



29 November 2023

**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 ‘Tata Communications Limited’s response to TRAI Consultation Paper on ‘Open and De-licensed use of Unused or Limited Used Spectrum Bands for Demand Generation for Limited Period in Tera Hertz Range’**

Dear Sir,


This is with reference to the TRAI Consultation Paper No. 21/2023 dated 27-09-2023 on ‘Tata Communications Limited’s response to TRAI Consultation Paper on ‘Open and De-licensed use of Unused or Limited Used Spectrum Bands for Demand Generation for Limited Period in Tera Hertz Range’.

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,**

  
**Praveen Sharma**  
**(Strategic Advisor)**

Enclosed: As mentioned above

**TATA COMMUNICATIONS**

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**Tata Communications Limited's response to TRAI Consultation Paper on  
'Open and De-licensed use of Unused or Limited Used Spectrum Bands  
for Demand Generation for Limited Period in Tera Hertz Range'**

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At the outset, we thank TRAI for providing us an opportunity to share our comments/inputs on this important consultation paper on Open and De-licensed use of Unused or Limited Used Spectrum Bands for Demand Generation for Limited Period in Tera Hertz Range. TRAI has in its paper focused on the spectrum lying unused or limited use in Tera Hertz range, especially from 95 GHz to 3 THz, for its open and de-licensed use, a move aimed to stimulate innovation and developing new applications.

We also welcome the initiative to open the frequency band from 95 GHz to 3 THz, for experiments under Spectrum-Terahertz Applications License. We are of the view that this will encourage the development of new communications technologies and new services, without any restriction on technical condition for designing and conducting experiments and tests in the country in the spectrum bands beyond 95 GHz. It is also submitted that these frequency bands should be delicensed to promote innovation and enabling opportunities to develop new services and technologies in line with DoT committee recommendations.

Further, we understand that THz wireless system can be used for captive & private networks across the industry verticals in various use cases such as precision robotic applications, machine vision, low latency-real time AR/VR applications, imaging applications in medicine, security screening, industrial quality inspection, remote repairs & maintenance of complex machinery and so on. It would be therefore appropriate that part of the spectrum is delicensed for the limited purpose of use by CNPN licensees on registration basis which can be done geographically to avoid interference in mission critical applications run on CNPN networks. However, THz frequencies are highly susceptible to atmospheric absorption and attenuation, which limit their range and reliability. This makes challenging to develop THz wireless systems for use in practical applications. Despite these challenges, frequencies above 300 GHz offer some advantages, such as the availability of larger frequency bands, which can enable higher data rates and greater capacity for communication systems. These frequencies are also used in remote sensing applications such as atmospheric monitoring, environmental sensing, and imaging, where the atmospheric attenuation and scattering properties can be exploited for specific applications.

In this regard, Tata Communications Ltd. comments on the issues raised in the Consultation Paper are as follows:

**Q1. Whether there is a need for permitting license-exempt operations in 116-123 GHz, 174.8-182 GHz, 185-190 GHz, and 244-246 GHz frequency ranges? Please provide a detailed response with justification.**



### **Tata Communications Response:**

Yes, there is a need for permitting license-exempt operations in the 116-123 GHz, 174.8-182 GHz, 185-190 GHz, and 244-246 GHz frequency ranges. As these frequency bands are largely unused or underutilized, allowing license-exempt operations in these bands will open up new opportunities for innovation and the development of new applications. These bands provide a good basis, although minimal, to enable development above 95 GHz.

The DoT Committee had also recommended that *the frequency bands, 116-123 GHz, 174.8-182 GHz, 185-190 GHz, and 244-246 GHz may be opened for unlicensed use. Initially FCC's Technical specifications may be adopted. After study in Indian environment, technical parameters may be revised.*

The Electronic Communications Committee (ECC) after detailed study concluded that the THz waves have the potential to revolutionize wireless communications, THz waves can support a wide range of new applications, and the use of THz waves is growing rapidly. As License-exempt operations can encourage innovation and development of new THz technologies and applications, ECC recently decided to permit license-exempt operations of the use of terahertz (THz) waves in the 116-123 GHz, 174.8-182 GHz, 185-190 GHz, and 244-246 GHz frequency ranges, for a variety of applications.

Additionally part of the spectrum can be delicensed for the limited purpose of use by CNPN licensees on registration basis which can be done geographically to avoid interference in mission critical applications run on CNPN networks.

**Q2. In case it is decided to permit license-exempt operations in 116-123 GHz, 174.8-182 GHz, 185-190 GHz, and 244-246 GHz frequency ranges, what should be the terms and conditions including technical parameters for permitting license-exempt operations in these bands, while protecting both passive and active services in and around these frequency ranges? Please provide a detailed response with justification.**

### **Tata Communications Response:**

While permitting license-exempt operations for ensuring equitable and safe spectrum usage while protecting both passive and active services, the following terms and conditions should be implemented:

#### **Technical Parameters:**

- a. Specific operating bandwidth within each band should be defined for license-exempt use to ensure dedicated space for unlicensed services while preventing interference with adjacent services.
- b. Maximum permissible power levels based on antenna type and application must be clearly defined.
- c. Stringent emission masks should be enforced to restrict out-of-band emissions, and to safeguard adjacent services.



- d. Efficient modulation techniques like Orthogonal Frequency Division Multiplexing (OFDM) should be used to optimize spectral efficiency and minimize interference.
- e. Dynamic Frequency Selection (DFS) and Transmit Power Control (TPC) should be implemented in specific situations to facilitate dynamic spectrum sharing with incumbent services.
- f. Geographic Restrictions like exclusion zones around sensitive sites like radio telescopes should be defined, to prohibit the license-exempt operation.

**Operational Requirements:**

- a. Mandatory registration of devices for identification and tracking purposes must be compulsory.
- b. All devices used must be clearly labelled, specifying operating frequencies and power levels.
- c. Mandatory compliance testing by accredited laboratories must be ensured for conformity with technical parameters.
- d. Clear procedures for interference mitigation and resolution should be defined.
- e. Stakeholders should be encouraged to collaborate and develop innovative spectrum sharing mechanisms for efficient coexistence.

**Q3. Whether there is a need for permitting license-exempt operations in any other bands in the 95 GHz to 3 THz frequency range? Please provide a detailed response with justification.**

**Tata Communications Response:**

The frequency bands in frequency range 95 GHz to 3 THz specified above in Q-1 have limited bandwidth. The full potential of the 95 GHz to 3 THz frequency range can only be unleashed, if wide bandwidth is being made available (20 GHz or more).

It is suggested to preserve regulatory flexibility in recognition of the difficulty of making predictions about the future path of technology and look into shared use with incumbents adjacent to these frequency ranges.

**Q4. Whether there is a need for permitting license-exempt operation in 77-81 GHz band for automotive radar applications? Please provide a detailed response with justification.**

**And**

**Q5. In case it is decided to permit license-exempt operations in the 77-81 GHz band for automotive radar applications, what should be the terms and conditions including technical parameters for permitting licensed-exempt operations in this frequency band? Please provide detailed response with justification.**

**Tata Communications Response to Q 4 & Q5:**

Yes, Tata Communications Ltd is of the view that there is a need for permitting license-exempt operation in the 77-81 GHz band. There are applications / use case available in this band for short range radar applications for the automotive industry. The 77-81 GHz band offers a number of



advantages for automotive radar applications, including - high bandwidth which enables automotive radar systems to achieve high resolution and range, low interference from other sources, such as satellite communications and Wi-Fi and this band is globally harmonized for automotive radar usage worldwide.

For the terms and conditions including technical parameters for permitting licensed-exempt operations in this frequency band, TRAI may refer the ETSI System Reference Document<sup>1</sup> for automotive collision warning Short Range Radar.

**Q6. Whether there is a need to open the frequency spectrum between 95 GHz to 3 THz for experiment and demonstration of equipment designed to operate on any frequency above 95 GHz through a separate experimental license? Please provide a detailed response with justification.**

**Tata Communications Response:**

Yes, there is a need to open the frequency spectrum between 95 GHz to 3 THz for experiment and demonstration of equipment designed to operate on any frequency above 95 GHz through a separate experimental license.

**Q7. In case it is decided to open the frequency spectrum between 95 GHz to 3 THz for experiment and demonstration of equipment designed to operate on any frequency above 95 GHz through a separate experimental license –**

**(a) What should be the terms and conditions under such a license? Kindly provide inputs in respect of, inter alia, the following aspects for the proposed separate experimental license:**

- i. Purpose of the license;**
- ii. Scope of the license;**
- iii. Eligibility conditions for entities seeking to acquire the license;**
- iv. Mode of applying for the license;**
- v. Duration of the license;**
- vi. Obligation under the license;**
- vii. Financial conditions including the license fees;**
- viii. Technical conditions and other terms and conditions for operations under the license;**
- ix. Mechanism to ensure protection to passive services in the frequency range between 95 GHz to 3 THz; and**
- x. Any other (please specify).**

**(b) whether the licensees should be permitted to market experimental devices**

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<sup>1</sup> [TR 102 263 - V1.1.2 - Electromagnetic compatibility and Radio spectrum Matters \(ERM\); Road Transport and Traffic Telematics \(RTTT\); Radio equipment to be used in the 77 GHz to 81 GHz band; System Reference Document for automotive collision warning Short Range Radar \(etsi.org\)](#)



**designed to operate in the frequency range between 95 GHz to 3 THz via direct sale?  
If yes, what should be the associated terms and conditions?**

**Please provide a detailed response with justification.**

**Tata Communications Response:**

In our view DoT has already established framework for the experimental licenses in FR1 and FR2 frequency bands, same framework could be used for the frequency range between 95GHz to 3THz without any additional conditions. This will promote a wide range of trials and use case testing using these spectrum bands and faster development of the ecosystem.

**Q8. Whether there are any other issues or inputs in respect of the frequency spectrum in Tera Hertz bands? If yes, please provide detailed comments with justification.**

**Tata Communications Response:**

It is important to note that since the terahertz bands offer a significant amount of spectrum, which could be used to develop new and innovative products and services, permitting license-exempt operations could encourage innovation in the terahertz technology sector. This could lead to the development of new and more affordable terahertz devices and systems.

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