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TRAI/FY25-26/056
04th November 2025

Shri Akhilesh Kumar Trivedi
Advisor (Networks, Spectrum and Licensing)
Telecom Regulatory Authority of India,
World Trade Centre, Nauroji Nagar,
New Delhi – 110029

Subject: Bharti Airtel's Comments on Consultation Paper on *the Auction of Radio Frequency Spectrum in the Frequency Bands Identified for International Mobile Telecommunications (IMT)*

Reference: TRAI's Consultation Paper dated 30th September 2025

Dear Sir,

This is in reference to TRAI's Consultation Paper on *the Auction of Radio Frequency Spectrum in the Frequency Bands Identified for International Mobile Telecommunications (IMT)* dated 30th September 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**

A handwritten signature in blue ink, appearing to read 'Rahul Vatts', is written over a light blue circular stamp.

Rahul Vatts
Chief Regulatory Officer

Encl: a.a

Preamble:

1. Airtel would like to begin by thanking the Authority for inviting comments on consultation paper “Auction of Radio Frequency Spectrum in the Frequency Bands Identified for International Mobile Telecommunications (IMT)”. Airtel would also like to applaud TRAI’s continued consultative and evidence-driven approach to ensuring efficient spectrum management – a cornerstone of India’s digital and economic growth. 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.
2. Airtel recognizes that radio spectrum is a finite and valuable national resource whose judicious and efficient allocation is critical to advancing India’s digital ambitions — enabling widespread connectivity, fostering investment, and ensuring affordable, high-quality broadband access to every citizen. **The next phase of India’s spectrum policy must therefore be guided not merely by short-term fiscal considerations but by broader objectives of connectivity expansion, sectoral sustainability, consumer welfare, and national competitiveness.**
3. Over the past few years, the Indian telecom sector has demonstrated exceptional resilience and long-term commitment — having invested heavily to deploy nationwide 5G networks, extend rural broadband coverage, and drive innovation across domains such as digital public infrastructure, enterprise solutions, IoT, and satellite communications. These achievements have been realized despite significant structural pressures, including high capital intensity, cumulative levies, and limited monetization opportunities. In this context, the forthcoming spectrum auction must reinforce sectoral stability and enable continued investment to sustain India’s digital growth trajectory.
4. Such evolution of 5G networks, private enterprise networks, and smart city deployments will intensify the need for both capacity and coverage spectrum. The Government’s Digital India and Make in India initiatives depend on ubiquitous and affordable connectivity, which cannot be achieved if operators are spectrum-constrained. **Any notion of “over-supply” fails to appreciate that spectrum is the backbone of every new digital service, and any artificial restrictions can undermine the vision of ‘Digital India’.**
5. **Considering India’s digital economy is entering a phase of accelerated transformation driven by 5G, IoT, and AI-led services, in such a scenario, any restrictive or fragmented approach to spectrum release could impede long-term network planning and delay the monetization of new technologies. Therefore, Airtel submits that ensuring a predictable, abundant, and affordable spectrum supply is critical for long-term policy stability and investor confidence.**

6. Furthermore, it is worthwhile to note that the Indian telecom sector has remained fully open and competitive for over two decades. Spectrum has consistently been allocated through transparent, market-based auctions, and the Unified License framework ensures that authorization to provide telecom services is available to all eligible entities on non-discriminatory terms. **The access services constitute the backbone of all telecom offerings, enabling both consumer and enterprise digital transformation. Their capital requirements and regulatory responsibilities are substantially greater than those of other licenses, making prudent spectrum policy especially critical.** Market entry is therefore determined entirely by commercial viability, operational capability, and financial strength — not by regulatory restriction.
7. Having said this, we would also like to highlight the following areas where we seek kind consideration of the Authority and the Government:

a. Rationalize Spectrum Cost

- i. **Airtel respectfully submits that lowering spectrum prices across all frequency bands is essential to unlocking the full potential of India's digital transformation.** Excessively high reserve prices keep valuable spectrum idle and result in operators facing capacity and capital constraints. Spectrum that remains unsold or underutilized due to inflated pricing represents a direct loss to the country — delaying network expansion, degrading service quality, and undermining the Government's Digital India vision.
- ii. By rationalizing spectrum costs, operators can redirect capital toward network densification, faster 5G rollout, and wider rural coverage, thereby improving both service quality and capacity. Funds currently absorbed by inflated auction costs can instead be invested in fiber backhaul, tower infrastructure, and next-generation technologies that deliver tangible consumer and economic benefits.
- iii. **Airtel therefore urges TRAI to substantially lower reserve prices across all spectrum bands to ensure affordable access and efficient utilization.** Pursuing short-term fiscal gain through high pricing is counterproductive, since it constrains industry growth, delays technology adoption, and weakens India's competitiveness in the global digital economy. A forward-looking, affordability-driven spectrum policy is critical to sustaining investment, innovation, and inclusive connectivity.

b. Unlock Spectrum Value — Ensure Comprehensive Release, Refarming, and Productive Reuse of Idle Spectrum

- i. **Comprehensive Auction of All Available Spectrum in Existing Bands:** Airtel submits that all available and planned spectrum — including upcoming releases in the 900 MHz and 2100 MHz bands — should be brought to auction. Ensuring full commercial

availability will enable efficient network expansion, enhance affordability, and support national digital objectives. Any deliberate limitation of supply to extract higher revenues will be counterproductive to affordability and consumer interest.

- ii. **Reform and Reallocate Underutilized Spectrum:** The Comptroller and Auditor General of India (CAG), in its Report No. 2 of 2022 (dated 1 April 2022), highlighted sub-optimal utilization of commercially valuable IMT spectrum by PSUs and Defence. The report recommended that such underutilized spectrum be reformed for commercial use.
 - iii. **Include Spectrum under NCLT/NCLAT Proceedings:** Spectrum currently locked in insolvency proceedings before the National Company Law Tribunal (NCLT) or its Appellate Tribunal (NCLAT) remains an unproductive national asset. Its prompt inclusion in upcoming auctions will prevent further value erosion, ensure transparent access for all service providers, and enable efficient, demand-driven utilization.
 - iv. **Airtel therefore submits that ensuring the timely release of all spectrum in existing bands — including balance inventory, reformed and surrendered bands, and spectrum under NCLT/NCLAT — will sustain a competitive, transparent, and forward-looking spectrum ecosystem that maximizes public value and sectoral growth.**
- c. **600 MHz Band – Defer Auction:** The 600 MHz band was included in the previous spectrum auction despite the existence of a nascent global ecosystem and limited operator interest. Consequently, there were no bidders for this band. In view of these circumstances, **Airtel recommends that the 600 MHz spectrum should be considered for auction only after an appropriate interval—approximately two years—by which time the device and network ecosystem is expected to mature.** This approach will ensure efficient utilisation of the band, promote meaningful participation from service providers, and optimise the overall value derived from the spectrum resource.
- d. **Upper 6 GHz Band – Defer Auction:** At present, only fragmented portions of the upper 6 GHz band—amounting to approximately 400 MHz—are available in India, which limits the potential for efficient utilization. Furthermore, the ecosystem readiness for this band, in terms of device availability, network equipment, and global harmonization, remains at an early stage. In addition, coexistence and interference mitigation issues with incumbent services, particularly satellite earth stations operating within or adjacent to this band, are yet to be comprehensively resolved. In view of the above, **Airtel submits that the inclusion of the 6425–6725 MHz and 7025–7125 MHz bands in the forthcoming IMT auction be deferred until these issues are adequately addressed and a mature ecosystem is established.**

2. **With the above context, Airtel urges the Authority to consider the following Guiding Principles for Upcoming Auctions:**
 - a. **Auction the entire available spectrum in existing bands to prevent artificial scarcity.**
 - b. **Rationalize reserve prices to encourage participation, enhance affordability, and support downstream service delivery.**
 - c. **Ensure timely release of all spectrum — including balance inventory, refarmed and surrendered bands, and spectrum under NCLT/NCLAT.**
 - d. **Address spectrum shortage in certain bands through circle-specific efforts (e.g., 2100 MHz band in UP-East, West Bengal).**
 - e. **Spectrum in the 600 MHz and upper 6 GHz ranges should not be included in forthcoming IMT auction.**
 - f. **The Indian market is already highly competitive, and the UL framework ensures that authorization to provide telecom services is available to all eligible entities on non-discriminatory terms.**
 - g. **Ensure regular and predictable auction timeframe to facilitate capital-efficient investments.**
3. Airtel therefore submits that the forthcoming spectrum auction should continue to adhere to the principles of transparency, market efficiency, and competitive neutrality. This will help ensure that spectrum pricing and allocation frameworks promote optimal utilization, robust sectoral investment, and affordable connectivity for all citizens.
4. Airtel reaffirms its commitment to advancing India's vision of a digitally empowered society through continued investment, innovation, and service excellence. The upcoming auction presents a pivotal opportunity to accelerate the growth of 5G-Advanced networks and lay the foundation for future 6G technologies. Therefore, spectrum policy should focus on affordability, efficient utilization, and long-term sectoral viability, rather than short-term revenue maximization. Ensuring the financial health and investment capacity of telecom operators is vital to achieving India's broader objectives of universal broadband access, digital innovation, and global competitiveness.
5. And, finally, Airtel commends the Authority's continued consultative and transparent approach to policymaking and looks forward to working closely with TRAI and the Department of Telecommunications in shaping a forward-looking, harmonized, and investment-friendly spectrum ecosystem that unlocks the full potential of India's digital future.

In summary:

1. *The Indian telecom market is already intensely competitive, and any further measures or relaxations aimed at increasing competition could inadvertently affect the financial stability and long-term viability of existing operators.*

2. *The priority should be to ensure the financial sustainability of existing TSPs, thereby enabling continued investment in next-generation technologies and expansion of rural connectivity.*
3. *The core aim of auction should be to enhance spectrum availability at affordable prices.*
4. *Referring to the currently available spectrum inventory as an “over-supply” may not accurately reflect market realities. Rather, this spectrum should be viewed as strategic reserve capacity intended to address future growth requirements and regional variations in demand.*
5. *Adopting a balanced, future-focused regulatory approach is essential. Spectrum should be treated as national infrastructure, not merely a revenue source.*
6. *The auction framework must ensure abundant supply and pricing, avoid artificial scarcity, promote sustainable competition, and encourage long-term investment through predictable policy and clear spectrum roadmap visibility for future technologies.*
7. *Forward-looking policy shift is needed—from “maximizing auction proceeds” to “maximizing long-term public value.”*
8. *Rationalizing reserve prices will encourage operator participation, improve affordability of spectrum and downstream services.*
9. *Holding regular auction will help operators make capital-efficient investments without regulatory uncertainty.*
10. **Existing bands viz. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz band**
 - a. *Entire available inventory in existing bands to be made available for auction, with circle-specific considerations where demand-supply gaps persist. Circle-specific planning to address regional imbalances (e.g., 2100 MHz shortage in UP-E, WB, etc.)*
 - b. *Existing band plans, block size, minimum bidding quantity and LSA basis to be retained.*
 - c. *While retaining the existing 20-year spectrum validity, larger deliberations should be done to extend the validity of access spectrum for a longer period say 30/40 years, for existing spectrum holdings as well.*
 - d. *Existing eligibility criteria and associated eligibility conditions for participation in the auction to be retained. No relaxation to be granted to include ISPs or entities lacking the demonstrated ability to provide comprehensive telecom services.*
 - e. *Roll-out obligations for existing players to be relaxed.*
 - f. *New roll-out obligations to be reserved strictly for genuine new entrants to incentivize network expansion and service availability.*
 - g. *Reduce existing spectrum cap from 40% to 35% per TSP as per band grouped under NIA 2024.*

- h. Spectrum pricing to be rationalized and auction timelines be aligned with ecosystem maturity for all bands, especially low-frequency spectrum.*
- i. Operational challenges associated with 3300 MHz band to be proactively addressed and resolved by harmonizing spectrum use by moving the current un-allocated spectrum to the 3400-3430 MHz range in exclusion zones around DoS NavIC stations – before auctions.*
- j. Explicit regulatory frameworks to be established to mitigate interference risks between adjacent 850 & 900 MHz band deployments, enforcing 3GPP-compliant emission standards.*

11. 600 MHz band: *Auction to be conducted only after concrete evidence of ecosystem readiness is established, ideally post 2–3 years, using n105 band configuration. Meanwhile, TRAI and DoT should conduct annual reviews of global developments and domestic ecosystem progress before finalizing auction timelines.*

12. 6 GHz band:

- a. Entire spectrum in 6 GHz band should be made available for IMT services and auctioned accordingly.*
- b. Spectrum in 6425-6725 MHz and 7025-7125 MHz ranges should not be included in forthcoming IMT auction.*
- c. India-specific pilot coexistence trials between IMT base stations and satellite uplink earth stations be conducted before auction of this band.*
 - i. Trials should be jointly undertaken by DoT, DoS/ISRO, TRAI, and TSPs to determine optimal keep-out distances, interference thresholds, and EIRP limits.*
 - ii. Studies should cover different terrain and density environments (urban, semi-urban, rural) to derive a robust, nationally applicable coexistence framework.*
 - iii. Basis pilot results, define standardized technical parameters, exclusion zone templates, and coordination procedures for inclusion in auction design and license conditions.*
 - iv. Only after completion of these studies and availability of validated coexistence parameters should this be included in commercial auctions.*
- d. Adopt globally harmonized 3GPP n104 band plan for upper 6GHz band.*
- e. Approach adopted for 3300 MHz and 26 GHz bands regarding TDD synchronization and coordination be explicitly extended to the upper 6 GHz band;*
- f. Following mandatory technical provisions be established in auction and licensing framework:*
 - i. Common GPS-based synchronization across all TSP networks;*
 - ii. Uniform DL/UL frame configuration for all outdoor sites;*
 - iii. Spectrum assignment in contiguous blocks, consistently positioned across LSAs;*
 - iv. Coordination mechanism facilitated by DoT/WPC to harmonize TSPs' deployments.*

13. 1427–1518 MHz band:

- i. Valuable mid-band spectrum that can play a critical role in uplink enhancement and balanced 5G-Advanced network performance.*
 - ii. Efforts should be initiated through DoT, WPC, and TRAI to engage with 3GPP and global OEMs for defining and standardizing an SUL option.*
 - iii. 24 MHz contiguous block for Government use should be located at one end of the band.*
 - iv. DoT and TRAI should initiate early consultations with chipset, device, and network vendors to ensure ecosystem readiness for SUL deployment in the 1427–1518 MHz band.*
 - v. Phased roadmap should be developed, targeting ecosystem maturity by 2027–2028, synchronized with the expected availability of this band post-2026.*
- 14. While SMRA framework has served India well, there is merit in reviewing and evolving the auction design to align with the next phase of 5G-Advanced and 6G spectrum requirements.*
- 15. Optimal spectrum valuation and reserve price determination must integrate economic sustainability, global benchmarks, technical readiness, and market realities.*
- 16. TRAI should move away from exclusive reliance on past auction prices and adopt a marginal/incremental revenue–based approach. If indexation is applied, use REPO or Reverse REPO rate instead of MCLR to account for temporal value adjustments.*
- 17. Spectrum valuation exercise should be undertaken afresh every year.*
- 18. Spectral efficiency should be treated as a supporting input, not a determinant, within a comprehensive valuation methodology that reflects both the technical and economic realities of spectrum deployment in India.*
- 19. Reserve price of spectrum for all bands to be set at 50% of the valuation.*
- 20. No upfront payment should be mandated. TSPs should be allowed to make payments solely through annual installments after a 6-year moratorium, spread over the remaining 14-year spectrum validity period.*
- 21. Minimum 6-year moratorium should be provided in forthcoming auctions, followed by 14 equal annual installments for payment of the spectrum price.*
- 22. Total of 14 installments, post the moratorium period, should be prescribed to recover the deferred payment amount — with no upfront payment requirement.*
- 23. No interest should be levied on deferred spectrum payments. Without prejudice, if interest is imposed, rate to be aligned with prevailing RBI Repo Rate to reflect current market conditions.*
- 24. Spectrum swap policy allowing TSPs to exchange spectrum in one band for another on a revenue-neutral or positive basis to the exchequer should be introduced.*

25. Spectrum Surrender Guidelines should be revised to enable refund or adjustment of paid spectrum charges in case of surrender. If refund is not feasible, the amount may be adjusted against future deferred payments or future auction acquisitions by the TSP.

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

Question-wise Comments

Q1. What measures should be taken to enhance competition and mitigate over-supply of the spectrum in various frequency bands in the forthcoming auction? Please provide a detailed response with justifications.

Airtel Comments to Q1:

1. Bharti Airtel acknowledges that strong, sustainable competition and careful management of spectrum supply are foundational to India's digital future. Spectrum requirements evolve in response to the increasing use and development of telecommunication services. This demand is influenced by several factors that affect the uptake of telecom services. These include prevailing market conditions such as tele-density and internet penetration, and techno-economic factors like investment in telecom infrastructure. Other relevant variables such as geographic features, population demographics, and living standards also influence consumer preferences and the demand for telecom services.
2. It is also important to recognize that spectrum demand in India is structurally different from other markets due to the extremely high population density, rapid traffic growth, and relatively lower spectrum holdings per operator. Hence, any characterization of "over-supply" must be viewed through the lens of actual per-user availability and comparative international benchmarks, rather than total quantum released.
3. **Competition in the Indian Telecom Market is already Intense and Sustainable:**
 - a. India's telecom sector is globally recognized for its high level of competition and efficiency. With three private TSPs and a public TSP, the market is structurally competitive, ensuring consumer welfare through low tariffs and high service penetration. This structure has already achieved an optimal balance between consumer interest and market sustainability, with each operator having a nationwide footprint and competing on quality, innovation, and pricing.
 - b. The competition in the Indian market is already driving constant innovation, quality enhancement, and rural expansion. Indian consumers enjoy one of the most affordable

data environments in the world, while operators continue to invest billions in spectrum and infrastructure each year despite low returns.

- c. **Therefore, Airtel submits that rather than focusing on measures aimed at enhancing competition or mitigating perceived oversupply of spectrum, policy and regulatory efforts should be directed towards ensuring financial sustainability of existing players so that investments in next-generation technologies and rural connectivity can continue.**
- d. It must also be recognized that the Indian telecom market has achieved a rare equilibrium between affordability and technological advancement. Any policy action that disrupts this equilibrium, such as holding back spectrum, could destabilize the sector and adversely affect consumer interests. Hence, competition policy in telecom should prioritize stability, consolidation, and efficiency rather than numeric plurality.

4. Spectrum Demand is a Derived and Growing Requirement – Over-Supply is a Mischaracterization:

- a. The spectrum demand arises as a derivative of consumer demand for mobile and broadband services. With the exponential growth in the following segments, the requirement for spectrum is expanding non-linearly, especially in mid-band and sub-GHz ranges:
 - Mobile data consumption,
 - 5G rollout and densification,
 - Fixed Wireless Access (FWA),
 - Enterprise use cases, and
 - Upcoming 6G developments.
- b. In addition, India's Digital Public Infrastructure (DPI), the expanding base of connected devices, and the Government's focus on industry 4.0 will further accelerate spectrum requirements in both coverage and capacity bands.
- c. **Therefore, Airtel submits that characterizing the currently available spectrum inventory as "over-supply" is inaccurate. In reality, this strategic inventory is required to meet anticipated growth and regional capacity needs.** For example:
 - In Uttar Pradesh (East) and West Bengal, there is a critical shortage of 2100 MHz spectrum, adversely affecting service quality and expansion potential.
 - Similarly, high-traffic urban clusters continue to face capacity constraints despite available inventory in other circles.
- d. Further, the existence of unsold spectrum in certain bands does not indicate lack of demand — it reflects pricing or ecosystem misalignment. Spectrum should be viewed as

a long-term national asset that must remain available for flexible and future deployment, not withheld to manufacture scarcity.

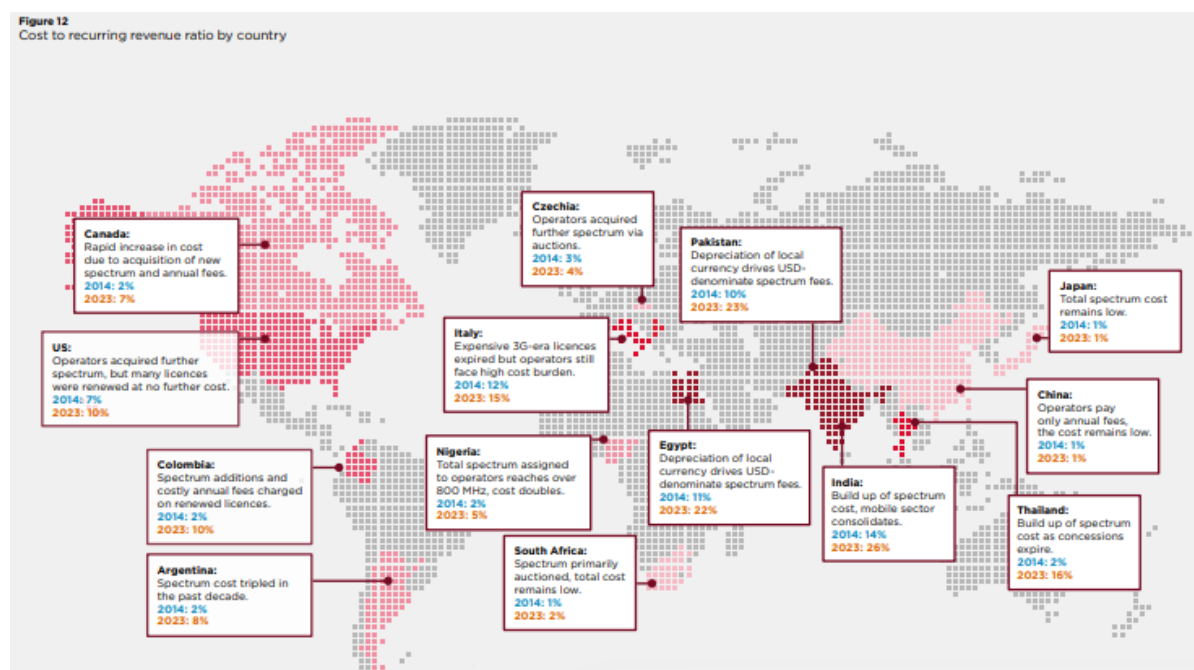
- e. In addition, Airtel believes that restricting the supply to artificially manufacture scarcity would be counterproductive and lead to:
 - Higher prices for spectrum,
 - Lower network investment,
 - Slower service expansion, and
 - Deterioration in the consumer experience.
- f. Artificial scarcity would also distort competitive neutrality among operators by disproportionately impacting those expanding into new circles or densifying networks for 5G. Ensuring abundant supply allows fair opportunity for all players and accelerates the rollout of advanced technologies.
- g. In summary, **the argument of “over-supply” overlooks ground realities — including exponential traffic growth, dense urban demand clusters, and evolving enterprise applications — and does not reflect India’s true requirements. Instead of withholding, Airtel strongly recommends that India should progressively expand access to harmonized, technology-neutral spectrum to remain globally competitive. The Government must adopt a forward-looking stance by auctioning full available inventory while maintaining rational reserve pricing.**

5. High Spectrum Prices are Hindering Investments and Innovation:

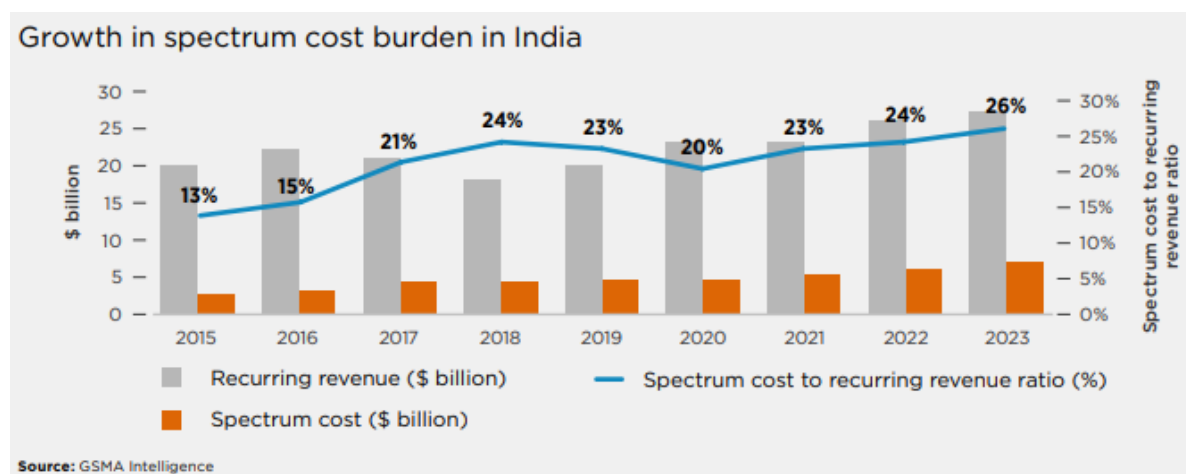
- a. We would also like to highlight that the historical auction data and global reports, including those from GSMA Intelligence, have consistently highlighted the high cost of spectrum acquisition in India as a barrier to competition and network investment. The key insights reflect that spectrum prices in India are among the highest in the world in proportion to TSPs’ revenues. The 2024 auction for 533.6 MHz across various bands saw only 26.5% uptake, despite price reductions. This clearly demonstrates that price rationalization, not supply limitation, is the key to ensuring spectrum utilization and industry growth.
- b. The GSMA Intelligence report¹ mentions that: “The acquisition of new bands to support 5G and improved 4G networks has meant that the spectrum cost burden gradually increased between 2015 and 2023. This currently stands at 26% of operator recurring revenues and is among the highest in the world. Rationalised spectrum pricing can be seen as a catalyst for recent accelerated 5G rollout and improved network quality in India. However, the burden of spectrum cost will continue to influence India’s progress towards

¹ <https://www.gsmaintelligence.com/research/research-file-download?reportId=64863&assetId=64866>

its digital goals for years to come.” The cost to recurring revenue ratio for India in comparison to other countries is depicted in the following image for ready reference:



- c. In addition to above, the detailed analysis of spectrum cost burden in India is also provided below:



- d. In fact, according to GSMA, globally:
- Spectrum costs now account for 7% of TSPs’ revenues (a 63% increase over a decade),
 - While revenue per MHz has dropped by 60%,
 - Every 10 percentage-point increase in spectrum cost-to-revenue ratio reduces coverage by 4% and download speeds by 6%.

- e. In India, this correlation is even more acute because of one of the world's lowest tariffs and limited pricing flexibility. Excessive spectrum pricing thus crowds out capital that could otherwise be used for tower rollout, fiberization, and network modernization.
 - f. The key takeaway from such findings is that high reserve prices deter participation, delay spectrum utilization, and diminish consumer benefits. Thus, spectrum pricing must be realistic, demand-driven, and aligned with ecosystem readiness.
 - g. India's experience over the last decade shows that aggressive reserve pricing neither maximizes revenue nor ensures optimal use of spectrum. Unsold spectrum remains idle, generating zero economic or social value. In contrast, a moderate pricing framework that stimulates full participation yields greater long-term benefits in terms of GDP growth, tax revenues, and digital inclusion.
 - h. Hence, a forward-looking policy shift is needed—from "maximizing auction proceeds" to "maximizing long-term public value." Spectrum pricing should be formulated in a manner that directly supports national digital objectives.
6. **In summary, Airtel submits that the success of spectrum auctions depends not only on revenue maximization, but also on enabling TSPs to expand networks, improve service quality, and support national digital ambitions. Our key submissions are as below:**
- a. **Auction complete available spectrum inventory in existing bands as it prevents artificial scarcity.**
 - b. **Define clear roadmap for spectrum availability in new bands and timing of the auction of spectrum in new bands should be aligned with the global OEMs and device ecosystem maturity in those bands.**
 - c. **Rationalize reserve prices to encourage operator participation, improve affordability of spectrum and downstream services.**
 - d. **Address spectrum shortage in certain bands through circle-specific efforts (e.g., 2100 MHz shortage in UP-E etc.)**
 - e. **The Indian telecom market is already intensely competitive, and any further measures or relaxations aimed at increasing competition could inadvertently affect the financial stability and long-term viability of existing operators.**
 - f. **The priority should be to ensure the financial sustainability of existing TSPs, thereby enabling continued investment in next-generation technologies and expansion of rural connectivity.**
 - g. **Holding regular spectrum auction will help operators make capital-efficient investments without regulatory uncertainty.**
7. **We urge the Authority to adopt a balanced and future-focused regulatory approach and consider the following factors to design the upcoming auction framework:**

- a. Recognize spectrum as a public infrastructure enabler, not merely a revenue source.
- b. Promote sustainable competition through rational supply and pricing.
- c. Avoid creating artificial scarcity that harms service quality and consumer welfare.
- d. Encourage investment in next-generation infrastructure through predictable and equitable policy.
- e. Ensure long-term visibility of spectrum roadmap (including refarming and new bands) to foster investor confidence and network readiness for future technologies.

Q2. Whether the entire available spectrum in the existing bands viz. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz band should be put to auction in the forthcoming auction?

(a) If yes, what measures should be taken to ensure effective competition in the forthcoming auction?

(b) If no, what quantum of spectrum in each of the frequency bands should be put to auction in the forthcoming auction?

Kindly provide a detailed response with justifications.

Airtel Comments to Q2:

1. Airtel strongly supports the proposition that the entire available spectrum across all existing IMT bands i.e. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz should be put up for auction in the forthcoming round. This includes spectrum currently held by non-commercial users (such as Defense and other Government entities) as well as spectrum currently locked with NCLT/NCLAT that can be harmonized or released in accordance with national policy. Any artificial scarcity of spectrum must be avoided to ensure optimal utilization of this critical national resource.
2. Further, full release of all available spectrum promotes transparency, ensures proper price discovery, and allows operators to plan for long-term technology transitions. Artificial withholding of spectrum distorts market equilibrium, limits operators' ability to deploy advanced technologies efficiently, and ultimately delays consumer benefits. A comprehensive release will also strengthen investor confidence and support the Government's vision of a Digital India built on transparent, market-based allocation principles.
3. **Optimal Resource Utilization and Digital Growth:**
 - a. Spectrum is a vital public resource and must be leveraged efficiently to sustain India's telecom growth, foster innovation, and advance digital inclusion. With surging data consumption driven by smartphone proliferation, rapid 5G rollout, fixed wireless access (FWA) expansion, and the emerging 6G landscape, the availability of sufficient spectrum is essential. Restricting supply would constrain capacity growth and impede the Government's vision of a robust digital economy.

- b. In addition, telecom connectivity has now become the foundation of India's digital public infrastructure, enabling UPI, ONDC, health, and education platforms. Ensuring abundant and affordable spectrum availability is therefore not only a sectoral requirement but a national economic imperative. International studies (e.g., GSMA, World Bank) indicate that a 10% increase in broadband penetration can raise GDP by 1–1.5%, underlining the economic significance of spectrum availability.
- c. Moreover, the next decade will witness exponential growth in bandwidth-intensive applications such as IoT, AI, cloud gaming, and edge computing. To meet this surge, operators require predictable access to adequate and harmonized spectrum across all bands. Restricting supply would reduce capacity, slow down 5G densification, and delay India's readiness for future 6G networks.

4. **Market-Driven Allocation and Competition:**

- a. The past auctions have shown varying demand intensity across bands and service areas due to differences in technology maturity and device ecosystem readiness. By offering the entire available spectrum, market forces can determine the most efficient allocation and pricing based on actual demand. This approach promotes competition, enables operators to plan networks flexibly, and supports diverse coverage and capacity needs across LSAs.
- b. The principle of market discovery works effectively only when supply is not artificially constrained. Allowing the market to determine value ensures both efficient allocation and sustainable pricing, while maintaining a level playing field. Attempts to restrict supply in the name of inducing competition have, in the past, led to inflated auction prices and limited operators' capacity to invest in network expansion. Therefore, TRAI should continue to rely on a market-driven, technology-neutral, and transparent auction framework supported by rational reserve pricing.

5. **Addressing Circle-specific and Band-specific Gaps:** Despite an overall perception of adequate supply, we would like to highlight that certain LSAs, for example, the 2100 MHz band in UP (East) and West Bengal, face acute shortages.

6. **Efficient Use of Unsold and Fragmented Spectrum:** We believe that any unsold or fragmented portions of spectrum, in 3300 MHz band (around 20 to 70 MHz) in 6 LSAs with ISRO NavIC stations, should be harmonized in the limited area of the exclusion zones around ISRO NavIC stations before auctions. In these exclusion zones, 3400 to 3430 MHz has been kept unused, fragmenting the spectrum assigned to TSPs, while at the same time there is unlocated/unsold spectrum also available in the LSA. The unallocated spectrum should be moved to 3400 to 3430 MHz range and TSPs should be offered spectrum in contiguous blocks on priority in exclusion zones around NavIC stations in Port Blair, Shillong, Bhopal, Hasan,

Trivandrum and Jodhpur. Contiguous holdings improve spectral efficiency and commercial viability, at the same time ensuring spectrum does not remain idle or underutilized.

7. Therefore, Airtel submits that the entire available spectrum across existing bands viz. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz band should be put to auction in the forthcoming auction. Such practice aligns with India's national digital objectives and the principles of transparent, market-based resource allocation. This approach will also ensure dynamic spectrum utilization, enhance service quality, and support a competitive and sustainable telecom ecosystem.

**Q3. Whether the band plans, which have been adopted for the existing bands viz. the 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz bands in India, should be retained in the forthcoming auction?
If no, kindly suggest new band plan(s) for the existing bands with detailed justifications.**

Airtel Comments to Q3:

1. The existing band plans have proven effective in supporting India's telecom growth, ensuring ecosystem stability, and maintaining global harmonization. We understand that retaining them in the forthcoming auction will uphold continuity, safeguard investments, and sustain quality of service, fully aligned with national digital objectives and international standards.
2. Based on the following justifications, we submit that our detailed assessment strongly supports the continuation of these established band plans:
 - a. **Established Ecosystem Alignment:** The current band plans were adopted after extensive deliberation and are deeply embedded within India's telecom ecosystem. Device manufacturers, infrastructure vendors, and network equipment suppliers have structured their offerings around these plans, ensuring compatibility, cost efficiency, and a mature supply chain. Any alteration at this stage would risk ecosystem disruption, higher deployment costs, and rollout delays.
 - b. **Global Harmonization and Standards Compliance:** The existing band plans are closely aligned with globally harmonized 3GPP standards, facilitating economies of scale, interoperability, and seamless international roaming. Also, retaining these band plans ensures India's alignment with international best practices and supports the competitiveness of the domestic telecom sector.
 - c. **Support for Technological Continuity:** These band plans effectively support both 4G and 5G deployments through established FDD and TDD schemes. Their retention ensures technology-neutral nature and allows TSPs to build upon existing investments, ensuring a smooth and efficient transition towards advanced network capabilities, including 5G and beyond.

- d. **Avoiding Fragmentation and Operational Complexity:** Introducing new band plans at this stage would create fragmentation, complicate network planning, and increase operational challenges, particularly amid ongoing 5G deployments and evolving use of mmWave and dynamic spectrum sharing technologies. Maintaining the current structure is vital to ensure network stability and efficient spectrum utilization.
 - e. **Policy Consistency and Regulatory Stability:** Lastly, retaining the existing band plans aligns well with national policy objectives of promoting efficient spectrum use, innovation, and sustained digital infrastructure growth. It reinforces regulatory predictability and confidence for continued investment in the sector.
3. Therefore, Airtel submits that the existing band plans for the 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz bands should be retained for the forthcoming spectrum auction.

Q4. Whether the spectrum in the existing bands viz. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz bands should be auctioned on Telecom Circle/ Metro Area basis with a validity period of 20 years in the forthcoming auction? If no, what should be the area, and validity period of spectrum assignment in the existing bands? Please provide detailed response with justifications.

Airtel Comments to Q4:

A. Auction of Existing Bands on Telecom Circle/ Metro Area basis:

- 1. Airtel strongly submits that the spectrum in the 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz bands **should continue to be assigned on a Licensed Service Area (LSA) basis**, i.e., at the Telecom Circle/Metro Area level, as applicable for Access Services. Any move towards assigning spectrum for smaller service areas would be inconsistent with the existing licensing, operational, and policy framework and would adversely affect sectoral efficiency and national digital objectives. The reasons for continuing with the present LSA-based regime are as follows:
 - a. **Preservation of National Connectivity Goals:** It is important to note that assignment of spectrum for areas smaller than LSAs would lead to selective deployment, with TSPs focusing on high-revenue urban clusters while leaving rural and semi-urban regions underserved. Such an approach would run counter to the Government's Digital India and digital inclusion vision, which is founded on equitable and ubiquitous connectivity. The LSA-based model ensures uniform service availability and promotes balanced regional development.

- b. **Accordant with the Established Licensing Framework:** Since the inception of the telecom sector, access spectrum has always been assigned on an LSA basis, irrespective of the mode of assignment, whether through administrative allocation or competitive auctions. This approach is intrinsically linked to the Indian licensing regime, under which Access Service authorizations are issued on an LSA-level basis (earlier under CMTS/UASL and currently under Unified License). Hence, we do not foresee any regulatory or operational rationale to deviate from this well-established, coherent framework.
 - c. **Continuity of Network and Business Architecture:** The entire network design, service architecture, and commercial planning of TSPs are structured at the LSA level. Tariff plans, coverage strategies, and investment frameworks are all aligned accordingly. Introducing smaller service areas would disrupt the established network planning and ecosystem, create regulatory inconsistency, and significantly multiply operational complexity, thereby hampering efficient spectrum use and service quality.
 - d. **Avoidance of Spectrum Fragmentation and Inefficiency:** We submit that sub-LSA assignments would inevitably result in fragmentation of spectrum holdings, proliferation of localized operators, and inefficient utilization of this critical national resource. Larger TSPs would end up facing disjointed and non-contiguous holdings, undermining economies of scale and efficient network rollout. Hence, such artificial fragmentation would increase both costs and coordination challenges, ultimately diminishing consumer welfare.
 - e. **Spectrum Management and Interference Concerns:** It is further significant to point out that assigning spectrum at smaller geographic levels would substantially escalate the complexity of interference management, coordination, and harmonization tasks for the WPC wing. This would impose unnecessary administrative burdens without delivering any tangible benefit. Notably, even for high-frequency bands such as the 26 GHz mmWave band, spectrum has been assigned on an LSA basis in the 2022 auctions and as reiterated in the NIA 2024, clearly underscoring the practicality and efficiency of the current regime.
2. **Therefore, considering the above, we strongly recommend that the existing LSA-based framework for spectrum assignment be retained for all the existing bands viz. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz bands. This approach safeguards policy consistency, operational efficiency, optimal resource utilization, and alignment with India's digital transformation objectives. Any deviation from this proven model would create unwarranted complexity, hinder investment, and fragment the national telecom ecosystem.**

B. Validity Period of Spectrum Assignment in the Existing Bands:

1. Given the capital-intensive nature of telecom infrastructure, the evolving technology landscape, and the long-term investment horizon required to develop and monetize networks effectively, we understand that a longer tenure will provide essential regulatory certainty and promote sustainable growth.
2. Such longer validity deliberations are going on in various other countries to extend the validity period of spectrum for a longer period say 30/40 years. We believe that the similar discussions should also be done in India to extend the validity of access spectrum from existing 20 years to 30/40 years, including existing spectrum holdings as well. Such a policy will support the long-term investment horizon, technological evolution, and sustainable growth of the telecom sector in India.
3. In this regard, the detailed justifications are as follows:
 - a. **Long-Term Investment and Network Development:** Undoubtedly, telecom infrastructure deployment is capital-intensive with inherently long gestation periods. It is crucial to point that new spectrum bands and technologies require several years before the ecosystem, including device availability and service monetization, matures. For instance, the 2300 MHz band took nearly 5-6 years post-auction to develop a robust ecosystem and scale of deployment. Similarly, despite rapid 5G rollout since the 2022 auctions, full monetization remains a challenge. **The longer validity will give long-term visibility and investment security to the TSPs, enabling them to recover costs and plan sustained, phased rollouts without the disruption and uncertainty of frequent renewals.**
 - b. **Regulatory Stability and Proven Framework:** Spectrum in India has traditionally been assigned for 20 years, a practice that has underpinned consistent growth, investor confidence, and market stability. **The longer validity aligns with the objective of regulatory certainty and offers a more future-proof framework that reflects the evolving nature of telecom investments and technologies.**
 - c. **Supporting Emerging and Developing Ecosystem:** The query around validity period appears to stem from concerns regarding the ecosystem maturity in certain bands. Precisely for such developing bands and nascent use cases, the longer validity period is even more critical. It guarantees operators the confidence and flexibility needed to build ecosystems sustainably, accelerate innovation, and deliver enhanced services without the looming uncertainty of shorter tenure expiry.
 - d. **Facilitating Technology-Neutral Evolution:** The policy of technology neutrality combined with longer validity has enabled dynamic evolution of spectrum usage, from 3G to 4G, and now to 5G, across bands like 900 MHz, 1800 MHz and 2100 MHz. Such seamless transitions would not have been possible under shorter validity periods, which risk disincentivizing technological innovation and gradual network evolution.

The longer validity period ensures that spectrum remains a flexible resource to support future technologies including 6G.

- e. **Preventing Market Fragmentation and Ensuring Quality Operators:** Shorter validity periods may inadvertently attract transient or speculative players with short-term interests, undermining network quality and consumer trust. **A longer tenure ensures that only serious, committed service providers with robust business models participate, safeguarding sectoral stability and protecting consumer interests.**
 - f. **Existing Provisions for Flexibility:** The current policy framework already provides mechanisms for spectrum trading and surrender, with provisions allowing spectrum holders to trade after 2 years and surrender after 10 years. These conditions offer sufficient flexibility for spectrum management without compromising the advantages of a longer validity period.
4. **Therefore, in conclusion, Airtel submits that while retaining the existing 20-year spectrum validity, larger deliberations should be done to extend the validity of access spectrum for a longer period say 30/40 years, for existing spectrum holdings as well. Such a policy will strengthen regulatory certainty, foster innovation, support evolving technology deployments, and safeguard India's digital infrastructure. We urge the Authority to adopt this forward-looking framework to empower operators and ensure India's telecom sector sustains robust growth and global competitiveness.**

Q5. Whether the block size and minimum quantity for bidding in the existing bands viz. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz bands should be kept the same in the forthcoming auction as those in the spectrum auction of June 2024 as mentioned in Table No. 2.14 of this consultation paper? If not, what should be the band-wise block size and minimum bid quantity? Kindly provide a detailed response with justifications.

Airtel Comments to Q5:

1. **Airtel recommends retaining the existing block sizes and minimum quantity for bidding for the upcoming auction of the existing bands i.e. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz bands, consistent with those prescribed in the June 2024 auction. The current block sizes, such as 1.25 MHz for 800 MHz, 0.2 MHz for 900/1800 MHz, 5 MHz for 2100 MHz, 10 MHz for 2300/2500/3300 MHz, and 50 MHz for 26 GHz, are aligned with international standards and 3GPP technical specifications.**
2. **These block sizes facilitate efficient Radio Access Network (RAN) deployment by aligning with equipment, device capabilities, and radio propagation characteristics specific to each band, thereby minimizing the need for additional harmonization and avoiding compatibility risks.**

3. It is relevant to note that the outcomes of the June 2024 auction, along with previous auctions, demonstrate that the current block sizes and minimum quantities adequately support multi-operator participation across both high-capacity and critical coverage bands, without imposing artificial entry barriers.
4. Indeed, maintaining uniformity and continuity in block sizing mitigates regulatory uncertainty, simplifies compliance, and supports predictable financial planning and investment strategies for operators. Any changes at this stage could disrupt ongoing network expansions and capital expenditure cycles.
5. Furthermore, the existing parameters are consistent with historic Notices Inviting Applications (NIA), and altering them without robust, data-driven justification would introduce unnecessary regulatory volatility and operational disruption.
6. **Therefore, in light of these considerations, we urge the Authority to preserve the current block size and minimum bidding quantity framework for the existing bands viz. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz in the forthcoming auction. This confirms continuity, efficiency, and simplicity in both regulatory and operational terms.**

Q6. What should be the eligibility criteria and associated eligibility conditions for participation in the forthcoming auction for the existing bands viz. the 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz bands? Kindly provide a detailed response with justifications.

Airtel Comments to Q6:

1. Airtel submits that the eligibility criteria and associated eligibility conditions for participation in the forthcoming auction for the existing bands viz. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz should remain consistent with those specified in the Notice Inviting Applications (NIA) for auctions held in 2024 and thereafter.
2. It is noteworthy to mention that introduction of new spectrum bands should not serve as a basis for altering established eligibility conditions. The eligibility framework outlined in NIA 2024 is appropriately flexible, permitting non-licensees to participate in the auction provided they furnish an undertaking to procure the requisite license. This approach ensures an open yet controlled bidding environment.
3. However, it is imperative to maintain safeguards that:
 - a. Prevent frivolous or speculative participation that undermines the integrity of the auction process of such a valuable resource.

- b. Preserve a level playing field by ensuring that only entities with proven financial strength and technical expertise can secure spectrum.
4. In addition to above, we strongly oppose extending eligibility to Internet Service Providers (ISPs) that do not currently hold unified access service licenses or demonstrate the requisite operational capabilities to deploy and manage telecom networks at scale. It is crucial to highlight that telecom spectrum auctions allocate a critical public resource essential for nationwide digital infrastructure and service delivery. Therefore, the Government must prioritize bidders capable of efficiently utilizing spectrum to enhance coverage, capacity, and quality of service.
5. **Therefore, Airtel submits that retaining the existing eligibility criteria and associated eligibility conditions for participation in the forthcoming auction for the existing bands viz. the 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz bands ensures prudent stewardship of public spectrum resources while fostering a competitive and sustainable telecom ecosystem.**

Q7. Whether there is a need for modifying roll-out obligations for the existing bands viz. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz and 26 GHz bands, as stipulated in the Notice Inviting Application (NIA) for the spectrum auction held in June 2024 in order to improve mobile coverage in the country? If yes, what modifications should be made in the roll-out obligations for the existing bands? Kindly provide a detailed response with justifications.

Airtel Comments to Q7:

1. Airtel submits that imposing new roll-out obligations on existing licensees who have already fulfilled their deployment commitments in the respective bands would be counterproductive. It is pertinent to note that spectrum acquired in subsequent auctions for these bands will primarily be utilized to enhance capacity rather than extend network coverage beyond what has already been deployed for 5G and FWA services.
2. In this regard, it is worthy to highlight that after acquiring 5G spectrum in the 3.3 GHz band, Airtel deployed one of the fastest 5G networks globally, exceeding rollout obligations by over 300% within just two years. This demonstrates our strong commitment to advancing 5G connectivity across India, despite challenges related to monetization and limited use cases. The Phase 1 rollout obligations under NIA-2022 for both the 3.3 GHz and 26 GHz bands were fully met within the stipulated timelines.
3. When acquiring the 26 GHz spectrum in 2022, it was with the expectation that the supporting ecosystem—devices, chipsets, and use cases—would evolve rapidly, in line with global trends. However, the ecosystem for 26 GHz remains nascent, facing chipset constraints, limited device compatibility, and low market adoption of mmWave technology. These

factors—arising from external technological and market constraints beyond the control of TSPs—have significantly impeded the ability to meet Phase 2 rollout obligations in a meaningful and commercially viable manner.

4. Given that established TSPs have already demonstrated extensive rollout achievements across multiple spectrum bands, it is both reasonable and pragmatic that rollout obligations for existing operators be rationalized. Specifically, the Phase 2 rollout obligations for the 26 GHz band should be merged with Phase 3 (fifth year), allowing cumulative compliance. This approach would ensure efficient, technology-aligned deployment rather than premature rollouts that risk suboptimal utilization of national spectrum resources.
5. For the Sub-GHz bands (800 MHz and 900 MHz), no additional or new band-specific roll-out obligations should be introduced for existing licensees. These bands are critical for coverage and have already seen substantial network deployments by incumbent operators. Any additional spectrum won in auctions will primarily be used to bolster capacity and enhance quality of service, rendering new roll-out obligations unnecessary.
6. Similarly, for the mid-band spectrum ranging from 1800 MHz to 3300 MHz, existing licensees who have fulfilled prior roll-out commitments should not be subjected to new or incremental coverage obligations. The focus of subsequent auctions should be to facilitate capacity augmentation rather than duplicative coverage requirements.
7. **In summary, Airtel submits that the most effective mechanism to improve mobile coverage and service quality lies in enabling existing operators to efficiently acquire and deploy additional capacity. This is best achieved by relaxing redundant roll-out obligations for incumbents and allowing them operational flexibility to address coverage and capacity gaps dynamically. New roll-out obligations should be reserved strictly for genuine and long-term new entrants to incentivize network expansion and service availability.**

Q8. Whether there is a need to review the spectrum caps for the existing bands viz. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz and 26 GHz bands for the forthcoming auction? If yes, what should be the spectrum cap per service provider for different frequency bands? Kindly provide a detailed response with justifications.

Airtel Comments to Q8:

1. Airtel affirms the need to review and revise the spectrum caps for the forthcoming auction across the existing bands viz. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz and 26 GHz bands. Specifically, we strongly recommend reducing the existing spectrum cap of 40% to 35% per service provider, with justifications as follows:
 - a. **Increased Spectrum Availability in Sub-1 GHz bands and Necessity for Lower Caps:**

- i. The availability of sub-GHz spectrum has expanded significantly, notably with the addition of the 600 MHz band, which complements the existing 700/800/900 MHz allocations. Historically, sub-GHz spectrum supply was limited, often restricting TSPs to 10-15 MHz allocations, which justified higher caps to enable sufficient access. However, the introduction of new sub-GHz bands increases total spectrum availability, rendering the previous cap of 40% disproportionately high.
 - ii. By setting the cap at 35% for the Sub-GHz band, the Government can ensure equitable spectrum distribution, preventing any single operator from accumulating an excessive share of this crucial coverage layer. This reduction will promote wider access and foster a competitive environment by broadening choice and availability among all market participants.
- b. **Preservation of Competitive Equilibrium and Efficient Spectrum Utilization:**
 - i. Spectrum caps are instrumental in maintaining a competitive equilibrium and preventing monopolistic control over limited resources. While caps must not be so restrictive as to leave spectrum unsold and underutilized, they must also be stringent enough to avoid market distortion.
 - ii. Airtel believes that the 35% cap is conducive to multi-operator competition (considering 3 private TSPs and 1 PSU), technological innovation, and rational bidding behavior observed in previous auction cycles. It will allow the private TSPs to consolidate meaningful spectrum blocks necessary for wide-area and urban deployment, fostering efficient rollout of 5G and future 6G services.
2. **Therefore, considering the increased spectrum availability, particularly in sub-GHz bands, and the strategic importance of mid-band and mmWave frequencies, we strongly advocate for reducing the existing spectrum cap from 40% to 35% per service provider as per band grouped under NIA 2024 for the forthcoming auction. This adjustment will ensure fair competition, equitable spectrum access, and optimal utilization of this national resource.**

Q9. Are there any other inputs/ issues related to the auction of spectrum in the existing bands viz. 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz and 26 GHz bands for the forthcoming auction? Suggestions may be made with detailed justifications.

Airtel Comments to Q9:

1. In view of the forthcoming auction, Airtel believes that it is imperative to adopt a comprehensive and pragmatic approach towards the allocation of existing bands spanning 800 MHz through 3300 MHz, including the 26 GHz millimeter-wave band, while addressing

the inherent challenges associated with these frequencies. Our detailed perspective, in this regard, is outlined below:

2. **Operational Challenges Observed in Existing Bands:** Based on our extensive field experience in deploying networks across the 800 MHz, 900 MHz, and 3300 MHz bands, we highlight the following key challenges encountered during deployment and ongoing network operations, which merit urgent attention:

- a. **Challenges in 3300 MHz Band Deployment due to Spectrum Fragmentation and Exclusion Zones:**

- i. In the 2022 spectrum auction, Airtel was allocated spectrum blocks within the 3300 MHz band for 5G services. However, the frequency range from 3400 MHz to 3430 MHz remains allocated to the Department of Space (DoS) for NavIC (Navigation with Indian Constellation) operations. To protect these critical NavIC systems from interference, the Government has defined exclusion zones around the NavIC stations located in Jodhpur, Bhopal, Hassan, Shillong, Trivandrum, and Port Blair.

Sl. No.	LSA	IRCDR Location	Frequency Allocated to Airtel	NavIC Operating Frequency
1	Rajasthan	Jodhpur	3370MHz -3470MHz	3400 MHz - 3430 MHz
2	Madhya Pradesh	Bhopal	3370MHz -3470MHz	3400 MHz - 3430 MHz
3	Karnataka	Hasan	3370MHz -3470MHz	3400 MHz - 3430 MHz
4	Northeast	Shillong	3370MHz -3470MHz	3400 MHz - 3430 MHz
5	Kerala	Trivandrum	3370MHz -3470MHz	3400 MHz - 3430 MHz
6	West Bengal	Port Blair	3400MHz -3500MHz	3400 MHz - 3430 MHz

- ii. Such arrangement amounts to the following concerns:
 - These exclusion zones significantly restrict C-band 5G transmissions within these frequency ranges.
 - As a result, we are unable to fully utilize the assigned contiguous 100 MHz spectrum blocks in these affected LSAs, since the NavIC frequencies fall in the middle of Airtel's allocated bands, thereby fragmenting Airtel's spectrum holdings.
 - The restricted spectrum availability in these populous urban centers constrains 5G network performance and degrades service quality.
 - We have received recurring customer complaints from these regions, reflecting impaired 5G user experience.
- iii. Within the exclusion zones surrounding these NavIC stations, the spectrum remains unutilized, resulting in a loss of potential revenue for the Government. At the same time, between 20 MHz and 70 MHz of spectrum at the lower end of the 3300 MHz

frequency band remains vacant across these LSAs, leading to inefficient utilization of valuable spectrum resources.

- iv. **To mitigate these constraints and enable effective deployment of contiguous 100 MHz blocks crucial for high-capacity 5G services, Airtel urges the TRAI/Government to devise a comprehensive spectrum harmonization plan but limited to exclusion zone area around NavIC stations. The unallocated vacant spectrum should be moved to 3400-3430 MHz range. This plan should address interference management and facilitate the coordinated use of spectrum in the affected locations. Upon successful harmonization, the unutilized spectrum can be made available for auction, enabling operators to fully exploit the 3300 MHz band's potential.**

b. Inter-System Interference Risks Between Adjacent 850 MHz and 900 MHz Bands:

- i. The India 800 MHz band (subset of 3GPP Band 5 range) operates in the uplink range of 824–844 MHz and downlink range of 869–889 MHz, while the adjacent India 900 MHz band (subset of 3GPP Band 8 range) operates in uplink frequencies from 890.1–915.1 MHz and downlink frequencies from 935–960 MHz. The close spectral adjacency of these bands, coupled with deployment by different TSPs, presents a significant risk of inter-system interference, particularly in uplink and downlink transmissions occurring in contiguous frequency blocks.
- ii. Currently, the Indian regulatory framework lacks explicit, comprehensive guidelines to address interference mitigation in scenarios involving adjacent-band deployments. To date, only limited, case-specific field trials have been conducted, which are insufficient to standardize interference management nationwide.
- iii. Although 3GPP specifications establish spurious emission and out-of-band emission limits for coexistence of adjacent bands, these standards primarily reference globally recognized bands and do not explicitly mandate their application to India-specific band definitions, which represent subsets of the 3GPP bands. Moreover, while 3GPP defines base station emission limits when multiple technologies (e.g., GSM 900 MHz, DCS 1800, PCS 1900, GSM 850, CDMA 850, UTRA FDD/TDD, and E-UTRA) coexist, there is currently no explicit enforcement or regulatory mandate requiring Indian operators and equipment vendors to comply with these limits.

Type of co-located BS	Frequency range for co-location requirement	Maximum Level	Measurement Bandwidth	Note
Macro GSM900	876-915 MHz	-98 dBm	100 kHz	
Macro DCS1800	1710 - 1785 MHz	-98 dBm	100 kHz	
Macro PCS1900	1850 - 1910 MHz	-98 dBm	100 kHz	
Macro GSM850 or CDMA850	824 - 849 MHz	-98 dBm	100 kHz	
WA UTRA FDD Band I or E-UTRA Band 1 or NR Band n1	1920 - 1980 MHz	-96 dBm	100 kHz	
WA UTRA FDD Band II or E-UTRA Band 2 or NR Band n2	1850 - 1910 MHz	-96 dBm	100 kHz	
WA UTRA FDD Band III or E-UTRA Band 3 or NR Band n3	1710 - 1785 MHz	-96 dBm	100 kHz	
WA UTRA FDD Band IV or E-UTRA Band 4	1710 - 1755 MHz	-96 dBm	100 kHz	
WA UTRA FDD Band V or E-UTRA Band 5 or NR Band n5	824 - 849 MHz	-96 dBm	100 kHz	
WA UTRA FDD Band VI, XIX or E-UTRA Band 6, 19	830 - 845 MHz	-96 dBm	100 kHz	
WA UTRA FDD Band VII or E-UTRA Band 7 or NR Band n7	2500 - 2570 MHz	-96 dBm	100 kHz	
WA UTRA FDD Band VIII or E-UTRA Band 8 or NR Band n8	880 - 915 MHz	-96 dBm	100 kHz	

iv. To safeguard network stability and ensure interference-free operation, it is imperative that the DoT and the WPC Wing:

- Develop and enforce **clear technical guidelines and emission coordination protocols** for operators deploying services in the 850 MHz and 900 MHz bands.
- Mandate strict adherence to internationally accepted spurious emission limits as prescribed by 3GPP, tailored appropriately to Indian band specifications.
- Implement a coordinated framework for interference mitigation that includes regular monitoring, reporting, and resolution mechanisms.

This regulatory clarity will enable operators to optimize network performance, enhance quality of service, and reduce customer complaints related to interference.

3. In summary, to effectively address the dynamic spectrum requirements of the Indian telecom industry and ensure sustained growth and innovation, Airtel submits that it is crucial to:

- a. Proactively address and resolve operational challenges associated with the 3300 MHz band by harmonizing spectrum use around DoS NaVIC exclusion zones.
- b. Establish explicit regulatory frameworks to mitigate interference risks between adjacent 850 MHz and 900 MHz band deployments, enforcing 3GPP-compliant emission standards.

4. These measures will facilitate equitable spectrum access, promote healthy competition, and enable operators to deliver high-quality, ubiquitous telecom services to India's diverse and rapidly growing user base.

Q10. Whether the spectrum in the 600 MHz band should be put to auction in the forthcoming auction? If yes, whether the band plan n105 should be adopted for the 600 MHz band, or otherwise? Please provide a detailed response with justifications.

And

Q11. In case you are of the opinion that the 600 MHz band should not be put to auction in the forthcoming auction, what should be the timelines for auctioning of the 600 MHz band? Please provide a detailed response with justifications.

Airtel Comments to Q10 and 11:

1. Airtel respectfully submits that the 600 MHz band should *not* be included in the forthcoming spectrum auction, as the global and domestic ecosystem for this band remains immature both in terms of device availability and network equipment readiness. It is important to highlight that premature auction of the band, without sufficient ecosystem support, risks inefficient utilization of a valuable national resource and could result in non-participation by TSPs, as observed in previous low-band auctions.

a. Current Ecosystem Status and Market Readiness:

- i. The 600 MHz band, while highly valuable for deep indoor coverage and rural broadband expansion, presently lacks a viable commercial ecosystem in India and globally. Most network vendors and device OEMs are still in the early stages of developing products for this frequency range. As a result:
 - Handset and chipset availability for 600 MHz remains minimal, with limited vendor support.
 - Network radio units compatible with this band are not yet widely available or optimized for Indian deployment conditions.
 - Global adoption of 600 MHz for IMT remains modest, with few countries having deployed commercial networks at scale.
- ii. Therefore, Airtel submits that auctioning this band in the absence of ecosystem maturity would likely lead to suboptimal participation, spectrum remaining unsold, and inefficient allocation of national resources.

- b. Recommendations on Band Plan – Adoption of n105 Configuration: Airtel strongly submits that the adoption of band plan n105 for the 600 MHz band is the most suitable

approach for India. The n105 configuration offers an additional 2 x 5 MHz of spectrum compared to alternative band plans, thereby enabling more efficient utilization of this valuable sub-GHz spectrum resource. The APT has already finalized its recommendation for region 3 countries to adopt Band Plan n105 for IMT deployments, with formal adoption expected at the forthcoming APT meeting. Furthermore, there is broad-based regional consensus and industry support within region 3 in favor of Band Plan n105, ensuring greater harmonization, economies of scale, and ecosystem readiness. **Therefore, adoption of n105 band plan, whenever this band is put to auction in future, would align India with regional and global developments, facilitate cross-border compatibility, and promote efficient deployment of next-generation mobile broadband networks.**

- c. **Coexistence and Interference Considerations:** The Authority must also ensure that mobile base stations operating in the 617–698 MHz band do not require additional filtering or geographical isolation to coexist with terrestrial TV transmitters operating in the 526–582 MHz band. The protection of adjacent-band services must be carefully planned through technical coordination measures, consistent with global best practices, to avoid harmful interference while ensuring efficient spectrum use.
 - d. **Recommended Policy Approach and Timing:** Given the above technical and market realities, Airtel urges the Authority to recommend a phased and evidence-based approach for introducing the 600 MHz band into the market:
 - i. **Deferral of Auction:** The 600 MHz spectrum should be **deferred for at least 2–3 years**, until a clear and sufficient device and network equipment ecosystem emerges.
 - ii. **Ecosystem Development Roadmap:** TRAI and DoT should issue a **prior spectrum usage roadmap** to provide visibility to OEMs and operators, thereby encouraging ecosystem development (chipsets, handsets, and base transceiver stations).
 - iii. **Regular Ecosystem Monitoring:** The TRAI and DoT may conduct periodic ecosystem readiness assessments, comprising of device availability, chipset integration, and vendor support, before deciding to auction the band.
2. **In summary, while the 600 MHz band holds significant potential for enhancing rural connectivity, improving indoor coverage, and supporting next-generation IMT deployments, the current ecosystem immaturity renders it unsuitable for immediate auction. A premature auction of this band would risk spectrum lying idle, increased cost burden on operators, and loss of alignment with global standards.**
 3. **Therefore, Airtel strongly recommends that the 600 MHz band should be auctioned only after concrete evidence of ecosystem readiness, ideally post 2–3 years, using the n105 band configuration. Meanwhile, the TRAI and DoT should conduct annual reviews of global**

developments and domestic ecosystem progress before finalizing auction timelines. This calibrated approach will ensure that when the band is eventually put to auction, it will attract genuine participation, enable efficient spectrum utilization, and yield maximum long-term economic efficiency.

Q12. In case it is decided to auction the spectrum in the 600 MHz band in the forthcoming auction, -

(a) Should the entire available spectrum in the 600 MHz band be put for bidding in the forthcoming auction?

(b) Whether the eligibility criteria, associated eligibility conditions, block size, minimum bid quantity of spectrum, validity period for the assignment of spectrum, area of assignment on Telecom Circle/ Metro Area-basis, spectrum cap and roll out obligations for the spectrum in the 600 MHz band in the forthcoming auction should be kept the same as those in the spectrum auction of 2022, or otherwise?

Please provide a detailed response with justifications.

Airtel Comments to Q12:

Airtel strongly recommends that the 600 MHz band should be auctioned only after concrete evidence of ecosystem readiness, ideally post 2–3 years. Please refer to our detailed comments provided to Q10 and 11.

Q13. Are there any other inputs/ issues related to the auction of spectrum in the 600 MHz band for the forthcoming auction? Suggestions may be made with detailed justifications.

Airtel Comments to Q13:

Airtel strongly recommends that the 600 MHz band should be auctioned only after concrete evidence of ecosystem readiness, ideally post 2–3 years. Please refer to our detailed comments provided to Q10 and 11.

Q14. Whether the spectrum in 6425-6725 MHz and 7025-7125 MHz ranges in the upper 6 GHz band should be put to auction for IMT in the forthcoming auction? Kindly provide a detailed response with justifications.

And

Q15. In case you are of the opinion that the spectrum in 6425-6725 MHz and 7025-7125 MHz ranges should not be put to auction in the forthcoming auction, what should be the timelines for auctioning of this spectrum for IMT? Kindly provide a detailed response with justifications.

Airtel Comments to Q14 and Q15:

1. India's Telecom Sector: A Strategic Economic Pillar

- a. India's telecom sector stands at a critical inflection point, driving the country's digital transformation through rapid 4G and 5G expansion, affordable data access, and surging mobile usage. As of March 2025, total internet subscriptions have exceeded 900 million², with wireless broadband also accounting for over 875 million. The mobile data traffic grew by 22% in FY2023–24, reflecting deepening digital adoption. In addition, voice usage and per-user data consumption continues to rise, with 5G users projected to surpass 600 million by 2030.
- b. Telecom is no longer just a service; it is the foundational infrastructure of India's economic engine. It supports 1.2+ billion mobile users, enables e-governance, digital commerce, tele-medicine, online education and powers Government initiatives like Digital India, Gati Shakti and many more. Emerging technologies like 5G, AI, IoT, cloud computing are also dependent on robust, high-speed networks.
- c. It is pertinent to note that any slowdown in telecom investment or growth, risks cascading impacts across sectors and delays in achieving India's digital and economic goals. A healthy, competitive, and well-capitalized telecom industry is, therefore, a strategic national imperative.
- d. With such exponential rise in data consumption, particularly driven by 5G and emerging digital applications, **access to 6 GHz band and long-term sustainability of digital infrastructure deployed in the 6 GHz band is critical to ensure network efficiency and service quality.**

2. Prioritizing IMT to Meet India's Soaring Connectivity Demand:

- a. India is at a defining stage in its digital evolution, with rapidly increasing demand for high-capacity mobile broadband, enterprise-grade private networks, and mission-critical 5G services. The 6 GHz band, particularly the lower portion (5925–6425 MHz), is globally acknowledged as a key mid-band spectrum resource for IMT, owing to its optimal balance of coverage and capacity.
- b. **The 6 GHz band is of critical strategic importance for TSPs as it represents the last remaining large block of mid-band spectrum suitable for 5G and future 6G networks.** It enables wide-area, high-speed mobile broadband that is essential for both urban densification and rural expansion. **With existing mid-band resources like 3.3 GHz band nearing exhaustion, the 6 GHz band is indispensable for meeting the projected surge in**

² Telecom Subscription Data as on 31st March, 2025 issued by TRAI

data demand, supporting ultra-low latency applications, and ensuring network efficiency.

- c. While the ITU has identified the upper 6 GHz band (6425–7125 MHz) for IMT in several global markets and the DoT has acknowledged the same, the lower 6 GHz band also plays a crucial role in meeting the spectrum requirements necessary to support high-throughput, next-generation networks.
- d. In the Indian context, where TSPs remain central to delivering last-mile connectivity across diverse geographies, a balanced approach is essential. **While unlicensed use of spectrum has its own merits, careful coordination is required to ensure that critical IMT applications are not constrained. A forward-looking spectrum strategy should seek to harmonize the needs of both licensed and unlicensed use,** maximizing public benefit without compromising the ability to meet rising connectivity demands.

3. Sub-optimal Utilization of Existing De-licensed Spectrum Bands

- a. India has already delicensed significant portions of spectrum in the 2.4 GHz and 5 GHz ranges to promote Wi-Fi-based connectivity. However, the actual deployment and adoption of Wi-Fi, particularly in outdoor and public access scenarios, has not kept pace with policy objectives. While initiatives such as PM-WANI are commendable, their on-ground impact has been limited due to factors such as high deployment costs, fragmented implementation models and insufficient commercial incentives for private stakeholders.
 - b. In this context, **any further de-licensing of high-value spectrum such as the 6 GHz band should be guided by a comprehensive assessment of actual utilization patterns, implementation challenges, and potential for shared or hybrid models.** This will help ensure that spectrum resources are deployed efficiently and equitably, aligning with both national connectivity goals and long-term digital inclusion objectives.
4. **While there is a significant need of last large contiguous mid-band spectrum i.e. 6 GHz for IMT services, given its unique suitability for mobile broadband, we acknowledge that the DoT has proposed delicensing of the lower 6 GHz band (5925–6425 MHz) for unlicensed use. In this regard, the DoT has already constituted a multi-stakeholder committee for deliberations on power limits which are yet to be finalized. Given this, we reiterate that the entire spectrum in 6 GHz band should be made available for IMT services and auctioned accordingly.**
5. Further, it is pertinent to note that the 3GPP standardized the upper 6 GHz frequency range (6425–7125 MHz) as Band n104 under Release 17 (June 2022), designating it for Time Division Duplex (TDD) operation. This band has been identified as a key mid-to-high frequency range for 5G-Advanced and initial 6G deployments, primarily due to its large contiguous bandwidth availability that can support ultra-high capacity and low-latency applications.

6. According to *Policy Tracker (2025)*, 22 countries have announced plans to authorize IMT use in all or part of the upper 6 GHz band. Among these, 12 Asian nations are currently conducting public consultations or developing frameworks for licensed IMT deployment. This global momentum clearly indicates a growing recognition of the upper 6 GHz band as a critical capacity layer for next-generation mobile networks.
7. It is pertinent to note that the upper 6 GHz band provides substantial contiguous bandwidth with propagation characteristics that are intermediate between the lower mid-bands (such as 3.5 GHz) and mmWave frequencies. This makes it particularly attractive for dense urban capacity enhancement, FWA, and high-capacity backhaul augmentation. Where deployed, this band can significantly enhance per-user throughput, network efficiency, and enable low-latency enterprise applications.
8. However, in the Indian context, only 400 MHz of spectrum—fragmented into the 6425–6725 MHz and 7025–7125 MHz blocks—is currently available for potential IMT deployment. The mid-block (6725–7025 MHz, 300 MHz) is expected to be vacated and become available only after December 2030.
9. In this regard, please find below our **concerns against immediate auction of 6425-6725 MHz and 7025-7125 MHz ranges in the upper 6 GHz band:**
 - a. **Fragmented Spectrum and Non-contiguity:**
 - i. The portion of spectrum currently available (6425-6725 MHz plus 7025-7125 MHz) is fragmented and excludes a middle block of 6725-7025 MHz. This non-contiguous availability means that any allocation now would force the TSPs to contend with two disjoint blocks, which would likely reduce spectral efficiency, raise deployment complexity, and delay realization of full band-synergies (e.g., for wide-band carriers, high-capacity channels).
 - ii. Given that globally the upper 6 GHz band is being considered in contiguous form, and equipment vendors are optimizing for contiguous large-blocks, it would be sub-optimal to auction only partial/truncated holdings now.
 - b. **Ecosystem and Device Readiness:** While the upper 6 GHz band (6425-7125 MHz) has been standardized in 3GPP (as Band n104 under Release 17) for TDD operation, actual commercial deployments remain nascent. Airtel believes that premature auctioning may lead to under-utilization of spectrum, slow uptake, and inferior returns (in terms of service outcomes and spectrum value). A deferral will allow the ecosystem (chipsets, base-stations, terminals, passive infrastructure) to mature, benefiting both service providers and consumers.

- c. **Incumbent Services and Coexistence Challenges:** In India, the upper 6 GHz band carries incumbent satellite (Fixed Satellite Service — FSS) operations, thereby requiring India-specific coexistence studies (keep-out distances, emission masks, interference coordination) prior to large-scale IMT deployment in this band. International best practices indicate that a phased approach with trials and coordination is prudent. For example, satellite operations in India may restrict immediate IMT access to parts of the band. Proceeding to auction without fully addressing these issues could expose both the mobile services and incumbents to risk of interference, regulatory or operational constraints.

10. **Therefore, Airtel submits that the spectrum in the 6425-6725 MHz and 7025-7125 MHz ranges should not be included in the forthcoming IMT auction. Proceeding now would jeopardize efficient spectrum use, delay service roll-out, raise network planning costs due to fragmentation, and expose incumbent services to interference risks.**

Q16. Considering that the satellite-based service (uplink) will coexist with IMT-based services in the upper 6 GHz band, - whether pilot trials should be conducted to ascertain the keep out distance of the IMT base stations for satellite uplink stations before the auction of the upper 6 GHz band, or should it be left to the telecom service providers to ascertain the keep-out distance of the IMT base stations for satellite uplink stations at the time of commercial deployment after the auction?

Kindly provide a detailed response with justifications.

Airtel Comments to Q16:

1. Airtel submits that India should conduct India-specific pilot trials and formal coexistence studies prior to any commercial auction of the upper 6 GHz band (6425–6725 MHz and 7025–7125 MHz). These pilot studies are essential to empirically determine, validate, and standardize the required keep-out (exclusion) distances between IMT base stations and satellite uplink earth stations, ensuring both efficient IMT deployment and protection of critical satellite operations.
2. **DoT Communication on Coexistence Methodology:** In this regard, we draw reference to the DoT letter dated 14th August, 2025, wherein DoT informed TRAI that:

“The determination of keep-out distances for satellite uplink stations shall be worked out by the TSPs in coordination with the Department of Space (DoS), based on the technical specifications of the BTS. At present, the technical details of IMT base stations operating in the 6 GHz band are not available. Once any technical analysis is carried out by the TSPs and DoS, the outcome will be duly communicated to TRAI.”

- a. This communication clearly establishes that the technical parameters of IMT base stations operating in the upper 6 GHz band are yet to be defined, and therefore, scientific

coexistence analysis and field validation are prerequisites before finalizing spectrum allocation and auction conditions.

- b. Given this regulatory position, it is both premature and imprudent to leave the determination of keep-out distances to individual TSPs post-auction. Instead, nationwide pilot coexistence trials should be conducted collaboratively between DoT, DoS/ISRO, TRAI, and TSPs prior to the commercial release of this band.

3. Rationale for India-Specific Pilot Trials:

- a. The IMT ecosystem in the upper 6 GHz band is still nascent. Globally, only a few markets, such as China, South Korea, UAE, and Saudi Arabia, have initiated limited IMT operations in this range. The global device ecosystem, chipset integration, and network field experience remain limited. Furthermore:
 - Domestic technical parameters such as EIRP limits, antenna configurations, and out-of-band emission standards for IMT systems in this band are yet to be finalized by the Indian administration.
 - Propagation environments, terrain variability, and density of satellite earth stations in India differ significantly from other geographies; thus, international coexistence studies cannot be directly applied to the Indian context.
 - Without India-specific empirical data, defining static or generic exclusion zones could lead to either excessive protection (wasting spectrum) or insufficient protection (causing harmful interference).
- b. **Therefore, Airtel submits that controlled pilot trials are necessary to simulate real-world interference scenarios and determine appropriate coexistence parameters through data-driven, verifiable testing in this band.**

4. Technical Considerations and Satellite Protection Requirements:

- a. It is pertinent to note that with reference to the coexistence between IMT and space-based services, the Department of Space (DoS) shared the following details of the services operating in 6425-7025 MHz which co-exist with the IMT.

Services	Frequency Band (MHz)	No. of Earth station	Locations
TT&C	6425-6435 (10 MHz) 7010-7025 (15 MHz)	3	1. Hassan 2. Bhopal 3. Shillong
MSS Feeder Link*	6450-6485 (35 MHz)	20	At the user premises of 1. Fisheries, 2. Railways & 3. Defense and 4. ISRO centers (SAC-Ahmedabad, DES-Delhi, MCF- Hassan & Bhopal)
Antarctica Uplink	6600-6640 (40 MHz)	2	1. Hyderabad 2. Goa
GAGAN (AAI)	6664-6725 (61 MHz)	3	1. Bengaluru 2. Delhi 3. Mumbai
NavIC CDMA	6700-6725 (25 MHz)	6	1. Hassan 2. Bhopal 3. Shillong 4. Jodhpur 5. Port Blair 6. Trivandrum

* Location Information available with user agency

- b. The DoS and ISRO have highlighted that IMT transmissions in the upper 6 GHz band may elevate the noise floor of satellite uplink receivers, potentially disrupting critical satellite payloads, communication, and navigation operations. Their studies indicate that:
- Higher Earth Station EIRP levels and increased protection zones are necessary to ensure coexistence.
 - An I/N (interference-to-noise) protection criterion of -6 dB is recommended to safeguard satellite operations.
 - Coexistence parameters are highly location-dependent and must account for topography, antenna elevation, and power flux density (PFD) levels.
- c. These technical findings underscore the complexity of coexistence in the upper 6 GHz band and further justify the need for empirical coexistence validation through pilot trials.

5. Learnings from Previous Coexistence Challenges

- a. The experience from prior IMT deployments in India, particularly in the 3300–3670 MHz (C-band), demonstrates the operational and consumer impacts of insufficient pre-auction coexistence analysis.
- b. In that case, NavIC exclusion zones were defined post-auction around ISRO's IRCDR stations (in Jodhpur, Bhopal, Hassan, Shillong, Trivandrum, and Port Blair), leading to:
- Partial utilization of assigned spectrum blocks;
 - Coverage gaps and degraded network performance; and
 - Recurring customer complaints in affected urban areas.

- c. This precedent highlights that deferring coexistence studies until after spectrum assignment results in long-term operational inefficiencies, revenue loss, and diminished consumer experience. It is therefore critical to avoid repeating this scenario for the upper 6 GHz band.
6. In light of the above, **Airtel strongly submits that:**
- a. **India-specific pilot coexistence trials between IMT base stations and satellite uplink earth stations be conducted before auction of the upper 6 GHz band.**
 - b. **These trials should be jointly undertaken by DoT, DoS/ISRO, TRAI, and representative TSPs to determine optimal keep-out distances, interference thresholds, and EIRP limits.**
 - c. **The studies should cover different terrain and density environments (urban, semi-urban, rural) to derive a robust, nationally applicable coexistence framework.**
 - d. **Based on the pilot results, the Government may define standardized technical parameters, exclusion zone templates, and coordination procedures for inclusion in the auction design and license conditions.**
7. In summary, the upper 6 GHz band represents a strategically significant resource for India's 5G-Advanced and future 6G deployments. However, its coexistence with satellite uplinks presents complex technical challenges that cannot be resolved through theoretical modeling alone.
8. Airtel, therefore, requests for India-specific pilot coexistence trials and technical validation. This approach will safeguard satellite operations, optimize IMT spectrum utilization, and ensure that future commercial rollouts proceed on a scientifically validated and interference-free basis, thereby protecting both public and private investments in India's telecom and space sectors.

Q17. In case it is decided to put the spectrum in 6425-6725 MHz and 7025-7125 MHz ranges in the forthcoming auction, -

(a) Whether the 3GPP band plan n104 should be adopted for the upper 6 GHz band? If no, which band plan should be adopted for the upper 6 GHz band?

(b) What amount of spectrum in the 6425-6725 MHz and 7025-7125 MHz ranges should be put to auction?

(c) Whether the spectrum in the 6425-6725 MHz and 7025- 7125 MHz ranges should be auctioned on Telecom Circle/ Metro service area basis with a validity period of 20 years? If no, what should be the area and validity period of spectrum assignment in the 6425-6725 MHz and 7025- 7125 MHz ranges?

(d) What should be the block size, minimum bid quantity, and roll-out obligations for the spectrum in these ranges?

(e) What should be the eligibility criteria and associated eligibility conditions for bidding for the spectrum in these ranges?

Please provide a detailed response with justifications.

Airtel Comments to Q17:

A. Band Plan:

1. Airtel strongly recommends that the 3GPP band plan n104 (6425–7125 MHz, TDD) be adopted for the upper 6 GHz band, whenever it is put to auction, due to the following reasons:
 - a. **Global Harmonization:** The n104 band plan, defined under 3GPP Release 17, represents the globally harmonized approach for the upper 6 GHz range. Adopting this band plan will facilitate seamless interoperability of devices and equipment and ensure alignment with international deployments, thereby enabling a robust ecosystem for 5G-Advanced and future 6G networks.
 - b. **Ecosystem Readiness:** The interoperability trials conducted by leading OEMs such as Ericsson, MediaTek, and Nokia have already validated the technical feasibility and readiness of commercial deployments in band n104. The vendor product development for this band is well underway, and commercial availability is expected as soon as licensed spectrum is made available.
 - c. **Accelerated Ecosystem Development:** Aligning with the n104 band plan will enable India to leverage the global device and equipment ecosystem, ensuring faster time-to-market, lower device costs, and ecosystem scalability in line with international best practices.
2. **Therefore, Airtel submits that adoption of the globally harmonized 3GPP n104 band plan for the upper 6 GHz band, whenever it is put to auction, is essential for ensuring**

spectrum efficiency, investment certainty, and early realization of India's 5G-Advanced and 6G vision.

On other terms and conditions, Airtel submits that we do not support auction of upper 6 GHz band at this stage. Please refer to our detailed comments provided to Q14 and 15.

Q18. What provisions with respect to the spectrum cap per service provider in a licensed service area (LSA) should be made applicable for the spectrum in the upper 6 GHz band for IMT? Specifically, -

(a) Whether a combined spectrum cap for the 3300 MHz band and the upper 6 GHz band should be prescribed? If yes, what should be the spectrum cap per service provider?

(b) In case your response to (a) above is in the negative, what should be the spectrum cap per service provider for the spectrum in the upper 6 GHz band?

Please provide a detailed response with justifications.

Airtel Comments to Q18:

Airtel does not support auction of upper 6 GHz band at this stage. Please refer to our comments provided to Q14 and 15.

Q19. To mitigate inter-operator interference due to TDD-based configuration, whether the approach adopted for the 3300 MHz and 26 GHz bands should also be made applicable for the newly identified spectrum in the upper 6 GHz band? In case you are of the opinion that some other provisions are required to be established, suggestions may kindly be made with detailed justifications.

Airtel Comments to Q19:

1. Airtel submits that interference-free and contiguous spectrum allocation is a fundamental pre-requisite for efficient and reliable IMT network deployment—particularly for TDD configured mid-band and upper-band frequencies.
2. The experience from earlier deployments, such as in the 900 MHz, 2100 MHz, 2300 MHz (Band 40), 2500 MHz (Band 41), and 3300 MHz bands, clearly demonstrates that fragmented and uncoordinated spectrum assignments lead to cross-operator interference, reduced throughput, degraded user experience, and inefficient spectrum utilization.
3. Given that the upper 6 GHz band (6425–7125 MHz) is also expected to be deployed using TDD technology, it is imperative to adopt uniform synchronization and frame configuration practices similar to those prescribed for the 3300 MHz and 26 GHz bands. To mitigate inter-operator interference and ensure efficient coexistence, the following provisions are essential:

- a. **GPS-Based Synchronization:** All TDD networks and sites operating in the upper 6 GHz band should be synchronized using a common timing source, preferably the GPS. This will ensure uniform uplink (UL) and downlink (DL) transmission windows across operators and prevent overlapping transmissions that lead to interference.
 - b. **Harmonized UL/DL Frame Configuration:** All outdoor base stations in the upper 6 GHz band must follow a common downlink/uplink ratio configuration and be time-aligned across all operators. This alignment is critical to avoid UL–DL interference between neighboring cells of different operators.
 - c. **Cross-Operator Coordination Framework:** The DoT and WPC wing may facilitate the establishment of a TDD Synchronization and Coordination Protocol, under which operators are required to mutually coordinate frame configurations and timing parameters, particularly for high-density deployment areas.
4. To further reduce inter-operator interference, we submit the following allocation practices whenever the upper 6 GHz band is put to auction:
- a. **Contiguous Spectrum Assignment:** Spectrum in the upper 6 GHz band should be assigned to each TSP in contiguous blocks within an LSA. Fragmented allocations significantly increase the risk of adjacent-channel interference and complicate network planning.
 - b. **Uniform Band Positioning Across LSAs:** Consistency in spectrum range assignment (e.g., TSP A always receiving the lower portion of the band in every LSA) should be ensured to minimize cross-border or inter-LSA interference and enable efficient use of common radio equipment configurations.
 - c. **Exclusive Use Allocation:** Spectrum in this band should be allocated on an exclusive-use basis (not shared), especially in early deployment phases, to ensure predictable interference environments and maintain quality-of-service standards.
5. It is worthwhile to mention that our past experience in the deployment of TDD-based systems in the 2300 MHz and 2500 MHz bands has demonstrated that unsynchronized or partially aligned networks can result in severe uplink–downlink interference, manifesting as reduced spectral efficiency and degraded customer experience.
6. Similarly, in the 3300 MHz deployments post-2022 auction, fragmented spectrum assignments and inconsistent synchronization practices across operators in dense urban environments have necessitated additional mitigation efforts, including power reduction and guard band provisioning—leading to avoidable network inefficiencies and investment duplication.

7. Such lessons should be proactively incorporated into the planning framework for the upper 6 GHz band, which is expected to play a pivotal role in 5G capacity augmentation and future 6G deployments.
8. **In light of the above, Airtel recommends that:**
 - a. **The approach adopted for the 3300 MHz and 26 GHz bands regarding TDD synchronization and coordination be explicitly extended to the upper 6 GHz band;**
 - b. **The following mandatory technical provisions be established in the auction and licensing framework:**
 - i. **Common GPS-based synchronization across all TSP networks;**
 - ii. **Uniform DL/UL frame configuration for all outdoor sites;**
 - iii. **Spectrum assignment in contiguous blocks, consistently positioned across LSAs;**
 - iv. **Coordination mechanism facilitated by DoT/WPC to harmonize operator deployments.**

Q20. Are there any other inputs/ issues related to the auction of spectrum in the upper 6 GHz band for the forthcoming auction? Suggestions may be made with detailed justifications.

Airtel Comments to Q20:

Airtel submits the following inputs for consideration for the upper 6 GHz band (6425–7125 MHz) for IMT-based services:

1. Ecosystem Readiness and Global Context:

- a. The IMT ecosystem in the upper 6 GHz band is currently at a nascent stage of development. Global adoption remains limited, with early regulatory actions primarily seen in a few markets such as China, South Korea, the UAE, and Saudi Arabia. The band has been standardized by 3GPP as Band n104 under Release 17 and is envisioned to play a significant role in 5G-Advanced and early 6G deployments due to its large contiguous bandwidth and substantial capacity potential.
- b. However, commercial ecosystem readiness, particularly for devices, chipsets, and radio equipment, remains limited. As of 2025, only a handful of field trials have been conducted by certain vendors internationally, and no commercial device ecosystem has yet achieved mass production scale. It is therefore expected that widespread ecosystem maturity may take several years to materialize.

2. Indian Context and Spectrum Availability:

- a. In the Indian context, the 6425–7125 MHz band has been identified for IMT use but remains partially available and fragmented. Currently, only 400 MHz of spectrum is being proposed for auction, with the remaining 300 MHz is anticipated to become available by December 2030.
 - b. Given this staggered availability, it is essential that DoT, WPC, and TRAI jointly define a clear, time-bound roadmap for the full release and utilization of the upper 6 GHz band. This roadmap should include:
 - i. Defined timelines for phased availability of the remaining spectrum;
 - ii. EIRP guidelines aligned with international standards; and
 - iii. Coordination mechanisms with the DoS to address coexistence with satellite uplinks.
 - c. Such clarity will ensure policy predictability, facilitate industry investment planning, and align India's spectrum roadmap with global IMT development timelines.
3. **Propagation and Use-Case Suitability:** While the upper 6 GHz band provides substantial capacity and throughput advantages, it exhibits weaker propagation characteristics and lower building penetration compared to existing mid-bands such as the 3300–3670 MHz range.
4. **Coexistence with Satellite Services and Technical Constraints**
- a. The DoS has highlighted the potential for interference between IMT systems and satellite uplink earth stations operating in adjacent frequency bands. Coexistence studies indicate that increased earth station EIRP levels and wider exclusion (keep-out) zones may be necessary to protect satellite operations.
 - b. Furthermore, the EIRP mask defined under the WRC-23 may impose additional constraints on IMT link budgets, reducing effective coverage and increasing network deployment costs. These coexistence and technical limitations must be addressed before large-scale commercial deployments are undertaken.
 - c. It is therefore imperative that comprehensive India-specific coexistence trials be conducted jointly by TSPs, DoS, and WPC prior to finalizing auction terms and technical operating conditions.
5. This approach will safeguard the spectrum's long-term value, promote efficient utilization, and ensure that India's policy trajectory remains aligned with global IMT developments and domestic market readiness.

Q21. Considering the need to assign a contiguous 24 MHz block in the 1427-1518 MHz range to the Government user,
(a) Which band plan and duplexing scheme should be adopted for IMT in the 1427-1518 MHz range?
(b) Which range of spectrum (a contiguous block of 24 MHz) should be assigned to the Government user?
Kindly provide a detailed response with justifications.

Airtel Comments to Q21:

1. Often referred to as the 1.5 GHz or L-band, this band holds strategic importance as a mid-to-low band spectrum resource, capable of improving uplink capacity, deep indoor coverage, and overall spectral efficiency when integrated with higher-frequency IMT bands.
2. Of the total 97 MHz of spectrum in the 1427–1518 MHz range, only 67 MHz is currently available for IMT use, with a contiguous 24 MHz portion proposed to be assigned to Government users. The IMT-identified portion of this band is expected to become available for commercial use after 31 December 2026.
3. The 3GPP has standardized multiple IMT band configurations in the 1427–1518 MHz range, as follows:

Sl. No.	Band Plan for LTE	Band Plan for 5G NR	Uplink (MHz)	Downlink (MHz)	Mode	Duplex Spacing (MHz)
1	74	n74	1427-1470	1475-1518	FDD	48
2	51	n51	1427-1432		TDD	-
3	50	n50	1432-1517		TDD	-
4	75	n75	-	1427-1432	SDL	-
5	76`	n76	-	1432-1517	SDL	-

4. While SDL-based band plans (n75/n76) have been defined for 5G NR, there is no Supplementary Uplink (SUL) band plan yet standardized under 3GPP for this range. Nonetheless, there is growing industry and chipset vendor interest in supporting SUL capabilities in this band, particularly in light of increasing uplink traffic demands anticipated from AI-driven applications, industrial IoT, extended reality (XR), and video-based services.
5. Considering the above, Airtel submits that India should take a forward-looking approach by encouraging the development and adoption of an SUL configuration in this band through coordinated engagement with global standards bodies and OEMs, because:

- a. **Future-Ready Spectrum Utilization:** Defining an SUL option in 3GPP for this band will provide Indian TSPs enhanced flexibility for future use, particularly in support of uplink-intensive 5G-Advanced and 6G applications.
 - b. **Enhancement of Uplink Capacity:** With the expected surge in uplink traffic from user-generated and edge-compute content, uplink capacity will become a critical network bottleneck. The introduction of SUL in this band can significantly augment uplink throughput.
 - c. **Improved Uplink Coverage and User Experience:** When combined with mid-band TDD carriers, this band can extend uplink coverage, improve cell-edge user performance, and enable more balanced uplink-downlink performance—an aspect of growing importance for low-latency and symmetric communication use cases.
 - d. **Propagation Advantage:** Being lower in frequency than most 5G TDD bands, the 1.5 GHz range offers better propagation and building penetration characteristics, making it ideal for SUL augmentation without significant additional infrastructure investments.
 - e. **Resilience and Interference-Free Operations:** The band can serve as a tropospheric ducting-free, reliable uplink option when used alongside existing TDD bands. This makes it particularly valuable for mission-critical and uplink-sensitive applications in diverse climatic and geographic environments.
6. **In conclusion, the 1427–1518 MHz band offers valuable mid-band spectrum that can play a critical role in uplink enhancement and balanced 5G-Advanced network performance. Based on the technical and ecosystem considerations cited above, Airtel submits the following:**
- a. **Band Plan Adoption:** Efforts should be initiated through DoT, WPC, and TRAI to engage with 3GPP and global OEMs for defining and standardizing an SUL option in this spectrum band.
 - b. **Assignment to Government Users:** The 24 MHz contiguous block to be assigned to Government use should ideally be located at one end of the band, to preserve maximum spectral contiguity for IMT use in the remaining portion. This approach will simplify filter design, minimize guard band requirements, and ensure cleaner spectral boundaries between IMT and Government operations.
 - c. **Ecosystem and Implementation Roadmap:**
 - i. DoT and TRAI should initiate early consultations with chipset, device, and network vendors to ensure ecosystem readiness for SUL deployment in the 1427–1518 MHz band.

- ii. **A phased roadmap should be developed, targeting ecosystem maturity by 2027–2028, synchronized with the expected availability of this band post-2026.**
7. This balanced approach ensures harmonization with global standards, future-proofing for uplink-heavy use cases, and efficient spectrum utilization in alignment with India’s long-term spectrum roadmap.

Q22. Are there any other inputs/ issues related to the spectrum in the 1427-1518 MHz range? Suggestions may be made with detailed justifications.

Airtel Comments to Q22:

Please refer to our comments provided to Q21.

Q23. Whether there is a need to review the spectrum auction method and design followed in India? If yes, suggestions on spectrum auction method and design may be made with detailed justifications and international practice in this regard.

Airtel Comments to Q23:

1. Airtel recognizes the centrality of transparent, competitive, and market-oriented spectrum auctions to India’s digital infrastructure growth. The Simultaneous Multiple Round Ascending (SMRA) auction format, adopted since 2010, has effectively facilitated fair price discovery, ensured efficient spectrum allocation, and aligned with global best practices followed by regulators such as the FCC (United States), Ofcom (United Kingdom), and ACMA (Australia).
2. However, the evolving market environment, characterized by increasingly complex multi-band auctions, emerging requirements for carrier aggregation, and the need for greater flexibility in spectrum usage, necessitates a careful and forward-looking review of the auction design.
3. In our view, the future spectrum auctions should aim to:
 - Enhance efficiency by allowing bidders to optimize holdings across multiple bands and geographies;
 - Support flexibility and aggregation, enabling operators to pursue technology-neutral deployment strategies;
 - Preserve competition while maintaining affordability and promoting long-term investment sustainability; and
 - Incorporate international learnings on advanced auction formats, where applicable, to ensure optimal price discovery and efficient assignment.

4. Therefore, while the SMRA framework has served India well, Airtel submits that there is merit in reviewing and evolving the auction design to align with the next phase of 5G-Advanced and 6G spectrum requirements, ensuring continued efficiency, competitiveness, and investor confidence in the Indian telecom sector.

Q24. What additional economic, technical, or market-related factors should be taken into account while determining the valuation, and, subsequently, the reserve price of spectrum, in order to promote effective competition, ensure optimal spectrum utilization, and encourage wider participation in auctions?

Airtel Comments to Q24:

1. Airtel submits that the reserve price of spectrum should be determined through a balanced, evidence-based approach that promotes robust competition, maximizes sectoral investment, and ensures efficient spectrum utilization. Spectrum is a public good, and unsold or underutilized spectrum represents a lost socio-economic opportunity for the country. Therefore, spectrum policy and valuation must be guided not by short-term fiscal considerations but by the long-term multiplier effect of digital connectivity, economic productivity, and societal inclusion enabled by 5G and future networks.
2. The economic framework for spectrum auctions should focus on sector's sustainability and value creation, rather than on immediate revenue maximization. The health of the telecom industry must remain central to the valuation process to ensure that sustainable network investments can fully unlock the potential of the spectrum deployed.
3. **Affordability and Sectoral Health:** Spectrum prices should be set at sustainable levels, reflecting current telecom sector realities, operator profitability trends, and the need for continued long-term capital investment in networks. Historically, high reserve prices have led to limited participation and unsold spectrum, as seen in the 600 MHz band in India and in certain 700 MHz auctions in Europe. Such outcomes highlight the importance of maintaining affordability to ensure full and efficient spectrum utilization.
4. **Comparative International Benchmarking:** Spectrum valuation should be benchmarked against global norms using metrics such as price per MHz per population (MHz/Pop) or MHz per subscriber, consistent with data and methodologies followed by international organizations like the GSMA and OECD. This will ensure that Indian spectrum valuations and holdings remain aligned with international averages and best practices, avoiding artificially inflated prices driven by short-term revenue considerations.
5. **Alignment with National Digital Objectives:** Spectrum valuation should be designed to advance the goals of the National Digital Communications Policy (NDCP) and Digital India initiatives—treating spectrum as a strategic enabler for affordable and ubiquitous

broadband, not merely as a fiscal asset. Rational valuation and reserve pricing will directly contribute to greater rural and semi-urban connectivity, digital inclusion, and the expansion of enterprise and innovation ecosystems across the country.

6. Therefore, Airtel strongly submits that optimal spectrum valuation and reserve price determination must integrate economic sustainability, global benchmarks, technical readiness, and market realities. A holistic, forward-looking approach will ensure India achieves its dual objectives of competitive, efficiently utilized spectrum and inclusive digital progress, while encouraging broader operator participation and stable long-term sectoral growth.

Q25. Should the valuation of a given spectrum band, among 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2500 MHz, 3300 MHz, and 26 GHz, be based exclusively on its respective auction-determined price from the 2022 and/or 2024 auctions, without applying any other valuation approach? In such a case, should the auction price be indexed using MCLR or any other basis (please specify) to account for the time gap? Please provide detailed justification.

And

Q26. If the answer to the above is in the negative, should the past auction-determined price of the respective spectrum band still be considered as one of the approaches or basis for valuation, along with other approaches? Please provide justification for your response. In such a case, should the auction price be indexed using MCLR or any other basis (please specify) to account for the time gap? Please provide detailed justification.

And

Q28. Should the valuation models as adopted by the Authority in its last recommendation, continue to be used as a basis for valuation of spectrum in the 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, and 26 GHz bands? Please provide a detailed justification.

And

Q29. Is there a need to introduce any changes to the valuation models or methodologies currently followed by the Authority for spectrum valuation exercises, including the discontinuation of any existing model or the introduction of a new model? If yes, please provide specific suggestions along with a detailed justification.

Airtel Comments to Q25, 26, 28 and 29:

1. Airtel believes that there is a clear need to revisit and update the existing spectrum valuation methodologies, as the current approaches were originally formulated around 2013. A considerable period has elapsed since then, and the telecom sector has undergone significant transformation. These changes include:
 - Technological evolution and obsolescence;
 - Industry consolidation and rationalization of operators;

- Shift of monetary value from network operators (TSPs) to OTT service providers; and
 - Disruption to traditional business models and sustained pressure on sector profitability.
2. In previous valuation exercises, TRAI's methodology relied on technologically segregated financial and non-financial data, with several underlying assumptions. These assumptions no longer reflect the current technology-neutral framework for spectrum usage, where spectrum is increasingly viewed as a flexible and fungible asset supporting multiple generations and technologies.
 3. Accordingly, there is a strong case for adopting a new valuation framework that ensures affordability, technology neutrality, and long-term sustainability for the telecom sector. Airtel recommends considering a 'Marginal or Incremental Revenue Approach', which would enable a more realistic and proportional estimation of the potential revenue generated from additional spectrum holdings acquired through auction.
 4. It is also important to acknowledge that valuation models used for setting auction reserve prices are inherently assumption-driven and, therefore, subjective in nature. As the Authority itself has noted (Paragraphs 3.51–3.53 of the Consultation Paper), the valuation of spectrum is a function of numerous interdependent variables, and no single model can comprehensively account for all these parameters. Consequently, even when past auction prices are used as a reference, they should be appropriately adjusted to reflect changing market conditions, technology shifts, and demand elasticity.
 5. An alternative approach could involve allowing the market to organically discover the true economic value of spectrum based on actual use and value creation. Under this model, spectrum could be made available to licensed operators for a limited initial period (e.g., 3–5 years), during which the value created by its deployment—in terms of incremental revenue and service innovation—could be evaluated. This would facilitate an evidence-based valuation reflecting real-world economic contribution rather than purely theoretical assumptions.
 6. For example, each TSP could be provisionally allocated a small quantum of spectrum (e.g., 2.5 MHz) in a specific band to enable deployment. After a defined evaluation period (e.g., three years), the marginal or proportionate revenue generated by the use of such spectrum could form the basis for determining its long-term value. International benchmarks—such as the GSMA's finding that spectrum cost typically contributes around 7% of total service production costs—could also be referenced to ensure reasonableness and global alignment.
 7. Furthermore, if TRAI intends to retain the current valuation model, we recommend that the indexation mechanism be revised. Specifically, the Marginal Cost of Funds-Based Lending Rate (MCLR) should be replaced by the REPO or Reverse REPO Rate for the purpose of time-based adjustment. The objective of indexation should be to preserve the time value of money, rather than to replicate commercial borrowing costs. The REPO/Reverse REPO rate

more accurately reflects inflationary trends and provides a balanced, transparent, and economically sound basis for indexation.

8. **In summary, Airtel strongly submits that TRAI should:**
 - **Move away from an exclusive reliance on past auction prices;**
 - **Adopt a Marginal/Incremental Revenue-based approach for forward-looking, sustainable valuation; and**
 - **If indexation is applied, use REPO or Reverse REPO rate instead of MCLR to account for temporal value adjustments.**
9. This approach will help ensure a rational, evidence-based, and future-oriented spectrum valuation methodology aligned with the current realities of India's telecom ecosystem.

Q27. Should the spectrum valuation exercise be undertaken once every three years, as recommended by the Authority in its recommendations dated 11.04.2022? If not, what should be the revised periodicity for conducting the valuation exercise? Please justify your response along with detailed basis for conducting a fresh valuation exercise.

Airtel Comments to Q27:

1. It is pertinent to note that each spectrum auction is an independent exercise, and the market dynamics, technology evolution, and demand–supply conditions can vary significantly from year to year. This is particularly relevant in the case of multi-band auctions, where bidders must evaluate and select their spectrum portfolios based on their specific network strategies, service requirements, and use cases.
2. Airtel believes that conducting the valuation exercise annually would ensure that reserve prices reflect current market realities, ecosystem readiness, and the economic context at the time of each auction. This would enable more accurate price discovery, encourage broader participation, and help achieve efficient spectrum utilization.
3. Also, given the rapid pace of technological development—including 5G-Advanced, FWA, private networks, and the early evolution of 6G—it is critical that valuation exercises remain contemporaneous and data-driven rather than rely on outdated assumptions.
4. The reserve price determination process and subsequent auction design should be exhaustively researched and supported by a market assessment that takes into account sector sustainability, investment capacity, and affordability. This ensures that the valuation framework promotes long-term sectoral health rather than short-term fiscal maximization.
5. **Therefore, Airtel submits that that the spectrum valuation exercise should be undertaken afresh every year. An annual spectrum valuation exercise would allow the Authority to**

maintain relevance, transparency, and responsiveness to evolving market conditions, ensuring that the reserve prices and auction processes remain fair, sustainable, and conducive to continued investment and innovation in the Indian telecom sector.

Q30. Should the auction determined price of other bands by using spectral efficiency factor serve as a basis of valuation for the 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz and 26 GHz 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.

And

Q31. Apart from the approaches highlighted above which other valuation approaches should be adopted for the valuation of spectrum in existing bands? Please provide detailed information along with justifications.

Airtel Comments to Q30 and 31:

1. Airtel acknowledges that spectral efficiency is a foundational parameter in spectrum valuation, as it reflects the differential utility, propagation characteristics, and application value of various frequency bands. However, its use must be informed, calibrated, and applied with due regard to the prevailing technical, market, and auction context.
2. While spectral efficiency factors can serve as a guiding principle in establishing comparative valuation relationships, they should not be treated as the sole or default basis for valuing spectrum bands that differ significantly in propagation behavior, ecosystem maturity, or market demand.
3. By definition, spectral efficiency—the ratio of achievable throughput per MHz under standardized conditions (e.g., bits/sec/Hz)—is inherently influenced by:
 - Propagation characteristics (e.g., superior building penetration of lower bands);
 - Coverage area and cell radius;
 - Supported device and equipment ecosystem;
 - Interference environment and coexistence constraints; and
 - Regulatory parameters, including permitted power/EIRP limits and guard band requirements.
4. Globally, mature regulators such as OFCOM (UK), FCC (USA), and ACMA (Australia) employ spectral efficiency correction factors only where spectrum bands are highly substitutable and support comparable use cases, such as among adjacent mid-band frequencies for 5G.
5. However, direct price transfer between dissimilar bands based solely on spectral efficiency factors risks valuation distortion, particularly where the underlying utility of the band is

influenced by coverage restrictions, exclusion zones, or ecosystem gaps. For example, issues such as NaVIC exclusion zones in the 3300 MHz band or EIRP and guard band constraints in the 6 GHz range materially alter the usable capacity and deployment economics of the spectrum.

6. Therefore, Airtel submits that while spectral efficiency–corrected auction pricing may provide indicative insights for valuation across harmonized and technically comparable bands, it must not substitute a holistic, multi-factor, and country-specific valuation framework. Over-reliance on this single parameter may lead to significant mispricing when applied across bands with divergent propagation characteristics, ecosystem readiness, or regulatory limitations in the Indian context.
7. In conclusion, Airtel urge that spectral efficiency should be treated as a supporting input, not a determinant, within a comprehensive valuation methodology that reflects both technical and economic realities of spectrum deployment in India.

Q32. Should the auction determined price of other bands by using spectral efficiency factor serve as a basis of valuation for 6425– 6725 MHz and 7025–7125 MHz 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.

And

Q33. Should the auction determined price of other countries in 6 GHz spectrum bands serve as a basis of valuation of 6425- 6725 MHz & 7025-7125 MHz bands in India? 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.

And

Q34. 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 6 GHz spectrum bands vs other mid band/mmWave band 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.

And

Q35. Apart from the approaches highlighted above, which other valuation approaches may be adopted for the valuation of 6425- 6725 MHz & 7025-7125 MHz bands? Please provide detailed information along with justifications.

Airtel Comments to Q32, 33, 34 and 35:

Please refer to our comments provided to Q14 and 15.

Q36. Should the auction determined price of other bands by using spectral efficiency factor serve as a basis of valuation for 600 MHz 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.

And

Q37. Should the auction determined price of other countries in 600 MHz band serve as a basis of valuation of 600 MHz band in India? 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.

And

Q38. 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 600MHz band vs other sub GHz 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.

And

Q39. Apart from the approaches highlighted above which other valuation approaches may be adopted for the valuation of 600 MHz band? Please provide detailed information.

Airtel Comments to Q36, 37, 38 and 39:

Please refer to our comments provided to Q10 and 11.

Q40. Should the value of 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, 26 GHz, 6425- 6725 MHz & 7025-7125 MHz and 600 MHz bands 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

Q41. 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.

Airtel Comments to Q40 & 41:

Please refer to our comments provided to Q25, 26, 28 and 29.

Q42. What ratio should be adopted between the reserve price for the auction and the valuation of the spectrum in 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, 26 GHz, 6425- 6725 MHz & 7025-7125 MHz and 600 MHz bands and why? Please support your answer with detailed justification.

Airtel Comments to Q42:

1. Airtel submits that the reserve price for all spectrum bands (800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, 26 GHz, 6425–6725 MHz, 7025–7125 MHz, and 600 MHz) should be set at no more than 50% of the valuation of the spectrum band. This is essential to ensure that the auction results in vibrant, market-driven price discovery and to avoid the risk of unsold spectrum due to overly high entry prices.
2. We understand that the primary objective of spectrum auctions should be to maximize public welfare through efficient spectrum utilization, rather than short-term revenue maximization. Reserve prices play a crucial role in achieving this objective and a balanced reserve price must ensure the following:
 - a. Be high enough to deter non-serious participants and speculative bidders, and
 - b. Be low enough to encourage genuine competition, allowing the final prices to be determined through market-based bidding rather than through administrative pricing.
3. In other words, the reserve price should act as an enabler for efficient allocation, not as a barrier to market entry.
4. Setting reserve prices too close to the estimated market valuation restricts participation, suppresses competition, and prevents efficient price discovery. Therefore, a reserve price not exceeding 50% of the band valuation strikes an optimal balance between fiscal prudence and market efficiency.
5. In fact, the UK regulator, Ofcom, has explicitly stated that it aims to set reserve prices below market value to:
 - Avoid the risk of unsold spectrum,
 - Encourage wider participation, and
 - Allow sufficient margin for price discovery through competitive bidding.
6. The European Commission, in its *“Recommendation on Incentives for Investment in 5G Networks”*, also advises the following clearly recognizing that excessively high reserve prices

can stifle investment, limit competition, and slow the rollout of advanced digital infrastructure. :

“Member States are invited to set reserve prices using a methodology that includes benchmarking, financial valuation models, and adjustments for country-specific factors such as population, licence duration, and coverage obligations. Member States should avoid revenue maximization.”

7. Historically, TRAI has recommended setting the reserve price at 70% of the spectrum valuation. However, empirical evidence from past auctions demonstrates that this approach has not yielded optimal results:
 - In multiple auction rounds, winning bid prices were found to be very close to the reserve price.
 - Spectrum remained unsold, reflecting market resistance to inflated starting prices.
 - High reserve prices have constrained TSP participation, particularly given the substantial capital requirements for network deployment and technology upgrades.
8. This experience underlines the need to recalibrate the reserve price ratio to encourage competition and ensure that spectrum is put to active use for public benefit.
9. Undoubtedly, setting the reserve price at 50% of the valuation ensures:
 - **Efficient Price Discovery:** Lower reserve price stimulates participation and competitive bidding, allowing market forces to establish true economic value of the spectrum.
 - **Maximized Spectrum Utilization:** Affordable reserve prices prevent spectrum from lying unsold or underutilized, thus enhancing public value through faster and broader service rollouts.
 - **Balanced Fiscal Outcome:** While encouraging competition, a 50% reserve price still guarantees meaningful revenue to the Government and safeguards against speculative or non-serious participation.
 - **Encouragement of Infrastructure Investment:** Lower upfront costs free up capital for TSPs to invest in network expansion, modernization, and digital inclusion, thereby supporting national connectivity goals such as Digital India.
10. On the contrary, maintaining a high ratio, such as the current 70% benchmark, carries several risks:
 - **Discouraged Participation:** Fewer qualified bidders reduce competition and the likelihood of price discovery.
 - **Unsold Spectrum:** Overpriced spectrum remains unallocated, leading to inefficient use of national resources.
 - **Delayed 5G/6G Rollout:** High reserve prices divert operator resources away from network deployment toward spectrum acquisition costs.

- 11. Therefore, Airtel submits that the reserve price of spectrum for all bands be set at 50% of the valuation. This level provides an optimum balance, sufficient to deter non-serious bidders while low enough to promote competitive bidding, ensuring that prices discovered through the auction process are genuinely market-driven and optimal spectrum utilization.**

Q43. What should the payment terms and associated conditions for the assignment of 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, 2500 MHz, 3300 MHz, 26 GHz bands, 6425-6725 MHz & 7025-7125 MHz bands and 600 MHz bands 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.**

Airtel Comments to Q43:

i) Upfront Payment:

- During the 2022 auctions, operators opting for moratorium were required to make an upfront payment equal to the spectrum installments of a minimum of 2 years. Making this kind of hefty upfront payment for a resource that is utilized over a period of 20 years causes a strain on the finances of operators. The core tenet of the recent Cabinet Reforms was to increase availability of cash with the operators by providing a moratorium on dues. If operators are again forced to make hefty upfront payments for acquiring spectrum in the upcoming auctions, then it will effectively negate the relief provided by the Cabinet decision and adversely impact the financial health of the industry.
- **Therefore, Airtel recommends that no upfront payment should be required. Operators should be allowed to make payments in the form of annual installments only (post a 6-year moratorium), spread over the remaining 14-year spectrum duration period. Needless to say, a TSP should always have the flexibility to pay the upfront amount or any number of annual installments at any time of its choosing.**

ii) Moratorium Period:

- Please refer to the response to point i. above - No upfront payment should be required. Operators should be allowed to make payments in the form of annual installments only (post a 6-year moratorium), spread over the remaining 14-year spectrum duration period. As noted above, operating in the telecom sector requires TSPs to make huge investments that have long gestation periods. Any new network takes a time period of at least 4-5 years to monetize. In view of this, huge upfront payments combined with short

moratorium periods are likely to cause significant strain on the finances of TSPs over the long run. In the interests of the overall financial health of the industry in the long-term, it is essential to provide a longer moratorium period with no upfront payment requirement.

- **Therefore, Airtel recommends that a moratorium of at least 6 years be allowed in the forthcoming auctions, with no requirement of upfront payment and annual installments spread over the remaining 14-year spectrum duration period.**

iii) Total number of instalments to recover deferred payment:

- Please refer to the response to points i. and ii. No upfront payment should be required. Operators should be allowed to make payments in the form of annual installments spread over the remaining 14-year spectrum duration period (post a 6-year moratorium). Recovering the payment for spectrum in 14 installments spread over the period of spectrum can meet the objective of securing revenue for the exchequer while also alleviating the financial burden on TSPs and giving them enough liquidity to invest in the network to ensure maximum utilization of spectrum for the public good.
- **Therefore, Airtel recommends that a total of 14 installments, after the 6-year moratorium period, should be fixed to recover the deferred payment, with no requirement of upfront payment.**

iv) Applicable interest rate for protecting the NPV of bid amount

- The purpose of allowing deferred payments of spectrum charges is to provide some liquidity to TSPs, to enable them to keep investing in network infrastructure. However, the obligation to pay an additional huge interest on such deferred spectrum payments defeats this objective, since the interest rate burdens the TSPs' finances and impairs their ability to make investments in the network rollout. Hence, to alleviate the financial burden on the TSPs, no interest should be levied on the deferred spectrum installments.
- In any case, the purpose of levying interest on deferred payments is not to create an additional source of revenue for the exchequer. Hence, the interest rate, if any, must be such that it is just enough to protect the time value of money and not more – and the repo rate declared by the RBI is the best way to achieve the same.
- On the other hand, PLR/MCLR are rates at which loans are offered by banks to customers. Accordingly, they involve a business margin over and above the repo rate, which is as high as 3-4% in some cases. Considering the huge sums involved in spectrum payments, this margin amounts to a significant extra cost for the TSPs.
- Thus, in case it is decided to levy interest on deferred payment installments, the interest rate must be lowered to be in line with the repo rate prevailing in the country, in order to

ensure that no unwarranted financial burden is imposed on the TSPs while simultaneously protecting the interests of the exchequer.

- **Therefore, Airtel recommends the following: (i) No interest should be levied on the deferred spectrum installments. (ii) Without prejudice, if it is decided to charge interest on deferred payment installments, then the interest rate must be lowered to align with the prevailing repo rate in the country.**

Q44. Any other suggestion relevant to the subject may be submitted with detailed justification

Airtel Comments to Q44:

In addition to Airtel's submissions in Q1-43 above, there are certain other issues related to spectrum assignment, which need to be highlighted:

1. Refund of Spectrum Charges on Surrender of Spectrum:

- a. Clause 2.2(viii) of the Guidelines for surrender of Access Spectrum by Access Service Providers dated 15.06.2022 ("Spectrum Surrender Guidelines"), provides that "On surrender of spectrum, no future instalments with respect to surrendered spectrum will be required to be paid after the date of surrender." However, clause 2.2(ix) provides that *"There shall be no refund of any payment made, either as full or partial upfront payment or instalments or pre-payments, towards the acquisition of such spectrum."*
- b. Thus, as per the current guidelines, if a TSP surrenders spectrum for which prepayment has been made, DoT does not refund any amount. However, if no prepayment has been made, no further installments are required to be paid after surrender. This is not only discriminatory towards the TSPs who make part/full upfront/pre-payment of spectrum charges but it also discourages TSPs from making such upfront/pre-payments.
- c. Further, it also deters TSPs who have made upfront/pre-payments from surrendering such spectrum, even if it is of no use to them – thus, resulting in the spectrum lying idle. This represents a loss of public good as well as a loss to the exchequer – as this spectrum, if surrendered, could have been put to auction and used for provision of services by some other TSP.
- d. It is pertinent to mention here that the DoT itself, while seeking TRAI's recommendations on the terms and conditions of surrender, had stated that "the spectrum purchase dues for the remaining (post surrender) period will not be levied" (as quoted in the 2022 Auctions Recommendations). However, the Spectrum Surrender Guidelines are not in line with the policy decision conveyed by DoT in its reference.

- e. It is important that when a policy decision has been taken to waive future payments in case of surrender, it should be implemented both in letter and spirit. In the interests of parity and fairness, the benefit has to be provided in both situations – i.e., if no prepayment has been made, there should be no need for future payments; and if some amount has been pre-paid, the same must be refunded.
- f. In case it is not possible to refund the spectrum charges, they should at least be adjusted with the deferred spectrum payments of the TSP, or with the charges for any spectrum acquired by the TSP in future auctions.
- g. **In summary, Airtel recommends the following:**
 - i. **The Spectrum Surrender Guidelines should be amended to provide for a refund of spectrum charges in case of surrender of spectrum.**
 - ii. **In the alternative, i.e., in case the spectrum charges cannot be refunded, they may be adjusted with the deferred spectrum payments of TSP, or with the charges for any spectrum acquired by the TSP in future auctions.**
