10900-B Stonelake Boulevard, Suite 126 · Austin, Texas 78759 U.S.A.
Phone: +1-512-498-9434 (WIFI) · Fax: +1-512-498-9435
www.wi-fi.org

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Via Electronic Filing: dvmn@trai.gov.in

Re: Telecom Regulatory Authority of India Consultation Paper on the Auction of Radio Frequency Spectrum in the Frequency Bands Identified for International Mobile Telecommunications (IMT)

Dear Mr. Shri Akhilesh Kumar Trivedi,

As a global industry association representing over 900 leading technology companies across the wireless connectivity ecosystem, Wi-Fi Alliance commends the Telecom Regulatory Authority of India (TRAI) for its comprehensive, inclusive vision to foster a fair and transparent regulatory environment that ensures a level playing field and robust competition for the benefit of India's consumers, enterprises, and economy. We enthusiastically support the TRAI's effort to consult on the proposed *Auction of Radio Frequency Spectrum in the Frequency Bands Identified for International Mobile Telecommunications (IMT)* ("Consultation") and are pleased to provide the following responses and recommendations.

Wi-Fi Alliance commends TRAI's commitment to promote broadband and digital infrastructure readiness while bridging the digital divide through ubiquitous and affordable broadband connectivity across India. Reliable and affordable digital communications are essential to overcoming the 'tyranny of distance' and ensuring that all Indian citizens can fully participate in the digital economy. Wi-Fi is instrumental to this mission as a cost-effective connectivity solution that extends broadband access across both urban and rural areas. Wi-Fi Alliance respectfully urges TRAI to recognize Wi-Fi's fundamental role in complementing mobile, fixed and satellite broadband networks, particularly in underserved regions where infrastructure challenges limit connectivity. The expansion of advanced Wi-Fi technologies (e.g., Wi-Fi 7), enabled by access to sufficient spectrum—namely the 5.925–7.125 GHz frequency band—will significantly enhance broadband performance in India's homes, businesses, and public spaces.

Wi-Fi Alliance respectfully asks TRAI to consider that Wi-Fi access to the full 6 GHz band (5.925–7.125 GHz) is essential to support high-capacity, multi-gigabit Wi-Fi networks that are scalable, inclusive, and locally deployable. Countries that have already opened the full 6 GHz band for Wi-Fi are seeing rapid innovation, cost-effective deployments, and the growth of vibrant digital ecosystems. India's digital future depends on broadband wireless connectivity delivered by Wi-Fi.

Importantly, 6 GHz Wi-Fi technology is available here and now, enabling advanced and affordable communications. It is already implemented in a wide range of products—including flagship smartphones, laptops, and access points. However, currently in India, 6 GHz Wi-Fi capabilities are impaired because access to the 6 GHz (5.925-7.125 GHz) spectrum remains blocked. Notably, India's DOT has yet to issue final rules for Wi-Fi use in 5.925–6.425 GHz, despite releasing draft regulations in May 2025 to delicense the lower 6 GHz band, while availability of the upper 6 GHz is uncertain, further delaying advanced Wi-Fi connectivity in India. Indian consumers and enterprises pay a premium for the latest 6 GHz Wi-Fi-enabled products (compared with 5 GHz devices) with the expectation of optimal performance but are unable to realize the full benefits of higher data rates, ultra-low and deterministic latencies, improved mobility, better power efficiency, or support for high densities of users and devices—features that are available in the US and elsewhere which are essential for modern connectivity. Unlocking Wi-Fi access to both the lower and upper 6 GHz band in India will unleash significant innovation and economic momentum, drive competitiveness and deliver meaningful consumer benefits. Acting promptly and without delay will help secure India's leadership in the global digital economy.

Considering the above, Wi-Fi Alliance respectfully submits responses to the select set of questions posed in the Consultation.

Question 14. 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?

Wi-Fi Alliance respectfully submits**:** No, the upper-6 GHz band should not be included in the forthcoming IMT auction.

Rationale:

1. *Immediate consumer benefit via license-exempt Wi-Fi 7*
   The upper-6 GHz band is pivotal for next-generation Wi-Fi (Wi-Fi 7 and beyond), enabling wider channels (160/320 MHz), lower latency, and higher throughput for homes, enterprises, education, healthcare, and public venues. Delicensing this band—at least for low-power indoor (LPI) use now and standard-power under an automated frequency coordination (AFC) regime thereafter—would deliver near-term gains to Indian consumers and enterprises at minimal administrative cost.
2. *Ecosystem readiness and time-to-value*
   The global device and infrastructure ecosystem for 6 GHz Wi-Fi is mature and shipping at scale today, while a robust handset and radio ecosystem for 6 GHz IMT remains in the very early development stages. Auctioning spectrum that lacks immediate, widespread IMT ecosystem support risks uncertainty and disruption to the services of the incumbent users (fixed services, fixed satellite services, etc.) in the short term, and under-utilization in the

medium to long term, and delaying or potentially not realizing the socioeconomic benefits that can be readily delivered by 6 GHz Wi-Fi.

3. *Competition and a level playing field*
   Preserving 6 GHz for license-exempt use supports TRAI's objectives of fair competition and a level playing field by empowering millions of small and large actors—ISPs, device makers, start-ups, campuses, and households—without erecting barriers to entry inherent in exclusive (auctioned) licensing.
4. *Efficient spectrum use where data actually flows*
   The majority of broadband data is ultimately delivered over Wi-Fi at the edge. Opening the upper-6 GHz for Wi-Fi aligns spectrum supply with demand points (homes, enterprises, dense venues), improving spectral efficiency and quality of experience while complementing India's licensed mobile network infrastructure.
5. *Incumbent protection and implementation practicality*
   Upper-6 GHz hosts important incumbent services. Establishing a license-exempt regulatory regime (LPI now; AFC-controlled standard power next) offers TRAI a proven, low-risk coexistence solution that can be implemented faster and at scale, avoiding the protracted coordination challenges that would accompany exclusive IMT use.
6. *International spectrum harmonization and investment certainty*
   A growing number of leading economies have opened the upper 6 GHz for Wi-Fi. Aligning India with this trajectory will accelerate local manufacturing, drive economies of scale, and reduce costs for Indian consumers and enterprises.

<u>Recommended approach</u>

- Do not include 6425–6725 MHz and 7025–7125 MHz in the forthcoming IMT auctions.
- Authorize Wi-Fi low-power indoors (LPI) across 6425–7125 MHz to unlock consumer and enterprise benefits now.
- Introduce standard-power Wi-Fi under control of the Automated Frequency Coordination system in appropriate portions of the band to extend benefits to managed enterprise, campus, and outdoor deployments while protecting incumbents.
- Undertake a structured, evidence-based review of actual utilization, device ecosystem maturity, and socioeconomic outcomes before considering any future reallocation decisions.

This balanced path delivers rapid, tangible benefits to Indian users and industry, advances TRAI's pro-consumer and pro-competition objectives, and preserves optionality for India's connectivity technologies and use-cases.

Question 15. 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?

Wi-Fi Alliance respectfully submits**:** No timeline should be set at this stage. Instead, TRAI should adopt a milestone-based (trigger) review, not a date-certain auction plan. Prematurely calendaring spectrum auction for nonexistent 6 GHz IMT risks foreclosing higher near-term socioeconomic gains deliverable through license-exempt Wi-Fi 7 and future generations of Wi-Fi technologies.

Recommended approach:

1. Defer any auction decision and establish a formal review in 2028.
2. Condition any future reconsideration on the following objective triggers:
    - Incumbent protection certainty: Completed, India-specific coexistence studies and field experience demonstrating long-term protection of incumbent services.
    - Ecosystem maturity evidence: Demonstrable, widespread availability of commercial IMT devices and networks in the upper-6 GHz band (handsets, radios, backhaul) at scale in multiple peer markets.
    - Utilization and benefits audit: Independent assessment showing that shifting any portion of the upper 6 GHz band to exclusive (auctioned) IMT would increase total consumer welfare and competition relative to continued license-exempt use.
    - International harmonization clarity: Seek global/regional harmonization that would actually lower India's costs and avoid fragmentation.
    - Backhaul/enterprise needs review: Confirmation that public-interest uses (e.g., enterprise Wi-Fi, campus networks, public Wi-Fi networks, fixed wireless/Wi-Fi backhaul) are not impaired.
3. Only if all triggers are met, TRAI should launch a fresh consultation on options in 2029, with any auction no earlier than 2030—and only for portions of the band that clear the above tests.

Wi-Fi Alliance respectfully asks TRAI to consider the advantages of the above recommended approach:

- It maximizes near-term consumer and enterprise benefits by unlocking Wi-Fi capacity now, while preserving future optionality.
- It aligns with TRAI's goals of fair competition, efficient spectrum use, and evidence-based, transparent decision-making**.**
- It avoids stranding spectrum in the absence of a mature IMT ecosystem and protects incumbent operations.

Question 16. 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?

Wi-Fi Alliance respectfully submits**:** TRAI should *not* leave determination of keep-out distances to telecom service providers post-auction. Any IMT vs. incumbent coexistence determination in the upper 6 GHz spectrum must be completed *before* an auction through a transparent, government-led process in coordination with WPC/DoT/ISRO and published for comment.

Rationale:

1. *Treaty-level obligations are already defined*.
   Following extensive ITU-R studies, the 2023 World Radiocommunication Conference (WRC-23) adopted Resolution 220 (WRC-23) which establishes the expected e.i.r.p. spectral-density limits vs. elevation angle (i.e., emission/compatibility mask) that IMT base stations in 6 425–7 125 MHz must meet "to ensure protection for the FSS (Earth-to-space)." These limits constitute binding international commitments and must be complied with in India. A domestic auction cannot assume looser conditions ex post.
2. *Post-WRC-23 feasibility concerns*.
   After WRC-23, IMT proponents themselves have stated that deploying a commercially viable macro-cell network while consistently meeting the WRC-23 satellite-protection mask would be impractical. If true, keep-out distances and/or configuration constraints (e.g., e.i.r.p., antenna tilt/height, density) could be so onerous that they undermine the utility of any spectrum rights auctioned—creating material risk of stranded investment and disputes.
3. *Public-interest risk management*.
   Deferring coexistence to fragmented, operator-specific trials after an auction would shift systemic interference risk to incumbents and consumers, and invite inconsistent practices, enforcement challenges, and litigation. A uniform, pre-auction determination is essential to give all parties regulatory certainty.
4. In the Consultation, Annexure - 1.2, *DoT Response letter dated 14.08.2025* , Paragraph 2.5, DoT notes that incumbents in the upper-6 GHz band "*will be relocated to another frequency band in due course of time*." Absent a clear, time-bound relocation plan and process, proceeding to auction would be premature. A clearly stipulated incumbent relocation plan is a fundamental precondition to any auction.

Recommended approach (if 6 GHz IMT is still under consideration)

- Complete, before any auction, a national coexistence program that includes:
  a) Codifying the WRC-23 emission/compatibility mask for IMT in India's regulations;
  b) Independent India-specific modeling (terrain, clutter, network density, antenna patterns) to derive protection contours/keep-out distances for both individual satellite earth stations and aggregate interference to satellite receivers;
  c) Controlled field pilots led by the government (not operator-run alone) in representative environments, using worst-case network parameters, with measurements made public;
  d) An impact assessment showing that any contemplated IMT configuration both meets the mask with margin and remains commercially viable without excessive exclusion zones.

- If the pilots/modeling show impractical keep-out distances or infeasible deployment constraints, TRAI should not auction this spectrum for IMT and should instead prioritize license-exempt use—which can protect incumbents while delivering immediate consumer and enterprise benefits.

***Question* 20. Are there any other inputs/ issues related to the auction of spectrum in the upper 6 GHz band for the forthcoming auction?**

Wi-Fi Alliance respectfully submits: Market evidence and risk factors do not support auction of the upper 6 GHz at this time.

- Hong Kong was the first and thus far only authority to auction a portion of its upper 6 GHz band for mobile use in December 2024. The auction's results evidence weak demand and unsold spectrum. Part of the band (notably 7025–7125 MHz) remained unsold, bidding hovered only ~5% above reserve even though it was largely subsidized by tax incentives. One major Hong Kong MNO (Hutchison) did not even participate.
- India's recent spectrum auctions already saw large unsold inventories even in "harmonized IMT" bands. In June 2024, India sold only ~141.4 MHz of 10,522 MHz on offer**,** with 600 MHz and 3300 MHz bands seeing no takers—underscoring demand and affordability constraints that are likely to be more acute for a nascent upper-6 GHz IMT ecosystem.
- 6 GHz IMT device/network ecosystem immaturity increases the risk of stranded spectrum. Compared with Wi-Fi 7 (already shipping at scale), the commercial handset/RAN ecosystem for upper-6 GHz IMT remains early, which may help explain weak auction interest and unsold blocks in Hong Kong
- International policy uncertainty and coexistence obligations depress effective value. Many regulatory authorities are still deciding how (or if) upper-6 GHz IMT would be used given satellite-protection obligations from WRC-23 and the growing adoption of Wi-Fi access or sharing approaches—factors that reduce the effective, usable MHz-pop for exclusive IMT licenses.

Question 32. 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?

Wi-Fi Alliance respectfully submits**:** No. A cross-band benchmarking approach using a generic "spectral-efficiency factor" is not appropriate for the upper-6 GHz band and should not be used as the basis for valuation—particularly when the Authority is still assessing fundamental questions about feasibility of IMT deployment under WRC-23 satellite-protection limits and when substantial public-interest value can be realized through license-exempt use.

Rationale:

- Non-comparable technical characteristics. Upper-6 GHz propagation, power/antenna constraints, and likely dense/small-cell topology are materially different from sub-GHz, 1800/2100/2300 MHz, or 3.3–3.67 GHz "mid-band" IMT. A scalar efficiency factor will not capture these structural differences.
- Binding coexistence obligations. These obligations may force large exclusion zones/keep-out distances or severe IMT network configuration limits. Any "value" must first reflect the effective usable MHz-pop after such constraints—something a generic factor cannot do.
- Ecosystem maturity and time-to-use. Unlike well-established IMT bands, upper-6 GHz IMT device/network ecosystems remain nascent. Benchmarking to bands with mature ecosystems overstates realizable value and risks stranded spectrum.
- Public-interest alternative (license-exempt). The upper 6 GHz spectrum can deliver immediate, broad-based consumer surplus. Auction benchmarks ignore this counterfactual and therefore cannot guide welfare-maximizing policy.

Question 35. Apart from the approaches highlighted above, which other valuation approaches may be adopted for the valuation of 6425-6725 MHz & 7025-7125 MHz bands?

Wi-Fi Alliance respectfully submits: Any valuation of the upper-6 GHz band should go beyond cross-band benchmarks and adopt approaches that reflect India-specific technical constraints, ecosystem readiness, and public-interest outcomes.

Recommended approach: Consistent with TRAI's objectives of efficient spectrum use, fair competition, consumer benefit, and evidence-based, transparent decision-making, Wi-Fi Alliance recommends the following process:

- Adopt the "social-welfare" + "effective-MHz-pop" + "real-options" trio as the primary valuation toolkit.
- Center the license-exempt counterfactual in all analyses to avoid systematic overvaluation of exclusivity.
- If results are highly sensitive to assumptions or show low/negative net welfare for IMT, assign a de minimis reserve and defer licensing, prioritizing license-exempt LPI now and AFC standard-power next.

Conclusion

Wi-Fi Alliance respectfully submits that the economic case for deploying and operating IMT networks in the upper 6 GHz band remains highly uncertain, particularly considering coexistence obligations and the dense, high-cost topologies likely required. Device and service affordability is a further constraint: 6 GHz-capable IMT handsets and associated services are expected to be priced beyond the reach of most Indian consumers in the near term, risking low adoption and stranded investment. In these circumstances, TRAI should not rush to auction the upper 6 GHz for IMT when

the claimed benefits are unproven and immediate, broad-based gains can be readily realized through license-exempt Wi-Fi 7. Accordingly, we recommend:

1. Defer any IMT auction in the upper-6 GHz band and adopt a milestone-based review tied to ecosystem maturity, coexistence feasibility, and demonstrable consumer-welfare gains.
2. Prioritize license-exempt authorization to deliver near-term capacity, affordability, and competition benefits to households, SMEs, and enterprises across India.
3. Reassess the upper 6 GHz auction for IMT only when objective triggers are met—including widespread, affordable devices, proven protection of incumbents under real-world conditions, and clear evidence that exclusive IMT use would substantively improve total social welfare versus other alternatives.

This prudent, evidence-led path aligns with TRAI's objectives of fair competition, consumer protection, efficient spectrum use, and transparency, while delivering tangible benefits to India's digital economy without imposing premature costs on consumers.

We appreciate the opportunity and look forward to continued engagement with TRAI and Indian stakeholders.

Respectfully submitted,

/s/ Alex Roytblat

WI-FI ALLIANCE
Alex Roytblat
Vice President of Regulatory Affairs
aroytblat@wi-fi.org