has been covered in the report that co-existence is possible. It is a natural expectation from a spectrum holder to ensure that it deploys appropriate interference mitigation tools and systems. Therefore, both, the IR and NCRTC (or any other such PSU/government user of same spectrum) should deploy such mitigation tools at such limited locations.

8. **Consideration of Alternate Bands for NCRTC**:

a. Despite the report by a group of eminent experts stating that co-existence is possible between IR & NCRTC, if the Government wants to allocate additional spectrum to NCRTC, then **it should be done in other bands**. Given that we expect many more such rail networks in future (e.g., High Speed Rail), it is now fundamental to identify newer non-IMT bands for use of Railways or such users.

b. Since spectrum requirement for signalling purpose in Railway Networks is of the nature of low bandwidth and high coverage and spectrum in sub-1 GHz bands will be suitable to meet the requirement, there are various bands available through which these requirements could be met.

c. TRAI in its earlier recommendations of 2018 on "Next Generation Public Protection and Disaster Relief (PPDR) communication networks", had recommended that that 2x10 MHz of dedicated spectrum, 814-824/859-869 MHz, should be assigned for nationwide BB-PPDR services.

d. Also, as per the NFAP released by DoT in October 2018, spectrum bands identified for PPDR include 380-387.5/390-397.5 MHz, 410-417.5/420-427.5 MHz, 806-811/851-856 MHz and 4940-4990 MHz. In addition, NFAP 2018 also indicates that part of 440-470 MHz may be considered for PPDR.

e. Despite identification of these bands, no deployment of Next Generation PPDR Communication network has taken place so far. Further, spectrum in 800 MHz band is assigned / earmarked for PMRTS, which is migrating from analog to digital, enhancing spectrum efficiency. Therefore, there may be spectrum availability in 800 MHz band (i.e. 806-811/851-856 MHz), which may be sufficient to fulfill the requirement of NCRTC for RSTT. The same has also been noted by the Authority in the Paper.

f. As India is expected to have many more such rail networks (e.g. High Speed Rail), it is now critical to identify newer bands for use of Railways or such users, and clear separate roadmap is created for such users, without impacting the present and future spectrum needs/requirements of Telecommunications networks/ TSPs.

In view of the above, COAI strongly recommends that no spectrum from 700 MHz band which has for long been identified for IMT in India and with developed global eco-system should be given to NCRTC.

Our issue wise response is as follows:

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

Q.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?

COAI Response

1. Since a group of eminent experts have already stated that co-existence is possible between IR & NCRTC in the 5 MHz block already assigned to IR. The first preference should be to efficiently utilize this block (same spots) and the same should be assigned to NCRTC.

2. However, in case separate block is to be assigned to NCRTC, then it should be from spectrum bands identified for PPDR including 380-387.5/390-397.5 MHz, 410-417.5/420-427.5 MHz, 440-470 MHz, 806-811/851-856 MHz and 4940-4990 MHz.

3. While identifying usage for such purposes, it needs to be seen that bands which have lower retail device ecosystem are utilized..

4. **Therefore, given the importance of 700 MHz band for IMT, we strongly oppose any further allocation of spectrum to NCRTC in this band. Alternatively, non-IMT bands should be looked into. Also, band/frequencies where retail device ecosystem is not available should be utilized for such purposes.**

5. Regarding assignment of block, since the demand of NCRTC is of 5 MHz, the same should be allocated to them.

Q.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.

Q.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.

Q.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?**

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.**

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

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

COAI Response

1. The report of group of eminent experts has already demonstrated and stated that co-existence is possible between IR & NCRTC in the 5 MHz block already assigned to IR. Hence, the same spectrum will also be usable by future users like RRTS/Metro.

2. The experts have mentioned that for assignment of same spectrum to different RRTS/metro rail networks, which are operating in geographically separated manner such that, there is no interference, it can be easily done without any complications.

3. The same spectrum can easily be assigned to RRTS/ Metro which has been assigned to Indian Railways, if the geographical area of new RRTS/metro rail network is different and away from Indian Railways rail network.

4. The report also mentions that in case more than one RRTS Metro/rail networks are to operate on same spectrum frequencies in overlapping geographical area, the RRTS Metro/rail networks may share the Radio Access Network (RAN) in the overlapping area, which is known as Multi-Operator Core Network (MOCN). The Authority has already noted the point and the same has already been implemented in South Korea.

5. Since options are available for all scenarios, the endeavor of the Government, in light of efficient utilization of spectrum, should be to assign same spots to all such users. Suitable terms and conditions should be defined so that the users are aware of these scenarios right from the beginning and are able to design their networks/ solutions accordingly.

6. Sharing of spectrum/Radio Network should be made mandatory for these licensees in case of overlap region, in the terms and conditions of the assignments, in order to prevent any issues in future.

Q.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.

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

COAI Response

1. The license conditions of such licensees need to clearly state that the spectrum is to be used for the intended use and not for any commercial activity directly or indirectly. It is submitted that the provision of Voice/ Internet services is part of the licenses issued to TSPs/ISPs. Therefore, any spectrum assignment to NCRTC or Indian Railways should have clear restriction that the said spectrum can neither be used to provide voice, data, SMS or any other commercial services to consumers or its employees, nor the entity can seek connectivity with public networks. The use of spectrum should be strictly regulated and not allowed to give any services, commercial or non-commercial, which otherwise can only be given through license under section 4 of Indian Telegraph Act or through spectrum acquired through auction.

2. If any entity needs these or similar other commercial services, then that should be provided by the authorized licensees (TSPs/ISPs) similar to the provision of In-flight connectivity. The In-flight service providers use the Infrastructure of TSPs to provide the In-flight communication /Internet services. The same model may be replicated for Railways/ RRTS, etc. too in case the intention is to provide voice/ internet to the onboard passengers.

Q.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.

Q.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.

COAI Response

1. There is no case of any additional spectrum allocation when the requirements can be met from current allocation as explained in previous response. Further, as commercial spectrum in 700 MHz has been allocated to commercial enterprises like Indian Railways, it is important that Exchequer should be duly compensated through adequate and appropriate spectrum charges.

2. Further, such terms and conditions shall be made part of the spectrum roadmap, to avoid any kind of ambiguities in future.

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

COAI Response

Provide clear spectrum roadmap for Railways and similar new users

This increasing demand for spectrum from Railways, RRTS is likely to accelerate further from similar other users like Metros, Highspeed rails, etc. Hence a proper spectrum demand estimation study is necessary to set clarity for such users for at-least next decade. The study must identify new non-IMT bands for such railway purposes. This will help in long term planning for IR, NCRTC and similar Railways entities while mitigate risk to the IMT spectrum needs of mobile networks operators/TSPs. Besides, through such study, it should also be assessed that whether such demands can be met through licensed TSPs having spectrum acquired through auction.