



06 March 2024

**Shri Akhilesh Kumar Trivedi,
Advisor (Networks, Spectrum and Licensing)
Telecom Regulatory Authority of India
Mahanagar Doorsanchar Bhawan
Jawahar Lal Nehru Marg
New Delhi – 110 002**

Subject: Tata Communications Ltd. comments to TRAI Consultation Paper on ‘Assignment of Additional Spectrum to Indian Railways for its Safety and Security Applications’

Dear Sir

This is with reference to the TRAI Consultation Paper No. 01/2024 dated 07-02-2024 on ‘Assignment of Additional Spectrum to Indian Railways for its Safety and Security Applications’.

In this regard, please find enclosed herewith Tata Communication Limited’s comments for your kind consideration as Annexure.

We request you to kindly consider our submissions while finalizing the recommendations and would be happy to provide any additional information, if required.

Thanking You,

Yours Sincerely,
For Tata Communications Limited,

**Alka Selot Asthana
Vice President and Head Regulatory Affairs
(Authorized Signatory)**

Enclosed: As mentioned above

TATA COMMUNICATIONS

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**Tata Communications Limited's response to TRAI Consultation Paper on
'Assignment of Additional Spectrum to Indian Railways for its Safety and Security
Applications'**

At the outset, we thank TRAI for providing an opportunity to provide our comments on this consultation paper which has been issued basis DoT reference dated 26.07.2023 wherein DoT in its reference has informed TRAI that Indian Railways has requested for an additional 5 MHz of paired spectrum in the 700 MHz band to be allocated for enhancing its safety and security systems.

Further, DoT in its reference has also mentioned that TRAI may also consider the possibility of sharing of the spectrum between IR/ NCRTC/ RRTS/ Metro and other similar networks to ensure the efficient utilization of spectrum and also sought TRAI recommendation considering the different spectrum valuation methodology as recommended by TRAI for the 5 MHz of paired spectrum in the 700 MHz band, assigned to Indian Railways and for NCRTC, TRAI may examine and if found necessary recommend uniform spectrum valuation and charging methodology considering similar usage in the same spectrum band. Additionally, Indian Railways in its representation sent to DoT had also mentioned that Utilization of this spectrum by other users can be done provided the same does not cause any interference to the network of IR.

Tata Communications being an Enterprise Service Provider is required to deliver services to its Enterprise Customers' premises / locations as per their business requirements which is not feasible at all the times in terms of technical feasibility to access customer location(s) or areas where availability of fixed line connectivity (e.g. Fiber) is a challenge due to exorbitantly higher ROW cost. Tata Communications being an ISP licensee was administratively allocated spectrum in 3.3-3.6 GHz band which was used to provide services to Enterprise Customers since 2006 and was surrendered in Jan 2020 as the spectrum allocated in 3.3.-3.6 GHz was required to be vacated being identified for IMT/5G services. In order to serve Enterprise customers efficiently, there is need to have spectrum in licensed band for ensuring good quality internet connectivity for various Enterprises to meet their business requirement and digitization of their applications and services.

It is also pertinent to highlight that~40-50 percent of the Enterprise market in the country is being served by larger ISPs incl. Tata Communications alone (non-Access Service Providers) who are deprived of administrative allocation of spectrum for last mile access / connectivity to serve their Enterprise customers in an efficient manner whereas the Access Service Providers are still enjoying such administrative allocated spectrum (point to point) in the form of back-haul spectrum. The non-availability of spectrum for establishing last mile connectivity has put us into a competitive disadvantage as compared to the Access Service Providers providing services to the same Enterprise market segment. This creates non-level playing field between Access Service Providers and non-Access Service Providers in the Enterprise market resulting into Enterprise Customer churn due to deterioration in quality of service as per industry norms/ agreed SLAs on account of not having adequate spectrum for establishing last mile access / connectivity. In the absence of availability of spectrum, non-Access Service Providers like Tata Communications has

been finding it very difficult to retain existing Enterprise Customers due to increasing cost of maintaining the network on suboptimal unlicensed band using Unlicensed Band Radio (UBR). The use of UBR for last mile connectivity as against to earlier used spectrum in 3.3 GHz has many operational and technical challenges.

Similarly, in India, deployment of Captive Non-public Network (CNPN) by Enterprise is at nascent stage. The ecosystem for CNPN use cases are dependent upon the availability of wireless spectrum to Enterprises in an affordable manner instead of relying on Fiber connectivity. Presently, despite of having CNPN license framework in place, there is no take-off of deployment of CNPN by Enterprises due to the fact that Enterprises are struggling to either getting Spectrum on lease from Access Service Providers or deployment of CNPN by Access Service provider for Enterprises due to non-commercial viability and other technical reasons. There is an immense need for policy framework for assigning dedicated spectrum for Industrial applications and use cases directly to Enterprises on an administrative basis for deployment of CNPN or alternatively to Enterprise Service Providers who can provide CNPN services to the Enterprises at affordable cost and in an efficient manner. Pricing for such a spectrum allocation can be recommended by TRAI. However, the reuse of administratively allocated spectrum to primary users for public use / captive purposes would also be made available for other users for their captive use purposes.

In view of this context, it is submitted that TRAI may kindly recommend to DoT to permit alternative uses of such administratively allocated spectrum to the users for the public use / captive purposes to other users to ensure optimal utilization of the said assigned spectrum provided the same does not cause any interference to the network of said agency (s). It also suggested that the alternative usages of the administrative allocated spectrum may include such as last mile access connectivity (FWA Application), CNPN services by Enterprises at non-interference locations to other users with a condition of non-interference.

With the above submissions, we are hereby providing our inputs on the issues raised in the Consultation Paper:

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.

Tata Communications Response:

- Tata Communications prioritizes public safety and firmly believes that modernizing legacy systems is essential to keeping pace with evolving technologies. Legacy systems, like GSM-R, may lack the capacity and security features necessary to handle the demands of modern emergency response. This can create vulnerabilities in communication networks during critical situations.
- Newer technologies such as LTE and 5G offer increased speed, reliability, and broader bandwidth. This can significantly improve communication efficiency and coordination between first responders, ultimately saving lives and minimizing damage during disasters.

Allocating the additional 5 MHz vacant spectrum to relevant authorities like Indian Railways is crucial for facilitating the deployment and operation of these advanced communication technologies. This spectrum allocation can provide the necessary resources to build a more robust and reliable public safety communication network.

- Additionally, we suggest that this spectrum band can be shared between multiple users in a non- interference manner. For example - CNPN user which are geographically at a safe distance from the railway tracks can easily reuse this spectrum band. This not only increases the effective utilization of spectrum, but also primary holder can leverage its business by leasing its asset. There is already global best practice like CBRS which allows multiple users to share the spectrum without impacting each other. DoT/IR can adopt similar methodology for assignment of secondary user group. Similarly, such spectrum can also be reused for last mile access (FWA) / connectivity to serve the Enterprise customers in an efficient manner whereas the Access Service Providers are still enjoying such administrative allocated spectrum (point to point) in the form of back-haul spectrum.
- Therefore, Tata Communications fully supports the modernization of communication infrastructure and the allocation of additional spectrum to facilitate this critical advancement in public safety and spectrum sharing between multiple users in a non-interference manner.

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 [5MHz (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 Transport Corporation (NCRTC) for Train Control System for RRTS Corrido 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.**

Tata Communications Response: No Comments.

(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 networks in India particularly in the overlapping zones? Kindly provide a detailed response with justification.

Tata Communications Response:

- In the para no 2.47 of the paper, the studies done by IIT Hyderabad, total DL throughput requirement was around 4.06 Mbps and Upload throughput requirement around 43.86Mbps

for LTE based ETCS Level 2 signalling, this included ETCS Level-2, MC PTT + Voice, IoT services, Passenger information display system and On-Board Video Surveillance (minimum per Train). Which later changed to 13.06 and 45.820 Mbps respectively.

- We would like to mention that, since proposed communication network is mission critical and deals with safety of life, it is utmost required to perform the network as per desired performance. throughput performance depends upon multiple factors such as environment, obstacles, vegetation area, which further adds to the propagation losses of the cellular signals. IR passes through diverse geography and these propagation losses are inevitable.
- Throughput requirement mentioned in table 2.4 page no 18 of the paper related to *LTE FDD System Throughput* is more theoretical and may get deteriorate further with the account of propagation losses. It is evident that revised throughput requirement is significantly high for a 10 MHz network to deliver in practical, we would like DoT to be considerate of these factors.
- Alongside, we would also suggest IR to adopt latest 5G technology, which offers better spectral efficiency. Current as well as proposed throughput requirement can easily be met on 5G, hence we suggest IR to explore the 5G potential in this band. There are already OEMs and device ecosystem of 5G in this band.

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.

Tata Communications Response:

Yes, there is an utmost requirement of harmonization to make spectrum contiguous 10MHz for IR. Performance of a contiguous band is always higher than the two bands separated in frequency domain. Reason why IR is asking for additional 5MHz is because of additional throughput requirement which could not be fulfilled by 5MHz channel profile. If this 10MHz is not contiguous then it can impact the end device performance as well and may not suffice the requirement of IR, not all end devices support carrier aggregation and hence IR won't be able to reap the benefits of additional 5MHz. Thus, in order to leverage the full benefit of 10MHz, both the chunks (of 5MHz) need to be contiguous.

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.

Tata Communications Response:

- Tata Communication suggest adopting a uniform charging methodology, that is basis DoT's order 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).
- Auction determined price is different for each LSA and have a very wide variance, this gives irrational charges. Second methodology is basis royalty fee and independent of ADP and is more uniform.
- Since there is technical feasibility of spectrum sharing between primary and secondary user groups, we emphasise to add protection area for secondary users. This additional protection area other than focused/operational area can be charged at the same methodology.

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 35 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.

And

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:

- Upfront payment**
- Moratorium period**
- Total number of instalments to recover deferred payments**
- Rate of interest in respect of deferred payment and prepayment**

Please support your answer with detailed justification.

Tata Communications Response to Q 5 & Q6: No Comments.

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

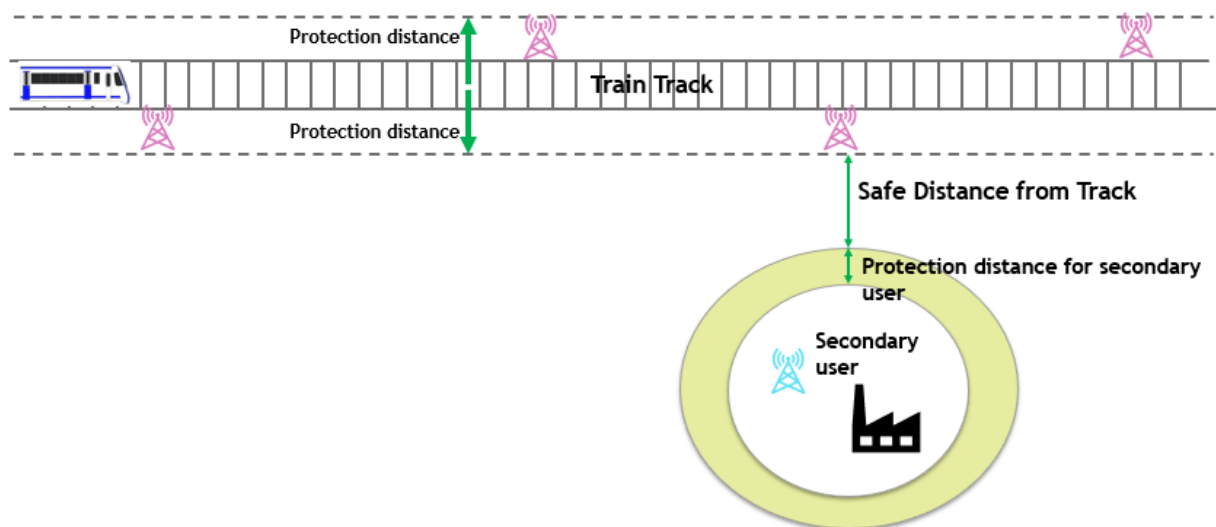
Tata Communications Response:

- There is growing demand for spectrum in India, a vital resource for various wireless technologies. With increasing mobile usage, internet penetration, and adoption of technologies like IoT, the pressure on spectrum allocation intensifies. spectrum is a finite

resource, and the current methods of allocation might not be optimal. Traditional methods often allocate entire bands to specific users, even if they utilize it only in specific areas, leading to inefficient usage.

- In today's world, Enterprises are becoming increasingly distributed and autonomous. The applications and services they deliver are increasingly demanding high bandwidth, as well as reliable, deterministic communications over wide areas under different conditions and multiple networks. Enterprises and enterprise networks are increasingly demanding more spectrum, more bandwidth and lower latency. Vertical industries each present their own set of unique requirements on communications networks and no one technology or operating model will meet the connectivity needs of the Enterprise. This makes the requirement of Enterprises quite complex and complicated involving use of multiple technologies and platforms to meet their needs.
- Tata Communications being an Enterprise Service Provider is required to deliver services to its Enterprise Customers' premises / locations as per their business requirements which is not feasible at all the times in terms of technical feasibility to access customer location(s) or areas where availability of fixed line connectivity (e.g. Fiber) is a challenge due to exorbitantly higher ROW cost. In order to serve Enterprise customers efficiently, there is need to have spectrum in licensed band for ensuring good quality internet connectivity for various Enterprises to meet their business requirement and digitization of their applications and services.
- Similarly, deployment of Captive Non-public Network (CNPN) by Enterprise in India is at nascent stage. The ecosystem for CNPN use cases are dependent upon the availability of wireless spectrum to Enterprises in an affordable manner instead of relying on Fiber connectivity. Presently, despite of having CNPN license framework in place, there is no take-off of deployment of CNPN by Enterprises due to the fact that Enterprises are struggling to either getting Spectrum on lease from Access Service Providers or deployment of CNPN by Access Service provider for Enterprises due to non-commercial viability and other technical reasons.
- There is an immense need for policy framework for assigning dedicated spectrum for Industrial applications and use cases directly to Enterprises on an administrative basis for deployment of CNPN or alternatively to the Enterprise Service Providers who can provide CNPN services and last mile connectivity (FWA) to the Enterprises at affordable cost and in an efficient manner. Pricing for such a spectrum allocation can be recommended by TRAI. However, the reuse of administratively allocated spectrum to primary users for public use / captive purposes would also be made available for other users for their captive use purposes.
- The example of Indian Railways (IR) using spectrum only near railway tracks and blocking its use for others highlights the issue. This approach prevents other users from potentially utilizing the same band in geographically separate areas without causing interference. There are many users group including Indian Railways which are occupying the spectrum and are using only in a certain area, for example- IR using spectrum only near to the railway track. But these authorities have prohibited the use of IR spectrum band for other users even if they are geographically miles apart. We strongly believe that same spectrum band can be used by

other users in a non-interference manner. Different methodologies can be adopted by DoT & IR to ensure no interference between primary and secondary user group.



Communications - Restricted

As depicted in the picture above, if IR is using a spectrum band along the track, then a secondary user like CNPN / FWA can easily use if the distance between IR track and CNPN user / FWA Application is at a safe distance to each other. Further studies can be done to define the protection area & distance for both primary & secondary user. We would like to suggest the distance to be categorised in four brackets 1. Highly safe, 2. Moderate Safe 3. Safe and 4. Close

- If CNPN user/ FWA falls in the first three categories then spectrum sharing shall be allowed. Periodic measurements can be done to ensure non-interference among spectrum users.
- Sharing unused portions of the spectrum can accommodate more users and technologies, leading to better efficiency and broader access.
- Primary spectrum holders like IR could potentially earn revenue by allowing other users to access their underutilized spectrum through leasing or market mechanisms.

In view of above submissions, it is submitted that TRAI may kindly recommend to DoT to allow alternative uses of such administratively allocated spectrum to Indian Railways / NCRTC/RRTS/Metro or any other similar agency for the public use / captive purposes to other users to ensure optimal utilization of the said assigned spectrum provided the same does not cause any interference to the network of said agency (s). It also proposed that the alternative usages of the administrative allocated spectrum may include such as last mile access connectivity (FWA Application), CNPN services by Enterprises at non-interference locations to other users with a condition of non-interference basis the pricing methodology as suggested in our response to Question no. 4 above.