Annexure

Tata Communications Ltd.'s Comments to TRAI Consultation Paper on the "Proliferation of Public Wi-Fi Networks in India"

Tata Communications Ltd. (Tata Communications) welcomes the opportunity to provide its views on the Telecom Regulatory Authority of India's (TRAI) Consultation Paper on the *Proliferation of Public Wi-Fi Networks in India*. We appreciate TRAI's continued efforts to foster digital inclusion, enhance broadband access, and enable innovative frameworks that support the expansion of public Wi-Fi infrastructure across the country.

In India, connectivity is not a commodity, it is a tool of empowerment and nation building. Public Wi-Fi plays a critical role in bridging the digital divide, particularly in underserved and rural areas, while complementing existing mobile and fixed broadband networks. In recent years, initiatives such as PM-WANI have demonstrated the potential of decentralized models to accelerate last-mile connectivity and promote local entrepreneurship. At the same time, the evolving ecosystem presents important considerations around spectrum efficiency, quality of service, security, interoperability, and long-term sustainability of business models. On World Wi-Fi Day on June 24, 2025, the Hon'ble Union Minister for Communications, Govt. of India, Shri Jyotiraditya M. Scindia, reaffirmed stating, "*Wi-Fi is the invisible power that makes connectivity visible in every home and enterprise*." The indispensability of PM-WANI and the proliferation of public Wi-Fi hotspots can provide significant boost to the government's digital ambition – ubiquitous connectivity, digital inclusion and enabling infrastructure.

Tata Communications and Public Wi-Fi

While Tata Communications operates as an Internet Service Provider (ISP) providing internet backhaul connectivity, the PM WANI framework is implemented through Public Data Offices (PDOs) and PDO Aggregators (PDOAs). Tata Communications is an ISP license with service offerings focused on the enterprise segment and do not include retail or consumer broadband services such as FTTH. We can play an important role in backhaul connectivity for Public Wi-Fi.

As a leading global digital infrastructure, connectivity, and managed services provider, Tata Communications brings a perspective grounded in extensive experience across enterprise networks, internet backbone services, and emerging digital platforms. We are committed to supporting a robust, scalable, and secure public Wi-Fi ecosystem that aligns with national objectives such as Digital India while ensuring a level playing field for all stakeholders.

Certain TSPs and ISPs operate directly in the retail broadband market and may compete with PDOs, while in some cases, PDOs procure bandwidth from ISPs based on their specific business requirements. In this context, any regulatory recommendations that disrupt existing market practices could confer undue advantage on one category of stakeholders over another, potentially placing ISPs like us at a disadvantage and leading to market distortion and erosion of a level playing field.

In this submission, we aim to present a balanced set of recommendations that encourage innovation and investment, safeguard consumer interests, and ensure operational viability. We have structured our response to address key issues raised in the consultation paper, while also highlighting opportunities to strengthen policy alignment, streamline regulatory processes, and promote sustainable growth of public Wi-Fi networks in India.

Tata Communications question-wise response

A. Status Assessment and specific strategies for the proliferation of Public Wi-Fi

Q1. What are the key supply-side constraints affecting Public Wi-Fi proliferation in India? What targeted policy or regulatory measures may be required to address these supply-side constraints? Please provide your response in detail with justification.

Tata Communications Response:

The proliferation of Public Wi-Fi networks in India is critical to advancing broadband penetration, improving data affordability, and supporting the Digital India vision. While demand-side drivers remain robust, the pace of rollout is significantly influenced by several supply-side constraints, which impact infrastructure deployment, operational viability, and ecosystem participation.

In our view, the key supply-side constraints affecting Public Wi-Fi proliferation in India are as follows:

- **Limited commercial viability of Public Wi-Fi deployments, particularly in rural and semi-urban areas**: Low ARPU, competition from affordable mobile data plans, and the absence of robust monetization mechanisms for Public Data Offices (PDOs) weaken the business case for investment. This results in subdued participation from both small entrepreneurs and larger service providers.

- **High cost and uneven availability of reliable backhaul connectivity:** Public Wi-Fi performance is intrinsically dependent on robust backhaul, which remains expensive and difficult to deploy in remote or low-density regions due to fiber gaps, RoW challenges, and infrastructure limitations. This often leads to poor quality of service and limits scalability.

- **Mobile centricity over Wi-Fi and Fiber**: The government's Bharat 6G Vision and Digital India program both recognize that future prosperity depends on inclusive, affordable and high-capacity broadband. However, international benchmarks show India is lagging in both fiber rollout and Wi-Fi densification, resulting in limited usage, suboptimal economics and persistent digital divides. Countries that scaled public Wi-Fi and delicensed new spectrum (South Korea, US, Brazil, EU) have realized faster inclusion, more competitive markets and greater innovation. Modern, affordable and consumer-first broadband demands a layered architecture, with Wi-Fi (public and private) and high-capacity fiber as indispensable elements. As countries with the world's best digital access show, the real backbone of a digital society is not only mobile, but converged, with Wi-Fi and fiber as equal partners.

- **Right-of-Way** (**RoW) implementation bottlenecks**: Non-uniform RoW policies, approval delays and procedural inconsistencies, exorbitant/non-standard municipal charges, and lack of standardized access to street furniture and public assets increase both cost and time of deployment. These constraints are particularly acute given the inherently localized and distributed nature of Wi-Fi hotspot deployments and persist despite the implementation of the RoW Rules, 2024. There is a need to move towards a truly harmonized, pan-India framework that ensures uniformity in procedures, enforces clearly defined approval timelines, rationalizes and caps charges, and enables a single-window clearance mechanism, thereby significantly streamlining the RoW approval process and accelerating network rollout.

- **Spectrum-related constraints**: Public Wi-Fi largely relies on unlicensed spectrum bands, many of which particularly the 2.4 GHz band are already congested and impact network performance and scalability. Current public Wi-Fi deployments using Wi-Fi 5 & Wi-Fi 6 technology face intrinsic capacity constraints and cannot deliver the throughput and low latency needed for catering to next gen and new applications & services. Immediate permission and deployment of Wi-Fi 6E/7, enabled by delicensing the 6 GHz band for public use, are essential for India to meet its broadband and productivity goals.

- **Fragmented PM-WANI ecosystem**: The PM-WANI ecosystem, while innovative, remains fragmented and at a nascent stage of maturity. Limited interoperability between PDOs, PDO aggregators (PDOAs), and application providers, coupled with the absence of large-scale aggregation platforms, constraints seamless user experiences and scalability.

- **Restricted and discriminatory access to public infrastructure:** Restricted and non-uniform access to public infrastructure such as transport hubs, government premises, and smart city assets continues to constrain the deployment of Wi-Fi hotspots in high-footfall and high-demand locations. The absence of a standardized and transparent access framework across jurisdictions leads to uncertainty, delays, and increased costs.

- **Access to street furniture/public infrastructure**: This is a grave supply side constraint as access to street furniture/public infrastructure remains difficult.

- **Last-meter gap**: Consequently, the main barrier to a truly ubiquitous, high-quality digital experience is the persistent failure of deep-indoor coverage, what may aptly be termed today's "last-meter gap". The global response to this immutable physics has been to complement mobile networks with dense, fiber-backhauled modern Wi-Fi layers. These indoor access points carry the majority of smartphone and broadband traffic even in the most advanced 5G markets - over 70 to 80% and continuing to rise.

In our considered view, addressing these supply-side constraints through targeted, forward-looking policy interventions is essential to unlocking the full potential of Public Wi-Fi in India. A balanced approach that lowers entry barriers, enhances infrastructure availability, ensures service quality, and supports sustainable business models will be critical to achieving large-scale proliferation and delivering meaningful digital inclusion.

For targeted policy or regulatory measures required to address these supply-side constraints, please refer to our combined response to Question no. 3 to 5.

Q2. What are the major demand-side constraints limiting the uptake of Public Wi-Fi services in the country? What targeted policy or regulatory measures may be required to address these demand-side constraints? Please provide your response in detail with justification.

Tata Communications Response:

The demand-side adoption of Public Wi-Fi services in India is constrained by several factors that limit user uptake, engagement, and sustained usage despite the availability of infrastructure.

In our view, following are the demand side constraints limiting the uptake of Public Wi-Fi services:

- **Widespread availability of low-cost mobile data**: With competitively priced 4G and emerging 5G data plans offering convenience, mobility, and seamless connectivity, users often prefer mobile broadband over logging into Public Wi-Fi networks, particularly when Public Wi-Fi access

involves authentication steps or inconsistent performance. This substitution effect weakens demand, especially in urban and semi-urban markets and has significantly reduced the perceived need for Public Wi-Fi among consumers.

- **Inconsistent quality of user experience with Public Wi-Fi networks**: Users frequently encounter issues such as low speeds, session drops, congestion in high-density locations, and variable reliability. Such experiences reduce trust and discourage repeat usage, leading to low stickiness even where networks are available. In addition, the lack of seamless interoperability and roaming across different Wi-Fi providers creates friction, as users may need to repeatedly authenticate or switch networks, further diminishing the attractiveness of Public Wi-Fi services.

- **Digital awareness and literacy gaps:** The limited digital literacy contributes to subdued demand, particularly in rural and underserved areas. Many potential users are either unaware of the availability of Public Wi-Fi services under initiatives like PM-WANI or lack familiarity with access mechanisms. This is compounded by language barriers, lack of user-friendly interfaces, and limited local content, which collectively constrain adoption among first-time internet users.

- **Security and privacy concerns**: Users are often apprehensive about the safety of their personal data, transactions, and online activities on public networks. Concerns regarding hacking, data theft, and misuse of personal information discourage usage, particularly for sensitive activities such as digital payments or accessing government services. The absence of visible and trusted security assurances further reinforces this hesitation and discourages users from using public networks.

- **Limited compelling use cases and localized content**: If users do not find differentiated benefits such as faster speeds, free or subsidized access to essential services, or locally relevant digital applications, the incentive to switch from mobile data to Public Wi-Fi remains weak and reduce the perceived value of Public Wi-Fi. This is particularly relevant in rural areas where demand stimulation often depends on relevance to livelihoods, education, healthcare, and governance services.

- **Cumbersome and repeated authentication processes**: Frequent login (OTP-based authentication) disrupt seamless browsing including repeated OTP-based logins or time-bound sessions. While such mechanisms are important for security and regulatory compliance, they can negatively impact user convenience, especially for low-literacy users or those without consistent access to mobile numbers. Simplifying onboarding and enabling seamless, one-time authentication experiences would be critical to improving adoption.

- **Poor interoperability**: Roaming across hotspots is still not frictionless, despite the federated architecture.

- **Fragmented access and payments:** Lack of standardized interfaces across PDOs and apps leads to inconsistency.

In our view, addressing these issues requires coordinated efforts to enhance user trust, improve service quality, simplify access, and create meaningful value propositions that make Public Wi-Fi an attractive and complementary connectivity option.

For targeted policy or regulatory measures required to address these demand-side constraints, please refer to our combined response to Question no. 3 to 5.

Q3. Despite the PM WANI initiative, scaling the number of public hotspots across diverse geographies, especially in remote and underserved regions, remains uneven. What are the key challenges in expanding both the density and geographic spread of hotspots, and what strategies could help accelerate more balanced, nationwide coverage? Please provide your response in detail with justification.

And

Q4. What changes, if any, are required in the existing PM-WANI framework to improve revenue certainty and long-term sustainability for PDOs/PDOAs? Please provide your response in detail with justification.

And

Q5. Are there any other challenges currently faced by PDOAs/PDOs? If yes, what changes can enhance the participation of entrepreneurs under the PM-WANI framework? Please provide your response in detail with justification.

Tata Communications Response to Q3, Q4 and Q5:

The uneven expansion of PM-WANI (Wi-Fi Access Network Interface) hotspots across India reflects a mix of structural demand-side weaknesses, economic feasibility challenges, and ecosystem-level frictions, rather than simply regulatory or supply bottlenecks.

Key Challenges in Expanding PM-WANI Hotspots:

- **Demand-Side Constraints are more pronounced than Supply-Side Constraints:** While PM-WANI made it easier for local entrepreneurs (PDOs) to set up hotspots without licensing requirements, actual consumer demand remains weak:
  - Willingness to pay is low in rural and underserved regions due to limited disposable income.
  - Users often perceive Wi-Fi as a complementary or backup service, not a primary connectivity mode.
  - Limited digital literacy reduces the perceived value of public Wi-Fi, especially for advanced use cases beyond entertainment. Even if infrastructure is deployed, low usage leads to poor monetization, disincentivizing operators from expanding coverage.

- **Affordable and Ubiquitous Mobile Broadband Reduces Need:** India's telecom sector offers one of the cheapest mobile data tariffs globally, with widespread 4G and growing 5G rollout:
  - Mobile broadband is highly convenient, requiring no login or session-based authentication.
  - Telecom operators provide bundled plans with high data caps, making public Wi-Fi redundant for many users.

  Thus, PM-WANI competes with a superior substitute (mobile data) rather than filling a major connectivity gap, especially in semi-urban and urban areas.

- **Authentication Friction, Security Concerns, and Fragmented User Experience:** User experience remains a significant barrier. These reduce repeat usage and customer retention, weakening demand sustainability.

- **Limited Scope for Large-Scale Proliferation Under Current Market Conditions:** Roaming across hotspots is still not frictionless, despite the federated architecture. Economic viability issues constrain expansion:
  - PDOs operate on thin margins and struggle to recover costs (equipment, bandwidth, maintenance).

- Revenue streams are limited to user fees, with minimal alternative monetization (ads, enterprise services).
- Remote areas face high backhaul costs and unreliable power supply, further increasing operating expenses.
- Aggregators (PDOAs) have yet to develop scalable, profitable business models.
- The density of Public Wi-Fi Hotspots density remains clustered in high-footfall urban or semi-urban locations, rather than spreading geographically.

- **Structural Sustainability Concerns:** The challenges are not merely regulatory but structural:
  - Misalignment between supply incentives and demand realities.
  - Competition from mobile broadband substitutes rather than complementary positioning.
  - Absence of strong ecosystem use cases (e.g., enterprise, education, IoT).
  - Revenue model limitations hinder private participation.

    Without structural corrections, scaling will remain uneven regardless of policy simplifications.

Strategies for Accelerating Balanced Nationwide Coverage

- **Shift from Generic Connectivity to Targeted Use Cases:** Instead of positioning PM-WANI as a general internet access service, targeted applications create captive demand, ensuring minimum usage levels and improving sustainability. This requires:
  - Focus on specific high-impact use cases, such as digital education hubs (schools, libraries), telemedicine centers, agricultural advisory kiosks, public service delivery (e-governance)
  - Integration of Wi-Fi with government service points to ensure consistent demand.

- **Improve Demand Through Incentivization and Awareness**
  - Offer subsidized or free access for essential services (education, health).
  - Launch digital literacy campaigns to increase awareness of public Wi-Fi benefits.
  - Bundle PM-WANI access with government welfare programs.

- **Reduce Authentication Friction and Enhance User Experience:** Repeat usage is essential and encourages habitual adoption.
  - Implement seamless authentication mechanisms (e.g., SIM-based, device-based auto-login).
  - Standardize the user interface across PDOs for consistency.
  - Enable true interoperability and roaming across networks.
  - Strengthen security protocols and public messaging to build user trust.

- **Explore Hybrid Revenue Models:** Diversified revenue streams improve financial viability for PDOs and PDOAs. Move beyond pay-per-use:
  - Introduce advertising-supported access models.
  - Enable enterprise and institutional partnerships (e.g., campuses, transport hubs).
  - Monetize anonymized data insights (with strict privacy compliance).
  - Bundle with content providers (OTT, education platforms).

- **Public Funding and Viability Gap Support for Rural Areas:** In case of Public Wi-Fi, government support is essential.
  - Provide targeted subsidies for deployment in low-density and remote regions.
  - Integrate PM-WANI with BharatNet and other public infrastructure to reduce backhaul costs.
  - Offer capital grants or viability gap funding for rural PDOs.

- **Position PM-WANI as Complementary to Mobile Broadband Networks:** There is a need to create synergies with telecom networks.

- Offload data-heavy applications (video streaming, downloads) to Wi-Fi.
- Partner with telecom operators for Wi-Fi offloading strategies.
- Use PM-WANI in high-density environments (markets, transport hubs).

- **6G roadmap:** The 6G roadmap must adopt concrete, measurable and accountable targets:
  - Delicense spectrum for Wi-Fi 6E/7 indoor use and urgently upgrade policy to support next-generation public Wi-Fi.
  - Integrate Wi-Fi and PM-WANI as foundational components of the 6G network architecture, recognizing the dominance of indoor data consumption.
  - Accelerate rural and urban FTTH rollout, with yearly percentage targets and public reporting on household penetration.
  - Set clear annual benchmarks for PM-WANI hotspot deployment nation-wide track progress by state/district, ensure momentum and transparency.
  - Institutionalize Wi-Fi infrastructure as mandatory in all new buildings, commercial and housing developments and prioritize smart in-building connectivity upgrades.
  - Leverage PM-WANI as a targeted policy lever to close the rural-urban divide,

A cohesive ecosystem improves scalability and reduces fragmentation. Only through a multidimensional strategy can PM-WANI achieve balanced, nationwide coverage and long-term viability.

Q6. Are there improvements needed in the Authentication, Authorization, Roaming, and Payment architecture of the PM-WANI Framework? Please share suggestions, if any. Please provide your response in detail with justification.

Tata Communications Response:

- Yes, there is scope for improvement in the Authentication, Authorization, Roaming, and Payment (AARP) architecture under the PM-WANI framework.
- While the current system enables low-cost and decentralized access, it can be enhanced by enabling seamless, single sign-on based authentication to reduce user friction, and by strengthening interoperability standards to allow effortless roaming across PDO networks. Further, integrating widely used digital payment platforms and enabling frictionless micro-payment options would improve user convenience and monetization.
- A more robust, standardized architecture with greater involvement of large-scale aggregators can also improve service reliability, security, and scalability, thereby enhancing overall user experience and driving adoption.
- International practices adopted by various countries may also be kindly referred to make it India centric guidelines.

Q7. In the Indian context, which of the following models would be more appropriate for the proliferation of Public Wi-Fi?

a. A model where the Government actively ensures hotspot deployment through direct funding and implementation support, including backhaul provision; or

b. A model where the Government primarily ensures availability of robust backhaul infrastructure and intervenes in hotspot deployment only in cases of market failure.

Please provide your response in detail with justification.

Tata Communications Response:

- In the Indian context, a hybrid approach with primary reliance on model (b) where the Government focuses on ensuring robust and affordable backhaul infrastructure and intervenes

in hotspot deployment only in cases of market failure would be more appropriate for the sustainable proliferation of Public Wi-Fi networks.

- A backhaul-led strategy addresses the most critical structural bottleneck in Wi-Fi expansion while allowing market-driven deployment to determine scale, efficiency, and innovation. By investing in fiberization (e.g., BharatNet), promoting infrastructure sharing, and ensuring affordable access to high-capacity backhaul, the Government can create an enabling foundation on which private players, PDOs, and aggregators can build viable Wi-Fi business models.
- Government should ensure availability of robust backhaul by enabling ISPs/TSPs and by simplifying the regulation and permissions for laying fiber to the underserved/rural areas where private ROI is negative. Fiber/backhaul, poles, ducts, street infrastructure, etc. should have open access at regulated, cost-based rates for all TSPs trying to wire the area.
- This approach minimizes fiscal burden, avoids duplication of infrastructure, and encourages competition and efficiency, which are essential for long-term sustainability.
- At the same time, targeted intervention under model (a) should be retained for areas of market failure, such as remote rural regions, low-income geographies, and strategically important public locations where commercial incentives are inadequate. In such cases, direct funding support, viability gap funding, or public-led deployment can ensure equitable access and advance digital inclusion objectives.
- This calibrated approach balances efficiency with inclusivity: it leverages private sector capabilities and innovation where viable, while ensuring that underserved areas are not left behind. It also aligns with India's broader policy direction of enabling digital infrastructure through public investment while fostering competitive service delivery ecosystems.

Q8. Is there a need to adopt separate strategies for Public Wi-Fi proliferation in rural and urban areas? If yes, suggestions may be provided. Please provide your response in detail with justification.

Tata Communications Response:

- Yes, there is a clear need to adopt differentiated strategies for Public Wi-Fi proliferation in rural and urban areas, given the significant variations in infrastructure availability, user behavior, commercial viability, and demand patterns across these geographies.
- In urban areas, the key objective should be to enhance capacity, user experience, and network densification in high-footfall locations such as transport hubs, commercial centers, educational institutions, and public spaces. Urban markets are relatively more commercially viable due to higher population density and data consumption. Therefore, a market-driven approach should be emphasized, supported by policies that facilitate ease of deployment, such as streamlined Right-of-Way (RoW) processes, access to street furniture, and fair use of public infrastructure. In addition, focus should be placed on ensuring high quality of service (QoS), seamless roaming across networks, and integration with digital services and payment platforms, which can improve user stickiness and monetization opportunities. Encouraging participation of large ISPs, telecom operators, and technology providers can further drive scale and innovation in these markets.
- In contrast, rural areas require a more interventionist and support-driven approach, as the business case for Public Wi-Fi is often weak due to low ARPU, sparse populations, and limited digital awareness. The primary focus in rural areas should be on ensuring availability of reliable and affordable backhaul connectivity, leveraging initiatives such as BharatNet. Targeted policy support in the form of viability gap funding, subsidies for equipment and backhaul, and incentives for PDOs and aggregators will be essential to stimulate deployment. Additionally, efforts must be made to drive digital literacy, local content development, and awareness of public Wi-Fi services, so that demand is effectively generated alongside supply. Simplified authentication mechanisms and multilingual interfaces will also play a key role in improving accessibility.

- Furthermore, rural strategies should emphasize integration with public service delivery ecosystems, such as e-governance, telemedicine, online education, and financial inclusion platforms, thereby creating tangible value for users. Leveraging community institutions such as panchayats, common service centers (CSCs), and local entrepreneurs can strengthen last-mile delivery and ensure sustainability.

Q9. What measures can be taken to improve the deployment and uptake of Public Wi-Fi networks in high-footfall areas for both outdoor (such as bus stops, roadside transit points, open public parks, markets, tourist sites), and indoor (such as airports, railway stations, malls, public institutions)? Please provide your response in detail with justification, separately for outdoor and indoor scenarios.

Tata Communications Response:

In Airports and Railway stations, (Private ones or under AAI/Indian Railways), a factor disincentivizing service providers from making fiber available, is the high cost getting fiber inside the building and the RoW and OSP charges. Such charges should be nullified, and providers should be encouraged to add more and more fiber connectivity. Private operators of Airports, ports, railway stations, etc. should also be advised to waive off such fiber entry charges to the TSPs in the interest of nation-building.

In order to improve the deployment and uptake of Public Wi-Fi networks in high-footfall areas – we would like to suggest as follows:

- Outdoor (e.g., bus stops, parks, markets, tourist sites): Deployment can be improved by streamlining access to street furniture and public infrastructure on standardized, low-cost terms, along with faster RoW approvals. Use of rugged, low-power Wi-Fi equipment and alternative backhaul (E/V-band or satellite) can support coverage in open areas. To drive uptake, offering free or ad-supported access, integrating location-based services (navigation, tourism, local commerce), and ensuring simple, seamless authentication will improve user engagement.

- Indoor (e.g., airports, Railway stations, malls, institutions): Deployment should focus on high-capacity infrastructure with assured backhaul, supported by neutral-host or shared network models to reduce duplication. Mandating non-discriminatory access to infrastructure within large venues can accelerate rollout. For uptake, ensuring high QoS, seamless roaming, single sign-on authentication, and integration with digital payments and service platforms (retail, ticketing, governance services) will create a superior user experience and enhance sustained usage.

B. Role of Government- Funding deployments

Q10. If the Government decides to provide financial support for the proliferation of Public Wi-Fi, which funding mechanisms would be most suitable for India? Should a uniform funding mechanism be adopted nationwide, or should differentiated funding mechanisms be used for rural, urban, and high-footfall areas? Please provide your response in detail with justification.

And

Q11. What criteria should govern the allocation and disbursement of funds across rural, urban, and high-footfall areas, respectively? Please provide your response in detail with justification.

Tata Communications Response to Q10 & Q11:

- A differentiated funding approach is most suitable for India rather than a uniform nationwide mechanism. Market-driven deployment should be the primary approach in urban and high-footfall areas, with limited support through PPP models or targeted incentives, while viability gap funding (VGF), capital subsidies, or output-based funding should be prioritized for rural and underserved areas where commercial viability is limited. As highlighted earlier, the Government should play a central role in enabling affordable and ubiquitous backhaul provisioning and funding, which remains the most critical enabler for Public Wi-Fi proliferation.
- At the same time, funding frameworks must adhere to the principles of being fair, proportionate, and technology-neutral. Any subsidy should not be selectively directed only towards Public Wi-Fi but should instead support a broader connectivity ecosystem, ensuring an equitable funding environment with comparable obligations across technologies and service providers. This will avoid market distortions and promote efficient resource allocation ensuring level playing field for all licensed operators.
- The allocation and disbursement of funds should be guided by objective, performance-linked criteria tailored to different geographies. In rural areas, priority should be given to connectivity gaps, population coverage, and service delivery to key public institutions. In urban areas, funding (where applicable) should be linked to network densification, QoS standards, and user adoption levels. For high-footfall locations, support should be tied to usage metrics, uptime, and service quality benchmarks. Across all segments, disbursement should be outcome-based, ensuring accountability, efficient utilization of public funds, and sustained service delivery.

C. Role of Government- Backhaul provisioning and funding

Q12. Is the lack of adequate and reliable last-mile connectivity a critical constraint for the proliferation of Public Wi-Fi in the country? If yes, what specific measures may be considered by the Central Government, State Governments, and local bodies to address the last-mile constraints? Please provide your response in detail with justification.

And

Q13. Is there a need for the Government to provide funding for provisioning of last-mile connectivity in the uncovered or underserved areas for Public Wi-Fi networks? If yes, which funding option is best suited in the Indian context, and what should be the criteria for rural, urban, and high footfall areas, respectively? Please provide your response in detail with justification.

Tata Communications Response to Q12 & Q13

- Yes, lack of adequate and reliable last-mile connectivity remains a critical constraint for the proliferation of Public Wi-Fi in India, particularly in rural, remote, and underserved areas. While core and backhaul networks have seen significant expansion, gaps persist at the access layer due to high deployment costs, limited fiber penetration, power availability issues, and operational challenges. These constraints directly impact the quality, scalability, and viability of Public Wi-Fi networks.
- Addressing last-mile constraints requires coordinated action across all levels of government. The Central Government should prioritize expansion of national broadband infrastructure (such as BharatNet), promote infrastructure sharing, and enable the use of alternative technologies (fixed wireless, satellite, E/V-band) to bridge connectivity gaps. State Governments and local

bodies should facilitate faster and low-cost Right-of-Way (RoW) approvals, provide access to public infrastructure (poles, buildings, street furniture), and rationalize local levies to reduce deployment costs. A streamlined, single-window clearance mechanism at the local level would further accelerate rollout.

- There is also a clear need for targeted funding support for last-mile connectivity in uncovered and underserved areas, where commercial viability is limited. The most suitable approach would be a differentiated funding framework, with viability gap funding (VGF), capital subsidies, or output-based incentives for rural and remote areas, while relying largely on market-driven deployment in urban and high-footfall locations, with limited targeted support where required. As highlighted earlier, the Government should play a central role in enabling affordable backhaul provisioning and funding, as this is fundamental to last-mile connectivity.
- Importantly, any funding mechanism should be fair, proportionate, and technology-neutral, and should not be restricted solely to Public Wi-Fi. Instead, it should support a broader connectivity ecosystem, ensuring an equitable funding environment with comparable obligations across technologies to avoid market distortions.
- Fund allocation and disbursement should be performance-linked and outcome-based. In rural areas, criteria should include coverage of unserved habitations, connectivity to public institutions, and uptime. In urban areas, focus should be on densification, QoS, and user adoption, while in high-footfall areas, funding should be tied to usage levels, reliability, and service quality benchmarks. Such an approach would ensure efficient utilization of public funds while enabling sustainable expansion of Public Wi-Fi networks.

D. Facilitative role- States and local bodies

Q14. Are there any RoW challenges faced by service providers in accessing public places or street furniture to install Public Wi-Fi hotspots? If yes, details may be provided along with suggestions for improvements. Please provide your response in detail with justification.

Tata Communications Response:

- Yes, Telecom service providers continue to face several RoW and access-related challenges in installing Public Wi-Fi hotspots, particularly in accessing public places and street furniture. Despite reforms such as the RoW Rules, 2024, implementation remains uneven across states and local bodies. Service providers often encounter delays in approvals, non-uniform procedures, and lack of clarity in documentation requirements, which increase deployment timelines and uncertainty. In many cases, high and inconsistent municipal charges, multiple permission layers, and ad hoc conditions imposed by local authorities further escalate costs and hinder scalability. Additionally, access to street furniture such as poles, bus shelters, traffic signals, and public buildings is often fragmented, with no standardized framework governing availability, pricing, or technical specifications.
- These challenges are particularly significant given the localized and distributed nature of Public Wi-Fi deployments, which require rapid, small-scale installations across multiple points. The absence of a streamlined and predictable access regime reduces operational efficiency and discourages investment, especially for PDOs and smaller ecosystem participants.
- To address these issues, there is a need to strengthen implementation of a uniform, pan-India RoW framework with clearly defined timelines, standardized documentation, and strict adherence by state and local authorities. Municipal charges should be rationalized and capped, and arbitrary levies should be eliminated to reduce cost burdens. A single-window digital clearance system at the state or city level can significantly improve processing efficiency and transparency.
- Further, a standardized policy for access to street furniture and public infrastructure should be notified, mandating fair, non-discriminatory access on pre-defined commercial and technical

terms. Creating a centralized inventory or GIS-based mapping of available public assets can also improve visibility and planning for service providers. Such measures would reduce friction in deployments, lower costs, and accelerate the rollout of Public Wi-Fi networks across both urban and rural areas.

Q15. What facilitative roles can State Governments play in accelerating Public Wi-Fi deployment across rural, urban, and high-footfall areas, respectively? Should States consider deploying Public Wi-Fi networks at the municipal and gram panchayat level? Please provide your response in detail with justification.

And

Q16. Should the State Government need to take initiatives to improve the availability of last-mile connectivity for Public Wi-Fi networks? If yes, what measures can incentivize States /municipalities to undertake city- and town-level fiberisation to ensure Public Wi-Fi network proliferation? Please provide your response in detail with justification.

Tata Communications Response to Q15 & Q16:

- State Governments play a crucial facilitative role in accelerating Public Wi-Fi deployment across rural, urban, and high-footfall areas by enabling a supportive policy and infrastructure environment. This includes streamlining RoW approvals, rationalizing local charges, enabling single-window clearance systems, and ensuring uniform access to public infrastructure and street furniture. States can also actively promote deployment through integration with Smart City initiatives, public institutions, and transport hubs, and by leveraging local bodies and gram panchayats to support last-mile rollout. Deployment at the municipal and gram panchayat levels can be particularly effective in driving localized adoption, improving access in underserved areas, and supporting community-based models such as PM-WANI.
- Further, State Governments should take targeted initiatives to improve last-mile connectivity, which remains a key bottleneck. This can be achieved by promoting city and town level fiberization, encouraging infrastructure sharing, and facilitating access to ducts, poles, and public assets. To incentivize such efforts, the Central Government may consider performance-linked grants, financial incentives, or co-funding mechanisms tied to fiberization targets, coverage milestones, and QoS outcomes. Encouraging PPP models and aligning state-level programs with national initiatives like BharatNet can further enhance effectiveness.
- In high-footfall urban environments, the State Government can facilitate harmonized RoW frameworks, common duct policies, smart City integration, municipal fiber systems and simplified infrastructure access mechanisms. In rural areas, state governments can support integration of Public Wi-Fi with BharatNet, panchayat connectivity, educational institutions, CSC ecosystems, healthcare facilities and rural public-service delivery systems.
- Overall, a coordinated approach combining policy facilitation, infrastructure enablement, and targeted incentives will enable States and local bodies to play a pivotal role in ensuring scalable and sustainable proliferation of Public Wi-Fi networks.

Q17. What facilitative roles can local bodies play in accelerating the deployment and sustainable operation of Public Wi-Fi networks in rural and urban areas? Please provide your response in detail with justification.

Tata Communications Response:

- Local bodies play a pivotal role in accelerating the deployment and ensuring the sustainable operation of Public Wi-Fi networks in both rural and urban areas by acting as key enablers at the ground level. They can facilitate timely and cost-effective access to public infrastructure and street furniture such as poles, buildings, bus shelters, and community centers on fair and standardized terms, while streamlining approval processes through simplified, single-window mechanisms. Rationalization of local levies and adherence to uniform RoW norms are critical to reducing deployment costs and delays.
- Local bodies can also support last-mile connectivity by coordinating with service providers for fiberization, enabling ducting infrastructure, and promoting infrastructure sharing. In rural areas, gram panchayats can play an active role in hosting Wi-Fi hotspots at common service centers, schools, and health facilities, thereby driving adoption and digital inclusion. In urban areas, municipalities can integrate Wi-Fi deployment into smart city initiatives and public service delivery ecosystems.
- Further, local bodies can enhance sustainability by promoting awareness, digital literacy, and local use cases, as well as facilitating partnerships with PDOs and aggregators under frameworks like PM-WANI. Overall, their proactive involvement in facilitation, coordination, and localized implementation is essential to achieving scalable and efficient Public Wi-Fi proliferation.

E. Incentivising Service Providers

Q18. What regulatory or policy incentives, schemes or programs are required to promote active participation of TSPs and ISPs in Public Wi-Fi deployment? Please provide your response in detail with justification.

And

Q19. What regulatory or fiscal incentives, schemes or programs may be required in the provisioning of bandwidth and backhaul for Public Wi-Fi networks? Please provide your response in detail with justification.

Tata Communications Response to Q18 & Q19:

- Promoting active participation of TSPs and ISPs in Public Wi-Fi deployment requires a combination of regulatory clarity, fiscal incentives, and ecosystem-level enablers, particularly in relation to bandwidth provisioning and backhaul, which remain critical cost components. A key measure is to ensure affordable and non-discriminatory access to bandwidth and backhaul, including rationalization of leased line tariffs and promotion of infrastructure sharing (fiber, ducts, and towers). This will significantly reduce entry barriers and improve the business case for participation.
- Regulatory incentives may include simplified compliance frameworks, light-touch regulations under PM-WANI, and removal of unnecessary licensing or approval burdens, enabling TSPs and ISPs to participate flexibly across different layers of the ecosystem. Encouraging neutral host models and aggregator platforms can further enable efficient scaling and utilization of infrastructure. For instance, ISPs/TSPs providing backhaul bandwidth for Public Wi-Fi networks should be given waivers of RoW, OSP and other charges levied by state and local bodies. Such waiver window should be offered to all such TSPs/ISPs who are expanding their network in Urban or Rural areas and are supporting PDOs/PDOAs involved in proliferation of Public Wi-Fi through PM-WANI.
- From a fiscal perspective, targeted support such as viability gap funding (VGF), capital subsidies, or tax incentives may be provided for deployments in underserved and rural areas, while maintaining a largely market-driven approach in urban and high-footfall locations. As

highlighted earlier, the Government should play a central role in strengthening backhaul infrastructure and funding, which is foundational to Public Wi-Fi expansion.

- Importantly, all incentives and support mechanisms must be fair, proportionate, and technology-neutral, and should not be limited exclusively to Public Wi-Fi. Instead, they should promote an equitable connectivity ecosystem with comparable obligations across technologies and service providers, thereby avoiding market distortions and ensuring efficient allocation of resources.
- Further, enabling access to public infrastructure on standardized terms, streamlining RoW processes, and incentivizing fiberization at city and rural levels will complement these measures. Together, these steps will create a conducive environment for TSPs and ISPs to actively invest in and scale Public Wi-Fi networks while ensuring sustainable and high-quality service delivery.

F. Incentivising Private Entities

Q20. What measures can be adopted to incentivize private enterprises, commercial establishments, shop owners, community institutions etc. to install public Wi-Fi hotspots? Please provide your response in detail with justification.

Tata Communications Response:

- Incentivizing private enterprises, commercial establishments, shop owners, and community institutions to install Public Wi-Fi hotspots requires a mix of financial support, regulatory facilitation, and infrastructure enablement to address key deployment barriers.
- As highlighted earlier, a major constraint is the high cost and limited availability of deployment infrastructure. In this context, Public Wi-Fi should be accorded the status of a public utility, enabling access to existing public infrastructure such as street furniture, public buildings, and common spaces on fair and standardized terms. Free or nominal RoW permissions, at par with other public utilities, should be encouraged wherever feasible. Additionally, ensuring on-ground security support for installed infrastructure can improve reliability and stakeholder confidence.
- Financial incentives such as subsidies (on the lines of NOFN/BharatNet), tax benefits, and customs duty exemptions on Wi-Fi equipment can help lower upfront costs and improve viability. Enabling revenue opportunities through advertising, digital services integration, and public service delivery platforms can further strengthen the business case.
- From a regulatory perspective, simplified onboarding under PM-WANI, plug-and-play models via PDO aggregators, and reduced compliance burden will encourage participation. There is also a need for greater clarity and simplification of authentication frameworks, for ensuring ease of use without compromising security aspects.
- Overall, a coordinated approach focused on cost reduction, ease of deployment, infrastructure access, and revenue enablement will be essential to drive widespread participation in Public Wi-Fi deployment.

Q21. Is there a need to strengthen the role of public or private entities as system integrators for the deployment of Public Wi-Fi networks? If yes, what policy or institutional support may be required? Please provide your response in detail with justification.

Tata Communications Response:

- Yes, there is a need to strengthen the role of both public and private entities as system integrators to enable scalable and efficient deployment of Public Wi-Fi networks. System integrators can help aggregate stakeholders, standardize deployment, and ensure interoperability and QoS across the ecosystem.
- Policy support should include regulatory recognition, open and technology-neutral architectures, interoperability standards, and simplified integration frameworks, along with access to public

infrastructure, affordable backhaul, and streamlined RoW processes. Encouraging PPP models and providing targeted incentives for underserved areas can further enhance their role in driving scale and sustainability.

- There should be a consolidated approach across different initiatives launched at different points of time, e.g. BharatNet, PM-WANI, Project Ganga (UP), etc. for the deployment of Public Wi-Fi networks.

G. Technical Architecture, Authentication, and Interoperability

Q22. Are users facing challenges in the authorization and authentication procedures for accessing Public Wi-Fi Networks? If yes, how can authorization and authentication processes be simplified while ensuring security and compliance? Please provide your response in detail with justification.

Tata Communications Response:

- Yes, users face challenges in current authentication processes, including repetitive OTP logins, session interruptions, and lack of seamless access across networks, which reduce ease of use and adoption. TRAI in its paper has also highlighted such concerns related to authentication process.
- In our view, these can be addressed by enabling single sign-on (SSO), interoperable and federated authentication across networks, and simplified methods such as app-based or device-based login, while leveraging centralized authentication through PDO aggregators for compliance. A balanced approach focusing on user convenience with secure, standardized frameworks will improve adoption without compromising security.
- Further, for public space access through Public Wi-Fi, light authentication through SMS OTP or e-mail OTP should be allowed rather than full KYC. Security should be basic and session data logging only to minimum extent required from a national security perspective.

Q23. Is there a need for a centralized platform for authentication and payment systems in the Public Wi-Fi ecosystem? If yes, which entity is best suited for its implementation and management? Please provide your response in detail with justification.

Tata Communications Response:

- A centralized (or federated) platform for authentication and payment in the Public Wi-Fi ecosystem can be explored to enhance user experience, interoperability, and scalability. A unified approach can enable seamless single sign-on, standardized authentication, and integrated digital payment options, thereby reducing user friction and improving adoption. However, the architecture should preferably be federated rather than fully centralized, to ensure flexibility and avoid single points of failure. This can be implemented through PDO aggregators or a neutral, industry-led entity, with appropriate government oversight for standardization and compliance.
- A useful parallel example is the Mobile Number Portability Service Provider (MNPSP) model, where neutral third-party entities manage critical functions in a standardized and interoperable manner under regulatory supervision. A similar approach for Public Wi-Fi can ensure non-discriminatory access, scalability, and efficient ecosystem coordination while promoting innovation and participation.
- This model balances ease of use, security, and competition, making the ecosystem more robust and user-friendly.

Q24. What steps are required to achieve interoperability and seamless roaming among Public Wi-Fi networks? Should inter-hotspot roaming be made mandatory, and if yes, should a "super-aggregator" need to be introduced to facilitate it? Please provide your response in detail with justification.

Tata Communications Response:

- Achieving interoperability and seamless roaming across Public Wi-Fi networks requires a combination of standardization, interoperable architecture, and ecosystem coordination. Key steps include the adoption of common authentication protocols (e.g., single sign-on), standardized APIs, and interoperable platforms across PDOs, PDOAs, and service providers, enabling users to access multiple hotspots without repeated logins. Ensuring open, technology-neutral architectures and mandating compatibility across devices and networks is also essential to avoid fragmentation.
- Inter-hotspot roaming should be encouraged and progressively made mandatory, as it is critical for improving user experience, driving adoption, and achieving scale. However, the implementation should follow an interoperable and decentralized model, allowing multiple players to interconnect rather than relying on a rigid centralized system.
- In this context, introducing a "super-aggregator" or neutral coordinating entity may be beneficial to facilitate interoperability, define standards, and manage coordination similar to models like MNPSP. Such an entity, operating under regulatory oversight, can ensure non-discriminatory access, seamless roaming, and efficient integration, while preserving competition and innovation within the ecosystem.
- Having an open stack architecture not constrained by selective hardware requirements will help in further strengthening the overall framework. Interoperability between different networks should be non-negotiable.

H. Monetisation and Sustainability

Q25. What monetisation models are most appropriate for rural, urban, and high-footfall locations, respectively? Please also suggest any additional monetisation models that may be suitable in the Indian context. Please provide your response in detail with justification.

Tata Communications Response:

- The choice of monetisation models for Public Wi-Fi should be context-specific, reflecting variations in demand, user profiles, and commercial viability across rural, urban, and high-footfall locations.
- In rural areas, where affordability is a key constraint and ARPU is low, subsidized or free access models supported by government funding (e.g., VGF) are most appropriate. Monetisation can be supplemented through advertising, public service delivery integration (e-governance, telemedicine, education), and community-based models. This approach helps drive digital inclusion while ensuring minimum sustainability.
- In urban areas, freemium models (limited free access with paid premium tiers for higher speeds/data) are well-suited, along with advertising-based revenue and partnerships with OTT, fintech, and local businesses. Integration with digital payment platforms and enterprise services can further enhance monetisation opportunities.
- In high-footfall locations such as airports, railway stations, and malls, premium paid access, bundled services (retail, ticketing, entertainment), and location-based advertising are the most effective. These areas can also support sponsorship models and brand partnerships, given the high user engagement and visibility.

Q26. Please provide any additional comments, observations, or suggestions related to the proliferation of Public Wi-Fi in the country, including any potential issues or considerations that may not have been covered in the sections above. Please provide your response in detail with justification.

Tata Communications Response:

- Public Wi-Fi proliferation in India requires a holistic, technology-neutral policy approach, ensuring it complements mobile and fixed broadband while maintaining regulatory parity across technologies. Stronger coordination among central, state, and local authorities is essential for consistent implementation of RoW, infrastructure access, and deployment policies. There is also a need to promote standardization, interoperability, and open architectures to enable scalability and wider ecosystem participation, alongside simplified yet robust security frameworks to build user trust. Further, sustained growth will depend on demand creation through digital literacy, local content, and integration with essential services.
- In parallel, it is important that backhaul availability and spectrum policy are aligned to support this growth. In this regard, it is respectfully requested **TRAI to kindly take up with DoT to prioritise and expedite the decision-making process for the acceptance of the TRAI's forward looking and balanced recommendations dated 10-12-2025 pertaining to the assignment and utilisation of microwave spectrum, in traditional microwave backhaul bands viz. 6 GHz (lower), 7 GHz, 13 GHz, 15 GHz, 18 GHz, and 21 GHz bands as well as in the E-band (71–76 GHz, 81–86 GHz) and V-band (57–64 GHz).** These comprehensive recommendations on backhaul spectrum assignment establish an equitable and technology-neutral backhaul spectrum framework supporting diverse backhaul needs of all authorised entities including captive users and enterprise service providers, not just wireless access service providers.