

RJIL/TRAI/2023-24/327

6th March 2024

To,

Shri Akhilesh Kumar Trivedi,
Advisor (Networks, Spectrum and Licensing)
Telecom Regulatory Authority of India,
Mahanagar Doorsanchar Bhawan,
Jawaharlal Nehru Marg, New Delhi - 110002

Subject: RJIL's comments on TRAI's Consultation Paper on "Assignment of Additional Spectrum to Indian Railways for its Safety and Security Applications".

Dear Sir,

Please find enclosed the comments of Reliance Jio Infocomm Limited (RJIL) on the Consultation Paper dated 07.02.2024 on **"Assignment of Additional Spectrum to Indian Railways for its Safety and Security Applications"**.

Thanking you,

Yours Sincerely,
For **Reliance Jio Infocomm Limited**

Kapoor Singh Guliani
Authorized Signatory

Enclosure: As above

**Reliance Jio Infocomm Limited's comments on TRAI's Consultation Paper on
"Assignment of Additional Spectrum to Indian Railways for its Safety and Security
Applications" dated 7th February 2024.**

Preface:

1. Reliance Jio Infocomm Limited (RJIL) thanks the Authority for issuing this consultation paper to deliberate on the **Assignment of Additional Spectrum to Indian Railways for its Safety and Security Applications**.
2. At the outset, we submit that there is no doubt that suitable spectrum is required for setting up safety and security applications along the network of Indian Railways. Further, the evolving technology and the requirements of passenger safety, track-side communication, train and way-side telemetry, video surveillance etc. requires that these networks should at least be LTE based to deliver optimum services. **However, it is imperative that this spectrum is chosen post considering all relevant factors.**

A. Spectrum in the 700 MHz band is not the right option.

3. We submit that the choice of continually assigning the digital dividend spectrum in 700 MHz band for such services is sub-optimum and will lead to fragmentation of this valuable spectrum while simultaneously harming the densification of 5G services in the country. We submit that 700 MHz spectrum is providing extensive penetration to 5G networks, especially in rural and dense urban areas. Furthermore, this is the only low band 5G spectrum available with a reasonable device ecosystem for IMT services.
4. Globally, the railways are being supported by spectrum in band other than 700 MHz band. In Europe, spectrum in 5.9 GHz band, 800 MHz band, 900 MHz band as well as 1900 MHz band has been made available for Railways. Further, as per the National Frequency Allocation Plan (NFAP) 2022, spectrum bands identified for Public Protection and Disaster Relief (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 and a part of 440-470 MHz can also be considered.
5. These spectrum bands, which have been identified for the specific purpose, are optimum for Railways safety and security applications, as the coverage requirements are limited only to track lines and stations and these bands have sufficient data bit rates to meet the requirements. Further, the coverage requirements are also not as extensive as any terrestrial network and Railways can install as many poles around the tracks as required to meet these requirements.

6. On the contrary to the non-IMT bands reserved for PPDR, 700 MHz band has immense commercial potential and RJIL has already deployed 10 MHz of this band to provide ubiquitous 5G coverage across the country. This band can be a great capacity expansion band for RJIL, while being a viable sub1-GHz coverage option for any new entrant, as this is the only band where pan-India 5X2 MHz spectrum is available. **Therefore, removing the entire spectrum in this band from the market will only inhibit the 5G coverage growth in the country and it is imperative that this spectrum should be assigned to any claimant post evaluating all aspects.**

The TRAI in its CP of 8/2019 (para #1.20) has noted the following from DoT letter dated 02 November 2018:

“.. as LTE based enhancements are available in 450 MHz - up to 6 GHz, as mentioned in ITU-R Report (Rep. ITU-R M.2418) on “Description of RSTT” and also, NFAP makes a provision for considering requirements of IMT applications in 450-470 MHz; possibility of deployment of LTE based network of IR may be explored in other frequency bands (e.g. 450-470 MHz etc.).”

In view of this, there is a strong case for looking at the 440-470 MHz band for the purpose of assignment to Railways.

B. Impact of low band spectrum on 5G coverage and densification.

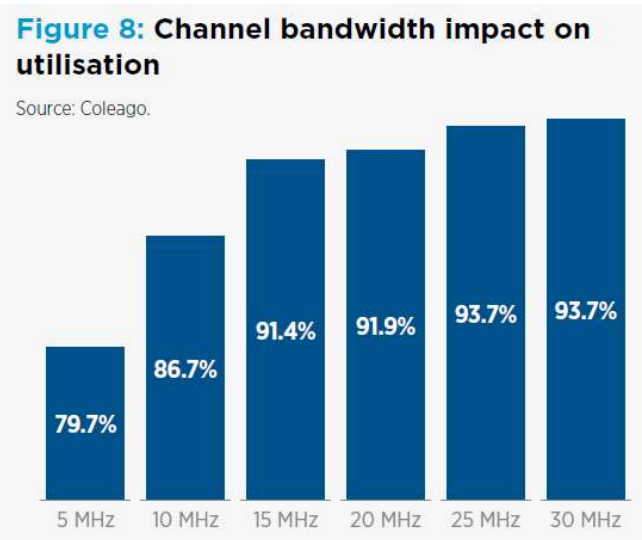
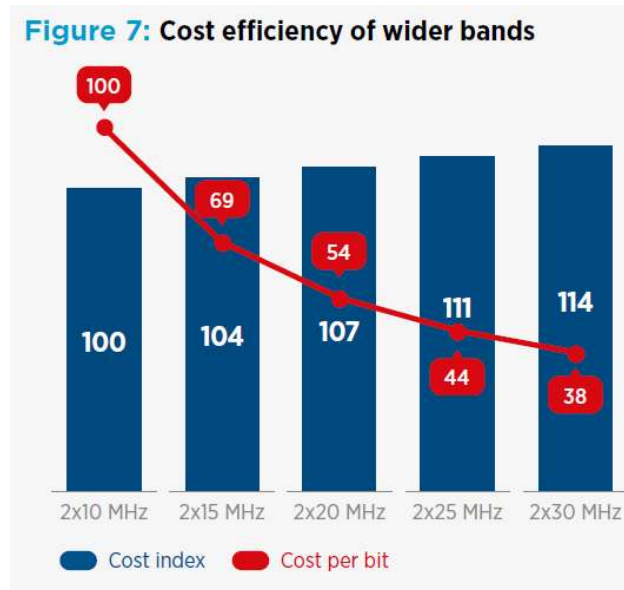
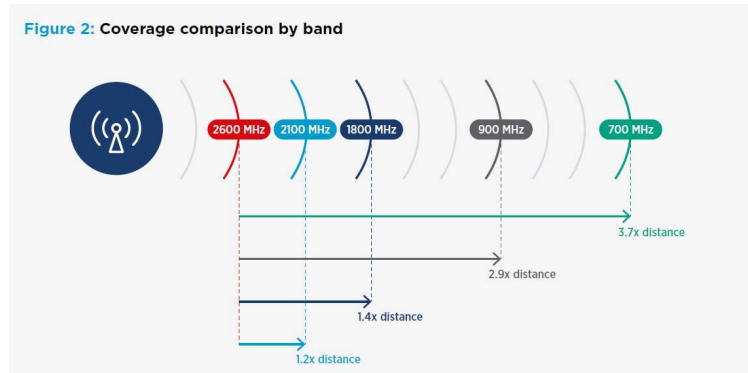
7. The impact of low band spectrum on coverage in wide and rural areas should not be lost on anyone. We bring your kind attention to GSMA paper on Vision 2030: Low-Band Spectrum¹, which brings out the impact of wider channels of contiguous low band spectrum in 5G coverage and costs.

To deliver sufficiently high data speeds in rural areas, as well as indoors in cities, the amount of sub-1 GHz spectrum matters as it is proportional to the user-experienced data rate.

8. The maximum availability of 700 MHz spectrum, in India is 2x45 MHz of mobile spectrum. Whereas the current proposal of Indian Railways would take the 700 MHz spectrum out of scope for any future commercial deployment in the country. The difference in coverage of 700 MHz band, cost efficiency of wider bands and wider

¹ <https://www.gsma.com/spectrum/wp-content/uploads/2022/07/5G-Low-Band-Spectrum-1.pdf>

channel impact on utilization, as noted by GSMA in aforementioned paper is reproduced herein below for reference.



9. The importance of 700 MHz band for public and private networks is evident from the above figures, **therefore it is critical that all the spectrum in 700 MHz band should be reserved for IMT and 5G services in the country and regular and ad-hoc demands of Government entities for spectrum should be explored from the spectrum identified for PPDR or other non-IMT bands.**

C. Optimal use of current Assignment to Indian Railways and National Capital Region Transport Corporation (NCRTC)

10. Notwithstanding the above submissions, in case a decision has been taken to assign only spectrum in 700 MHz band to Railways, then it is important that first option should be to ensure optimum use of already assigned spectrum. There cannot be a debate that tracks of Indian Railways and other such railways bodies like NCRTC cover a fraction of landmass and even in that area the overlap would be limited to a small number of areas. Thus, more than debating the additional assignment to Indian Railways, it is important to discuss the optimal use of spectrum already assigned.
11. Overall 2x5 MHz of 700 MHz spectrum has already been assigned to Indian Railways and NCRTC separately. We have already submitted in our comments to the TRAI consultation paper on *“Spectrum Requirements of National Capital Region Transport Corporation (NCRTC) for Train Control System for RRTS Corridors”* dated 9th June 2022, that only 5 MHz spectrum was sufficient to meet the requirements and demand for additional spectrum emanated from lack of co-ordination between Indian Railways and NCRTC.
12. Thus, before considering any fresh spectrum assignment, it would be important to examine as to why the spectrum already assigned to Railways cannot be used by Indian Railways and NCRTC in non-overlap areas. Further, even in overlap areas, the sharing of spectrum can be considered to optimize and help meet requirements of both entities. Furthermore, even in case of over-utilization in certain areas, the spectrum leasing option from BSNL can be explored.
13. **The Authority had already suggested possibilities of Radio Access Network (RAN) sharing to manage the spectrum requirements in overlapping geographical regions. We submit that in addition to very feasible option of RAN sharing, the option of spectrum sharing, and network slicing with the help of other TSPs can be used for such geographical regions.**
14. The Authority should examine this aspect of spectrum assignment and request the **Department of Telecommunications (DoT) to ask the parties to explore a way to share the spectrum. This should not be a difficulty as an expert body report certifying**

lack of interference risk is already in place and was discussed by the Authority as part of previous consultation exercise.

D. Impact on the Exchequer

15. A lot has happened since last assignment of free of cost spectrum in 700 MHz to Indian Railways. 10 MHz spectrum has been sold for over 39,000 Crores in 2022 and a 5G Stand Alone network has come up using this spectrum. The Exchequer stands to gain not only from the auction proceeds but also from regular license fee i.e. 8% percentage of AGR at present. In this background any free assignment to Government entities or PSUs will have massively impact the Exchequer.
16. Further, the assignment to Railways or other such bodies renders the spectrum unusable commercially as Railways pass through populated areas as well. Allocating the same spectrum to any TSP in non-Railways areas will lead to interference issues impacting the provision of safety and security applications. Thus, the spectrum allocated to Railways is lost for commercial deployment forever. **Therefore, no more spectrum in this 700 MHz band should be allocated for any other type of captive use by any Government/non-Government agency.**
17. We reiterate that while we agree that Railways requirements to provide mission critical passenger safety services & applications and video analytics for passenger security are valid and legitimate requirements, we strongly believe that the same can be met through non-IMT band spectrum instead of 700 MHz band which is one of the most important bands for coverage of IMT network meant for over 140 crore people in India. The spectrum in 440-470 MHz band and other bands discussed above will help provide sufficient bandwidth for video surveillance.

E. Common Service Provider for running critical telecommunication networks

18. Notwithstanding the above, in case it is decided that only the spectrum in 700 MHz band should be used for delivering high capacity, high efficiency and best performance along with highest security, the Authority should consider recommending a Common Service Provider (CSP) for meeting requirements of Railways and other bodies. This will be in line with other leading / secure public infrastructure built globally. The CSP can ensure that Railways and any first respondent including police, fire etc. can leverage the common infrastructure to deliver a seamless first response to any calamity or event.
19. Like FirstNet in the United States, this service provider will deliver an exclusive communication network for use of Railways and other First responders for Integrated Emergency communication and response system ("IECRS") using the spectrum in 700

MHz band already assigned to Indian Railways and entities like NCRTC. This will ensure the objective of efficient utilized without any fragmentation of IMT spectrum.

20. Furthermore, as the efficient management of available spectrum is one of Authority's primary functions under the terms of clause 11 (1)(a) of TRAI Act, 1997 as amended by TRAI Amendment Act 2000, we request the Authority to ensure that commercially sensitive spectrum in 700 MHz band is utilized in an optimum manner and for the larger public good and should not be blocked for the captive use of railway safety which can achieved by using the non-IMT spectrum bands or through a CAP.

21. To summarise, we submit as under:

1. **No IMT spectrum, 700 MHz band in the matter under consideration, shall be assigned for non-IMT applications.**
2. **Hence, no additional spectrum in 700 MHz band should be allocated to Indian Railways for building their safety network.**
3. **The fragmentation of 700 MHz spectrum should be avoided, and efforts should be made to migrate Indian Railways and entities like NCRTC to non-IMT spectrum identified for PPDR services.**
4. **In case the same is not possible, the requirements should be met from existing assignments to Indian Railways and NCRTC by sharing between various Railways entities.**
5. **In geographically overlapping areas, various railways entities shall use the technologies that facilitate sharing of spectrum, radio network, network slicing to build network within the presently assigned spectrum.**
6. **Notwithstanding the above, services of the CSP can be considered for meeting requirements of Railways and First Responders.**
7. **Any entities using administratively allocated spectrum for safety purpose should not be permitted to offer commercial communication services like Wi-Fi, IMT, FWA, point to point communication links to public or passengers.**

Issue wise response:

Q1. Whether an additional 5 MHz (paired) spectrum in the 700 MHz band should be assigned to Indian Railways (IR) in order to meet its requirement for safety and security applications? Kindly provide a detailed response with justification.

And

Q2. In case your response to Q1 is negative, -

(a) In what manner, the requirement of the IR for safety and security applications may be fulfilled?

- i. Specifically, whether it would be appropriate to devise a framework under which the 10 MHz (paired) spectrum [5 MHz (paired) assigned to IR, and 5 MHz (paired) reserved for NCRTC and other RRTS/ Metro rail network] in the 700 MHz band may be used by all types of rail networks on shared basis, subject to the outcome of the field trial recommended by the Authority in its recommendations on 'Spectrum Requirements of National Capital Region Transport Corporation (NCRTC) for Train Control System for RRTS Corridors' dated 28.12.2022? If yes, please suggest the key features which should be included in such a framework?
- ii. Any other suggestion may be provided with detailed justification.

(b) In case your response to Q(2)(a)(i) is affirmative, whether a frequency spectrum of 10 MHz (paired) in the 700 MHz band would be sufficient to meet the requirement of different rail provide a detailed response with justification.

RJIL Response:

1. We submit that 700 MHz is a commercially sensitive spectrum band as it is a major coverage band for 5G SA networks, especially in rural areas. We understand that as the load on 5G SA networks will increase, more and more coverage and capacity spectrum in sub-1-GHz bands will be required and 700 MHz will be the prime candidate for the same.
2. **Further, going forward, at least 2 x 20 MHz spectrum in 700 MHz band would be required to meet the 5G requirements across the country by each TSP, especially in rural areas.** As only 5 MHz spectrum is left vacant in this band and another 5 MHz band can be freed post cancellation of provisional assignment to NCRTC, it is imperative that no additional administrative assignments are made in this band. **In fact, the focus should be on freeing already assigned spectrum to ensure that sufficient spare spectrum is available in this band for existing TSPs as well as new entrants.**
3. Globally, the railways are being supported by spectrum in band other than 700 MHz band. In Europe, spectrum in 5.9 GHz band, 800 MHz band, 900 MHz band as well as 1900 MHz band has been made available for Railways². We are extracting and reproducing the relevant parts from European Union policy on 'Uses of Radio Spectrum', herein below.

² <https://digital-strategy.ec.europa.eu/en/policies/uses-radio-spectrum#:~:text=The%20frequency%20bands%20874%2C4,and%20management%20of%20railway%20operations.>

Radio spectrum has been made available to support automated cars and trains - the EU-harmonised 5.9 GHz frequency band (5 875-5 935 MHz) enables vehicle-to-vehicle connectivity on roads, as well as the operation of radio controlled urban rail transport. The frequency bands 874,4-880,0 MHz paired with 919,4-925,0 MHz, as well 1 900-1 910 MHz, are also harmonised in the EU for Railway Mobile Radio (RMR), which is intended to ensure ubiquitous control and management of railway operations.

4. It is also worthwhile to mention that even as per the National Frequency Allocation Plan (NFAP) 2022, spectrum bands identified for PPDR included 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 also indicates that part of 440-470 MHz may be considered for PPDR. **We submit that as spectrum in these bands is already available, the same should be utilized for meeting spectrum requirements for safety and security applications of Indian Railways and bodies like NCRTC. The spectrum in these bands can meet the requirements of both signalling and safety and security applications including video surveillance.**
5. The argument of network eco-system will not hold ground as once a massive customer like Indian Railways issues RFP/tender for procurement of equipment for such safety network, the suppliers are bound to develop the equipment on the non-IMT band assigned to them. **There can be special push to develop the network/equipment ecosystem indigenously under AatmaNirbharBharat programme and also by inclusion in PLI schemes.**
6. Notwithstanding the above, in case it is deemed that only spectrum in 700 MHz band can be used by Indian Railways then the existing assignments will suffice the requirements. **Already 5 MHz spectrum in 700 MHz band has been assigned to Indian Railways and another 5 MHz spectrum has been assigned to NCRTC for their Train control system for RRTS rail corridors. We believe that optimum and shared use of the 5 MHz spectrum assigned to Railways should be sufficient for both entities and there is no need for assigning more spectrum in 700 MHz band to Indian Railways.**
7. We submit that the assignment of 5 MHz spectrum to Indian Railways entities should be used efficiently. It is pertinent to mention here that the details of interaction between these entities note by the Authority in consultation paper on *“Spectrum Requirements of National Capital Region Transport Corporation (NCRTC) for Train Control System for RRTS Corridors”* dated 9th June 2022, and the expert report provided by the NCRTC, made it evident that there **is was no requirement for separate spectrum assignment for NCRTC and even the respective Authorities were clear on using the same spectrum, however, the delays in inter-departmental co-ordination led to the additional spectrum assignment to NCRTC.**

8. Now when, the urgent requirements of NCRTC have been met, **it is important for IR and NCRTC to co-ordinate and settle a shared usage plan for the existing spectrum allocation excluding the provisional assignment to Indian Railways. The Authority should recommend the DoT to resolve the issue between the entities instead of fragmenting this commercially important spectrum that can serve over 140 crore people of the country with IMT based mobile/FWA services that too when the Railway safety network can easily be deployed using non-IMT network. Further, use of non-IMT band will help Government of India to reduce loss to Exchequer that would result, if valuable IMT spectrum in 700 MHz band is blocked for non-revenue generating captive network that can be easily built over the non-IMT spectrum not required by telecommunication service providers.**
9. It is also worthwhile to mention here key objectives of spectrum allocation are to ensure its efficient utilization and obtain a market determined price and consequently, **the spectrum management Authorities are duty bound to ensure that all possible means are deployed to optimize the utilization of spectrum.**
10. Evidently, considering the length and breadth of Indian Railways, any spectrum assigned to IR will become **unusable for commercial networks across the country. Therefore, it is important that spectrum assignment is not from commercially viable and auctioned spectrum pool and all efforts should be made to optimize the use of existing spectrum assignments to different Government or PSU entities.**
11. Furthermore, in case of a **hypothetical scenario of capacity crunch in overlapping areas, the possibility of spectrum leasing and/or sharing by other TSPs can also be explored. This will help optimal utilization of spectrum already allocated for Railways.**
12. We also reiterate the submissions that for delivering high capacity, high efficiency, and best performance along with highest security, the Authority should also consider recommending a Common Service Provider (CSP) for meeting requirements of Railways and other bodies. This will be in line with other leading / secure public infrastructure built globally. The CSP, in line of FirstNet in United States, can ensure that Railways and any first respondent including police, fire etc. can leverage the common infrastructure to deliver a seamless first response to any calamity or event.
13. In view of the above, we submit that
 - a. **Spectrum in 700 MHz band should not be assigned to Indian Railways.**
 - b. **All efforts should be made to accommodate the spectrum requirements of Indian Railways and other Government undertakings and entities like NCRTC in non-commercial spectrum bands.**

- c. Non-IMT, PPDR bands under the NFAP, should be considered for this purpose.
- d. As a last resort, the shared usage of current assignment in 700 MHz band to Indian Railways should be used to meet additional requirements by Indian Railways and NCRTC.
- e. The Authority can also consider the possibility of a CSP for Railways and other designated users.

Q3. In case it is decided to assign an additional 5 MHz (paired) spectrum in the 700 MHz band to IR, whether there is a need for harmonization of spectrum in the 700 MHz band to make the spectrum assigned to IR, and NCRTC and other RRTS/ Metro Rail Networks contiguous? Kindly provide a detailed response with justification.

RJIL Response:

1. We reiterate our submissions that spectrum in 700 MHz is a commercially valuable and should not be assigned to any entity including Indian Railways on administrative basis. **Nevertheless, in case a decision has already been taken to assign more of this spectrum to Indian Railways, then any harmonization should not affect operational commercial networks.**
2. We submit that as RJIL network is already operational and serving a large number of customers and BSNL network is yet to come up, there is no point in disturbing the spectrum assignment to either Defence or RJIL. Accordingly, we are proposing following table for post harmonization assignment:

Sr. No.	Uplink Frequency (MHz)	Downlink Frequency (MHz)	Quantum (MHz)	Existing Assignment TSP/User	Revised Assignment TSP/User
1	703-713	758-768	10	Government User	Government User
2	713-718	768-773	5	Indian Railways	Reserved for BSNL
3	718-723	773-778	5	NCRTC/RRTS	Reserved for BSNL
4	723-733	778-788	10	Reliance Jio	Reliance Jio
5	733-738	788-793	5	Vacant	Vacant
6	738-743	793-798	5	Reserved for BSNL	NCRTC/RRTS (should be vacated)
7	743-748	798-803	5	Reserved for BSNL	Indian Railways

Q4. Should a uniform spectrum charging methodology be adopted for Indian Railways as well as for NCRTC and other RRTS/ Metro rail networks? If yes, which of the following spectrum charging methodology be adopted in this regard:

- i. Spectrum charging methodology based on Auction Determined price (ADP) as recommended in the TRAI's recommendations on 'Spectrum requirements of National Capital Region Transport Corporation (NCRTC) for train control system for RRTS corridors' dated 28.12.2022.
- ii. Spectrum charges as levied for Indian Railways as per DoT's Order No. P-11014/34/2009-PP (II) and P- 11014/34/2009-PP(IV) dated 22nd March 2012 (revised vide DoT's order dated 11.12.2023).
- iii. Apart from the methodologies highlighted in (i) and (ii) above, any other uniform spectrum charging methodology that may be adopted in this regard?

Details with justification may kindly be provided.

RJIL Response:

1. RJIL has a firm belief that all Access Spectrum, IMT identified and IMT targeted spectrum should be assigned only through a fair and transparent auction and should not be assigned through any other methodology. **However, in case this spectrum is assigned to Government Agencies like Indian Railways, then the assignment should be at market price.**
2. We submit that Auction determined price (ADP) is optimum measure for pricing the spectrum and all assignees should be required to pay the same. **Once a spectrum has been auctioned and ADP is available there should be no place for 'free of cost assignment' or 'formula-based charging'.**
3. Further, the assignment of spectrum to Indian Railways implies that the spectrum for all intent and purposes is lost for commercial use as the same spectrum cannot be used by any other assignee due to length and breadth of Railways. We submit that the ADP based formula for NCRTC also does not consider the fact that while the Railway Authority is using the spectrum in limited geographical area, but the spectrum is rendered useless in entire LSA. Therefore, the distance-based criteria should be removed, and spectrum charging should be for entire LSA. Accordingly, we submit that, the charging from Indian Railways should be the indexed market price for the complete 22 LSAs.

4. Indian Railways is a profitable government agency with a plethora of Public Sector Units (PSUs) that is offering its services at commercial rates and is capable of paying market price. **Nevertheless, in case Indian Railways desires free of cost spectrum on the grounds of safety and security related applications, then it should be accommodated from the spectrum bands reserved for PPDR services, as mentioned in previous section.**
5. We submit that in past DoT itself has taken a position that Spectrum is a scarce resource and may not be allotted free of cost. It would not be out of place to mention here that on a similar request for special dispensation on license fee waiver, on the grounds of metro rail organisation, being government in nature and working as public services, by a CMRTS licensee Gujarat Metro Rail Corporation (GMRC), DoT had not agreed to the proposition and concessions were given only on the aspect of payment terms and that too to bring parity with other licensees. We are extracting and reproducing the relevant excerpts of DoT view on these matters from the TRAI Consultation paper on “Review of Terms and Conditions of PMRTS and CMRTS Licenses” dated 29th August 2023, as herein below, for ready reference.

DoT's Views:

- (a) “Gujarat Metro Rail Corporation is a special purpose vehicle under the Companies Act 1956. This is 50:50 SPV Govt. of Gujarat and Govt. of India. GMRC may not be considered on equal footing with services like Police, Fire & Govt. Security.”*
- (b) “License fee may be levied as per terms and conditions of License Agreement.”*
- (c) “Spectrum is a scarce resource and may not be allotted free of cost.”*
- (d) “This may be accepted as at present only CMRTS licensees are paying advance payment, all other are paying subsequently. However, suitable safeguard may be ensured for Govt. revenue.”*

6. We submit that this principle should be followed for all assignments and no freebies should be given to any agency including Indian Railways.

Q5.If answer to Q4 above is no, whether the existing charging methodology as per DoT's Order No. P-11014/34/2009-PP (II) and P- 11014/34/2009-PP(IV) dated 22nd March 2012 (revised vide DoT's Order dated 11.12.2023) be continued for Indian Railways or some other spectrum charging methodology may be adopted specifically for Indian Railways? Please provide detailed response with justification.

RJIL Response: No, as mentioned in the previous response, Indian Railways should be required to pay the market price for the spectrum.

Q6. If a spectrum charging methodology similar to NCRTC and other RRTS/Metro rail networks, is adopted for Indian Railways, what should be the payment terms and associated conditions relating to:

- i. Upfront payment
- ii. Moratorium period
- iii. Total number of installments to recover deferred payments
- iv. Rate of interest in respect of deferred payment and prepayment –

Please support your answer with detailed justification.

RJIL Response: The payment terms for Indian Railways should be same as for all other users of this spectrum as per the Notice Inviting Application.

Q7. Any other suggestions relevant to the subject may kindly be made with detailed justification.

RJIL Response: We submit that all spectrum assignment to Indian Railways and NCRTC should be only for internal captive use only. The entities using administratively allocated spectrum should not be permitted to offer commercial services like Wi-Fi/IMT and any other type of voice, video communication etc. to the **public/railway passengers** who should continue to be served through the commercial communication networks established by telecommunication licensees. A clear instruction pertaining to this should be included in the spectrum assignment letter to all such bodies including Indian Railways.