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TRAI/FY23-24/56
Dated: 29.11.2023

To,
Shri Akhilesh Kumar Trivedi,
Advisor (Network, Spectrum and Licensing)
Telecom Regulatory Authority of India,
Mahanagar Door Sanchar Bhawan,
JawaharLal Nehru Marg,
New Delhi – 110 002.

Subject: Response to 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 in reference to TRAI’s 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” dated 27.09.2023 (CP No. 21/2023).

In this regard, please find enclosed our response for your kind consideration.

Thanking You,

Yours’ Sincerely,
For **Bharti Airtel Limited**

A handwritten signature in black ink, appearing to read 'Rahul Vatts', is written over a light blue rectangular background.

Rahul Vatts
Chief Regulatory Officer

Encl: a.a

**Response to TRAI Consultation on
*Open and De-licensed use of Unused or Limited Used Spectrum Bands for Demand Generation
for Limited Period in Tera Hertz Range***

Executive Summary

Airtel thanks the Regulator for coming out with this 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*" and providing all players with the opportunity to submit their inputs on the same. This consultative approach is essential to establish open dialogue and collaboration over the critical subject of delicensing of spectrum so that an appropriate, mutually well-regarded, and balanced regulatory framework for emerging technologies within the Tera Hertz (THz) spectrum can be developed.

THz frequencies hold future promises; however, it is too early:

We recognize the significance of the THz band in enabling groundbreaking innovations and applications across various sectors, from wireless communication to medical diagnostics and security. In the following paragraphs, we highlight the importance of THz frequencies, while cautioning against rushing into the decision of delicensing them at this stage since the applications and use cases are still at a very premature level of evolution.

The THz waves offer exceptional data transfer rates, revolutionizing wireless communication for larger throughput, improved connectivity, and reduced latency. This spectrum also excels in security screening, medical imaging, and material analysis, benefiting various applications. The THz spectroscopy aids in analyzing material composition in fields like pharmaceuticals, chemistry, and environmental monitoring. The THz spectrum is also utilized in astronomical research, including on star formation and cosmic background radiation.

Despite the promise, there are reasons to be cautious, for example, THz waves face limitations due to their short wavelengths and susceptibility to absorption which can affect line-of-sight communication, premature delicensing can cause interference with vital services like radio astronomy and earth observation - requiring careful management, the penetration capabilities of THz waves raise privacy and security concerns in security screening and imaging. This necessitates further research to fully harness the potential of the THz spectrum and developing regulations and standards for THz communication for safe and efficient operation.

Airtel's cautionary approach stems from the fact that once a regulatory decision has been taken, reversing the same (e.g., delicensing decision in this case) would be close to impossible.

Evolution of cellular communications and IMT services promise advancements, which, THz frequencies will strongly complement:

The evolution of cellular communication services, from 4G to 5G and the impending arrival of 6G, demonstrates remarkable progress and innovation in the industry. Anticipated technological advancements, including in beamforming, ultra-massive MIMO, reconfigurable intelligent surfaces, and embedded AI/ML, are expected to extend the usability of spectrum above 95 GHz for diverse network

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applications. IMT-2030 (6G) aims for ultra-high data rates and lower latencies, making the spectrum between 95 GHz and 300 GHz an impactful potential candidate.

Efforts in developing sub-Tera Hertz and Tera Hertz bands are underway, offering substantial bandwidth for high-data rates, low latency and advanced sensing. The backhaul ecosystem is evolving to meet the substantial demand, especially for 5G in mmWave deployments where fiber is cost-prohibitive. Ongoing studies by ITU-R, ETSI, and 3GPP are addressing the requirements of wireless communication in THz frequency bands. The 'Bharat 6G vision' in India recognises the crucial role of and emphasises the research in mmWave and THz communications.

While the future demands more licensed spectrum for 6G and beyond, Airtel recommends **not to take a hasty decision to adopt a license-exempt approach** until technical feasibility and use case requirements are thoroughly assessed, in order to prevent irreversible consequences and preserve avenues for deploying IMT when needed in India. Maintaining an adaptable ecosystem aligned with international regulatory organisations will be prudent, given the evolving nature of these bands.

Once a regulatory decision is taken, it remains for a long period of time and reversing it is never easy due to administrative, legislative, and commercial complexities. Airtel is of the view that there are downsides of delicensing such as - loss of regulatory control making it challenging to regain oversight, delicensing will prevent realising the full economic value of the spectrum, reversing delicensing disrupts established markets and can lead to financial losses, obsolescence of existing investments and innovations leading to technical and economic challenges. Further, users tend to start relying on delicensed spectrum and reversing it can lead to dissatisfaction. Additionally, the aspects related to international spectrum coordination will get complicated due to delicensing. Ultimately, undoing delicensing involves legal challenges and administrative burdens. Hence it is of utmost importance that a thorough regulatory impact assessment (RIA) is conducted before such decisions.

Experimental licensing is a better approach than delicensing THz spectrum:

We believe that **instead of deliberating the delicensing route** at such an early stage that too, to promote R&D, testing etc., **the government should explore alternate approach of experimental licensing (“EL”)**. This method is already in practice, and the same can serve this requirement of THz frequencies as well without causing a fundamental change in the licensing approach. **Experimental licensing provides regulatory control and oversight by allocating spectrum for research while minimizing interference risks - ensuring a structured resolution process.** The EL approach provides protection to incumbent users making them coexist with incumbents, ensuring continuity of essential services.

EL is ideal for innovation & research without disrupting existing services. This can encourage innovation and competition, particularly for startups and academia. In fact, EL can be tailored to specific use cases without the need for a permanent license. Since under the EL, the licenses are time-limited, it allows review & spectrum availability for other uses. Experimental licensing offers a controlled approach to harness its benefits while addressing the challenges and concerns. The terms and conditions of these licenses can be set in accordance with the Experimental and Technology trial licenses and Demonstration licenses as communicated by DoT.

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This approach supports the growth and development in various industries and technologies while safeguarding the efficient utilisation of these valuable resources.

In summary:

- a. There is no need for permitting license-exempt operations in any of the spectrum bands/frequency ranges under discussion.*

- b. The present DoT guidelines dated July 23, 2019; on Experimental and Technology trial licenses and Demonstration licenses are well-equipped to handle such requirements, including for the THz frequencies. Accordingly, there is no need for any separate experimental or demonstration license for any frequency band, including THz bands.*

Airtel thanks TRAI, once again, for allowing it to be part of this important dialogue and remains eager to support TRAI's ongoing efforts to drive innovation while ensuring responsible and equitable access to the THz spectrum.

In subsequent sections, we have provided question-wise responses.

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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.

Airtel Response:

No. Airtel believes that there is no need to authorise license-exempt operations within the 116-123 GHz, 174.8-182 GHz, 185-190 GHz and 244-246 GHz frequency ranges.

Remarkable advancements have taken place in the realm of mobile technology. The transition from 4G to 5G has taken less than a decade and there are already discussions about the upcoming 6G.

With the advent of 5G, an era of high-frequency carriers like mmWave, enabling real-time applications such as advanced wireless factory automation, has emerged and currently several international developments are in progress within these frequency bands.

Considering this ongoing situation, Airtel believes that it would be premature to make a policy decision that encompasses the broader interests of all stakeholders. The following paras describe the status of evolution of sub-THz and THz bands along with notable national and international developments:

- 1. Advancements in Spectrum Utilisation beyond 95 GHz:** Advancements such as improved beamforming, ultra-massive MIMO antennas, reconfigurable intelligent surfaces (RIS), embedded AI/ML, and enhanced energy efficiency are opening the door to spectrum utilisation beyond 95 GHz. IMT-2030 (6G) is targeting ultra-high data rates and low latencies, necessitating a substantial contiguous spectrum. Frequencies ranging from 95 GHz to 3 THz hold immense potential. Ongoing efforts are dedicated to the development of sub-THz and THz bands for wireless access and backhaul. These efforts include the W band at around 95 GHz and the exploration of the D band (110 - 170 GHz) as well as the H/J band (220 - 330 GHz) by original equipment manufacturers (OEMs). These sub-THz and THz frequencies offer significant bandwidth, enabling high data rates, low latency, high-resolution sensing and precise positioning.
- 2. Innovative Backhaul Systems in the D-Band:** Ongoing research is focusing on innovative backhaul systems^{1,2,3} in the D-Band, incorporating active phase array antennas with beam-steering.
- 3. Commercial Prototypes in the D-Band and W-Band:** With the publication of ECC/REC/(18)01 for the D-Band (110 GHz to 170 GHz) and ECC/REC/(18)02 for the W-Band in 2018, and forthcoming ITU-R recommendations aligned with ECCs, it is projected that commercial prototypes in the D-Band will be available in approximately two or three years. ETSI is also actively working to incorporate both W and D bands into harmonised standards for fixed systems.

¹ www.graph-x-project.eu/

² www.h2020-dream.eu

³ www.h2020-dragon.eu

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4. **Evolution of the Backhaul Ecosystem:** The backhaul ecosystem is expected to evolve ahead of the low-power access equipment ecosystem. There is substantial demand for backhaul capacity, particularly to expedite the deployment of 5G in mmWave, especially in situations where optical fiber deployment is cost-prohibitive or could lead to delay in deployment.
5. **Nokia's Breakthrough in D-Band Spectrum:** Notably, Nokia has achieved a live microwave connection⁴ using D-Band spectrum (130-175 GHz). This spectrum offers significantly higher bandwidth compared to existing microwave bands and serves as an ultra-high-capacity solution for 5G backhaul and fronthaul in densely populated urban areas. The trial, employing Nokia Bell Labs technology, explores the potential of frequencies beyond 100 GHz to meet the growing capacity demands of mobile networks.
6. **Research Initiatives in Tera Hertz Frequency Bands:** Numerous studies are actively underway by Working Party 5D (WP5D) of ITU-R and ISG THz group of ETSI to address the requirements of wireless communication in the THz frequency bands. Furthermore, 3GPP is set to initiate work on THz communication in 2024 after the initial studies by ITU-R WP5D and ETSI ISG THz group.
7. **Feasibility of IMT Deployment beyond 92 GHz:** The 'Document 5/131-E' dated 29th June 2023 from WP5D, titled '*Framework and overall objectives of the future development of IMT 2030 and beyond*' clearly indicates the feasibility of using bands above 92 GHz for IMT deployment scenarios. Additional ITU WP5D studies have shown that extreme densification in IMT systems operating in frequencies above 92 GHz, coupled with ultra-high bandwidths and massive multi-beam MIMO techniques, will significantly enhance user throughput and network capacity per unit area, supporting new and transformative services like immersive communications.
8. **Potential for Enhancing User Throughput and Network Capacity:** According to the ITU draft report titled "*Updates to the Draft working document towards a preliminary draft new Report ITU-R M.[IMT. Above 100 GHz] Technical feasibility of IMT in bands above 100 GHz*", frequencies beyond 92 GHz offer the potential to significantly enhance user throughput and network capacity:

"...In the context of extreme densification in IMT systems expected by 2030, particularly in frequencies above 92 GHz, there will be a substantial increase in both device density and the number of supporting network elements. This will be accompanied by the utilization of ultra-high bandwidths and massive multi-beam MIMO techniques, all working in tandem to maximize user throughput and network capacity per unit area. The objective is to facilitate the delivery of innovative services and applications, including immersive communications (Section 6.4.4 Ultra-Massive MIMO)..."

⁴ <https://www.nokia.com/about-us/news/releases/2022/04/13/nokia-demonstrates-live-d-band-microwave-backhaul-connection/>

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9. **India's 'Bharat 6G Vision'**: India's 'Bharat 6G Vision,' unveiled by the Hon'ble Prime Minister in March 2023, underscores the importance of Tera Hertz communication for high-speed indoor and outdoor applications. This vision promotes extensive research in mmWave and Tera Hertz communications. However, it is essential to acknowledge that these studies are in their initial stages, and specific use cases are yet to be finalised. Standardisation efforts are also in their infancy, and there is currently no established device ecosystem for these frequency bands.
10. **Ensuring Licensed Spectrum for 6G and Future Applications**: Looking ahead, securing more licensed spectrum is crucial to meeting the performance demands of 6G and its future applications. Airtel believes that it will be premature to adopt a license-exempt approach for specific parts of this spectrum. Such a decision should not be taken until all stakeholders thoroughly assess the technical feasibility for IMT and the requirements for various use cases. Therefore, India should maintain flexibility and keep the door open for potential alignment with international regulatory bodies to build an adaptable ecosystem that can benefit from global standardisation.

Further, there are far-reaching consequences of delicensing spectrum, such as:

- **Irreversibility of Delicensing and Additional Complexities**: Once a spectrum band is delicensed and the ecosystem around it is established, reversing the process becomes extremely challenging, disruptive, and often impractical. If THz bands are delicensed now, it would become very difficult to leverage them for future use cases such as IMT in the licensed telecom spectrum space due to the loss of regulatory oversight and control. If the spectrum is delicensed, it may lead to obsolescence of extant investments and innovations as well as reversing the decision may lead to legal and administrative challenges. **Therefore, considering the long-term consequences, delicensing of these critical spectrum bands should be avoided.**
- **Loss to Exchequer**: Introducing delicensing at such an early stage may prevent the government from realising the full economic value of the spectrum, which would not be in the best interests of the Indian economy.

Considering the evolving nature of these frequency bands, Airtel emphasizes that license-exempt operations should not be permitted in the THz bands in order to avoid the irreversible consequences of delicensing. If the THz bands are delicensed in a hurried manner, it may limit the deployment of IMT and allied licensed use cases when it is critically needed in India.

The policy goals of fostering innovation and advancing research and development can be more effectively realised by granting experimental or demonstration licenses within these frequency bands while maintain flexibility in utilization of spectrum resources. This approach is consistent with the principles set forth in the guidelines for Experimental and Technology Trial Licenses, as well as for Demonstration Licenses.

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In the light of the above, Airtel is not in favour of any policy framework related to the delicensing of THz bands. Rather, Airtel proposes issuing experimental or demonstration licenses for research and development in the Tera Hertz (THz) bands, spanning from 95 GHz to 3 THz.

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.

Airtel Response:

Kindly refer to our response to Question 1.

Airtel strongly opposes permitting license-exempt operations in the bands mentioned, instead, we believe **innovation and R&D can be more effectively accomplished by granting experimental or demonstration licenses within these frequency bands**. This approach is consistent with the principles set forth in the guidelines for Experimental and Technology Trial Licenses, as well as for Demonstration Licenses, by DoT.

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.

Airtel Response:

No. Kindly refer to our response to Question 1.

Airtel firmly believes that spectrum bands from 95 GHz to 3 THz should be safeguarded for IMT development rather than being delicensed. One way of doing this would be to institute a forward-looking strategy that permits the issuance of experimental and demonstration licenses in line with the guidelines for Experimental and Technology Trial Licenses and Demonstration Licenses.

This approach will not only foster innovation, but it will also unlock the vast potential of these frequency bands, driving technological advancements and enabling groundbreaking applications in various fields. By allowing experimental and demonstration licenses, a controlled environment for research and development will be established, allowing organisations and institutions to explore THz technology's capabilities while maintaining regulatory oversight.

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This method will not only uphold spectrum integrity but will also encourage responsible use. It will facilitate the testing and validation of applications with benefits for sectors like medical diagnostics, security, communication and material analysis.

Airtel believes that such a process will be the very embodiment of a commitment to continuous progress, fostering innovation and facilitating the responsible deployment of modern technologies.

Considering the above, Airtel firmly opposes permitting license-exempt operations in the frequency range spanning from 95 GHz to 3 THz.

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.

Airtel Response:

No, there is no need for permitting license-exempt operations in the 77-81 GHz band for automotive radar applications. The spectrum in the 76-77 GHz range is currently in a delicensed state for specific use cases, particularly short-range radar systems.

There is no compelling and well-defined demand from the existing user group in India for additional spectrum within 77-81 GHz pertaining to the development and assessment of Advance Driver Assistance Systems (ADAS). The characteristics of the applications enabled by this band are well accommodated with the existing allocation.

The E-band (71-76/ 81-86 GHz), which is adjacent to the 77-81 GHz band under discussion, is vital for mobile backhaul applications, and its importance is growing with the deployment of 5G and its upgrades. As a result, access to this band for backhaul mobile network operations will be critical in the near future, and its operation should therefore be free of harmful interference from other services.

ITU has conducted a study⁵ that has found potential adverse implications of using vehicular radars in the 76-81 range in E-band in some cases. Practical scenarios were identified by this study which result in interference levels above the threshold and additional studies are recommended in order to investigate ways to optimize coexistence of both services.

Therefore, before making a decision regarding license-exempt operations in 77-81 GHz band cannot be considered at this stage.

Further, the 77-81 GHz frequency band, also known as the "77 GHz band," is primarily allocated for several types of applications in the field of radio communication and radar systems. It is important to recognise

⁵ [Compatibility between point-to-point applications in E-band between fixed services and automatic radar \(itu.int\)](https://www.itu.int/ITU-T/overviews/compatibility/compatibility-between-point-to-point-applications-in-e-band-between-fixed-services-and-automatic-radar/)

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that the pursuit of a license-exempt approach for one specific user group within a shared spectrum could potentially have adverse implications for the broader community of users. The spectrum is a valuable and finite resource, and efficient allocation is crucial to ensuring equitable access and sustainable growth for all stakeholders.

In this context, adopting a license-exempt model exclusively for one user may inadvertently create an uneven playing field, impacting the potential for growth and innovation among other users. A harmonious and balanced allocation framework that considers the diverse needs and applications within the spectrum is essential to foster an environment of fair competition and technological advancement.

By maintaining a regulatory environment that values inclusivity and cooperation among users, the utilisation of this valuable resource can be optimised and it can continue to support the growth and development of various industries and technologies.

Some of the key applications that exist or can be operated in this frequency band include:

- 1. Research and Development:** This frequency band may be used for research purposes and experimental applications in the field of radio frequency technology and electromagnetic studies.
- 2. Automotive Radar Systems:** Currently there is no demand for this in India. However, this frequency range is also used for automotive radar systems. In particular, it is used for short-range radar applications, such as adaptive cruise control, collision avoidance and blind-spot monitoring in modern or driverless vehicles. These radar systems help enhance vehicle safety by providing information on the proximity of objects and potential collisions.
- 3. Industrial and Scientific Applications:** The 77-81 GHz band is also used in various industrial and scientific applications, including materials analysis and monitoring. It can be employed in areas like level measurement, distance measurement and process control.

As elaborated in the response to Question 1, the decision regarding the allocation of spectrum and associated terms for license-exempt use should be based on a comprehensive examination of specific use cases. This approach will ensure that spectrum resources are allocated judiciously, addressing the actual needs of users and applications.

Furthermore, it is essential to acknowledge that delicensing is an irreversible process with long-term implications. Reversing this process can be complex and may inadvertently limit the opportunities for other licensed use cases, including IMT, which plays a pivotal role in the efficient utilisation of spectrum resources.

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Considering these factors, it is Airtel's considered view that there is no pressing need at present for delicensing the 77-81 GHz band. The existing regulatory framework effectively balances the requirements of current users, and maintaining the status quo allows for continued proper and efficient utilisation of this spectrum.

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.

Airtel Response:

Kindly refer to our responses to Questions 1 & 4 above.

Airtel firmly believes that the delicensing of this spectrum is unnecessary, primarily because the usage of this band is evolving for different applications with different use cases and deployment scenarios. Furthermore, there has not been a specific, substantiated demand for this band from the relevant user group at this point in time.

As elaborated in our response to Question 4, an ITU study has shown that there can be adverse implications of operating backhaul and automotive radars in the said band as well as has suggested that further studies should be conducted in order to ensure coexistence of these services, if possible.

Considering the irreversible implications of the delicensing process and the substantial bandwidth involved, totaling 4 GHz, a measured and cautious approach would be best. **Hastily granting exemption from licensing to this spectrum could potentially unleash wide-ranging and adverse consequences.**

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.

Airtel Response:

Kindly refer to our response to Question 1.

In order to facilitate innovation and relevant research activities in THz communication, experimental licenses for the spectrum in 95 GHz to 3 THz may be given to interested organisations. In fact, that is the purpose of having experimental licenses with access to experimental spectrum for a defined period, extendable on a justified basis.

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Delicensing a band just for experimental purposes does not serve the objective of R&D. Further, in the long term, the utility and application/use cases of frequency range(s) should be clearly assessed.

It's important to note that while the frequency range from 95 GHz to 3 THz, often referred to as the "Tera Hertz" range, offers exciting possibilities, it also presents challenges, such as limited propagation distances due to the absorption and scattering of THz waves in the atmosphere. Therefore, applications within this range are often short-range or focused on specific use cases. They also encompass a broad spectrum with numerous potential applications in various fields. Some of the applications and technologies that are operated within this range include:

1. **Communication and Wireless Data Transfer:** Potential for high-capacity, short-range wireless data transmission. Researchers are exploring THz communication for ultra-high data rate wireless links in applications like point-to-point data transfer, backhaul needs for IMT networks as well as IMT-2030.
2. **Astronomy:** The spectrum is crucial for astronomical observations. Telescopes and sensors in this range help astronomers study celestial objects and phenomena, including the interstellar medium and molecular clouds.
3. **Imaging and Sensing:** THz radiation is known for its ability to penetrate many non-metallic materials without causing harm, making it valuable for imaging and sensing applications. THz imaging is used in fields such as security screening (e.g., detecting concealed weapons or explosives), medical imaging and material characterisation (e.g., identifying hidden defects in industrial materials).
4. **Semiconductor Characterisation:** In the semiconductor industry, THz radiation is used for non-destructive testing, such as the characterisation of semiconductor materials, the measurement of film thickness and the detection of defects in integrated circuits.
5. **Medical and Healthcare:** THz radiation holds potential applications in medical diagnostics and monitoring. There is research for potential non-invasive imaging, detecting skin cancer and analysing biological tissues.
6. **Remote Sensing:** THz technology has been explored for remote sensing applications, including environmental monitoring and earth observation.

The Department of Telecommunications (DoT), on July 23, 2019, had notified detailed guidelines pertaining to Experimental and Technology trial licenses, as well as Demonstration licenses. These guidelines provide a robust framework for conducting experiments, trials and demonstrations utilizing the spectrum awarded under the license.

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The scope of the above DoT framework can very well accommodate the R&D, experimentation, demonstration etc. aspects pertaining to the THz frequency bands; in an efficient and streamlined manner. This will also maintain regulatory clarity and simplicity as no new framework would need to be created specifically for the THz frequencies alone.

In light of the above discussion, Airtel firmly supports that:

- **There is no need for a separate experimental license for THz spectrum.**
- **The present DoT guidelines dated July 23, 2019, on Experimental and Technology trial licenses and Demonstration licenses are well-equipped to handle such requirements, including for the THz frequencies.**

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 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.

Airtel Response:

Response to (a):

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Please refer to our responses to Questions 1 and 6. Airtel firmly supports the issuing of experimental licenses to organisations expressing interest in the spectrum spanning from 95 GHz to 3 THz.

Since DoT has already laid down the guidelines and processes for Demonstration and Experimental Licenses, **Airtel believes that those guidelines should be adhered to and that there is no need to create a separate licensing regime.**

Response to (b):

No. Airtel strongly believes that the licensees should not be permitted to market experimental devices designed to operate in these frequency ranges via direct or indirect sale.

It is critical to ensure that the spirit of experimental licenses, which is focused on research, development and demonstration, is maintained. Otherwise, it will be tantamount to commercialisation and competition in the market, bypassing the legitimate routes of the licensed regime.

For example, when TSPs were assigned the 5G spectrum on a trial basis for a few months, the trial was conducted in an isolated and controlled environment to test various use cases and network elements. However, the spectrum was not assigned for commercial usage.

Further, based on TRAI's recommendations, the Government issued the guidelines for network testing before the launch of any services on a commercial basis. This meant that any service of a commercial nature had to be conducted under the proper licensing framework and the extract guidelines for the usage of spectrum on a commercial basis rather than under the garb of experimental licences. Such a sale, even on an experimental basis, would have resulted in the misuse of these licences and have distorted market conditions and the regulatory regime.

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

Airtel Response:

No comments