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Subject: Bharti Airtel's Comments on Consultation Paper on *Assignment of the Microwave Spectrum in 6GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, 21 GHz Bands, E-Band, and V-Band*

Reference: TRAI's Consultation Paper dated 28th May 2025

Dear Sir,

This is in reference to TRAI's Consultation Paper on *Assignment of the Microwave Spectrum in 6GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, 21 GHz Bands, E-Band, and V-Band* dated 28.05.2025.

In this regard, please find enclosed our comments to the consultation paper for your kind consideration.

Thanking You,

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

Rahul Vatts
Chief Regulatory Officer

Encl: a.a

Preamble:

At the outset, Airtel extends its sincere thanks to the Authority for inviting comments on the critical issue of assignment of spectrum in the traditional microwave backhaul bands, namely, 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, 21 GHz and in the E-band and V-band. This consultation comes at a particularly apposite time since India is in the throes of a rapid digital transformation, with 5G rollouts gathering pace and digital infrastructure becoming the backbone of socioeconomic development.

At a time such as this, it is imperative that a reliable and scalable backhaul is centrally at hand to deliver on the promise of universal, high-quality, and affordable connectivity, particularly when fiberization remains low and wireless backhaul continues to serve as the only viable alternative in many regions.

1. **India's Telecom Sector Growth:** The Indian telecommunication sector has witnessed remarkable growth in both voice and data services. As of April 2025, the country boasted over 1.20 billion telecom subscribers and more than 900 million internet users[1]. Voice usage in India continues to be among the highest globally, while the average monthly mobile data consumption per user has surpassed 24 GB[2]. Indeed, according to industry estimates, India's total monthly mobile data consumption is expected to cross 40 exabytes by 2027[3] — nearly doubling from 2024 levels. This exponential growth underscores the urgent need for scalable and cost-effective transport networks.

2. **Significance of Microwave Backhaul Spectrum:** The microwave backhaul spectrum forms the backbone of India's telecom infrastructure. More than 60% of India's mobile towers are currently dependent on wireless backhaul, with microwave links accounting for over 80% of all non-fiber backhaul connections[4]. In hilly, forested, or sparsely populated areas, including parts of the Northeast, Jammu & Kashmir, and tribal belts, microwave backhaul remains the only practical solution due to the challenges thrown by terrain and RoW. In the absence of a robust, reliable, affordable and scalable microwave backhaul framework, the effectiveness, reach, and quality of telecom services (4G/5G) and future technologies will remain significantly constrained, regardless of the amount of access spectrum made available.

3. **Rationalization of SUC is critical to fully utilize the potential of backhaul capacity:** In this context, it is noteworthy that the Government has taken several progressive measures to enhance the availability of access spectrum. The institution of annual spectrum auctions, the removal of Spectrum Usage Charges (SUC) for auctioned bands, and more flexible payment

[1] TRAI telecom data April 2025 shows 1.203 billion subscribers
[2] 27.5 GB average monthly data consumed by Indians, FWA using 12x more data than mobile users - The Hindu
[3] Mobile data traffic forecast – Ericsson Mobility Report
[4] MW Reco Final29082014.pdf

terms have together substantially improved the access spectrum environment. Consequently, the TSPs now hold significantly more access spectrum than they did a decade ago.

However, despite the higher availability of backhaul spectrum, TSPs have not been able to access more backhaul spectrum due to escalated higher SUC. Importantly, **India does not face a shortage of backhaul spectrum in absolute terms, and adequate spectrum exists in traditional microwave bands.** Yet, the current regulatory and pricing frameworks hinder efficient access and utilization by the TSPs. Specifically, the present SUC model, which imposes increasing charges based on the number of carriers and is linked to Adjusted Gross Revenue (AGR), results in an economically unviable cost structure, particularly in rural and low-traffic areas.

Without adequate and affordable backhaul capacity, even increased access spectrum cannot deliver its full potential—resulting in network congestion, slower speeds, and inconsistent coverage. To bridge this gap, there is a pressing need for rationalization of SUC for backhaul spectrum so that TSPs can access backhaul spectrum proportionate to their access spectrum holdings, thereby enabling the delivery of world-class telecom services in every nook and corner of the country.

4. Therefore, a carefully calibrated policy approach that ensures the continued availability of backhaul spectrum at nominal or rationalized rates is crucial for maintaining and accelerating India's digital growth trajectory. In this regard, please find below our key submissions:

a. Every Backhaul Band Plays a Critical Role—Just as in Access Spectrum

i. **In the same way that access networks rely on a mix of low-band, mid-band, and high-band (including mmWave) spectrum to meet diverse coverage and capacity needs, backhaul networks also require a range of frequency bands to address the unique geographical and infrastructural diversity of India.**

ii. **Each backhaul band serves a distinct and indispensable function:**

- **Low-frequency bands (e.g., 6 – 7 GHz)** are crucial for long-distance connectivity, especially in rural and remote regions, due to their superior propagation characteristics.

- **Mid-frequency bands (e.g., 13 – 21 GHz)** provide a balanced solution, offering moderate capacity and reach, making them suitable for semi-urban and expanding suburban areas. These bands are critical to bridge distance & reliability gaps and are used along with high frequency bands.

- **High-frequency and mmWave bands (e.g., E and V bands)** deliver ultra-high capacity over shorter distances, which is vital for dense urban environments and 5G small cell backhaul.

iii. **Just as no single access band can meet all network requirements, no single backhaul band can serve all deployment scenarios. A well-balanced and coordinated backhaul spectrum framework, encompassing low, mid, and high bands, is essential to enable seamless connectivity, support 5G expansion, and ensure equitable digital access across India.**

b. Strategic Spectrum Planning: 7 GHz for IMT, 15 GHz for Backhaul

i. The 7 GHz band (7.125–8.4 GHz) has been globally identified as a strong candidate for IMT and is under active consideration in WRC-27 under Agenda Item 1.7. The band holds immense promise due to its mid-band characteristics, potential for wide channel bandwidths, and the opportunity it presents for global harmonization.

ii. Reserving this band for future IMT use would ensure that domestic networks benefit from equipment scale, cross-border compatibility, and spectrum efficiency. Given that there is limited current usage of this band for backhaul purpose and the future required backhaul capacity in this range can be met through the 6 GHz band, the 7 GHz band should be preserved for mobile broadband services immediately without giving any further spectrum for backhaul purpose.

iii. In contrast, the 15 GHz band has become the bedrock of microwave backhaul across the industry in India. Its propagation characteristics, bandwidth availability, and mature equipment ecosystem make it indispensable, particularly for semi-urban and rural deployments. A substantial share of India's microwave links operate in this band.

Any move to reallocate the 15 GHz band for IMT would jeopardize current backhaul infrastructure and compromise the quality of mobile services. With fiberization still limited to around 46 percent, microwave remains the only scalable option in many parts of India. **The Authority should therefore preserve the 15 GHz band exclusively for licensed microwave backhaul use, even beyond WRC-27 - to protect infrastructure investments and service continuity.**

c. Urgent Need for Rationalization of Backhaul Spectrum Pricing

i. The current SUC model imposes escalating charges based on the number of carriers and is calculated as a percentage of AGR. This results in an inverted economic model where backhaul spectrum, which generates no standalone revenue, is subject to higher SUC than access spectrum.

ii. Such pricing creates a structural disincentive to deploy backhaul spectrum, particularly in rural and low-traffic areas where backhaul is most essential. Operators are compelled to limit deployment not based on need but based on cost escalation, which affects network quality and service reach.

iii. Comparative global analysis highlights that India's E-band spectrum is priced many multiples higher than that of other jurisdictions, by a factor of over 1000 in some cases. This makes India's current pricing regime unsustainable and misaligned with global best practices.

iv. A rational SUC model which is flat, low, and predictable must be adopted for backhaul spectrum. Delinking SUC from number of carriers would not only promote efficient deployment but also help optimize access spectrum utilization and improve consumer experience. In turn, this will result in greater overall revenue for the exchequer through increased usage, service growth, and enhanced LF/SUC collections from access spectrum.

5. In light of the above, Airtel respectfully urges the Authority to **retain microwave backhaul bands for backhaul purposes only.** At the same time, **any future-looking reforms must be sensitive to legacy deployments and their operational interdependencies.** The **7 GHz band should be reserved for future IMT/6G applications considering its low usage for backhaul purpose, while the 15 GHz band must be protected for continued backhaul use.** Most critically, a **rational pricing structure is urgently needed** to ensure that backhaul does not become the limiting factor in India's digital growth. A holistic, sector-sensitive, and legally sound framework that recognizes the foundational role of backhaul in the telecom value chain is the only way to ensure that India's digital future remains inclusive, affordable, and resilient.

In Summary:

1. *The demand for spectrum in traditional microwave backhaul bands, specifically 13 GHz, 15 GHz, 18 GHz, and 21 GHz bands, remains consistently high in India. This is attributable to their critical role in supporting the rapid growth of mobile broadband traffic, the limited reach of fiber infrastructure, and the ongoing deployment of 5G and future 6G networks.*

2. *MWA carriers should be assigned to TSPs holding access spectrum under Access Service Authorisation for the entire LSA on an exclusive basis. E/V band spectrum should be assigned to TSPs with Access Service Authorisation holding access spectrum for the entire LSA on an exclusive basis. There is no need at all to assign this spectrum to TSPs holding any other authorization other than Access Service Authorisation, and non-TSPs.*

3. *The allocation of 7 GHz band for IMT use is essential for sustaining the momentum of 5G rollouts, meeting future connectivity demands, and supporting national digital infrastructure development.*

4. *15 GHz band should be preserved for exclusive use as microwave backhaul spectrum, even post-WRC-27. No reallocation or repurposing of the band for IMT or unlicensed applications should be undertaken, given the critical dependency of national mobile infrastructure on this band.*

5. *The carrier size(s) and ceiling(s) for various backhaul bands should be as follows:*

S. No.	Spectrum	Carrier Size	Ceiling
1.	MWA (13/15/18/21 GHz) Carriers	28 MHz	8 carriers per LSA in Metros & Category A circles and 6 carriers per LSA in Category B & C circles
2.	MWB (6/7 GHz) Carriers	28 MHz	2 carriers per LSA in all categories of circles
3.	E-band	250 MHz	4 carriers per LSA in all categories of circles
4.	V-band	50 MHz	40 carriers per LSA in all categories of circles

6. *Validity of administratively assigned backhaul should be co-terminus with licenses/authorization (on migration to new regime under the Telecommunications Act, 2023).*

7. *The existing MWA/MWB assignments should not be disturbed as legacy backhaul equipment is incompatible to change in frequencies due to technical restrictions.*

8. *The power limits for the delicensed lower 6 GHz band be carefully evaluated before any meaningful real-world deployments are initiated. Without such an evaluation, there is a high likelihood that the band will see sub-optimal or negligible utilization for its intended unlicensed applications.*

9. *No spectrum in the traditional microwave backhaul bands be earmarked for last-mile Fixed Wireless Access (FWA) to customer equipment.*

10. *No portion of E/V bands should be earmarked for point-to-point connectivity requirements of captive (non-commercial/non-TSP) users.*

11. *No portion of E-band or V-band should be earmarked for services/usages other than backhaul, including "Access" and/or "Integrated Access & Backhaul (IAB)".*

12. *Entire 57–66 GHz frequency range in V-band should be adopted for radio backhaul purposes, in alignment with the internationally recognized framework.*

13. Neither low power indoor consumer device-to-consumer device usages, nor outdoor usages, should be permitted on a license-exempt basis in V-band.

14. For TSPs with Access Service Authorisation, the assignment of spectrum for E band, V band, MWA carriers and MWB carriers should be based on a percentage of AGR, but with the current rates significantly rationalized, preferably moving toward a fixed, nominal, or non-escalating fee model, consistent with its utility function

15. The existing SUC escalation matrix should be discontinued; instead, a uniform and nominal SUC rate should be applied across all carriers, regardless of the number held by the TSP.

16. The valuation of E/V bands and MWA/MWB carriers in the context of administrative assignment and for determining the applicable SUC must be based on their unique role as essential, non-commercial enabling infrastructure.

17. TRAI and DoT should adopt an independent and functionally appropriate framework to price backhaul spectrum, which is not linked in any manner to the pricing of IMT/mobile access spectrum.

In the remainder of this document, please find Airtel's question wise response to the TRAI Consultation Paper.

Question-wise Comments

Q1. What is the level of demand of the spectrum in the traditional microwave backhaul bands [viz. 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, and 21 GHz bands] for radio backhaul purposes? Kindly provide a detailed response with justifications.

Airtel Comments to Q1:

1. We would like to submit that since the early 2000s, the per-site backhaul capacity requirement has surged exponentially, driven initially by 4G and now by the rapid deployment of 5G. With the increasing rollout of 5G in both mid-band and millimeter wave (mmWave) frequencies, and assuming optimal utilization of access spectrum, backhaul demand is projected to grow by a factor of 3 to 5 over the next 5 years across most LSAs. This projected growth underscores the urgent need for forward-looking spectrum and infrastructure planning.

2. Considering the intensity of requirement for specific frequency bands across users and technologies to support wireless communications**, Airtel recommends the following:**

a. **Enhance Backhaul Capacity Provisions per Site:** It is recommended that backhaul capacity planning frameworks be urgently revised to accommodate the exponential growth in mobile data traffic in India, which is expected to increase from approximately 8.1 exabytes per month[5] in early 2018 to an estimated 58 exabytes by 2028[6]. This surge in data consumption necessitates a significant increase in per-site backhaul capacity, rising from around 4 Mbps to 1 Gbps and beyond. Regulatory policies should support infrastructure and spectrum allocations that are commensurate with this evolving demand.

b. **Address Increasing Network and Hub Density:** Given the rising density of mobile base stations and aggregation hubs, particularly in urban and semi-urban areas, it is imperative to ensure the availability of adequate backhaul spectrum and infrastructure. Enhanced microwave backhaul provisioning is critical to prevent congestion, maintain network reliability, and support low-latency services. The policies like access to more backhaul at nominal cost would help encourage investment in high-capacity and scalable backhaul solutions to meet the growing spatial and performance demands of dense network deployments.

c. **Traditional backhaul spectrum is and will remain central to India's telecom growth:**

   i. Indian telecom operators need access to backhaul spectrum across different frequency bands because each band serves a distinct purpose in network design, just like how operators use different access spectrum bands for specific coverage and capacity needs. The 13 GHz band provides an optimal balance between range and bandwidth and is widely used for inter-city or semi-urban links. The 15 GHz band supports higher throughput for moderate distances. The 18 GHz band is ideal for dense urban areas where high capacity is required but over shorter links. The 21 GHz band allows tight frequency reuse and is best suited for high-capacity, short-range backhaul in metros.

   ii. These traditional microwave bands are not interchangeable—they are complementary. Operators have developed their networks based on the spectrum bands available to them at various stages of their expansion and are consequently constrained to continue operating within those bands. As a result, access to the same bands remains critical to maintain continuity, avoid disruption, and scale up services efficiently. Forcing operators to switch to new bands would mean disturbing the existing infrastructure, reinvesting in equipment, and facing major rollout delays—especially when millions of subscribers are already connected through these backhaul routes.

[5] Mobile Traffic to Hit 18 Exabytes Per Month by 2018 | Datamation
[6] India's 5G Subscriptions Projected to Reach 700 Million by 2028: Ericsson Mobility Report

iii. Backhaul capacity planning should be undertaken with due consideration to the total access spectrum allocated and its expected full utilization over time. While current backhaul requirements are largely driven by limited traffic volumes and partial utilization of access spectrum, a forward-looking regulatory perspective should account for the peak throughput potential of the access spectrum already assigned to TSPs. For example, with the anticipated scale-up in 5G services and increased utilization of the 26 GHz band, the backhaul demand per site is projected to rise substantially—potentially reaching up to 4 Gbps per site.

iv. If these traditional backhaul bands are not made available or are repurposed for non-backhaul use, it will create an artificial scarcity, block network expansion, and derail the digital growth of the country. At a time when the government is pushing for universal 4G and 5G coverage, this would be a major setback.

v. Therefore, **continued and affordable access to these traditional microwave backhaul bands is critical, as it impacts millions of customers. Any denial of access would adversely affect connectivity, lead to a deterioration in quality of service (QoS), hinder network expansion, and undermine the government's Digital India vision.**

d. In light of the recent decision to delicense the lower 6 GHz band, it becomes imperative to address the resulting gap in mid-band spectrum availability for International Mobile Telecommunications (IMT). In this regard, **we submit that the 7 GHz band be considered for allocation for IMT services** due to the following factors:

i. **Mid-Band Spectrum is Critical for 5G Deployment**: Mid-band spectrum, particularly in the 6–7 GHz range, offers an optimal balance between coverage and capacity. It is widely acknowledged as essential for the scalable and efficient deployment of 5G networks. The unavailability of the lower 6 GHz band for IMT significantly constrains the ability of mobile operators to meet increasing demand for high-speed, low-latency services.

ii. **Growing Data Demand and Network Densification**: With exponential growth in mobile data consumption, driven by applications such as video streaming, cloud computing, IoT, and augmented reality, there is an urgent need for additional mid-band spectrum. Allocating the 7 GHz band for IMT would help address this demand and support continued network densification efforts.

iii. **Global Harmonization and Ecosystem Readiness**: Several international forums, including ITU and 3GPP, have initiated studies on the feasibility of 7 GHz for IMT. Early alignment and harmonization of the 7 GHz band for IMT would ensure a robust and cost-effective ecosystem of devices and equipment, benefiting both operators and end-users.

iv. **Spectrum Planning Continuity**: **The 6 GHz band was previously identified as a key candidate for IMT to support future mobile broadband requirements. With the lower portion now delicensed, it is both logical and necessary to consider the adjacent 7 GHz band for IMT to maintain spectrum continuity and avoid long-term planning disruptions.**

v. **National Broadband and Digital Inclusion Objectives**: Ensuring sufficient IMT spectrum is vital for achieving national goals related to digital connectivity, broadband proliferation, and socio-economic inclusion. The strategic allocation of the 7 GHz band for IMT will directly contribute to these policy objectives by enabling wider network reach and better quality of service.

vi. **Efficient Use of Spectrum Resources**: Given the scarcity and value of mid-band spectrum, it is essential to ensure that spectrum resources are allocated efficiently and aligned with evolving usage patterns and technological advancements. Allocating the 7 GHz band for IMT represents a prudent and forward-looking approach to spectrum management.

vii. Considering all above, **we submit that the allocation of the 7 GHz band for IMT use is a necessary and justified step to compensate for the delicensing of the lower 6 GHz band. It is essential for sustaining the momentum of rollouts to meet future connectivity demands, and support national digital infrastructure development.**

3. **Hence, the demand for spectrum in the traditional microwave backhaul bands, specifically the 13 GHz, 15 GHz, 18 GHz, and 21 GHz bands, remains consistently high in India. This is attributable to their critical role in supporting the rapid growth of mobile broadband traffic, the limited reach of fiber infrastructure, and the ongoing deployment of 5G and future 6G networks.**

Q2. For which commercial telecommunication services should the spectrum in traditional microwave backhaul bands be assigned for radio backhaul purposes? Kindly provide a detailed response with justifications.

Airtel Comments to Q2:

1. As a licensed TSP, we submit that the efficient and equitable assignment of spectrum in the traditional microwave backhaul bands, specifically the 13 GHz, 15 GHz, 18 GHz, and 21 GHz bands, is critical to ensuring the robustness, scalability, and quality of India's digital communication infrastructure. These bands form the backbone of mobile and broadband networks, particularly in regions where fiber-based backhaul is either unviable or significantly delayed. As spectrum is allocated under access authorization of UL, the associated backhaul spectrum shall enable all services that are delivered using access spectrum.

2. In view of the rapidly expanding mobile broadband ecosystem, the rollout of 5G services, and the impending emergence of 6G technologies, we submit the following:

   a. **Exclusive Use of Microwave Backhaul Bands for Mobile Services under Access Authorization:** Microwave backhaul spectrum should be allocated solely to support mobile services, including 4G, 5G, and future mobile generations, provided by Access Service Providers. These services are directly linked to public mobile communications and require a robust, high-capacity transport layer to deliver the quality of service expected by consumers and mandated by regulatory authorities.

      Permitting non-access entities or low-capacity services to access this critical spectrum risks congesting the available bandwidth and undermining QoS benchmarks. With 5G requiring multi-Gbps per site backhaul, shared or diluted access will prove detrimental to network performance and policy objectives

   b. **Substantial Investment in Access Spectrum:** TSPs acquire access spectrum at considerable cost through auctions, with the obligation to roll out high-quality mobile services across urban and rural areas. To realize the full value of this spectrum and meet regulatory performance benchmarks, access spectrum must be supported by sufficient and reliable backhaul capacity.

      On average, TSPs in India have invested over Rs.1.5 lakh crore in spectrum auctions[7] over the last five years. Such capital-intensive investments can only yield public benefits when complemented by affordable and assured access to supporting infrastructure like microwave backhaul.

   c. **Backhaul as a Complementary Resource:** The utility of access spectrum is inherently dependent on the availability of adequate backhaul. Without sufficient backhaul spectrum, TSPs are unable to unlock the full potential of access bands, leading to underutilization of spectrum assets and degraded end-user experience, particularly in high-traffic areas and during the rollout of 5G, where per-site capacity requirements are significantly higher.

   d. **Ensuring Service Quality and Coverage:** Assigning microwave backhaul spectrum exclusively for mobile services ensures network scalability, low latency, and consistent service quality, especially in regions where fiber deployment is limited or delayed due to Right of Way (RoW) and infrastructure challenges.

   e. **Need for Policy Alignment and Spectrum Prioritization:** To ensure a balanced and coherent telecom infrastructure policy, it is imperative that microwave backhaul spectrum, being a finite and critical national resource, be prioritized for use in mobile

[7] https://economictimes.indiatimes.com/industry/telecom/telecom-news/bids-in-spectrum-auction-cross-rs1-5-lakh-crore/articleshow/93257007.cms?from=mdr

network deployments. Allowing this spectrum to be diverted for non-mobile or low-priority commercial applications risks creating a structural bottleneck in India's mobile broadband architecture, particularly as 5G networks scale nationwide.

3. **In summary, Airtel recommends the following:**

   a. **Spectrum pricing and availability policies should recognize the complementary nature of access and backhaul, and be structured to ensure that backhaul does not become a limiting factor for mobile network performance or expansion.**

   b. **Regulatory mechanisms should protect backhaul spectrum from dilution by non-mobile or low-capacity uses, thereby preserving its strategic utility for high-capacity mobile deployments.**

4. **Therefore, the spectrum in traditional microwave backhaul bands should be assigned exclusively to TSPs holding access spectrum under Access Service Authorization. This recommendation is made in view of the critical role that backhaul spectrum plays in enabling efficient delivery of mobile services and the significant financial commitments made by TSPs to acquire access spectrum through market-based mechanisms. We urge the Authority to adopt this principle as a cornerstone of future backhaul spectrum allocation policies.**

Q3. Which of the following methods should be used for the assignment of the spectrum in traditional microwave backhaul bands for radio backhaul purposes for various commercial telecommunication services:
(a) Block-basis in LSA,
(b) Point-to-point link-basis, or
(c) Any other?
Please provide a detailed response with justifications in respect of the relevant commercial telecommunication services.

Airtel Comments to Q3:

1. Currently, the MWA carriers are assigned to TSPs with **Access Service Authorisation for the entire LSA on block-basis in LSA**, and to TSPs with other than Access Service Authorisation **on point-to-point (P2P) link-basis.**

2. Given the scale of mobile networks in India - with tens of thousands of sites per operator in each LSA - the **operational and logistical complexity of P2P link-based coordination is not sustainable**. A block-based assignment enables **operators to autonomously plan, deploy and optimize large** microwave networks, which is essential to meeting growing demand in a **cost-efficient and timely** manner.

3. **Advantages of assignment on block-basis to TSPs with Access Service Authorisation:**

   a. **Faster rollout:** Assignment on block-basis reduces the time required for deployment of network since it cuts out the cumbersome process of interference management.

   b. **Easier network planning:** The whole set of microwave carriers will be known in advance, making it easier to plan microwave network in such a way that each carrier is optimally loaded. This would ensure minimum network outages in cases of major and critical outage scenarios and, in turn, enhance customer satisfaction levels.

   c. **Cost-effective operations:** Implementing the right topology and plan will help operators to avoid frequent re-engineering, resulting in less wastage of hardware and site material.

4. **Disadvantages of P2P link-based assignment to TSPs with Access Service Authorisation:**

   a. **Logistical challenge:**

      i. The microwave links per operator run into the thousands in each LSA. P2P link-based assignments would put **the onus of interference management** on MW carriers assigned to different links on WPC. This would require that extensive interference analysis with the existing operating links of other TSPs be carried out, **requiring simulation tools, the geo-coordinates of connected sites, complete details of all links** (viz. antenna height, antenna gain, antenna radiation pattern power transmitted, etc.) and other details like nearby buildings, terrain, etc. This will be a huge challenge for WPC.

      ii. Therefore, **assignment on block-basis in LSA** is the only **practical way forward**. Even TRAI 2014 Recommendations took note of this and recommended "assignment on block-basis in LSA for all MWA carriers."

   b. **Not in line with the charging mechanism:** The spectrum charges for both **MWA and MWB carriers are currently charged for the entire LSA** (even though MWB carriers are assigned on a P2P link basis). In the interests of fairness, the assignment methodology should be in line with the spectrum charging mechanism. Accordingly, both MWA and MWB carriers should be assigned on block-basis in LSA.

   c. **Impact on Service Quality:** P2P link-based assignment introduces **delays and inefficiencies** that can impact the quality of service delivered to end users. Given India's heavy reliance on wireless backhaul in the absence of universal fiberization, delay in backhaul provisioning directly affects data throughput, network resilience, and customer satisfaction.

d. The above approach is critical for a country like India, where fiber deployment faces challenges due to terrain, cost, and ROW issues, microwave backhaul remains a critical enabler of digital connectivity. Assigning MWA spectrum on a block-basis to TSPs holding access spectrum under Access Service Authorization will ensure faster, cost-efficient deployment, better spectrum efficiency, and improved quality of service. Therefore, **the block-based model should continue for MWA to the TSPs holding spectrum under Access Authorization.**

e. **However, MWB assignment should continue as is basis for next 3 years, as it is already being recommended for IMT. No change is recommended for MWB assignment methodology for this short duration.**

5. **Therefore, Airtel recommends that the spectrum for MWA and MWB should be assigned to TSPs holding access spectrum under Access Service Authorisation; MWA for the entire LSA on an exclusive basis and MWB to continue as is considering it is being recommended for IMT in near future.**

Q4. In case it is decided to use different methods (block-based, link-based, or any other) for the assignment of the spectrum in traditional microwave backhaul bands for radio backhaul purposes for different types of commercial telecommunication services, what quantum of spectrum, and in which of 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, and 21 GHz bands should be earmarked for point-to-point link-based assignments? Kindly provide a detailed response with justifications.

Airtel Comments to Q4:

1. Please refer to our response to Q3 above.

2. **Airtel recommends the following:**

a. The extant policy of assigning MWA spectrum **on an administrative basis to TSPs holding spectrum under Access Service Authorisation on an exclusive basis for the entire LSA,** should be continued with.

b. **No specific P2P allocation should be made in 6 GHz (lower)** due to its future delicensing and critical use by TSPs for rural backhaul.

c. **7GHz band shall be excluded from P2P assignment as this band is under study for Access spectrum identification in WRC-27.**

Q5. What should be the terms and conditions for the assignment of spectrum in traditional microwave backhaul bands for radio backhaul purposes of various commercial telecommunication services, such as - (a) Carrier size; (b) Carrier aggregation; (c) Validity period of the assignment; (d) Renewal mechanism; (e) Roll-out obligations; and (f) Surrender of spectrum etc.? Kindly provide a detailed response with justifications along with the international scenario on the matter.

Airtel Comments to Q5:

1. In the current context, the terms and conditions for the assignment of spectrum in traditional microwave backhaul bands for radio backhaul purposes of various commercial telecommunication services are provided below:

   a. **Carrier size: Airtel proposes that the present carrier size should be continued with, i.e., 28 MHz, in traditional microwave backhaul bands.** A detailed justification of the same has been provided below:

      i. **Consequences of altering the Carrier Size:** The reason for continuing with the same carrier size is that the radios currently in operation are already compatible with the carrier size of 28 MHz. In case the size is altered, say, if it is made smaller, there is a high likelihood of the TSP in question not being able to acquire contiguous carriers totaling up to 28 MHz, thereby rendering the existing radios unusable and disturbing the entire network. Similarly, if the size is increased beyond 28 MHz, it may render the spectrum under-utilized, as all operators would compulsorily have to acquire a higher-sized carrier even if they did not need them.

      ii. **International Practices support Carrier Size of 28 MHz:**

      - The channeling plan defined by the ITU, for MWA and MWB carriers, permits the use of carrier sizes in the multiples of 28 MHz in each band. Nevertheless, while the carrier size is standardized at 28 MHz, TSPs can even currently utilize carrier bandwidths of higher sizes, i.e., 56/84/112 MHz, within their allocated spectrum, as per their requirements.

      - This is in line with the ITU Recommendations and international practices and hence carrier size must continue to be the same, and if any TSPs require a larger carrier size, they have the **option of obtaining two or more contiguous carriers** to maintain the **required spectral efficiency for increasing the same.**

      - For example, in the context of access spectrum, although block sizes are standardized in each band, TSPs frequently acquire multiple blocks, amalgamating their entire allocation into a unified spectrum chunk or multiple chunks based on their network deployment strategy. For example, in the 900 MHz band with a 0.2

MHz block size, a TSP might procure 50 blocks, deploying its entire 10 MHz holding as a singular spectrum chunk or two in the ratio of 5 MHz each.

b. **Carrier Aggregation:** As mentioned under point (a) above, carrier aggregation is permitted under the extant regime. It enhances equipment and operational efficiency, leads to energy savings, as well as reduces tower loading. Thus, it should not only be continued with, but also actively encouraged.

c. **Validity period of the assignment:**

i. Currently, the validity period of the MWA/MWB carriers assigned to a TSP is co-terminus with its license. This has worked well in the past, and there is no need for any change.

ii. Also, upon migration of a TSP to the new authorization framework under the Telecommunications Act, 2023, the existing validity of backhaul spectrum should continue seamlessly and automatically under the new regime. This will ensure regulatory continuity, protect prior investments, and avoid unnecessary operational disruptions during the transition.

iii. Therefore, **Airtel recommends that MWA/MWB carriers should continue to be assigned with a validity co-terminus with the license/authorization – in line with the prevailing practice.**

d. **Renewal Mechanism:**

i. As mentioned under point (c) above, under the extant regime, the validity period of the MWA/MWB carriers assigned to a TSP is co-terminus with its license. Accordingly, at the time of renewal of its licenses, a TSP has to submit a request to DoT for revalidation/renewal of its MWA/MWB carriers as well. This process has worked well in the past. It is aligned with the policy of assigning MWA/MWB carriers on administrative basis and with the validity period of MWA/MWB carriers being co-terminus with the license. Thus, the same should be continued with.

ii. Therefore, **Airtel recommends that the mechanism of renewal by application should be continued with – in line with the prevailing practice.**

e. **Roll-out Obligations:**

i. No, there is no need to prescribe any roll out obligations for MWA/MWB carrier assignment.

ii. TSPs holding access spectrum are already subject to rollout obligations specific to access services. These rollout obligations are designed to ensure that TSPs extend their network coverage to provide services to end-users within a defined timeframe and geographic area. This involves deploying cell sites, base stations and infrastructure to provide coverage to subscribers.

iii. Backhaul spectrum, on the other hand, is not meant to provide coverage at the access level; rather, its primary purpose is to establish high-capacity data links among various network elements. It only plays a supporting (and complementary) role in the telecommunications ecosystem by facilitating the efficient transport of network traffic between access points (e.g., cell towers) and the core network. Hence, there is no logical reason for having separate roll out obligations for MWA/MWB carriers.

f. **Surrender of Spectrum:**

i. As per the extant guidelines, a TSP may surrender an MWA/MWB carrier assigned to it by serving an advance notice of 30 days to DoT. This process has worked well in the past. Option to surrender is critical to ensure efficient spectrum utilization; and a simplified mechanism of surrender enables ease of doing business. Thus, the same should be continued with.

ii. Therefore, **Airtel recommends that TSPs should be allowed to surrender MWA/MWB carriers by serving a 30 days' advance notice to DoT – in line with the prevailing practice.**

2. In summary, Airtel recommends:

a. The carrier size in in traditional microwave backhaul bands should be 28 MHz, as per prevailing practice.

b. TSPs should be allowed to aggregate the carriers held by them, as per their business requirements, in line with the prevailing practice.

c. MWA/MWB carriers should continue to be assigned with a validity co-terminus with the license/authorization (on migration to new regime under the Telecommunications Act, 2023).

d. The mechanism of renewal by application should be continued with, in line with the prevailing practice.

e. There should not be any (separate) roll out obligations towards MWA/MWB carrier assignment for TSPs holding access spectrum.

f. TSPs should be allowed to surrender MWA/MWB carriers by serving a 30 days' advance notice to DoT – in line with the prevailing practice.

Q6. Is there a need to prescribe ceilings on the number of carriers that can be assigned to a commercial telecommunication service provider in each frequency band [6 GHz (lower)/ 7 GHz/ 13 GHz/ 15 GHz/ 18 GHz/ 21 GHz] or in a group of frequency bands for radio backhaul purposes? Kindly provide a detailed response with justifications.

Airtel Comments to Q6:

1. There is a clear need to **prescribe ceilings on the number of microwave carriers that can be assigned to a TSP holding spectrum under Access Service Authorisation in each traditional microwave backhaul frequency band (6 GHz lower, 7 GHz, 13 GHz, 15 GHz, 18 GHz, and 21 GHz) or across a group of these bands** for radio backhaul purposes.

2. Under the extant policy, there is no separate ceiling for each MWA band (13/15/18/21 GHz). There is only an overall ceiling for MWA carriers, taking all bands together.

3. Over the past two decades, existing network architectures have evolved without strict band-specific limitations. Consequently, operators have been assigned frequencies in various bands opportunistically, based on the request made by TSPs and the backhaul spectrum available at the time of allocation. Introducing band-specific ceilings at this stage, after certain allocations have already been made, would not only create uncertainty but could also disrupt ongoing operations and potentially disadvantage future rollouts.

4. To illustrate, an operator might have been assigned two carriers in the 13 GHz band within a metropolitan area in 2016, followed by a further two carriers in the same band in 2018. Should an individual band-wise ceiling be implemented, for example, restricting carriers to two per band, the operator would be mandated to relinquish two of its 13 GHz carriers and instead procure carriers in alternative bands. However, as previously established, legacy network infrastructure lacks compatibility with frequency alterations.

5. The overall ceiling in the MWA band should be linked to the total access spectrum allocated to a TSP. While the current ceiling is generally adequate in light of existing traffic levels on 4G and 5G networks, a significant increase in traffic load is anticipated over the next 3 to 5 years. Accordingly, it is recommended that the ceiling be subject to periodic review, preferably every three years, to ensure it remains aligned with evolving network demands and technological advancements.

6. The existing overarching ceiling has proven effective for the last two decades. **Therefore, it will be proper to maintain continuity with the same policy. We further believe that a similar approach be adopted in the case of MWB carriers, i.e., there should be an overall ceiling**

for MWB carriers, taking both the bands (6/7 GHz) together. There is no need to set distinct limits for each MWB band separately.

7. **In summary, Airtel recommends that the following ceiling should be considered:**

Sl. No.	Microwave Carriers	Present Demand
1.	**MWA** (13/15/18/21 GHz)	**8 MWA** carriers in each of Metros & Category A LSAs **6 MWA** carriers in each of the Category B & C LSAs
2.	**MWB** (6/7 GHz)	**2 MWB** carriers per each LSA

8. **In summary, any imposition of an individual band-wise ceiling would effectively result in the operator forfeiting its current spectrum holdings, thereby causing a complete disruption of services. Therefore, Airtel recommends that there should only be overall ceilings on the number of MWA carriers and MWB carriers, and there is no requirement for having individual band-wise ceilings within these groups.**

Q7. In case it is decided to prescribe ceilings on the number of carriers that can be assigned to a commercial telecommunication service provider (TSP) for each frequency band or each group of frequency bands, - (a) Should there be any criterion for the ceiling on the number of carriers that may be assigned to a TSP? If yes, what should be the criteria? (b) In case of group of frequency bands, how should the bands be grouped? (c) What should be the respective ceilings for each frequency band, or each group of frequency band(s)? (d) Should there be any provision for assignment of spectrum above the ceiling limit on a case-by-case basis? If yes, what criterion should be prescribed, based on which, additional spectrum above the ceiling limit may be assigned to a telecom service provider? Kindly provide a detailed response with justifications.

Airtel Comments to Q7:

1. Please refer to our response to Q6 above. **Airtel submits that there should only be overall ceilings on the number of MWA carriers and MWB carriers, and there is no requirement for having individual band-wise ceilings within these groups.**

2. Our comments to sub-sections of the question are as below for consideration of the Authority:

(a) Should there be any criterion for the ceiling on the number of carriers that may be assigned to a TSP? If yes, what should be the criteria?

i. The criteria for the ceiling on the number of carriers that may be assigned to a TSP, should be: the type of LSA and the quantum of access spectrum held by the TSP.

ii. Given the higher population density and higher quantum of traffic in Metro/Category-A circles, the requirement of MW carriers in these circles would be higher as compared to the Category-B/C circles. Thus, it is appropriate to have a higher ceiling in Metro/Category-A circles than Category-B/C circles. This is in line with the extant policy.

iii. Furthermore, proportional allocation based on access holdings ensures that operators with larger customer bases and heavier network loads receive backhaul capacity commensurate with their service delivery obligations. This is essential for maintaining QoS and enabling equitable competition. Without such a framework, smaller operators might accumulate excess carriers without corresponding access spectrum needs, leading to inefficient usage and spectrum hoarding.

iv. Therefore, a calibrated ceiling model, sensitive to LSA category and actual access spectrum holdings, strikes the right balance between capacity, fairness and operational efficiency. It will also provide the industry with a predictable and scalable mechanism to meet surging backhaul demands without distorting competition or resource allocation.

v. Even the Authority, in its Recommendations on "Allocation and Pricing of Microwave Access (MWA) and Microwave Backbone (MWB) RF carriers" dated 29.08.2014, had recommended ceilings based on the type of LSA and the quantum of access spectrum held by the TSP.

vi. **Therefore, in summary Airtel recommends the following:**

- **The ceiling on number of MW carriers should be based on the type of LSA, with a higher ceiling in Metros/Category-A circles than Category-B/C circles, in line with the extant regime.**

- **The MW carriers assigned to a TSP should be proportionate to the access spectrum held by it.**

- **However, it should be either based on the spectrum assignment or the existing ceiling whichever is higher.**

(b) In case of group of frequency bands, how should the bands be grouped?

i. Please refer to our response to Q6 above. Airtel submits that there should only be overall ceilings on the number of MWA carriers and MWB carriers, and there is no requirement for having individual band-wise ceilings within these groups.

ii. **Therefore, Airtel recommends that for prescribing overall ceilings, the bands should be grouped based on usage – i.e., MWA bands (13/15/18/21 GHz) should form one group, and MWB bands (6/7 GHz) should form another group.**

(c) What should be the respective ceilings for each frequency band, or each group of frequency band(s)?

i. **MWA Carriers:** The current guidelines allow a TSP with Access Service Authorisation to hold a maximum of 8 MWA carriers in each of the metros/Category-A LSAs, and 6 carriers in each of the Category-B/C LSAs. Airtel believes that this is sufficient to meet the industry demand both at present and in the near future.

ii. **MWB Carriers:** MWB carriers are currently assigned on a P2P link basis to all user categories. Having said that, Airtel submits that **MWB carriers should also be assigned on block-basis in LSA to TSPs with Access Service Authorisation, similar to MWA carriers** (please refer to the detailed response to Q3 in this regard).

Further, it is estimated that the operators with limited fiber infrastructure would need to acquire 2 MWB carriers initially, in order to meet their backhaul requirements. Thus, a ceiling of **2 MWB carriers per LSA**, in all categories of LSAs, should be sufficient.

iii. **Therefore, Airtel recommends the following:**

- **There should be a ceiling of 8 MWA carriers in each of the metros/Category-A LSAs, and 6 carriers in each of the Category-B/C LSAs.**
- **There should be a ceiling of 2 MWB carriers per LSA, in all categories of LSAs.**

(d) Should there be any provision for assignment of spectrum above the ceiling limit on a case-by-case basis? If yes, what criterion should be prescribed, based on which, additional spectrum above the ceiling limit may be assigned to a telecom service provider?

The spectrum ceilings should be periodically reviewed and revised to accommodate growing demands, while ensuring that the ceilings remain sacrosanct and are not exceeded.

Q8. In the new policy regime for the assignment of spectrum, whether there is a need to grant an option to telecom service providers already holding carriers in traditional microwave backhaul bands to retain the existing carriers with them? Kindly provide a detailed response with justifications.

Airtel Comments to Q8:

1. Given the legacy architecture of Indian telecom networks, where backhaul spectrum remains a critical pillar of connectivity, particularly in areas lacking deep fiber penetration, it is imperative that policy frameworks respect existing deployments. **Allowing TSPs to retain their currently held microwave carriers is not only essential for continuity but also for ensuring that India's ongoing 4G and 5G rollout is not derailed by regulatory disruptions.** In this regard, we submit the following:

2. **No flexibility for introducing change in vast legacy networks:**

   a. In India, presently, in the existing backhaul bands, a vast number of microwave hops, estimated to be ~ 5 lakh links, are already deployed. The legacy backhaul equipment has inherent limitations related to 'occupied bandwidth' ("OBW") and 'instantaneous bandwidth' ("IBW"). The designs of these systems are optimized for performance within specific frequency bands and sub-bands. Attempting any modifications to these systems could render existing backhaul equipment obsolete, necessitating a complete overhaul of the backhaul network. Therefore, practically, there is no flexibility to change the currently assigned spots.

   b. If such an exercise were undertaken, it would not only be a huge cost for TSPs, but also a colossal and time-consuming exercise, as new links would have to be commissioned in place of existing links, followed by a change-over, and finally the withdrawal of the old links.

   c. Moreover, there may be two scenarios in case of change in frequency:

      i. The operator is assigned a different sub-band within the same band.

      ii. The operator is assigned a different band altogether. While a different sub-band would require a change in radios (which itself would be a massive exercise), a different band (especially when the bands are widely separated) would disturb the entire link planning that the operator's network would be based on.

   d. For instance, in case an operator currently has spots in the 13 GHz band, it would have planned its network, including the number of links, their locations, etc., on the basis of the capacity of the 13 GHz band and its radiation and penetration characteristics. These factors would be very different for the 21 GHz band and would essentially require the

operator to re-plan its network from scratch, in case it is assigned spots in the 21 GHz band instead of the 13 GHz band.

e. Apart from the above, a lot of existing & planned inventory will go waste as new equipment hardware will be required. To prevent such adverse consequences, **it is essential that the TSPs are allowed to retain their existing MWA/MWB carriers.**

3. **Adverse Impact on Consumers:**

a. As previously explained, any modification to the existing frequency allocations assigned to MWA and MWB carriers would necessitate a complete overhaul of the legacy backhaul infrastructure. This process is likely to result in temporary service disruptions and degraded performance during the migration period.

b. For hundreds of millions of subscribers dependent on these legacy networks, such disruptions could lead to significant inconvenience, ranging from dropped calls and slower data speeds to limited access to essential digital services. These impacts would be particularly severe for users in underserved or remote areas where alternative connectivity options are limited. Any interruption in service continuity not only affects daily communication and productivity but also undermines customer confidence and satisfaction. Therefore, it is imperative that continuity and stability in frequency usage be maintained to safeguard the user experience and uphold public trust in digital infrastructure.

c. As per the latest TRAI data, Airtel alone has over 390 million wireless subscribers. The interests of this huge customer base would be adversely affected in case of any service disruption.

d. Since the prime objective of any policy has to be protection of the interests of consumers and public at large, the Government would do well to avoid taking the mammoth risk and allow TSPs to retain their existing MWA/MWB carriers.

4. It is pertinent to note that the fiberization in India, as stated by TRAI in its consultation paper, stands at 46%, which is very low, and the situation is not going to change materially for the next few years. In case TSPs are not allowed to retain their existing MWA/MWB carriers, only the TSP with the largest fiber footfall and without a legacy network will benefit. The networks of all other TSPs will be massively disrupted. This would give the competitive advantage to only one TSP, at the expense of others. Hence, allowing TSPs to retain their existing MWA/MWB carriers is vital.

5. Moreover, India's telecom market is not yet at a stage where a disruptive shift in microwave backhaul assignments can be undertaken without destabilizing the sector. Many regional and remote areas continue to rely solely on MWA/MWB due to the absence of viable alternatives.

Any change in their configuration would delay service expansion and hurt the government's broadband targets under BharatNet and Digital India.

6. **Hence, a stable and predictable policy environment is crucial for continued investments in telecom infrastructure. Any abrupt overhaul in spectrum assignments without ensuring continuity for existing deployments would disincentivize capital infusion into network upgrades, especially in high-capex areas like rural coverage and densification of 5G services.**

7. **In view of the above, Airtel recommends that the TSPs already holding carriers in traditional microwave backhaul bands must be allowed to retain the existing carriers with them in the new policy regime for the assignment of spectrum. This is essential to avoid massive cost burdens, prevent network re-planning, protect consumer interests, and preserve competitive parity. The Government and TRAI must prioritize continuity and stability over blanket realignment, and ensure that policy reforms are calibrated to India's operational realities and digital aspirations.**

Q9. As the 7125-8400 MHz range in the 7 GHz band and the 14.8-15.35 GHz range in the 15 GHz band are being considered for IMT in WRC27, whether there is a need to review the usage of 7 GHz and 15 GHz microwave backhaul bands at this stage itself, or should the review be undertaken after considering the outcome of WRC-27? Kindly provide a detailed response with justifications.

And

Q10. In case it is decided to review the usage of 7 GHz and 15 GHz bands at this stage itself, what should be the policy framework for the assignment of the spectrum in 7 GHz and 15 GHz microwave backhaul bands to take care the possible outcomes of AI 1.7 of the WRC-27? Kindly provide a detailed response with justifications.

Airtel Comments to Q9 and Q10:

1. While deciding the spectrum strategy for the country, it is important to take into account India's unique requirements and adopt a tailored approach.

2. **Use of the 7 GHz Band for IMT Services:**

   a. **Global Momentum under ITU-R WRC-27 Agenda Item 1.7**: The frequency range 7.125-8.4 GHz has emerged as a key candidate band for future IMT (6G) services, as part of ongoing global studies under Agenda Item 1.7 of the ITU-R preparatory work for the WRC-27. Considering numerous countries are actively participating in coexistence and compatibility studies to evaluate the feasibility of allocating this spectrum for IMT, this international momentum reflects the growing recognition of the 7 GHz band's potential to meet the spectrum demands of next-generation mobile broadband services.

b. **Opportunity for Global Harmonization and Economies of Scale:** The 7 GHz band presents a unique opportunity to achieve global harmonization for 6G spectrum, which has the potential to enable seamless global roaming, foster cross-border service continuity, and unlock economies of scale in equipment manufacturing. In our view, standardized use of the 7 GHz band for IMT would substantially reduce costs for network deployment and user devices, while also enhancing spectral efficiency and international spectrum coordination.

c. **Last Remaining Contiguous Spectrum Block in the Mid-Band Range:** Most importantly, there is a need to acknowledge that the 7 GHz band constitutes the last large block of contiguous spectrum within the low and mid-band frequency ranges, offering the potential for wide channel bandwidths of 200 to 400 MHz. This level of channelization is crucial for supporting the high data throughput, low latency, and network densification requirements of 6G, and will also serve to augment 5G capacity and coverage. Given the limited availability of contiguous mid-band spectrum elsewhere, the 7 GHz band is of strategic importance.

d. **Current IMT Spectrum Landscape in India:** Of the total spectrum identified for IMT use in India, a significant proportion lies in higher frequency bands, such as the 26 GHz and above, which are inherently limited in coverage and propagation characteristics. Conversely, new spectrum availability in the lower bands remains scarce. The inclusion of the 7 GHz band for IMT would help address this imbalance, offering a more favorable mix of coverage and capacity to support a broad range of use cases in urban and rural settings.

e. **IMT Use in the 7 GHz Band is a Long-Term Consideration Post-WRC-27**: Lastly, it is important to note that any regulatory decision to re-farm the 7 GHz band for IMT will only follow WRC-27 deliberations. As such, there remains a window of approximately 2 to 3 years before any potential reallocation takes effect. In the interim, existing backhaul deployments in the band may continue to operate. Migration of such links, if required, should be pursued on a voluntary basis, or alternatively, the band may continue to be allocated exclusively for operator backhaul use until it is formally transitioned to IMT.

f. **Considering all above, we submit that the strategic value of the 7 GHz band for future IMT deployment, particularly for 6G, cannot be overstated. Its global harmonization potential, mid-band propagation advantages, and ability to support wide bandwidths make it an essential asset in India's long-term spectrum roadmap. Hence, Airtel recommends that the 7 GHz band be reserved for IMT, while ensuring that near-term backhaul requirements are accommodated within the other microwave backhaul bands.**

3. **Continued Use of the 15 GHz Band for Microwave Backhaul Post-WRC-27:** As a TSP, we respectfully submit that the **15 GHz band must be preserved for continued use as microwave backhaul, even beyond the outcomes of the WRC-27.** The following factors clearly indicate

that this band is imperative for backhaul usage to ensure the resilience, scalability, and continuity of India's mobile and broadband infrastructure in the face of rising data demand and incomplete fiber coverage.

a. **Limited Fiberization and Ongoing Dependence on Microwave Backhaul:** Despite sustained industry efforts, the level of fiberization in India remains at approximately 46%**,** which is significantly below the global benchmarks required to support widespread 5G and future network deployments. Given the logistical and regulatory challenges related to fiber deployment, including RoW delays, cost constraints, and geographic limitations, microwave backhaul remains the primary and, in many cases, the only viable option for transport connectivity across large parts of the country, particularly in semi-urban and rural regions.

b. **Exponential Growth in Traffic Requires Proportionate Backhaul Capacity:**

   i. India is experiencing an unabated exponential rise in mobile data traffic**,** driven by increased smartphone penetration, video consumption, cloud-based services, and digital inclusion initiatives. As IMT bands are progressively deployed for access services, including mid-band and mmWave for 5G, the requirement for proportionate and high-capacity backhaul spectrum becomes even more critical.

   ii. Without sufficient microwave backhaul capacity, the utility of newly allocated access spectrum will remain suboptimal. This is particularly relevant for non-fiberized sites, which form a substantial portion of India's mobile network.

c. **Strategic Importance of the 15 GHz Band as a Backhaul Resource:** The 15 GHz band currently serves as a key pillar of the backhaul infrastructure across the telecom industry in India. Its technical characteristics, such as suitable bandwidth availability, favorable propagation, and mature equipment ecosystem, make it highly efficient and cost-effective for medium- to long-distance point-to-point backhaul links. The widespread use of 15 GHz band may rightfully mark the band as the "lifeline" of India's mobile backhaul network. A significant proportion of existing links are deployed in this band, supporting tens of thousands of cell sites across the country.

d. **Potential Reallocation to IMT Would Severely Impact Existing Infrastructure: Any consideration of re-allocating the 15 GHz band from backhaul to IMT under WRC-27 would have serious adverse consequences**, **including:**

   i. **Disruption of existing infrastructure:** Thousands of operational backhaul links would be rendered non-compliant or require forced migration, leading to costly and time-consuming reconfiguration.

ii. **Service degradation:** Loss of 15 GHz band could result in congestion or network instability, particularly in fiber-deficient areas where no immediate alternative exists.

iii. **Investment risk:** Reallocation would undermine long-term investments made by TSPs in backhaul planning, network rollouts, and spectrum licensing.

e. **In light of the above, Airtel strongly recommend that the 15 GHz band be preserved for exclusive use as microwave backhaul spectrum, even post-WRC-27. No reallocation or repurposing of the band for IMT or unlicensed applications should be undertaken, given the critical dependency of national mobile infrastructure on this band. We urge the Authority to extend regulatory certainty in this regard to support long-term investment and planning in backhaul infrastructure.**

f. **India's digital growth trajectory depends on a strong and uninterrupted backhaul layer, especially as we move toward widespread 5G adoption and any changes to allocation of 15 GHz band would threaten the integrity, affordability, and scalability of public telecom networks. We urge the Authority to safeguard the 15 GHz band for continued use as a microwave backhaul resource and to convey this position clearly in international spectrum harmonization forums such as WRC-27.**

Q11. Whether there is a need to earmark certain quantum of spectrum in traditional microwave backhaul bands for the last-mile connectivity (Fixed Wireless Access) to the customer equipment of commercial telecommunication services? Please provide a detailed response with justifications.

And

Q12. In case it is decided to earmark certain quantum of spectrum in traditional microwave backhaul bands for the last-mile connectivity (Fixed Wireless Access) to the customer equipment of commercial telecommunication services, - (a) What quantum of spectrum, and in which of 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, and 21 GHz bands should be earmarked for such purposes? (b) What should be the eligibility conditions to obtain the spectrum in traditional microwave backhaul bands for such purposes? (c) What should be the terms and conditions for the assignment of spectrum in traditional microwave backhaul bands for such purposes through auction such as- (i) Block size; (ii) Minimum quantity for bidding; (iii) Spectrum cap; (iv) Validity period of the assignment; (v) Roll-out obligations; (vi) Surrender of spectrum etc.? (d) Whether flexible use i.e., both backhaul connectivity, and last mile connectivity (fixed wireless access) to the customer equipment should be permitted in the frequency ranges earmarked for such purposes? If yes, should the terms and conditions of the auction of spectrum be the same as those applicable for the "access spectrum"? Kindly provide a detailed response with justification and international practice

Airtel Comments to Q11 and Q12:

1. It is pertinent to note that the traditional microwave backhaul bands serve a critical role in the transport layer of telecommunication networks, facilitating the movement of aggregated traffic between cell sites, aggregation nodes, and core networks.

2. India's regulatory and policy framework clearly defines customer connectivity as part of "access services", which must be delivered using access spectrum allocated through auction or administrative procedures under the Unified License.

3. The National Digital Communications Policy (NDCP) and Unified License conditions recognize the distinction between "access" and "backhaul," reinforcing the principle that customer equipment (end-user connectivity) is to be served via access spectrum.

4. **Any move to re-purpose backhaul spectrum for direct access to customer equipment would not only be inconsistent with current licensing provisions but would also distort the intended separation between network layers, leading to complications in spectrum management and interference mitigation.**

5. **Current Regulatory Framework Already Permits FWA Using Access Spectrum**

    a. There is no regulatory barrier preventing the deployment of Fixed Wireless Access (FWA) solutions today. TSPs are already empowered to use their access spectrum holdings to provide broadband connectivity, including FWA, to customer premises using licensed access bands such as 2.3 GHz, 2.5 GHz, 3.3–3.6 GHz, and mmWave spectrum, subject to rollout obligations and technical compatibility.

    b. In fact, the use of backhaul links as transport for FWA is already permitted within the current framework, where microwave links connect the wireless access node to the core network. However, the actual last-mile delivery to customer equipment must occur via access spectrum, as per regulatory and technical norms.

    c. The availability of mid-band and mmWave access spectrum provides ample opportunity for operators to deploy high-speed FWA without the need to divert scarce and valuable backhaul spectrum from its primary function.

6. **Risk of Spectrum Fragmentation and Inefficient Utilization:** In our view, earmarking any portion of the traditional microwave backhaul bands for access purposes such as FWA would result in:

    a. Artificial scarcity in already congested backhaul bands, particularly in urban and semi-urban areas where demand for high-capacity transport links is rising rapidly due to 5G rollout.

b. Increased interference risks, as mixing access and backhaul functions within the same bands compromises network planning and may degrade overall service quality for both use cases.

c. Undermining the investment case for TSPs, who acquire access spectrum through auctions at high cost, while creating potential regulatory imbalances if FWA is allowed to bypass access spectrum requirements via re-purposed backhaul spectrum.

7. **Importance of Protecting Backhaul Spectrum**

a. As India scales its 5G infrastructure and prepares for the transition to 6G, protecting and optimizing traditional microwave backhaul spectrum is of national strategic importance. The high throughput and low-latency requirements of next-generation networks will place significant demands on the backhaul layer.

b. Diverting spectrum from its core function of backhaul would undermine the performance, coverage, and scalability of mobile networks.

c. The Authority must ensure that scarce and high-demand backhaul spectrum remains fully available for its intended use, especially in fiber-deficient regions where microwave remains the only feasible transport medium.

8. **In view of the above considerations, Airtel strongly recommends that no spectrum in the traditional microwave backhaul bands be earmarked for last-mile Fixed Wireless Access (FWA) to customer equipment. The current policy and licensing framework already provides adequate avenues for delivering FWA using access spectrum, while maintaining the integrity and efficiency of backhaul resources.**

9. **We urge the Authority to maintain this clear distinction and prioritize the preservation of microwave backhaul spectrum for its core function i.e. supporting high-capacity, scalable transport for mobile and broadband networks. Earmarking any portion of these bands for last-mile access applications, such as FWA to end-customer equipment would disrupt the integrity of spectrum planning frameworks that have been carefully optimized for carrier-grade transport.**

Q13. Should a certain quantum of the spectrum in traditional microwave backhaul bands be earmarked for fulfilling point-to-point connectivity requirements of captive (non-commercial/ non-TSP) users? If yes - (a) What quantum of spectrum, and in which of 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, and 21 GHz bands should be earmarked for such purposes? (b) What should be the terms and conditions for the assignment of spectrum for such purposes, such as- (i) Carrier size; (ii) Carrier aggregation; (iii) Ceiling on the number of carriers; (iv) Validity period of the assignment; (v) Renewal mechanism; (vi) Criteria for the assignment of additional spectrum above the ceiling limit; (vii) Roll out obligations; and (viii) Surrender of the spectrum, etc.? Kindly provide a detailed response with justifications.

And

Q14. In case your response to Q13 is 'no', in what manner should the point-to-point connectivity requirements of captive (noncommercial/ non-TSP) users be fulfilled? Kindly provide a detailed response with justifications.

Airtel Comments to Q13 and Q14:

1. As far as earmarking a certain quantum of the spectrum in traditional microwave backhaul bands for fulfilling point-to-point connectivity requirements of captive (non-commercial/ non-TSP) users is concerned, **we strongly recommend that fiber connectivity should be the primary mode of backhaul, given its reliability and scalability. In case fiber is not feasible, services should be procured from licensed TSPs, who can offer managed microwave or fiber backhaul. Such a practice would help avoid fragmented and inefficient spectrum occupation and ensure better QoS and regulatory compliance in return.**

2. Alternatively, **such non-TSP users can also opt to use unlicensed bands to fulfill their needs.**

Q15. In case it is decided to assign the spectrum in traditional microwave backhaul bands on a point-to-point link basis to cater to point-to-point connectivity requirements of commercial telecommunication service providers as well as captive (non-commercial/ Non-TSP) users, whether there is a need to prescribe minimum link lengths (path lengths) in these bands? If yes, what should be the minimum link length for each of the traditional microwave backhaul bands? Kindly provide a detailed response with justifications.

Airtel Comments to Q15:

1. The telecom landscape in India is characterized by an exceptionally high density of network infrastructure, particularly in urban and semi-urban regions, where the concentration of users and services necessitates closely spaced cell sites to maintain service quality and capacity. This dense network topology is further intensified by the ongoing large-scale expansion of 4G infrastructure and the accelerated nationwide deployment of 5G networks.

These developments are being driven by increasing data demand, the proliferation of connected devices, and the Government's vision for a digitally inclusive India.

2. Furthermore, telecom networks in India are subject to frequent reconfiguration to accommodate rapidly evolving traffic patterns, shifts in user behavior, and dynamic changes in service demand. Such reconfigurations require significant operational agility and design flexibility from service providers to optimize network performance and maintain cost-efficiency.

3. In this context, **we submit that the introduction of minimum link length (path length) requirements for microwave backhaul bands would be counterproductive. Any such mandate would artificially constrain network architecture, limiting operators' ability to design optimal link topologies based on real-world deployment conditions. The operators may be forced to choose longer or indirect routing paths, even when more efficient, shorter links are both technically feasible and preferable.**

4. **Any such practice would delay network rollouts, as operators would be required to revisit and re-engineer backhaul designs to conform to arbitrary regulatory thresholds, thereby impeding timely infrastructure expansion.** Further, it will also reduce spectrum efficiency, as operators might be compelled to establish unnecessarily long links that consume more spectrum resources and potentially increase interference, when shorter, high-capacity paths would offer better technical and economic performance.

5. TRAI, in its paper has stated that the minimum path length has been prescribed in Singapore for each microwave backhaul band. However, it is pertinent to note that such considerations are based on specific regulatory, geographic, climatic, and spectrum management which are unique to that country. Replicating those minimum path lengths directly in India would not be feasible or effective as India is geographically vast and diverse, with varied geographical areas, climate zones and some regions can support longer paths, while others cannot. The Indian **TSPs needs longer backhaul links to serve larger rural and remote areas (especially for underserved regions)**. Low-density rural areas require longer range, lower frequency microwave links and last-mile fiber often being unavailable makes long microwave hops essential.

6. Given the scale, density, fiberization scenario and complexity of India's telecom networks, flexibility in link planning is critical and application of a similar regulatory model, as that of Singapore, is neither practical nor beneficial. **Any imposition of minimum path length requirements would undermine these operational imperatives, ultimately delaying connectivity goals and hindering optimal use of spectrum resources.**

7. **Considering that a substantial portion of the traditional microwave backhaul spectrum remains unallocated, we submit that there is currently no evidence of spectrum scarcity that would warrant restrictive conditions such as minimum link length mandates.**

8. Given the availability of ample unutilized spectrum, the priority should be to promote need-based and flexible spectrum assignments, which support rapid and cost-effective deployments, particularly in underserved and rural areas. Mandating minimum link lengths would conflict with the technical imperatives and limit the utility of MWA for emerging network requirements.

9. A flexible, non-restrictive regulatory framework aligned with actual deployment needs and evolving technological practices will be more conducive to achieving national connectivity goals and ensuring efficient spectrum use.

10. Also, **in case of non-commercial or captive users, we strongly recommend that fiber connectivity should be the primary mode of backhaul, given its reliability and scalability. In case fiber is not feasible, services should be procured from licensed TSPs, who can offer managed microwave or fiber backhaul. Such a practice would help avoid fragmented and inefficient spectrum occupation and ensure better QoS and regulatory compliance in return.**

Q16. Considering that the Government has decided to delicense the 6 GHz (lower) band (5.925-6.425 GHz) for low power applications, whether there is any need to prescribe certain measures to provide necessary protection to incumbent users such as Fixed Microwave (backhaul) Services, Fixed Satellite Service (FSS) etc. operating in the 6 GHz (lower) band? If yes, which specific measures should be prescribed for this purpose? Kindly provide a detailed response with justifications.

Airtel Comments to Q16:

1. **The power limits proposed under the draft regulatory framework for the lower 6 GHz band warrant a comprehensive and detailed study prior to finalization.** This is crucial given the strategic significance of the band for future wireless broadband and next-generation connectivity applications.

2. Any inappropriate power limit, if adopted without due technical validation, would lead to several adverse consequences, including but not limited to:

    a. **Ecosystem Disruption: Misaligned power thresholds may render equipment designs by OEMs non-compliant, necessitating significant redesign or re-certification.** This could reduce interoperability and disrupt supply chains, ultimately slowing down the deployment of advanced wireless technologies. It **may also lead to a failure to create a viable device ecosystem, consequently resulting in underutilization of the delicensed spectrum** and **loss of potential socio-economic benefits** envisioned from Wi-Fi 6/6E and similar technologies.

b. **Spectrum Underutilization: Incongruous power limits can also lead to inefficient use of a valuable mid-band spectrum resource.** This could significantly affect the coverage, indoor and outdoor penetration, ultimately resulting into an overall reduction in the economic and social benefits that could otherwise be realized from widespread spectrum adoption.

c. **Impact on Innovation and Investment**: Inappropriate power limits can further discourage investment in R&D, product development, and infrastructure by both domestic and global technology players. **A non-harmonized power regime also increases the risk of India becoming an isolated market, deterring international vendors from introducing cutting-edge technologies.**

d. **Hindrance to Affordable Broadband Expansion**: The lower 6 GHz band, if properly leveraged, has the potential to support affordable, high-capacity broadband access, especially in underserved and rural areas. Prematurely defined power levels may compromise the performance of wireless networks, thereby undermining national objectives pertaining to digital inclusion and the widespread proliferation of broadband services.

e. **Operational and Coexistence Challenges**: **If power levels are not aligned with realistic usage scenarios, they may result in unintended interference or incompatibility with existing users or services within or adjacent to the band, further complicating coexistence strategies.** Hence, there is a **need to evaluate and present the potential for harmful interference to existing or planned services, particularly fixed service links, fixed satellite services and IMT systems that may operate adjacent to the lower 6 GHz band**. These studies should provide empirical evidence on how unlicensed operations could influence the performance and reliability of such licensed services.

f. **Guard Band and Co-ordination Requirements:** It is important to determine whether guard bands, power level restrictions w.r.t. elevation angle, or co-ordination mechanisms are required to ensure interference-free operation on ground. Such requirements could significantly affect the practicality and efficiency of unlicensed use and must be evaluated before any regulatory decision is taken.

g. **Assess Aggregate Interference Risks from Large-Scale Low Power Deployments:** It is vital that technical studies also evaluate the cumulative interference potential of low power devices when deployed at scale, particularly in high-density urban environments.

3. Given the wide-ranging implications, **it is essential that the power limits for the delicensed lower 6 GHz band be carefully evaluated before any meaningful real-world deployments are initiated. Without such an evaluation, there is a high likelihood that the band will see sub-optimal or negligible utilization for its intended unlicensed applications.**

4. **Without power limits that are realistically studied and aligned with actual performance requirements, the band may remain largely unused or underused, defeating the core objective of enabling widespread, high-quality, unlicensed wireless access.**

5. **We therefore urge TRAI to recommend DoT to undertake a thorough, evidence-based evaluation of the proposed power limits. This assessment must be grounded in empirical data, account for India-specific deployment scenarios, and be aligned with international best practices. It should also include detailed propagation modeling, coexistence analyses, and inclusive consultation with key stakeholders including OEMs, ISPs, standards bodies, and incumbent users such as ISRO.**

6. **Such technical studies are primarily required to ensure that a data-informed and cautious approach is taken thereby confirming that spectrum policy decisions are aligned with national priorities and do not compromise service quality, investment certainty, or the broader public interest.**

7. **Global Experience Underscores the Need for a Calibrated and Evidence-Based Approach to De-licensing**

   a. While several advanced economies have moved toward de-licensing the lower 6 GHz band, **the anticipated large-scale benefits are yet to materialize**. Current trends suggest that the adoption of Wi-Fi 6E and Wi-Fi 7 technologies remains limited, primarily within enterprise and specialized use cases, with broader consumer uptake still emerging.

   b. In formulating India's policy approach, it is important to take into account not only global regulatory directions but also the actual outcomes observed in these markets. **The benefits of de-licensing have in some cases, been limited by factors such as the lack of mature device ecosystem, inadequate availability of compatible infrastructure, and other technical constraints.** This highlights the **importance of aligning de-licensing measures with ground-level readiness and implementation capabilities.**

   c. In this context, a measured and phased approach, supported by technical assessments and empirical data, would help ensure that any spectrum policy yields maximum public value. Specifically, **detailed technical studies on power limits and coexistence parameters for low-power indoor usage in the lower 6 GHz band should be undertaken to safeguard existing and future deployments, while also facilitating efficient unlicensed use.**

8. **Need for a Multi-Stakeholder Committee to Study Power Limits**

   a. In view of the critical importance of establishing appropriate power limits for low power usage in the lower 6 GHz band, **we propose the formation of a multi-stakeholder**

committee, comprising representatives from TSPs, equipment manufacturers, regulatory authorities and technical experts, similar to the collaborative frameworks implemented while arriving at EMF emission limits and 5G related deployments.

b. Considering ISRO operates satellite services in portions of the lower 6 GHz band, **any modification of power limits or spectrum usage in this band must be done with due consultation and technical coordination with ISRO** to ensure that new unlicensed or shared-use operations do not cause harmful interference to existing satellite operations. Their inputs are vital for defining coexistence parameters, protection criteria, and ensuring long-term spectrum sustainability.

c. Overall, a more effective strategy is required to optimize current allocations including resolving interoperability issues, strengthening backhaul infrastructure, and fostering public-private collaboration to unlock the full value of the bands. Notably, the **5 GHz band, despite being delicensed, remains underutilized till date, thereby confirming that any expansion in the delicensed spectrum footprint without addressing existing challenges does not lead to favorable outcomes**. Considering this, a collaborative approach involving OEMs, network providers, standards bodies, and policy experts will be essential in formulating a well-calibrated, future-proof regulatory framework in 6 GHz band.

d. Such a committee would facilitate an evidence-based and consensus-driven assessment of power thresholds, coexistence challenges, and interference mitigation strategies. This approach will **ensure that policy decisions are well informed, balanced, and supportive of both licensed and unlicensed use cases**, thereby safeguarding service quality and promoting efficient spectrum utilization.

9. **In summary, we recommend the following:**

a. **Prioritize IMT Access to Build Future-Ready Networks:** Given the projected average requirement of 2 GHz of spectrum by 2025–2030, TSPs require substantial access to mid-band spectrum to accommodate the rapid growth in mobile data traffic and rising per-user consumption. We submit that prioritizing 6 GHz band for IMT applications is both a strategic and necessary measure to address current spectrum shortfall. The availability of sufficient and contiguous mid-band spectrum is essential to support sustained network expansion, enhance overall capacity, and ensure the delivery of high-quality mobile broadband services.

b. **Technical Studies: A Prerequisite to Define the Power Limits as Proposed in Draft Rules:** We strongly recommend that if delicensing of the lower 6 GHz band proceeds, it is essential that the power limits be carefully evaluated before any meaningful real-world deployments are initiated. Without such an evaluation, there is a high likelihood that the band will see suboptimal or negligible utilization for its intended unlicensed applications.

This will ensure effective and reliable usage, enable a vibrant device ecosystem, and maintain parity with global markets while protecting existing licensed services.

c. **Promote Evidence-Based Spectrum Management:** It is suggested that power limit determinations be based on detailed empirical studies to ensure that de-licensing decisions are scientifically justified and operationally sound. This approach will enhance regulatory transparency, reduce the risk of unintended interference, and align national policy with international best practices for balanced and efficient spectrum utilization.

d. **Establish Clear Operational Parameters for Industry Compliance:** To support innovation while ensuring coexistence, it is important to define clear and enforceable operational parameters for low power devices based on technical assessments. Such clarity will enable industry stakeholders to design compliant equipment and services within a stable regulatory framework.

e. **Collaborative Deliberations through Multi-Stakeholder Engagement:** We strongly recommend forming a multi-stakeholder committee, comprising the concerned stakeholders, to conduct a thorough technical evaluation to ensure informed and balanced policy decisions, with respect to parameters like power limits that protect service quality and enable efficient spectrum use.

10. **A measured and technically thorough approach to the lower 6 GHz band will best serve the long-term interests of consumers, industry, and the digital economy.**

Q17. Any other suggestions relevant to the assignment of spectrum in 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, and 21 GHz bands may kindly be provided with detailed justifications.

Airtel Comments to Q17:

No comments.

Q18. What is the level of demand of the spectrum in the E-band (71-76 GHz, and 81-86 GHz) for each of the service/usage viz. "Backhaul", "Access" and "Integrated Access & Backhaul (IAB)"? Kindly provide a detailed response in respect of each service/usage with justification including availability of technical standards and ecosystem.

&

Q19. What is the level of demand of the spectrum in the V-band (57-64/ 66 GHz) for each of the service/usage viz. Backhaul, Access and IAB? Kindly provide a detailed response in respect of each service/usage with justification including availability of technical standards and eco-system.

Airtel Comments to Q18 and Q19:

1. **The scope of service/usage for spectrum in E-band (71-76 GHz, and 81-86 GHz) and V-band (57-64/66 GHz) should be restricted to backhaul only.**

2. **Critical role of E-band in 5G rollout and Promise of V-band in Small Cell Deployment:**

   a. India has witnessed one of the fastest 5G rollouts in the world mainly because of its seminal Cabinet reforms, path-breaking TRAI recommendations and, most critically, the decision of the DoT to assign E-band spectrum for backhaul. It is a known fact that the rollout of 5G services is intrinsically linked to availability of robust backhaul through fiber and, in its absence, E-band is essential. **By making E-band available to operators, the DoT ensured the rapid rollout of 5G services.**

   b. Further, with the advent of higher frequency access spectrum (e.g., 3.5 GHz, 26 GHz), the coverage radius per site continues to shrink, requiring a high density of small cells. **V-band offers a practical and scalable solution for connecting these small cells via short-hop, high-capacity wireless backhaul**. Thus, the demand for V-band backhaul will continue to grow significantly in urban and semi-urban zones for dense 5G and small cell architectures. Permitting access applications in V-band in parallel with backhaul use could lead to interference, congestion, and inefficient utilization of this valuable spectrum, especially in such dense deployment environments.

3. **Competitive issues likely to arise if scope of E and V bands usage is expanded beyond backhaul:** The level of fiberization in the country is very limited currently, and the situation is not about to change materially in the near future. Most TSPs are largely dependent on backhaul spectrum as they expand their fiber networks. In such a scenario, **any proposal to expand the usage of E and V bands and to use them for access and IAB would disrupt the telecom ecosystem and establish a near monopoly in the 5G space of the only TSP with a vast fiber footprint.** Had the Government subscribed to such a viewpoint earlier, India would not have witnessed one of the fastest rollouts of 5G services in the world.

4. **Growing backhaul requirement cannot be met by traditional microwave backhaul alone:**

   a. Over the last decade, the overall mobile data consumption and, consequently, the backhaul requirement per site, has grown manifold. Conventional microwave spectrum can barely keep up with the current bandwidth requirements for 4G, let alone 5G. Simply put, the amount of traffic surge that the access network is expected to witness will necessitate a multifold capacity augmentation at the backhaul level.

b. Therefore, although all TSPs are making every effort to fiberize their networks as rapidly as possible, using E and V bands for backhaul remains the only practical choice for TSPs given the fast pace of network rollout.

c. Having said that, it is also true that the clubbing of E/V bands for backhaul with access will deny backhaul rollout, creating a monopoly in 5G – the very reason that E-band was given. **Even internationally, many countries have identified E-band for providing only backhaul services to cater to the increase in data demands for 5G.**

5. **International Developments – support backhaul only usage:** The use of E-band for access services along with backhaul is not supported even internationally:

   a. E-band has been defined by 3GPP as appropriate neither for access services nor for IAB. Consequently, the ecosystem for E-band-compatible radios/handsets/FWA, based on 3GPP technologies does not even exist currently. In such a scenario, access connectivity to customers through E-band is completely out of the question.

   b. The ultra-high frequency bands are unsuitable for access use cases due to multipath propagation's high losses. Due to Line-of-Sight propagation requirements, these frequency channels are more suitable for backhaul. Consequently, 3GPP has not specified a band plan for E-band. Allowing access services in these bands will result in the wastage of scarce resources that are crucially required for constructing the high capacity backhaul for 5G and mitigating the challenges associated with fiber deployment.

   c. Also, in the previous WRC-23 cycle, spectrum access requirements w.r.t. subranges spanning 24 GHz to 95 GHz were analyzed. E and V (57-66 GHz) bands were excluded from identification for IMT. Even in the National Frequency Allocation Plan (NFAP) 2022, E and V (57-66 GHz) bands have not been defined for IMT in line with WRC resolutions.

6. **Adequate mmWave spectrum Already Available:**

   a. Currently, there is sufficient spectrum already available in the mmWave spectrum bands, which has been auctioned for IMT thus far. Also, DoT has identified additional mmWave bands in 37-43 GHz.

   b. Also, there is hardly any usage of mmWave bands, and TSPs have only deployed a handful of sites to comply with MRO requirements. In this context, there is no compelling reason to expand the scope of E-band beyond backhaul. Other mmWave bands, which are already assigned, can very well be used for providing the same service.

7. **Therefore, Airtel recommends that E and V bands should be used only for backhaul purposes. Deploying these critical bands for any other usage will destabilize the existing**

networks of TSPs, in addition to impacting the new rollouts. There is currently no case for use of E and V bands for purposes other than backhaul, and there is not likely to be any need for such usage in the near future as well.

Q20. For which commercial telecommunication services should the spectrum in E-band and V-band be assigned for radio backhaul purposes? Responses with detailed justifications may kindly be provided for E-band and V-band separately.

Airtel Comments to Q20:

1. The spectrum in E-band and V-band should be assigned only for radio backhaul purposes to TSPs holding access service authorization only and it should be assigned administratively – on an exclusive basis for the entire LSA.

2. It is important to underscore that the E-band, in particular, has played a pivotal role in facilitating the rapid and efficient rollout of 5G networks by Indian TSPs, positioning India among the fastest in the world to deploy next-generation mobile broadband infrastructure. Any fragmentation or diversion of this critical spectrum towards non-commercial use would compromise its optimal utility and undermine ongoing and future efforts to expand and strengthen telecom networks.

3. Therefore, to ensure continued momentum in digital infrastructure development and to maintain spectrum efficiency, **Airtel recommends that E/V bands should be assigned to TSPs with Access Service Authorisation for radio backhaul purposes only.**

Q21. Which of the following methods should be used for the assignment of the spectrum in E-band and V-band for radio backhaul purposes for various commercial telecommunication services: (a) Block-basis in LSA; (b) Point-to-point link-basis; or (c) Any other? Responses with detailed justifications may kindly be provided for E-band and V-band separately in respect of the relevant commercial telecommunication services.

And

Q22. In case it is decided to use different methods (block-based, link based, or any other) for the assignment of the spectrum in E-band and/ or V-band for radio backhaul purposes for different types of commercial telecommunication services, how much spectrum in E-band and V-band should be earmarked for the point-to-point link based assignment for radio backhaul purposes for commercial telecommunication services? Responses with justifications may kindly be provided for E-band and V-band separately.

Airtel Comments to Q21 and Q22:

1. Currently, E-band carriers are assigned only to TSPs with Access Service Authorisation, and the assignment is done on block-basis in LSA. On the other hand, there is no policy for assignment of V-band carriers. It is Airtel's suggestion that **spectrum in E-band and V-band should be assigned only to TSPs with Access Service Authorisation.** Please refer to our response to Q20 above for detailed justification. Further, it should be assigned on **block-basis in LSA**.

2. As also submitted in the context of MWA carriers in the response to Q3 earlier, **block-based assignment in LSA considerably reduces the time required for deployment of network, enabling faster rollout of services**. In fact, India witnessing one of the fastest 5G rollouts in the world has been possible only because of the availability of E-band spectrum on block-basis in LSA.

3. Further, **block-based assignment in LSA helps WPC to avoid the huge logistical challenges involved in the same. P2P link-based assignment, on the other hand, would require carrying out extensive interference analysis among the specific links assigned to various TSPs.**

4. Furthermore, especially in V-band, link distances are extremely short due to limited propagation, making P2P link-based assignments administratively unviable. Moreover, street-level deployment, particularly in urban small cell environments, involve multiple telecom operators sharing the same poles, rooftops or corridors. Given that pole infrastructure is frequently altered, shifted or upgraded, P2P link-based assignment would be technically inefficient and operationally untenable.

5. **Thus, block-based assignment in LSA ensures speed, operational agility and a lower regulatory burden, all of which are necessary for meeting 5G rollout timelines and high-capacity service levels. This model is essential to support dense, high-throughput and interference-free deployment in urban and suburban environments.**

6. **Therefore, Airtel recommends that the spectrum in E/V bands should be assigned only to TSPs with Access Service Authorisation, and the assignment should be done on block-basis in LSA.**

Q23. What should be the terms and conditions for the assignment of the spectrum in the E-band for radio backhaul purposes of commercial telecom services such as- (i) Band plan; (ii) Carrier size; (iii) Carrier aggregation; (iv) Validity period of the assignment; (v) Renewal mechanism; (vi) Surrender of the spectrum; (vii) Ceiling on the number of carriers (spectrum cap); (viii) Criteria for the assignment of additional spectrum above the ceiling limit; and (ix) Roll-out obligations etc.? Kindly provide a detailed response with justifications.

Airtel Comments to Q23:

1. Please refer to our response to Q20 above. We believe that the spectrum in E-band should be assigned only to TSPs with Access Service Authorisation. The terms and conditions for the assignment of the spectrum in the E-band for radio backhaul purposes of access services should be as follows:

(i) **Band plan:** The E-band spectrum should continue to follow the internationally harmonized plan (recommendation ITU-R F.2006 on radio frequency channel and block arrangements for fixed wireless systems) comprising of 71–76 GHz (uplink) and 81–86 GHz (downlink) with a 10 GHz duplex gap in between.

(ii) **Carrier size:** The carrier size for assignment of spectrum in E-band should be 250 MHz. Even under the extant regime, the carrier size for E-band is 250 MHz, as per TRAI's 2014 Recommendations. There is no reason to deviate from the same. Therefore, **Airtel recommends that the carrier size for E-band should be 250 MHz, as per prevailing practice and TRAI's Recommendations.**

(iii) **Carrier aggregation:** In line with prevailing practice in the case of MWA/MWB carriers, as discussed in our response to Q5(b) above, **TSPs must be allowed to aggregate the carriers held by them in E-band as well, to enable them to enhance spectral and spatial efficiency.**

(iv) **Validity period of the assignment:** As suggested in the case of MWA/MWB carriers in our response to Q5(c) above, **the validity period of assignment of E-band should also be co-terminus with the license.** Also, upon migration of a TSP to the new authorization framework under the Telecommunications Act, 2023, the existing validity of backhaul spectrum should continue seamlessly and automatically under the new regime. This will ensure regulatory continuity, protect prior investments, and avoid unnecessary operational disruptions during the transition.

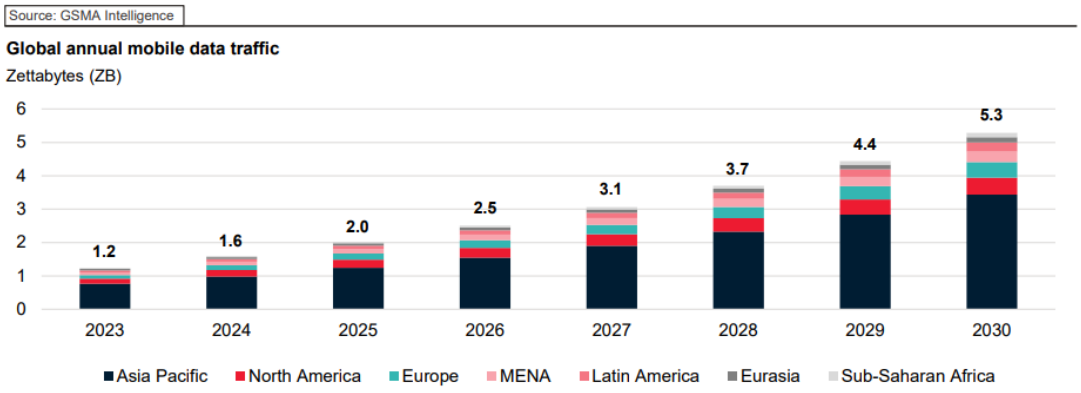
(v) **Renewal mechanism:** The renewal mechanism for E-band should be the same as currently prescribed in the case of MWA/MWB carriers, i.e. renewal by application – as discussed in our response to Q5 (d) above. Validity period of E-band being co-terminus with the license – as suggested under item (iv) above, **TSPs should be required to submit a request to DoT for revalidation/ renewal of its E-band carriers at the time of renewal of its license.**

(vi) **Surrender of the spectrum:** The process for surrender for E-band should be the same as currently prescribed in the case of MWA/MWB carriers, as discussed in our response to Q5(f) above. **Therefore, Airtel recommends that the TSPs should be allowed to surrender E-band carriers by serving a 30 days' advance notice to DoT.**

(vii) **Ceiling on the number of carriers (spectrum cap):**

a. Currently, there is a ceiling of 2 carriers per LSA in E-band. However, with the rapid increase in internet traffic, the current ceiling is not adequate to meet the constantly growing requirements and should immediately be increased to **4 carriers per LSA**.

b. According to GSMA Intelligence, Asia-Pacific accounted for 62% of global mobile data traffic in 2023, projected to rise to 65% by 2030. This surge is predominantly driven by China (337 EB in 2023) and India (225 EB), which together comprised 44% of the global total. With expanding 5G deployments and large user bases, the region's traffic is expected to increase nearly 350% by 2030, reaching over 3,500 EB.



c. Further, Ericsson's Mobility Report (November 2024) indicates that India leads globally in average monthly data usage per smartphone at 32 GB, projected to double to 66 GB by 2030. This trend underscores the urgent need to enhance backhaul infrastructure to sustain growing capacity requirements. Thus, the current E-band carrier ceiling must be revised upwards to maintain service quality and network reliability.

d. **Therefore, Airtel recommends that the current ceiling of 2 carriers for E-band should be increased to 4 carriers per LSA immediately.**

(viii) **Criteria for the assignment of additional spectrum above the ceiling limit:**

The spectrum ceilings should be periodically reviewed and revised to accommodate growing demands, while ensuring that the ceilings remain sacrosanct and are not exceeded.

(ix) **Roll-out obligations:** As also submitted in the context of MWA/MWB carriers in the response to Q5(e) earlier, the TSPs holding access spectrum are already subject to rollout obligations specific to access services, which are designed to ensure that services reach end-users within defined timelines. **Backhaul spectrum, however, is not directly linked to providing coverage at the site level.** It only plays a supporting role by facilitating high-capacity data links between various network elements,

thereby leaving no logical reason to have separate roll out obligations for the E-band spectrum. **Therefore, Airtel recommends that there should not be any (separate) roll out obligations in case of assignment of E-band spectrum.**

Q24. What frequency range (57-64 GHz, or 57-66 GHz) in the V-band should be adopted for radio backhaul purposes? In case you are of the opinion that the 57-66 GHz range should be adopted for radio backhaul purposes, considering that the 66-71 GHz range is already identified for IMT, whether there is a need for provisioning a guard band between the 57-66 GHz range (for the backhaul purposes) and the 66-71 GHz range (for IMT)? If yes, what should be the guard band? Kindly provide a detailed response with justifications.

Airtel Comments to Q24:

1. The consultation paper has not identified any existing service operating in the 64–66 GHz segment of the V-band. In this context, it is pertinent to note that ITU-R Recommendation F.1497-2 issued in 2014 provides standardized frequency channel arrangements for fixed wireless systems operating within the 57–66 GHz range.

2. Utilizing the full 57–66 GHz spectrum block will enhance the efficiency and capacity of wireless backhaul systems, which are vital for supporting high-speed broadband and next-generation network deployments.

3. **Hence, Airtel submits that the entire 57–66 GHz frequency range should be adopted for radio backhaul purposes, in alignment with the internationally recognized framework. The channel arrangements specified in ITU-R F.1497-2 already incorporate a final 50 MHz guard band, reserved specifically to prevent interference**.

Q25. What should be the terms and conditions for the assignment of the spectrum in the V-band for radio backhaul purposes of commercial telecom services including the following aspects:

- **(i) Band plan;**
- **(ii) Carrier size;**
- **(iii) Carrier aggregation;**
- **(iv) Validity period of the assignment;**
- **(v) Renewal mechanism;**
- **(vi) Surrender of the spectrum;**
- **(vii) Ceiling on the number of carriers (spectrum cap);**
- **(viii) Criteria for the assignment of additional spectrum above the ceiling limit; and**
- **(ix) Roll-out obligations etc.?**

Kindly provide a detailed response with justifications.

Airtel Comments to Q25:

Please refer to our response to Q20 above. We believe that the spectrum in V-band should be assigned only to TSPs with Access Service Authorisation. The terms and conditions for the assignment of the spectrum in the V-band for radio backhaul purposes of access services should be as follows:

(i) **Band plan:** The ITU issued its recommendation ITU-R F.1497-2 on 'Radiofrequency channel arrangements for fixed wireless systems operating in the band 55-66 GHz and we submit that same should be followed.

(ii) **Carrier Size:**

a. The carrier size for assignment of spectrum in V-band should be **50 MHz**.

b. While there is no policy for assignment of V-band currently, TRAI had recommended a carrier size of 50 MHz for V-band in 2014, after taking into account international standards. There is no reason to deviate from the same. **Therefore, Airtel recommends that the carrier size for V-band should be 50 MHz, as per global best practices and TRAI's Recommendations.**

(iii) **Carrier Aggregation:** In line with the prevailing practice in the case of MWA/MWB carriers as discussed in our response to Q5 (b) above, and as also suggested in the case of E-band in our response to Q23 (iii) above, the **TSPs must be allowed to aggregate the carriers held by them in V-band** as well, to enable them to enhance spectral and spatial efficiency.

(iv) **Validity period of the assignment:** As suggested in the case of MWA/MWB carriers in our response to Q5(c) above, and as also suggested in the case of E-band in our response to Q23 (iv) above, **the validity period of assignment of V-band should also be co-terminus with the license.** Also, upon migration of a TSP to the new authorization framework under the Telecommunications Act, 2023, the existing validity of backhaul spectrum should continue seamlessly and automatically under the new regime. This will ensure regulatory continuity, protect prior investments, and avoid unnecessary operational disruptions during the transition.

(v) **Renewal mechanism:** The renewal mechanism for V-band should be the same as currently prescribed in the case of MWA/MWB carriers, i.e. renewal by application, as discussed in our response to Q5(d) above, and as also suggested in the case of E-band in our response to Q23(v) above. The validity period of V-band being co-terminus with the license, as suggested under item (iv) above, **TSPs should be required to submit a request to DoT for revalidation/ renewal of its V-band carriers at the time of renewal of its license.**

(vi) **Surrender of the spectrum:** The process for surrender for V-band should be the same as currently prescribed in the case of MWA/MWB carriers, as discussed in our response to Q5(f) above, and as also suggested in the case of E-band in our response to Q23(vi) above. **Therefore, Airtel recommends that TSPs should be allowed to surrender V-band carriers by serving a 30 days' advance notice to DoT.**

(vii) **Ceiling on the number of carriers (spectrum cap):** Currently, there is no policy for assignment of V-band. We submit that a ceiling of 40 carriers per LSA would be sufficient to meet industry requirements at this stage. **Therefore, Airtel recommends that a ceiling of 40 carriers per LSA should be prescribed for V-band.**

(viii) **Criteria for the assignment of additional spectrum above the ceiling limit:**

The spectrum ceilings should be periodically reviewed and revised to accommodate growing demands, while ensuring that the ceilings remain sacrosanct and are not exceeded.

(ix) **Roll-out obligations:** As submitted earlier in the context of MWA/MWB carriers and E-band in the response to Q5(e) and Q23(ix) respectively, TSPs holding access spectrum are already subject to rollout obligations specific to access services, which are designed to ensure that services reach end-users within defined timelines. Backhaul spectrum, however, is not directly linked to providing coverage at the site level. It only plays a supporting role by facilitating high-capacity data links between various network elements. Considering this, there is no logical reason for having separate roll out obligations for the V-band spectrum. **Therefore, Airtel recommends that there should not be any (separate) roll out obligations in case of assignment of V-band spectrum.**

Q26. In case it is decided to earmark a few carriers in E-band and/or V-band for services/ usages as "Access" and/or "Integrated Access & Backhaul (IAB)", - (a) What quantum of spectrum in E-band and V-band should be earmarked for such services/ usages? (b) What should be the eligibility conditions to obtain the spectrum in E-band and V-band for such services/usages? (c) What should be the terms and conditions for the assignment of spectrum in E-band and V-band through auction such as- (i) Block size; (ii) Minimum quantity for bidding; (iii) Spectrum cap; (iv) Validity period of the assignment; (v) Roll-out obligations; and (vi) Surrender of spectrum etc.? (d) Should flexible use [i.e., radio backhaul, and last mile connectivity (fixed wireless access) to the customer equipment] be permitted in frequency ranges earmarked in E-band and/ or V-band for such services/ usages? If yes, should the terms and conditions of the auction of spectrum be the same as those applicable for "access spectrum"? Responses with detailed justifications and international practices may kindly be provided for E-band and V-band separately.

Airtel Comments to Q26:

1. Please refer to our response to Q18-19 above. **E/V bands should be earmarked only for backhaul purposes and assigned through administrative means only.** Deploying these critical bands for any other usage will destabilize the existing networks of TSPs, in addition to impacting the new rollouts. There is currently no case for use of E/V bands for purposes other than backhaul, and there is not likely to be any need for such usage in the near future as well.

2. **Therefore, Airtel recommends that no portion of E-band or V-band should be earmarked for services/usages other than backhaul, including "Access" and/or "Integrated Access & Backhaul (IAB)".**

Q27. Whether there is a need for earmarking certain quantum of spectrum in E-band and V-band for point-to-point connectivity requirements of captive (non-commercial/non-TSP) users? If yes, - (a) What quantum of spectrum in E-band and V-band should be earmarked for such purposes? (b) What should be the terms and conditions for the assignment of spectrum such as: (i) Carrier size; (ii) Carrier aggregation; (iii) Ceiling on the number of carriers; (iv) Validity period of the assignment; (v) Renewal mechanism; (vi) Criteria for the assignment of additional spectrum above the ceiling limit; (vii) Roll out obligations; and (viii) Surrender of the spectrum etc.? Responses with detailed justifications may kindly be provided for E-band and V-band separately.

And

Q28. In case your response to Q27 is 'no', in what manner should the point-to-point connectivity requirements of captive (non-commercial/non-TSP) users be fulfilled? Kindly provide a detailed response with justifications.

Airtel Comments to Q27 and Q28:

1. Please refer to our response to Q20 above. **We submit that E/V bands should be assigned only to TSPs with Access Service Authorisation and they should be assigned administratively – on an exclusive basis for the entire LSA.**

2. It is important to underscore that the E-band, in particular, has played a pivotal role in facilitating the rapid and efficient rollout of 5G networks by Indian TSPs, positioning India among the fastest in the world to deploy next-generation mobile broadband infrastructure. Any fragmentation or diversion of this critical spectrum towards non-commercial use would compromise its optimal utility and undermine ongoing and future efforts to expand and strengthen telecom networks.

3. **It is pertinent to note that the connectivity requirements of captive (non-commercial/non-TSP) users in the E and V bands can be effectively addressed through bandwidth services**

offered by TSPs, either through B2C or B2B arrangements. Given the availability of commercial solutions that meet diverse enterprise needs, there is no necessity to earmark any portion of the E or V bands specifically for point-to-point connectivity of captive users.

4. Moreover, **neither TRAI nor DoT have outlined any specific use case or instance where captive (non-commercial/non-TSP) users require the E/V bands**. In the absence of any case for its use, any earmarking/assignment of E/V bands to such users would only amount to inefficient utilization of scarce national resources.

5. Therefore, to ensure continued momentum in digital infrastructure development and to maintain spectrum efficiency, **Airtel recommends that no portion of E/V bands should be earmarked for point-to-point connectivity requirements of captive (non-commercial/non-TSP) users.**

Q29. Whether it is feasible to allow low power indoor consumer device to-consumer device usages on a license-exempt basis in the V-band in parallel to the use of the spectrum by telecom service providers for the establishment of terrestrial networks in a part or full V-band? Kindly provide a detailed response with justification and international scenario.

And

Q30. In case it is decided to allow low power indoor consumer device-to device usages on a license-exempt basis in the V-band (57-64/66 GHz), - (a) Should it be permitted in the entire V-band or only in a portion of the V-band? If it should be permitted only in a portion of the V-band, please specify the frequency range. (b) In case it is decided to permit low power indoor consumer device-to-device usages on a license-exempt basis in the entire V-band, whether the 57-64 GHz range, or the 57-66 GHz range should be considered for such usages? (c) What should be the carrier size/ channel bandwidth? (d) What should be the definition of indoor usages? (e) What technical parameters should be prescribed, including EIRP limits for low power indoor consumer device-to-device usages? Kindly provide a detailed response with justifications and international scenario.

And

Q31. Whether there is a need for permitting "outdoor" usages of V-band on a license-exempt basis? Kindly provide a detailed response with justification and international scenario.

And

Q32. If the response to the Q31 is in the affirmative, whether it is feasible to allow outdoor usages on a license-exempt basis in the V-band in parallel to the use of the spectrum by telecom service providers for the establishment of terrestrial networks in a part or full V-band? Kindly provide a detailed response with justification and international scenario.

And

Q33. In case it is decided to allow outdoor usages on a license-exempt basis in the V-band (57-64/ 66 GHz), - (a) Should it be permitted in the entire V-band or only in a portion of the V-band? If it should be permitted only in a portion of the V-band, please specify the frequency range. (b) In case it is decided to permit outdoor usages on a license exempt basis in the entire V-band, whether the 57-64 GHz range, or the 57-66 GHz range should be considered for such usages? (c) What should be the carrier size/ channel bandwidth? (d) What technical parameters should be prescribed, including EIRP limits for low power indoor consumer device-to-device usages? Kindly provide a detailed response with justifications and international scenario.

Airtel Comments to Q29 to Q33:

1. **No, it is not feasible to allow low power indoor consumer device to-consumer device usages on a license-exempt basis in the V-band in parallel to the use of the spectrum by telecom service providers for the establishment of access networks by TSP in/or a part or full V-band. There is also no need for permitting "outdoor" usages of V-band on a license-exempt basis.** The reasons for the same are discussed in the subsequent paras.

2. **Unique features of V-band:**

   a. V-band offers high data throughput, millimeter-wave technology, small form factor, low interference and line-of-sight communication capabilities and plays a pivotal role in 5G networks and smart city infrastructure. It is an efficient and effective solution for delivering high-capacity, low-latency wireless connectivity in urban environments while maintaining the aesthetic and functional requirements of street furniture. The V-band, being crucial for new-age telecom networks, must not be delicensed or reserved for any users other than TSPs.

   b. Moreover, device-to-device communication is inherently part of the access layer, not the backhaul infra structure. Such applications should be supported through dedicated access spectrum bands (e.g., 2.4 GHz, 5 GHz, 6 GHz unlicensed bands), not in critical backhaul bands like the V-band.

3. **Technological development:** Efforts are already underway for the development of a compatible ecosystem in the V-band. Moreover, as the industry advances toward next-generation technologies through the ongoing IMT-2030 study cycle, it is anticipated that innovative and creative applications of the V-band spectrum will emerge. Delicensing at this juncture may disrupt these efforts and go contrary to international standards.

4. **Irreversibility of delicensing:** Once a spectrum band is delicensed and the ecosystem around it is established, reversing the process can be highly challenging, disruptive and, often, impractical. Experience from international markets underscores the risk of prematurely delicensing strategic bands. In particular, countries that had initially opened the entire 6 GHz

band for Wi-Fi services are now facing significant challenges in reclaiming portions of the upper 6 GHz band for IMT, as considered under WRC-23. These precedents illustrate that if V-band is delicensed now, it would be very difficult to leverage it for future use cases in the licensed space.

5. **Loss to exchequer:** Introducing delicensing at this stage could deprive the government of realizing the true economic value of the spectrum, which may not be in the best interests of the Indian economy.

6. **Underutilization of Legacy License-Exempt Bands:** In India, DoT has already designated the lower 6 GHz band (5.925-6.425 GHz) for license-exempt applications. At the same time, legacy license-exempt (2.4/5 GHz) bands remain underutilized. Therefore, any proposal to open additional bands like the V-band for license-exempt use lacks justification and risks long-term harm to the strategic telecom roadmap.

7. **Interference Issues and Regulatory Ambiguity in case of Parallel Use:**

   a. Allowing both licensed and unlicensed use of the same spectrum would create regulatory ambiguity and technical conflict. Telecom networks require clean, interference-free spectrum for high-reliability backhaul. Allowing uncontrolled and license-exempt operation of consumer devices or outdoor use may result in mushrooming of uncoordinated, high-density deployments (e.g., Wi-Fi hotspots, campus links).

   b. Such unlicensed deployments would interfere with planned and licensed telecom backhaul links, especially when multiple networks share the same infrastructure (poles, rooftops, etc.). This would lead to degraded spectrum hygiene, eventually rendering the spectrum noisy and unclean for backhaul use of licensed TSPs. This would undermine network reliability, especially in urban deployments where V-band is crucial for dense 5G small cell backhaul.

8. **Therefore, Airtel recommends that neither low power indoor consumer device-to-consumer device usages, nor outdoor usages, should be permitted on a license-exempt basis in V-band.**

Q34. Any other suggestions relevant to the assignment of the spectrum in E-band (71-76/ 81-86 GHz) and V-band (57-64/ 66 GHz) may kindly be made with detailed justifications.

Airtel Comments to Q34:

No comments.

Q35. In case the 6 (lower)/7/13/15/18/21 GHz bands for radio backhaul of various commercial telecom services are assigned on a Point-to Point (P2P) Link basis, should the spectrum charges be levied: i. As a percentage of Adjusted Gross Revenue (AGR), or ii. On a per carrier/link basis, or iii. Through any alternative mechanism (please specify)? Kindly provide a detailed justification for the approach considered most suitable, along with the suggested percentage of AGR or the applicable per link/per carrier charge.

And

Q36. In case the 6 (lower)/7/13/15/18/21 GHz bands for radio backhaul of various commercial telecom services are assigned on a block basis for the entire Licensed Service Area (LSA), should the spectrum charges be levied: i. As a percentage of Adjusted Gross Revenue (AGR), or ii. On a per MHz or per carrier basis, or iii. Through any alternative mechanism (please specify)? Kindly provide a detailed justification for the approach considered most suitable, along with the suggested percentage of AGR or the applicable per carrier/ MHz charge.

And

Q37. In case it is decided to assign some frequency spectrum in 6 (lower)/7/13/15/18/21 GHz spectrum bands for last mile connectivity (Fixed Wireless Access) of commercial telecom services through auction, then: i. Should the auction determined price of other bands by using spectral efficiency factor serve as a basis of valuation for the above bands? If yes, which spectrum bands be related, what efficiency factor or formula should be used and what is the basis for the same? Please justify your suggestions. ii. If response to question (i) above is no, what other methodology may be used. Please justify your suggestions.

And

Q38. In case it is decided to assign some frequency spectrum in 6 (lower)/7/13/15/18/21 GHz spectrum bands for last mile connectivity (Fixed Wireless Access) of commercial telecom services through auction, then: i. Should the auction determined price of other countries in 6/7/13/15/18/21 GHz spectrum bands for last mile connectivity and/or IMT services serve as a basis of valuation of microwave bands for last mile connectivity? What methodology should be followed for using this auction determined price as a basis for valuation? Support your suggestions with justifications and country-wise auction data. ii. If the above approach is considered appropriate, should the international auction-determined prices be normalized to account for cross-country differences such as population, GDP, purchasing power parity (PPP), subscriber base, and other relevant factors? If so, should normalization be carried out by using the ratio of auction prices of spectrum bands within the same country to neutralize the impact of cross country differences? Alternatively, please suggest any other suitable normalization methodology that may be adopted in this context. iii. Apart from the approaches highlighted above which other valuation approaches may be adopted for the valuation of 6 (lower)/7//13/15/18/21 GHz spectrum bands? Please provide detailed information.

And

Q39. What valuation methodology should be followed if it is decided to assign frequency spectrum in traditional microwave backhaul bands for flexible use (i.e. both backhaul connectivity and last mile connectivity) of commercial telecom services through auction? Please provide detailed justification.

And

Q40. Should the spectrum charges for 6 (lower)/ 7/ 13/ 15/ 18/ 21 GHz bands for non-commercial/ captive backhaul use continue to be levied as per the M x C x W formula specified in the DoT's order No. P-11014/34/2009-PP dated 11.12.2023? Is there a need to revise this formula by inclusion of additional factors, modifying slab/factor values etc.? If yes, please specify which additional factors should be included and what should be the revised slab/factor values? Please provide detail of the same along with justification

And

Q41. If the answer to above question is no, whether an alternative charging mechanism should be adopted for levying spectrum charges for 6 (lower)/ 7/ 13/ 15/ 18/ 21 GHz bands for non-commercial/ captive backhaul use? Please provide detailed justification.

And

Q42. In case the E-band (71-76/ 81-86 GHz) is assigned for Radio backhaul purpose for various commercial telecommunication services and on a Point-to-Point (P2P) link basis, should the spectrum charges be levied: i. As a percentage of Adjusted Gross Revenue (AGR), or ii. On a per carrier/link basis, or iii. Through any alternative mechanism (please specify)? Kindly provide a detailed justification for the approach considered most suitable, along with the suggested percentage of AGR or the applicable per carrier/link charge.

And

Q43. In case the E-band (71-76/ 81-86 GHz) is assigned for Radio backhaul purpose for various commercial telecommunication services and on a block basis for the entire Licensed Service Area (LSA), should the spectrum charges be levied: i. As a percentage of Adjusted Gross Revenue (AGR), or ii. On a per MHz or per carrier basis, or iii. Through any alternative mechanism (please specify)? Kindly provide a detailed justification for the approach considered most suitable, along with the suggested percentage of AGR or the applicable per MHz/per carrier charge.

And

Q44. In case the V-band (57-64/66 GHz) is assigned for Radio backhaul purpose for various commercial telecommunication services and on a Point-to-Point (P2P) link basis, should the spectrum charges be levied: i. As a percentage of Adjusted Gross Revenue (AGR), or ii. On a per carrier/link basis, or iii. Through any alternative mechanism (please specify)? Kindly provide a detailed justification for the approach considered most suitable, along with the suggested percentage of AGR or the applicable per carrier/ link charge.

And

Q45. In case the V-band (57-64/66 GHz) is assigned for Radio backhaul purpose for various commercial telecommunication services and on a block basis for the entire Licensed Service Area (LSA), should the spectrum charges be levied: i. As a percentage of Adjusted Gross Revenue (AGR), or ii. On a per MHz or per carrier basis, or iii. Through any alternative mechanism (please specify)? Kindly provide a detailed justification for the approach considered most suitable, along with the suggested percentage of AGR or the applicable per MHz/per carrier charge.

And

Q46. In case it is decided to assign some frequency spectrum in E-band (71-76/ 81-86 GHz) and/or V-band (57-64/66 GHz) for Access (last mile connectivity)/ Integrated Access Backhaul (IAB) through auction, then: (i) Should the auction determined price of other bands serve as a basis of valuation for the above bands using spectral efficiency factor? If yes, which spectrum bands be related, what efficiency factor or formula should be used and what should be the basis for the same? Please justify your suggestions (ii) If response to question (i) above is no, what other methodology may be used? Please justify your suggestions.

And

Q47. In case it is decided to assign some frequency spectrum in E-band (71-76/ 81-86 GHz) and/or V-band (57-64/66 GHz) for Access (last mile connectivity)/ Integrated Access Backhaul (IAB) through auction, then: i. Should the auction determined price of other countries in E-band (71-76/ 81-86 GHz) and/or V-band (57-64/66 GHz) serve as a basis of valuation of these bands? If yes, what methodology should be followed for using this auction determined price as a basis for valuation? Support your suggestions with justifications and country-wise auction data. ii. If the above approach is considered appropriate, should the international auction-determined prices be normalized to account for cross-country differences such as population, GDP, purchasing power parity (PPP), subscriber base, and other relevant factors? If so, should normalization be carried out by using the ratio of auction prices of spectrum bands within the same country to neutralize the impact of cross country differences? Alternatively, please suggest any other suitable normalization methodology that may be adopted in this context. iii. Apart from the approaches highlighted above which other valuation approaches should be adopted for the valuation of Eband (71-76/ 81-86 GHz) and/or V-band (57-64/66 GHz)? Please provide detailed information.

And

Q48. In case it is decided to assign some frequency spectrum in E-band (71-76/ 81-86 GHz) and/or V-band (57-64/66 GHz) for point-to-point connectivity requirements of captive (non-commercial/ non-TSP) users, then: (i) Should the spectrum charges for E-band (71-76/ 81-86 GHz) and/or V-band (57-64/66 GHz) for point-to-point connectivity requirements of captive (non-commercial/ non-TSP) users may be levied as per the M x C x W formula as specified in the DoT's order No. P-11014/34/2009-PP dated 11.12.2023? Is there a need to revise this formula by inclusion of additional factors, modifying slab/factor values etc.? If yes, please specify which additional factors should be included and what should be the revised slab/factor values. Please provide detail of the same along with justification. (ii) If the answer to above question is no, whether an alternative charging mechanism such as link to link charges as recommended in 2014 for levying spectrum charges for E and V bands for non - commercial/ captive backhaul use, should be adopted? Please provide detailed justification.

And

Q49. In case it is decided to assign some frequency spectrum in 6 (lower)/ 7/13/15/18/21 GHz spectrum bands for last mile connectivity (Fixed Wireless Access) of commercial telecom services and in Eband (71-76/ 81-86 GHz) and/or V-band (57-64/66 GHz) for Access (last mile connectivity)/ Integrated Access Backhaul(IAB) through auction, then: Should the value of: (a) 6 (lower)/7/13/15/18/21 GHz bands (for last mile connectivity) (b) E-band (71–76/81–86 GHz) and V-band (57–64/66 GHz) (for Access (last mile connectivity)/IAB) be determined using a single valuation approach? If yes, please indicate which single valuation approach or method should be adopted in each case and provide detailed justification.

And

Q50. In case your response to the above question is negative, will it be appropriate to take the average valuation (simple mean) of the valuations obtained through the different approaches attempted for valuation of the above spectrum bands, or some other approach like taking weighted mean etc. should be followed? Please support your answer with detailed justification.

And

Q51. In case it is decided to assign some frequency spectrum in 6 (lower)/ 7/13/15/18/21 GHz spectrum bands for last mile connectivity (Fixed Wireless Access) of commercial telecom services and in Eband (71-76/ 81-86 GHz) and/or V-band (57-64/66 GHz) for Access(last mile connectivity)/ Integrated Access Backhaul (IAB) through auction, then: What ratio should be adopted between the reserve price for the auction and the valuation of the spectrum in: (a) 6 (lower)/7/13/15/18/21 GHz bands (for last mile connectivity) (b) E-band (71–76/81–86 GHz) and V-band (57–64/66 GHz) (for Access (last mile connectivity)/IAB) and why? Please support your answer with detailed justification.

And

Q52. In case it is decided to assign some frequency spectrum in 6 (lower)/ 7/13/15/18/21 GHz spectrum bands for last mile connectivity (Fixed Wireless Access) of commercial telecom services and in E-band (71-76/ 81-86 GHz) and/or V-band (57-64/66 GHz) for Access(last mile connectivity)/ Integrated Access Backhaul (IAB) through auction, then: What should the payment terms and associated conditions for the assignment of (a) 6 (lower)/7/13/15/18/21 GHz bands (for last mile connectivity) (b) E-band (71–76/81–86 GHz) and V-band (57–64/66 GHz) (for Access (last mile connectivity)/IAB) relating to: i. Upfront payment ii. Moratorium period iii. Total number of instalments to recover deferred payment iv. Applicable interest rate for protecting the NPV of bid amount Please support your answer with detailed justification.

And

Q53. Any other suggestions relevant to the subject may be submitted with detailed justification.

Airtel Comments to Q35 to Q53:

1. **Assignment of Microwave Bands Should be Only Through Administrative Methodology and for Backhaul Purposes Only:**

   a. **The administrative allocation of MWA/MWB spectrum is particularly essential to avoid large-scale disruption to existing legacy networks.** These bands support vital backhaul infrastructure serving hundreds of millions of customers. **Subjecting these bands to auction-based allocation for access purposes would not only jeopardize service continuity due to non-availability of required backhaul spectrum but can also create artificial scarcity by provisioning more spectrum towards access forcing operators to acquire the spectrum through auction and use it only for backhaul.**

   b. **In the case of the E and V bands, administrative assignment is not merely preferable, it is imperative.** These bands are central to ensuring the availability of high-capacity, short-distance backhaul links that are crucial for the successful rollout of advanced technologies such as 5G, 6G, and beyond. **It is pertinent to note that the operators with limited fiber infrastructure are especially dependent on wireless backhaul, and exposing these critical resources to auction dynamics for varied purposes would create severe competitive imbalances.**

   c. Furthermore, backhaul spectrum does not generate direct revenue; it functions purely as a supporting resource for access networks. Its utility lies in enabling end-to-end service delivery, not in revenue realization. It is also important to highlight that the TRAI, in its 2014 recommendations, explicitly supported the administrative allocation of MWA/MWB and E band spectrum. This position is aligned with global best practices, where administrative assignment is the prevailing approach for backhaul spectrum management.

d. In light of these considerations, **it is strongly recommended that the MWA/MWB and E/V band spectrum be assigned solely through administrative mechanisms strictly for backhaul use, to ensure cost-efficient, equitable, and uninterrupted network expansion across India.**

e. Further, **MWA/MWB carriers should be assigned on an exclusive basis for the entire LSA for TSPs holding access spectrum under Access Service Authorisation. The spectrum in E/V bands should be assigned for the entire LSA on an exclusive basis; and it should also be assigned only to TSPs with Access Service Authorisation.**

2. **Spectrum Charging Mechanism:**

a. **For TSPs with Access Service Authorisation**, the assignment of spectrum for E band, V band, MWA carriers and MWB carriers should be based on a **percentage of AGR, but with the current rates significantly rationalized**.

b. **Exorbitant rates under the current regime:**

i. At present, for TSPs with Access Service Authorisation, MWA/MWB carriers and E-band are charged based on a percentage of AGR, while there is no policy for assignment of V-band. However, the rates prescribed currently are quite high.

ii. In fact, **the data relating to SUC payouts reveals that only 25% of the total SUC payout of the industry relates to access spectrum. The remaining 75%, i.e., the lion's share, relates to SUC for backhaul spectrum. This is an alarming pattern, considering that backhaul spectrum does not generate any revenue of its own and is merely a complementary resource for access spectrum.**

3. **Need for Rationalizing the Current Charges Applicable to Microwave Backhaul Spectrum:**
There is an urgent and well-founded need to rationalize the existing charges applicable to microwave backhaul spectrum, particularly in the context of enabling cost-efficient network expansion and fulfilling national digital connectivity goals.

a. **Backhaul Spectrum is a Critical Enabler of Efficient Network Functioning:**

i. The microwave backhaul spectrum does not generate direct revenue for TSPs. Instead, it serves as a supporting infrastructure layer that enables the efficient utilization of the access network, including radio access spectrum acquired at significant cost through competitive auctions. The backhaul links ensure connectivity between mobile towers and the core network, directly affecting the performance and scalability of mobile services.

ii. By enabling more efficient use of access spectrum, microwave backhaul indirectly enhances TSPs' revenue-generating capabilities. Consequently, this leads to a proportional increase in Government revenue through LF and SUC collected from the allocation of access spectrum.

iii. Thus, backhaul spectrum should be regarded as a public utility resource whose affordability directly benefits both the Digital India mission and Government exchequer.

b. **Rational Pricing Will Accelerate Network Expansion and Improve Service Quality:** Making microwave backhaul spectrum available at reasonable and rationalized rates is in the national interest, as it would lead to following ultimately benefitting not just TSPs but also end-users, fostering inclusive digital growth and equitable access to telecom services.

i. Lower network rollout costs, particularly in underserved or fiber-deficient areas.
ii. Encourage faster deployment of 4G and 5G infrastructure by improving the business case for expansion.
iii. Improve service quality, reduce latency, and increase network reach.
iv. Promote cost-effective use of available spectrum resources, maximizing return on public assets.

c. **Public Interest and Availability Support Rationalization:** There is ample spectrum availability in traditional microwave backhaul bands, as such there is no inherent scarcity that would justify high or escalating charges.

i. In light of its utility as a core enabler for expanding digital services, particularly in areas where fiber is not feasible, there is a strong public interest rationale for making backhaul spectrum available at low, fixed, or nominal rates.

ii. Rationalizing backhaul charges will align with the broader telecom policy objective of bridging the digital divide, enhancing rural connectivity, and enabling cost-efficient service delivery across geographies.

d. Hence, microwave backhaul spectrum is indispensable for network scalability, particularly in the current environment where fiber coverage remains incomplete and traffic volumes are growing rapidly. Rationalizing the pricing of this non-revenue-generating yet critical layer of infrastructure will support orderly telecom sector growth, encourage investment, and foster inclusive digital access.

e. In light of the above, **we recommend that the charges applicable to microwave backhaul spectrum, particularly SUC, be revised and rationalized, preferably moving toward a fixed, nominal, or non-escalating fee model, consistent with its utility function.**

4. **Request for Elimination of the SUC Escalation Matrix**

a. It is respectfully submitted that the current SUC framework applicable to MWA and MWB carriers is structured in a manner that imposes an escalating rate of charge based on the number of carriers held. Specifically, the SUC rate begins at 0.15% of AGR for a single carrier, but escalates significantly as the number of carriers increases, reaching approximately 0.35% for two carriers, and rising steeply to 1.45% and 2.30% for six and eight carriers, respectively.

b. This progressive escalation mechanism results in a disproportionately high financial burden, especially considering that microwave backhaul is a non-revenue-generating, enabling infrastructure that merely supports the delivery of services through access spectrum. The cost implications of this structure become particularly acute in scenarios requiring multiple carriers for high-capacity links, especially in areas with limited fiber availability.

c. In light of the above, **Airtel recommends that the existing SUC escalation matrix be discontinued. Instead, a uniform SUC rate should be applied across all carriers, regardless of the number held by the TSP. This approach would:**

i. **Reflect the true utility function of microwave backhaul as support infrastructure;**

ii. **Facilitate cost-effective deployment of high-capacity links, particularly for 5G and beyond;**

iii. **Encourage optimal network planning without penalizing higher-capacity requirements.**

Such a reform would also align with the broader regulatory objective of enabling affordable and ubiquitous digital connectivity, particularly in fiber-deficient and remote regions.

5. **Distinct Nature of Backhaul Spectrum and Access Spectrum – Inappropriate to Compare for Valuation Purposes**

a. It is pertinent to note that backhaul spectrum (such as E/V bands and MWA/MWB carriers) and access spectrum (used for IMT services) serve fundamentally different technical and functional purposes, and therefore should not be compared or linked for valuation purposes.

b. The current practice of attempting to derive the valuation of E/V bands or MWA/MWB spectrum based on auction-determined prices for IMT/5G bands, or by applying spectral

efficiency-based valuation models extrapolated from access bands, is fundamentally flawed and lacks justification in international regulatory and technical frameworks.

c. As per the definitions laid down in the International Telecommunication Union, Radio Regulations (ITU-RR):

Article 1.20 defines 'fixed service' as: *"A radiocommunication service between specified fixed points."*
Article 1.24 defines 'mobile service' as: *"A radiocommunication service between mobile and land stations, or between mobile stations."*

d. It is important to note that E/V bands and MWA/MWB carriers are utilized for point-to-point transmission links between static sites and form part of the backhaul and transport layer of telecom infrastructure, which clearly falls within the category of fixed services. In contrast, spectrum allocated for IMT (encompassing 2G to 6G as defined by 3GPP) supports mobile services, intended for dynamic, user-accessed, last-mile connectivity.

e. Further, backhaul spectrum supports network transport and is used between fixed infrastructure nodes. It is not directly monetized and does not serve end-user access. Access spectrum, on the other hand, is used to deliver retail mobile services to consumers and enterprises and constitutes a revenue-generating layer for telecom operators.

f. Given these fundamental differences in use case, scope, regulatory classification, and economic role, any comparison between backhaul and access spectrum for the purpose of valuation is inherently flawed.

g. In view of the above, **Airtel urges the Authority to recognize and preserve this critical distinction in all policy and pricing decisions related to backhaul spectrum and submit that:**

i. The valuation of E/V bands and MWA/MWB carriers must be based on their unique role as essential, non-commercial enabling infrastructure.

ii. TRAI and DoT should adopt an independent and functionally appropriate framework for valuing backhaul spectrum, which is not linked in any manner to the pricing of IMT/mobile access spectrum.

iii. Continuing with comparative or derivative valuation methodologies would lead to distorted cost structures, discourage efficient deployment of backhaul capacity, and ultimately hamper the expansion of high-quality mobile networks.

*****