Public Wi-Fi as Digital Public Infrastructure: Recommendations for Scaling PM-WANI in India

Submission to the TRAI Consultation Paper No. 07/2026 on "Proliferation of Public Wi-Fi Networks in India"

Submitted to

Telecom Regulatory Authority of India

Submitted by

Digital Empowerment Foundation

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Executive Summary: Key Recommendations

This submission addresses all 26 questions posed in TRAI Consultation Paper No. 07/2026 on *"Proliferation of Public Wi-Fi Networks in India."* Drawing on Digital Empowerment Foundation's two decades of field experience in last-mile connectivity, community-owned Wi-Fi networks, digital literacy, and prior engagement with TRAI on public Wi-Fi policy, the following recommendations identify the regulatory, technical, financial, and institutional measures required to make PM-WANI scalable, affordable, interoperable, and genuinely useful for digitally excluded communities.

1. Expand PM-WANI device certification to include OpenWrt-compatible core routers (MikroTik-class), sector antennas, and GPON OLT configurations - enabling a single PDO registration to serve a 1-3 km radius rather than the current 50-100 metre limit (in case of both indoor and outdoor), with one activation fee and one monthly subscription.
2. Enact mandatory tower infrastructure sharing - requiring licensed ISPs and TSPs to provide rack space, antenna mounting, and power access at their tower sites to PM-WANI PDOs deploying wireless backhaul, at cost-based regulated tariffs.
3. Mandate ISPs to provide leased-line connectivity to registered PM-WANI PDOs as a service obligation at a regulated lower price. ISPs should have no discretionary power to refuse backhaul provisioning to a registered PDO operating in their licensed service area.
4. Mandate BSNL to offer a PM-WANI Backhaul Service at a government-notified maximum monthly rate, available to any registered PDO, and introduce a TRAI-regulated wholesale backhaul price ceiling so affordable backhaul is a regulated entitlement, not a market outcome.

   4.1 Mandate BharatNet infrastructure at every panchayat, block, and district level to function as backhaul infrastructure and service support for PDOs/PDOAs wherever available.

4.2 Ensure that the BSNL PM-WANI Backhaul Service is operationally integrated with BBNL/BharatNet infrastructure wherever available, so that PDOs/PDOAs can access public backhaul through a single, non-discretionary provisioning pathway. .

5. Mandate every trusted public infrastructure and community node as PM-WANI hotspots and PDOs (e.g., Gram Panchayats, PHCs, post offices, schools, police stations, Banking Correspondents, NGO offices, community radio stations, GI-tagged artisan clusters, SHGs, co-operatives, Haats, etc.) with first-infrastructure-readiness subsidies and unlimited unmetered bandwidth on regulated tariffs backed by mandatory BSNL/BBNL backhaul. Additionally, India's 10 lakh-plus ASHA workers should be enabled as mobile PM-WANI hotspots, carrying connectivity door-to-door to settlements no fixed access point can reach. All hardware, software, and platform technology across this ecosystem must be open - open standards, open hardware certification, and open APIs at both PDOA and PDO level - so no institution or individual is excluded by proprietary lock-in.

   5.1 In addition to the categories listed above, explicitly map district public libraries, common health centres, public offices and institutions, block and tehsil offices, police substations, micro and nano enterprises, societies, and artisan clusters, including potentially 200,000 artisans, as PM-WANI hotspot/PDO candidates.

   5.2 Recognise ASHA workers not only as beneficiaries but also as mobile or moving hotspot carriers for hard-to-reach settlements.

6. Require PDOAs to provide PDOs with monthly itemised revenue statements - disclosing gross revenue collected, all deductions by type (DoT levy, platform fee, taxes), and net amount remitted - enforceable through PDOA registration conditions.
7. Launch a PM-WANI Legal Clarity Campaign in plain local languages explaining that PM-WANI makes internet sharing fully legal, that KYC is met through OTP authentication, that logs are maintained by the PDOA, and that the PDO bears no criminal liability for user behaviour - delivered through district administration, CSCs, and civil society field workers.
8. Introduce a persistent device-level credential so that once a user authenticates via OTP at any PM-WANI hotspot, a secure token is stored on their device valid for all

future PM-WANI sessions nationally eliminating OTP dependency in low-signal areas after first registration. For notified low-signal geographies, permit supervised assisted registration as a valid KYC alternative.

9. Adopt UPI as the mandatory payment mechanism and align PM-WANI with Passpoint (Hotspot 2.0) standards for seamless, automatic authentication - eliminating separate payment portals and the login-portal experience for returning users.
10. Mandate concurrent, co-funded digital literacy and Wi-Fi deployment at the district level - treating demand creation and supply deployment as one integrated investment, not two sequential workstreams. PM-WANI scaling targets must be measured by active users, not registered PDOs.
11. Introduce Viability Gap Funding for PDOs in designated underserved geographies, disbursed as monthly operational support linked to verified uptime and active user counts, declining over a three-year transition to self-sustainability.
12. Establish a State Public Wi-Fi Mission - modelled on Kerala KFON or Andhra Pradesh APSFL - with a dedicated nodal agency, district-level rollout plans, a publicly accessible monthly progress dashboard, and public Wi-Fi as a dedicated budget line item, not a discretionary expenditure.

    12.1 As part of each district-level rollout plan, require mapping of public institutions, public offices, community nodes, local enterprises, GI locations, artisan clusters, and ASHA-led mobile hotspot actors, so that the State Public Wi-Fi Mission translates the hotspot/PDO mandate into an actionable deployment pipeline. .

13. Mandate integration of PM-WANI access with government service delivery - UMANG, DigiLocker, e-Shram, PM-Kisan, Ayushman Bharat - so that connecting to a public hotspot delivers an immediately tangible benefit, transforming Wi-Fi from an abstract tool into a functional utility.
14. Reject the super-aggregator model for roaming and instead mandate federated interoperability standards under which multiple PDOAs integrate directly. Adopt OpenRoaming or equivalent as the PM-WANI roaming protocol, with TRAI-published revenue settlement guidelines.
15. Mandate a Public Wi-Fi Outcome Index tracking functional hotspot utilisation, user demographics (women, elderly, first-time users), use cases served, and geographic

equity, because the success of public Wi-Fi must be measured not by hotspots deployed but by underserved citizens actually online.

15.1 Disaggregate Outcome Index reporting by the mapped public and community-node categories identified in district rollout plans, so that utilisation, user demographics, use cases, and geographic equity can be assessed across different types of hotspot/PDO locations.

Background Note

In the last two decades, Digital Empowerment Foundation (DEF) has been working in more than 2,500 sites across India, providing last-mile connectivity infrastructure and digital literacy programs to communities that are typically ignored by the mainstream market system. In doing so, a central pillar of DEF's work has been its Wireless for Communities (W4C) programme, launched in 2010 with support from the Internet Society. W4C was instrumental in introducing the concept of Community Owned and Community Managed WiFi networks in some of the most under-served areas of India through DEF. DEF worked not in the capacity of an Internet Service Provider (ISP), but that of a community network engineer; buying backhaul connections from bigger ISPs, deploying wireless infrastructure, training rural youth into becoming barefoot network engineers, and designing sustainable models for multiple users where the same network serves households, small business establishments, schools, and health centers all at once. Till date, through W4C, DEF has been successful in establishing functional community owned WiFi networks in over 56 sites across India. In the district of Guna in the state of Madhya Pradesh, DEF acted as an unofficial rural ISP providing internet backhaul connection worth 40 Mbps to households, kirana stores, and a national highway toll booth through subsidized and community donation models. In the state of Rajasthan in Baran, it created a 200-kilometer network linked with a server that helped the community to share content and gain access even without a stable backhaul connection. In Chanderi, it provided public WiFi to help a community of 3,500 weavers get access to design and marketing.

From W4C to PM-WANI, How DEF's Recommendations Shaped National Policy

In August 2016, DEF submitted detailed comments to TRAI's Consultation Paper on Proliferation of Broadband through Public Wi-Fi Networks. Drawing directly from the W4C programme's field experience, DEF made three arguments that were, at the time, ahead of regulatory consensus. First, it recommended the creation of a new licensing tier, Class C and Sub-Class C ISPs, for small and community-level internet providers, arguing that the full ISP licensing regime (with crore-level capital requirements, mandatory user-level Customer Acquisition Forms, six-month activity log retention, dedicated server infrastructure, and an

8% DoT revenue levy) was designed for large commercial operators and structurally prohibitive for micro-entrepreneurs, NGOs, and community institutions. The second recommendation was for making use of India's huge resource of public facilities such as over 14 lakh government schools, 1.5 lakh post offices, 7,000 railway stations, and even all gram panchayat offices, as public Wi-Fi spots. Third, it called for decentralisation of regulatory compliance obligations, so that community-level internet distribution could be legally recognised without requiring small entities to maintain dedicated technical infrastructure.

These recommendations, alongside the engagement of others with TRAI at the time, contributed to a policy trajectory that culminated in the launch of the PM-WANI framework in December 2020. The idea of PM-WANI was built around exactly what DEF has tried to test and prove. It made sure there was no license requirement for small-scale internet distributors, let micro-entrepreneurs run as PDOs without being ISPs, handed over responsibility of KYC and logging of activities to centralized PDOAs, and ensured that community points of contact, shops, kirana shops, and local institutions be the right place for delivering internet access to the public. PM-WANI, therefore, can be considered largely a regulatory solution to ground realities that DEF had shown proof of and argued about at TRAI. DEF's W4C programme was not just a precursor to PM-WANI in spirit, its specific operational models and its identification of the licensing barrier as the primary structural obstacle were directly reflected in the framework's design.

Why This Submission Must Be Read as Testimony

DEF makes this submission not as an onlooker but rather as a participant who has already contributed to the formulation of the framework being considered here by TRAI. Every problem identified in these pages has been encountered directly in the field, by DEF's network engineers, by the community members it has trained, and by the kirana store owners, schoolteachers, ASHA workers, and SHG members who are the intended but often unreached beneficiaries of the PM-WANI ecosystem. Every recommendation that follows has either been tested by DEF in its own deployments, or is drawn from the direct inputs of practitioners who operate at the last mile daily. When DEF identifies the 50–60 metre device coverage radius as a structural flaw, it does so because its field workers have hit that wall. When it makes a case for open-hardware router certification, it is based on its experience in

doing so. When it says OTP authentication won't work in poor signal environments, it is speaking for the many rural users who were denied access to a hotspot because their OTP never came through. The DEF submission should thus be seen as more than just another stakeholder submission; it comes from people who live the issue that the policy is meant to address. TRAI is humbly advised to see the recommendations herein as coming directly from the horse's mouth.

DEF maintains a consistent position across all its submissions to TRAI: Public Wi-Fi is a component of India's digital public infrastructure and must be governed as open, non-discriminatory, and community-integrated, not as a standalone commercial service. Its success must be measured not by the number of hotspots deployed, but by the extent to which digitally excluded citizens are able to access and meaningfully participate in an open internet.

Chapter A: Status Assessment and Specific Strategies

Supply Constraints and Geographic Scaling

Q1: What are the key supply-side constraints affecting Public Wi-Fi proliferation in India? What targeted policy or regulatory measures may be required?

Q3: 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?

Questions 1 and 3 are being dealt with simultaneously since the issue of geographic under-deployment is not a distinct issue from the problems of the supply side, but the result of the failure.

The device coverage problem, the root of both the supply and revenue failure: PM-WANI-certified indoor devices currently available in the market have a maximum wireless range of approximately around 50-60 metres. In case of outdoor devices, the ranges can be increased up to around 100 meters only, in an open area. A single PDO deployment serves only the immediate vicinity of the installation, a shop interior, a courtyard, a short stretch of street. In order to make coverage for even a small geographic area or even for a single panchayat campus, the PDO would need to install several certified devices, which would incur an initial cost (usually between INR 5,000 onwards, payable to PDOA) for hardwiring and subscription costs. The cost of installing multiple devices in order to cover 500 meters soon becomes unrealistic. This hardware constraint is also the root cause of the revenue problem: a 50-metre hotspot attracts too few concurrent sessions to generate meaningful income. The fix is not to deploy more small devices at compounding cost, it is to certify hardware capable of area-wide coverage from a single registration.

The 'client plan' problem, most PDOs are operating outside their ISP's terms of service: Most active PDOs are running their PM-WANI hotspot on a standard residential or consumer broadband plan, a plan explicitly not licensed for resale or commercial sharing. This means the PDO is technically non-compliant with their ISP even while being formally registered within PM-WANI. When usage spikes as a public hotspot will, the ISP may throttle, suspend, or terminate the connection without notice. No PDO can build a viable service on a

connection that can be cut at the ISP's discretion. It is necessary that TRAI takes care of the lack of a clearly identifiable and affordable commercial plan for PM-WANI PDOs, licensed for public distribution, with specific uptime commitments and regulated rates.

ISP refusal to share tower space and power, a hard barrier to wireless backhaul: In areas where fibre is absent, wireless point-to-point or point-to-multipoint radio links are the only viable backhaul option. Yet ISPs routinely refuse to share tower space, antenna mounts, or power supply at their existing infrastructure. No regulatory obligation currently compels them to do so. This refusal is a decisive barrier in precisely the geographies, hilly terrain, remote villages, peri-urban areas without fibre reach, where wireless backhaul is the only option. A willing PDO with the funds and technical knowledge to deploy a wireless link cannot proceed if there is no mounting space or power available at the nearest ISP tower.

The dilemma between supply and demand and what it means that infrastructure and literacy should go hand-in-hand: ISPs cannot put their money where there are no customers; customers will not come to being without connectivity. The experience of DEF's field interventions in community Wi-Fi sites in 56 places has proved this deadlock beyond doubt. It can be resolved only by simultaneously making investment in both building up the infrastructure and creating demand through digital literacy in the same geographical area and within the same intervention cycle. A linear approach of one after another will never work.

Deficit in awareness and idle PDO networks: Quite a number of PDOs that exist in nature – schools, market centers, libraries – may be either unaware of PM-WANI altogether, or may not understand the meaning of terms such as PDO, PDOA, and AAA. Additionally, many registered PDOs do not actually perform their intended function, giving false indications of density and causing user frustration.

Recommended Measures:

- Extend the certification of PM-WANI devices to OpenWrt-compliant core routers, including MikroTik-grade routers with sector antennas or integrated GPON OLT connectivity. With one installation, you could provide coverage for the whole lane, panchayat campus, or residential area, with a one-time setup charge and a subscription-based fee each month. It is economically revolutionary – coverage of 1-3

km from a sector antenna versus 50 metres from the user-end router, with comparable PDO subscription fees.

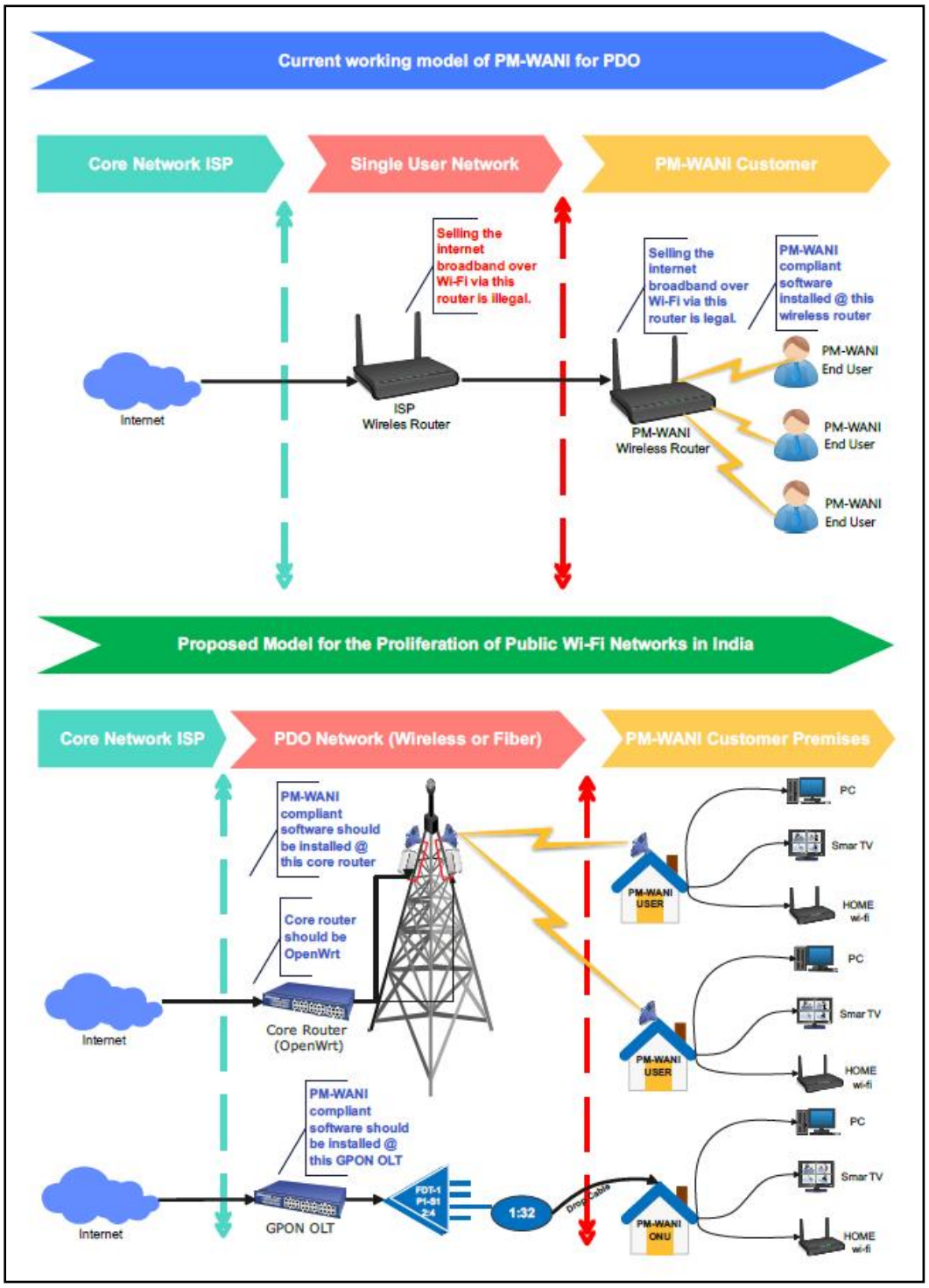

Image 1: Current and recommended model for Proliferating Public Wi-Fi Networks in India

- ISP service providers should be mandated to provide a licensed PM-WANI broadband service, with a price cap regulated, which is specifically authorized for public use. The current lack of clarity has exposed most PDOs to risk of disconnection.
- Impose a mandatory leased-line provisioning obligation on licensed ISPs: a registered PM-WANI PDO in a serviceable area must be able to obtain a leased-line connection within a defined timeframe at a regulated and lower price. ISPs should not have discretionary power to refuse backhaul provisioning to a registered PDO.
- Implement the legal mandate for tower infrastructure sharing which compels licensed ISPs/TSPs to make available rack space, antenna mounting facilities, and power connectivity to PDOs installing wireless backhaul, on regulated cost-based tariffs.
- Ensure that digital literacy initiatives and Wi-Fi installation initiatives are done in a concurrent manner in districts. These should not be done separately but together. The performance metrics for scaling PM-WANI should be based on active users and not number of PDOs.
- Develop an activation and revival programme of PDOs and track the number of functional versus total PDOs per district. This should be published quarterly.
- Undertake extensive awareness drives across languages and in simple terms explaining how to register with the PM-WANI programme.
- Mandate every trusted public infrastructure and community node as PM-WANI hotspots and PDOs (e.g., Gram Panchayats, PHCs, post offices, schools, police stations, Banking Correspondents, NGO offices, community radio stations, GI-tagged artisan clusters, SHGs, co-operatives, Haats, etc.) with first-infrastructure-readiness subsidies and unlimited unmetered bandwidth on regulated tariffs backed by mandatory BSNL/BBNL backhaul. Additionally, India's 10 lakh-plus ASHA workers should be enabled as mobile PM-WANI hotspots, carrying connectivity door-to-door to settlements no fixed access point can reach. All hardware, software, and platform technology across this ecosystem must be open - open standards, open hardware certification, and open APIs at both PDOA and PDO level - so no institution or individual is excluded by proprietary lock-in.

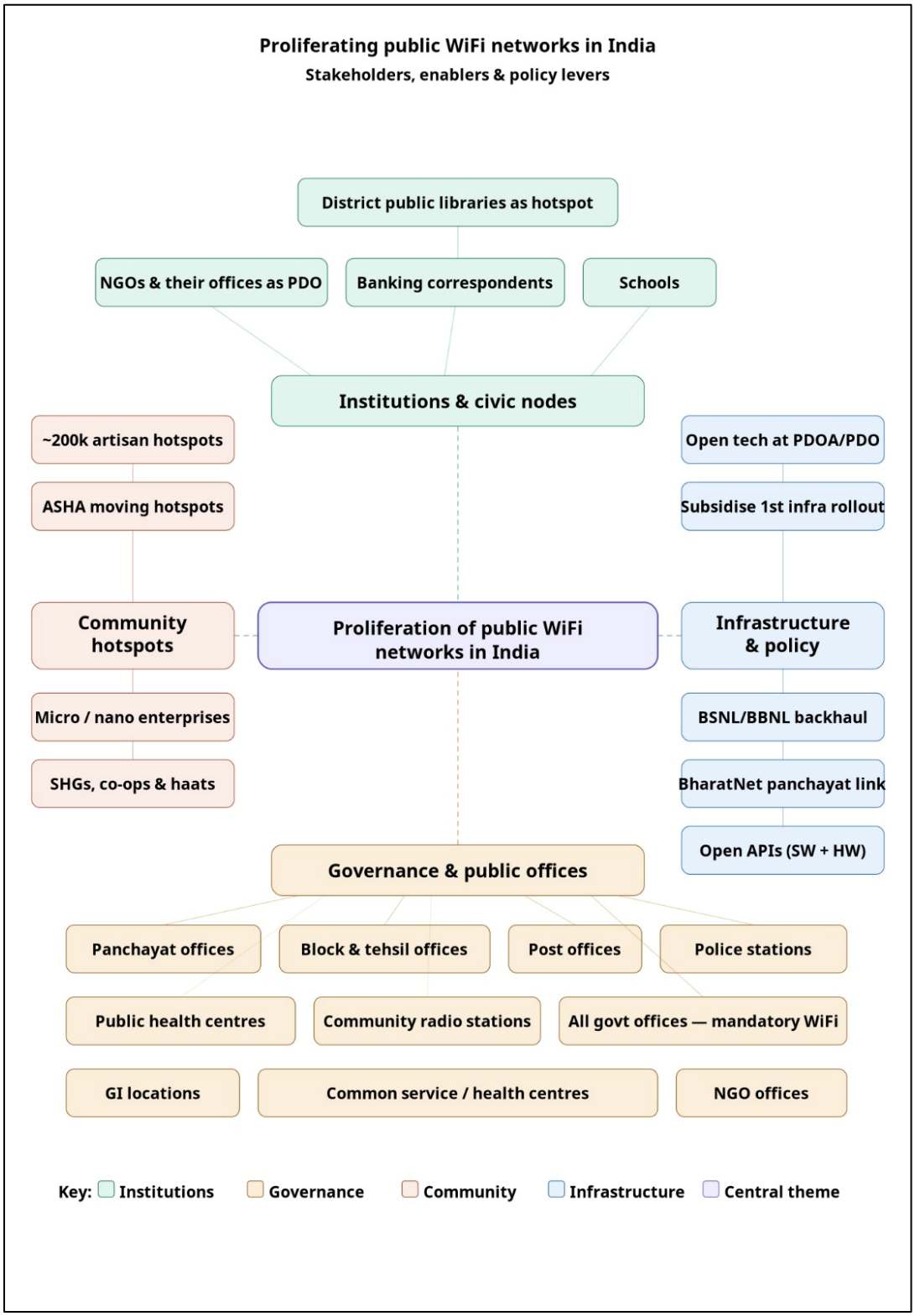

Image 2: Public and reliable ecosystem for the Proliferation of Public Wi-Fi Networks in India

Demand-Side Constraints

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?

A substantial distance separates access to infrastructure from effective use. DEF's twenty years of experience in working with rural and semi-urban communities in India shows how the presence of a WiFi hotspot does not translate into actual use if relevant support mechanisms are not put in place alongside installation.

Lack of digital literacy and lack of guidance: Many first-time Internet users in rural India have difficulty operating basic WiFi functions, navigating the portal used for signing on, or conducting an online search independently. To use PM WANI, one has to install a particular app within the given 15 minutes of using WiFi, then connect with that application, and pay a particular fee. Unless there is someone present locally to show them the way, this whole process of getting wi-fi becomes very troublesome. This failure to connect to WiFi through a public access point would create negative experiences for the exact segment of users that PM-WANI aims to reach, and the association of Internet use with failure could effectively preclude future use. Experience from DEF's own implementation of W4C projects revealed the importance of having local facilitators on hand for usage training.

Privacy and security issues of women and first time Internet users: In its community outreach campaigns, DEF's field team regularly comes across women and elderly people as well as first timers on the Internet who are not against Internet per se but are fearful of it because they fear themselves being cheated online, their private pictures being used by others, or their being blamed for accessing something unintentionally. These fears are not irrational since this happens in reality in many places due to low levels of digital literacy among people. However, these fears can be addressed.

No visible connection between Wi-Fi and everyday life: A person who has never used the internet will not spontaneously decide to connect to public Wi-Fi. Demand is created when connectivity is directly linked to something the user already needs: checking a PM-Kisan payment, registering for an Ayushman Bharat card, sending a message to a family member working in another city, or looking up the price of a crop at the nearest mandi. Every PM-

WANI hotspot that is not integrated with at least one immediately useful service for its likely user base is a deployment that will show low usage regardless of technical quality.

Gaps in ownership of devices: There is a considerable number of rural families whose household heads are either women, old-age persons, or temporary farm laborers that do not own a smart phone that can operate on Wi-Fi. The public Wi-Fi technology would be of no help to them if it is not accompanied by an aided access technology such as common-use devices in CSCs, NGOs, or Panchayats.

Recommended Measures:

- Mandate the use of PM-WANI connectivity as a link to government service delivery through UMANG, DigiLocker, e-Shram, PM-Kisan, Ayushman Bharat, and state health portals to ensure that the user derives instant value out of connecting to a government-provided Wi-Fi hotspot. This converts the concept of Wi-Fi into a usable utility.
- Mandate that all PM-WANI hotspots have a standardized safety communication at the time of logging in, to be displayed in the major local language prevalent at the place of deployment.
- Fund a Civil Society Assisted Access Programme under PM-WANI, providing block-level grants to NGOs, SHG federations, CSCs, and other community organisations to deploy trained local facilitators at PM-WANI hotspot clusters. DEF's own W4C model, where trained community members provided on-site support, demonstrated that facilitated access increases sustained usage by a significant margin compared to unassisted hotspot-only deployment.
- Align the introduction of public Wi-Fi networks to the National Digital Literacy Mission and similar state programs by considering the development of digital literacy to be an investment made alongside the installation of infrastructure, not a subsequent activity.
- Plan customized onboarding programs for women, senior citizens, and new internet users in all Wi-Fi networks mandated by the government..

PDO Sustainability, Revenue Architecture, and Participation Barriers

Q4: What changes, if any, are required in the existing PM-WANI framework to improve revenue certainty and long-term sustainability for PDOs/PDOAs?

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?

Sustainability and participation are two sides of the same problem. The structural features that make it impossible for existing PDOs to earn viable revenue are the same features that prevent potential operators from joining the ecosystem. They must be addressed together.

The roaming clientele revenue problem, why a single standard device cannot support a viable PDO: The PM-WANI model as currently structured is weighted towards transient, short-duration users: a commuter waiting at a bus stop, a patient sitting outside a PHC, a visitor browsing at a market stall. Each session generates very low revenue. The 50-60 metre coverage radius ensures that the concurrent user count at any given moment is small. After the PDOA deducts the 8% DoT revenue levy, its own platform margin, and other charges from the collected payments, the net remittance to the PDO is negligible. This is not a pricing problem, raising per-session charges will simply drive users to mobile data. It is a structural issue due to inadequate coverage areas covered per PDO. It can be solved using infrastructure such as sector antenna and GPON OLT deployments that offer services to an entire market, campus, or community by just registering one PDO which creates enough customers for sustaining revenue.

Revenue flow opacity, PDOs have no visibility into their own earnings: The PDO pays the PDOA a fixed fee upon activation (Rs. 5,000-7,000 per device) along with monthly platform costs (approximately Rs. 100/month). Every transaction of the customer flows to the PDOA bill. Taxes including 8% DoT fee, platform cost, and other expenses are deducted, after which PDO's commission is paid out. The PDO is unable to know how much is paid, what is deducted, and why. Such complete lack of transparency means that the PDO cannot validate its income and is therefore unable to plan and budget its activities. It acts as a deterrent for new businesses asking other PDOs about actual earning potentials and getting vague responses.

Legal ambiguity, the most underappreciated hurdle to PDO adoption: In the absence of PM-WANI, using one's internet connection without being an ISP would constitute an actionable offence that involved criminal culpability. If one gave access to an unknown individual through his Wi-Fi, and that individual committed a crime while on the internet, including posting a threat, accessing inappropriate material, defrauding others or something similar, there was a possibility of being arrested. It is noteworthy that these provisions were well-known and were practiced by people who had been dealing with such issues in relation to cable television operators and internet cafés for decades now. Consequently, the natural PDO providers, which are the local businesses that have established themselves in the community, have adequate power supply, space for installation, and are aware of such legal concerns, have avoided internet sharing altogether. The compliance requirement of PDOs through the platform is completely fulfilled. However, there has been no communication of this basic change in the legal status in the community. There is a majority of those PDOs who are among the most suitable potential PDOs, but they are unaware of their legal protection under the PM-WANI program. The best possible solution for expanding the number of PDOs could be creating legal awareness campaigns.

Complexity of the ecosystem and lack of dispute resolution system: The technical terms employed by PM-WANI such as PDO, PDOA, AAA, RADIUS, and OLT, are not within the comprehension of the small businesspeople whom PM-WANI intends to use. There is no dispute resolution mechanism that a PDO can employ against the PDOA for any form of disagreement regarding payments or service provision.

Recommended Changes:

- Enforce the issue of obligatory guidelines for a minimum ratio of revenue sharing between PDOAs and PDOs, and publicly publish the business terms on the PM-WANI portal.
- Compel submission of detailed revenue statements by all PDOAs to PDOs, containing details of: (a) total revenue earned from the users registered under that PDO; (b) all deductions made in form of types, Department of Telecommunications levy, platform fee, maintenance fee, and taxes; and (c) net total remitted. Non-compliance with this provision could be imposed on the PDOA under its registration rules.

- Initiate PM-WANI Legal Clarification campaign in simple local languages, stating that: (a) PM-WANI makes it entirely legal to share the internet connection; (b) each user's identity is established via OTP verification on his or her telecom registered mobile phone number; (c) all logs of user activity will be retained only by the PDOA's server while PDO retains no record whatsoever; and (d) PDO is not at any risk of criminal liability in the case of misbehaving user, if PM-WANI rules are being followed..
- Extend PM-WANI certified device inventory to OpenWrt compliant core router systems, sector antennae arrangements and GPON OLT systems, thereby allowing PDOs to offer coverage in larger geographical regions through a single registration and subscription.
- Adopt a Community Oriented Hybrid Viability Model whereby PM-WANI WiFi access services are combined with other vertical services delivery sectors such as education, tele-health services, e-governance and livelihood opportunities apart from per session coupons.
- Adopt Viability Gap Funding for PDOs working in underserved regions as per criteria laid down in the PM-WANI scheme, paid on a monthly basis depending on uptime and number of users and phased out over 3 years.
- Establish an independent grievance redressal mechanism for PDOs with authority to adjudicate disputes with PDOAs and impose remedies.
- Create a PM-WANI Operator Recognition Programme with certification tiers and branding support, giving PDO status the social and commercial recognition of a licensed business in the community.

Authentication, Authorization, and Payment Architecture

Q6: Are there improvements needed in the Authentication, Authorization, Roaming, and Payment architecture of the PM-WANI Framework?

Q22: Are users facing challenges in the authorization and authentication procedures for accessing Public Wi-Fi Networks? If yes, how can these be simplified while ensuring security and compliance?

Questions 6 and 22 pertain to the same topic, that is, the authentication architecture of PM-WANI. Both questions have been answered under a single response.

OTP-based authentication being the correct choice and reasons why the structure will fail: The OTP-based authentication architecture employed in the design of PM-WANI is very elegant. Traditionally, connections by ISPs involved the Customer Acquisition Form that needed physical proof such as document, photograph, address proof, and identification proof for every user. However, PM-WANI has replaced the need for this with the use of the KYC database that telecom operators maintain for mobile phone users. Whenever the user authenticates himself using OTP in his registered mobile phone, he validates his identity using telecom operator's records.

The system breaks down, however, in a certain and consistent manner: In places where there is bad or nonexistent mobile network coverage. Such locations are not an exception. Places that are likely to have bad mobile network coverage are rural or mountainous regions, which is where the system is targeted to begin with. While the user is already at a functional hotspot, with its power supply active, the backhaul connection working, and the server available via PDOA, the user’s device doesn’t receive the OTP due to lack of cellular network coverage. The user can’t go any further. The experience of attempting to connect to an internet access point but failing to do so will make users skeptical about all forms of Wi-Fi going forward.

Recommended Improvements:

- Develop a continuous device level identity: after the initial registration, each subsequent access to any PM-WANI point will allow the creation of an identity for the user's device which will work across the entire network across the country, ensuring no further reliance on OTPs.
- Allow assisted registration under notified areas of low signal: in such regions, the PDO, being a certified entity, guarantees the user's KYC credentials in order to establish the session, which gets logged immediately on PDOA's server without compromising the compliance framework but removing signal dependence.

- Adopt a one time registration approach using either DigiLocker or Aadhaar based eKYC, ensuring identities that are permanent and never have to be re-established in any session or location.
- Align PM-WANI with Passpoint (Hotspot 2.0), allowing for a frictionless identity-based access to any certified PM-WANI hotspot without going through the login portal for returning users.
- Make UPI as the compulsory standardized payment process, thereby negating the requirement for different payment platforms for PDOAs, allowing micro-payments with one simple tap.
- Make it mandatory for all PM-WANI authentication platforms to be available in at least eight scheduled Indian languages, keeping in mind low literacy rate interfaces and minimalistic user actions.
- Set up standards for a maximum time allowed for login on the portal, targeting less than 30 seconds from establishing physical connection till being able to browse effectively.
- Maintain simpler OTP fallbacks for authentication purposes in the case that some users lack smartphones and electronic identification cards..

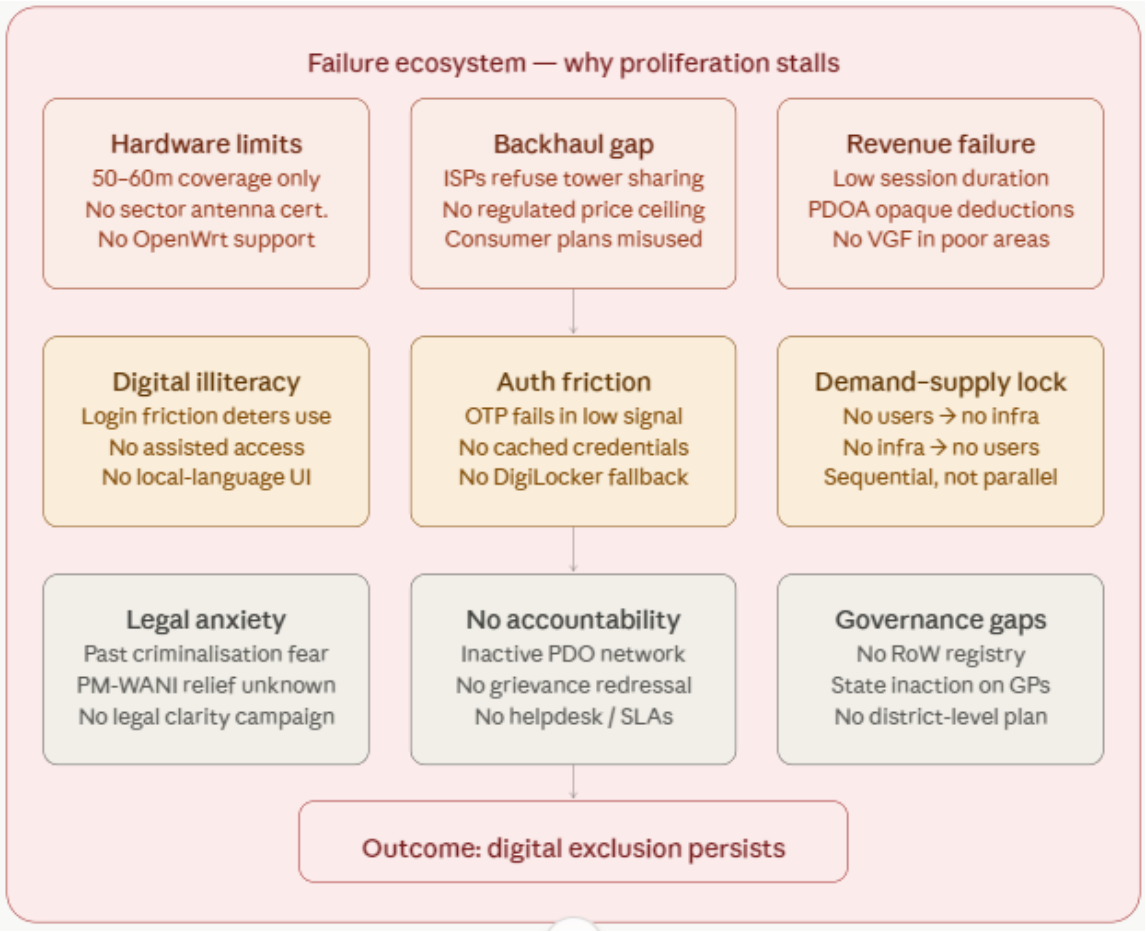

Image 3: Failure Ecosystem: Why Public Wi-Fi Proliferation Stalls

Government Deployment Model and Geographic Strategy

Q7: Which model is more appropriate: (a) Government actively ensures hotspot deployment through direct funding and implementation, or (b) Government primarily ensures backhaul availability and intervenes only in cases of market failure?

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.

Q7 and Q8 are addressed together because the answer to the deployment model question (Q7) is the rural-urban strategy (Q8): the correct model depends entirely on geography and market

structure. The binary framing of Q7, direct government deployment vs. backhaul-only intervention, misses the essential point that India is not a uniform market.

In rural and underserved geographies, Model (a) is not only appropriate but necessary: In a district where the nearest ISP has no commercial interest in deploying last-mile infrastructure, where purchasing power is low, and where there is no existing ecosystem of technically literate PDO operators, waiting for market signals will mean waiting indefinitely. Government must deploy directly, mandating public institution activation, funding backhaul extension, and engaging civil society organisations as on-ground implementation partners. DEF's W4C programme demonstrated that community-owned, community-managed networks in such geographies can achieve sustainable operational models, but only when the initial infrastructure investment is publicly funded and the implementation is community-embedded.

For semi-urban or commercially attractive geography, a hybrid approach will suffice, whereby if there is a commercial intention but coordination issues limit rollout plans, fragmented RoW clearing, high backhaul costs to achieve wholesale access, no PDO recruitment and training, the government should intervene to facilitate and create the necessary environment, including provision of wholesale access tariffs and subsidized early viability.

In urban high-footfall locations, Model (b) fits the bill: High footfall urban locations have proven viable for public Wi-Fi services. The government's role in this regard will be that of a regulator: Mandating deployment at selected public locations, quality-of-service standards, open access, and incentive measures in the form of licence fee rebates and spectrum credits.

Differentiated Strategy Recommendations:

- Rural: Utilization of the government resources through the utilization of compulsory participation of public institutions (office of the Gram Panchayat, PHCs, post office, ration shops, and schools). Backhaul by subsidized BSNL. Collaboration of civil society and government in activating demand, recruitment of PDOs, and digital literacy. Dual funding for digital literacy and connectivity utilization through one cycle of the program.

- Semi-Urban: Deployment via public institution involvement coupled with subsidised commercial involvement of private institutions as PDOs. Viability gap financing of backhaul. Facilitation through district administration and civil society in block level.
- Urban: Deployment based on market principles with incentives for telecom companies to set up Wi-Fi (licence fee waivers, spectrum credits). Mandatory free Wi-Fi at defined high traffic public places. Subsidised Wi-Fi deployment in low income wards and areas where migrants live.
- In all geographies: Availability of the open internet, guaranteed uptime and independent quality-of-service audit as a must for any government-supported or government-enabled Wi-Fi deployment scheme.

High-Footfall Areas: Outdoor and Indoor

Q9: What measures can be taken to improve the deployment and uptake of Public Wi-Fi networks in high-footfall areas for outdoor and indoor scenarios?

Outdoor (bus stops, transit points, markets, tourist sites):

- Free basic Wi-Fi to be provided with a minimum speed of 5 Mbps and a minimum usage period of 30 minutes for every use in state/national highways bus stations, parks that have a population of 1 lakh and above, and tourist spots
- Require Wi-Fi deployment to be included in Smart City Mission and AMRUT infrastructure plans as a binding deliverable with independently monitored outcomes, not an optional feature.
- Require local bodies to designate public street furniture, streetlights, shelter canopies, market kiosks, as Wi-Fi installation points with standardised power tapping access.
- Ensure that all outdoor Wi-Fi installations provide information in multiple languages and digital safety instructions in the dominant language spoken locally.

Indoor (airports, railway stations, government institutions, hospitals):

- Make the provision of free Wi-Fi in all government hospitals (both secondary and tertiary), institutions under AIIMS, and all government-owned universities and colleges mandatory in a phased manner over a period of three years.
- Make quality-of-service metrics, which should be independently monitored and reported publicly, obligatory for all airports and major railway stations. There would be penal consequences for repeated violations.
- Extend guidelines of the In-Building Solution (IBS) to make Wi-Fi provision necessary in all new constructions above a certain gross floor area requirement.
- Ensure that provision of Wi-Fi by all government organizations is linked with services provided through UMANG portal and other government portals.

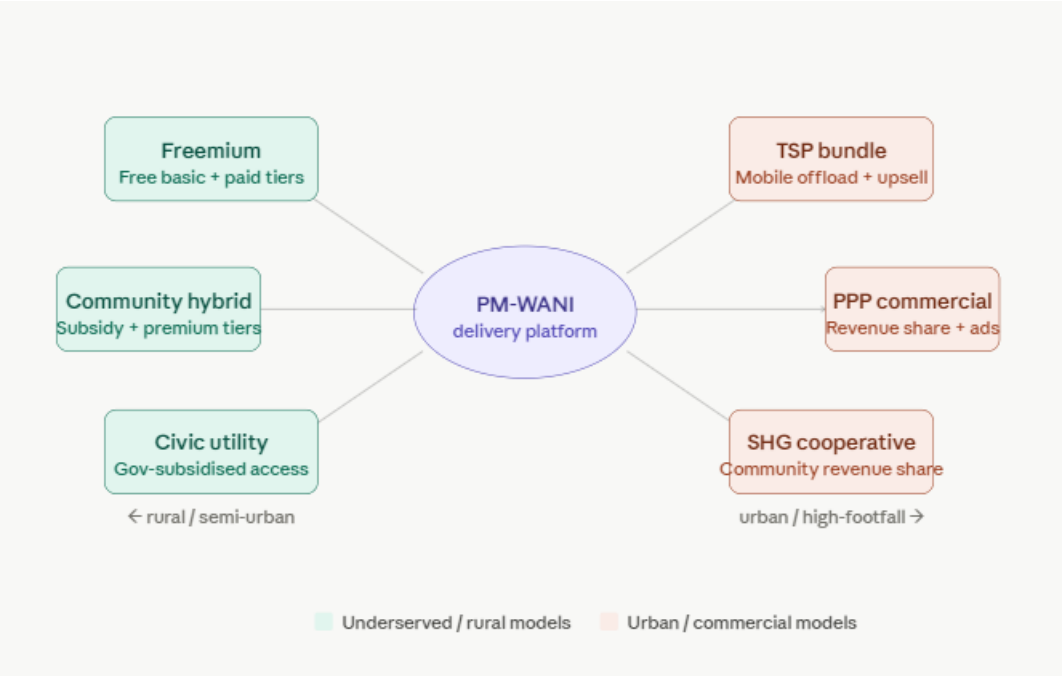

Image 4: PM-WANI Delivery Platform, Monetisation Models

Chapters B and C: Government Funding and Backhaul Provisioning

Funding Mechanisms and Allocation Criteria

Q10: Which funding mechanisms would be most suitable for India? Should a uniform or differentiated funding mechanism be adopted?

Q11: What criteria should govern the allocation and disbursement of funds across rural, urban, and high-footfall areas, respectively?

Uniform subsidy mechanisms will always miss the mark on the contexts that require subsidy, while subsidising those that do not need it. According to DEF, mechanisms should be context-specific based on geography, market structure, and demonstrable equity outcomes.

In rural and underserved areas: Capital support for hotspot infrastructure and backhaul installation using Digital Bharat Fund (DBN). NGOs need to be considered potential beneficiaries along with private operators. Operational subsidy contingent upon proving uptime and subscriber numbers, with phased reduction over a period of three years towards sustainability. Focus on districts with below-average fixed broadband subscribers per 100 persons, large share of SC/ST and women, and lower levels of internet penetration.

Semi-urban: Viability Gap Funding (VGF) for PDOs in below-cost scenarios provided in phased payments linked to uptime, subscriber numbers, and data usage. Backhaul subsidies via access to BSNL and/or State-owned fibre networks, conditional on having a viable last mile backhaul network and capacity amongst local operators.

Urban: Regulatory incentives, reduction of license fees, spectrum credits, for TSPs and ISPs rolling out and managing public Wi-Fi according to certain quality and open-access benchmarks. Disbursements for roll-out into lower income urban zones, resettlement colonies, and areas with a high density of migrants. Wi-Fi as an obligatory component in Smart Cities and AMRUT project budgets.

High-footfall: PPP framework where venue managers and operators share costs with the government. Quality-of-service benchmarks as conditions for any public subsidy or co-funding.

Project delivery (all categories): Performance-based disbursements with the first disbursement after roll-out and subsequent disbursements contingent upon uptime, activity, and adherence to open internet policies. Third-party audit of quality of roll-out and publication at district level. Civil society monitors to be mandatory partners for all publicly-funded initiatives. All publicly-funded roll-outs to comply with open internet standards, no walled gardens, no platform specific access, no discriminatory pricing.

Last-Mile Backhaul: The Binding Constraint and the Case for Public Funding

Q12: Is the lack of adequate and reliable last-mile connectivity a critical constraint for Public Wi-Fi proliferation? If yes, what specific measures may be considered?

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?

To both questions: yes. These questions address two aspects of the same problem and are answered together.

DEF's field teams have documented the same failure pattern across hundreds of rural deployments: Wi-Fi equipment is installed, powered, and technically functional, but the hotspot delivers no usable connectivity because the backhaul connection feeding it is absent, unreliable, or priced above what a PDO can sustain. No commercial operator will invest in last-mile backhaul in a geography with low revenue potential and high infrastructure cost. Government funding is not a policy choice in such geographies, it is the only viable option.

Tiered funding approach:

- Rural and unserved areas: Complete capital subsidy for last mile backhaul infrastructure using DBN, with preference to BSNL and BBNL as implementing agencies. Operational subsidy falling in 3 years as revenue models for PDOs become more evolved. BSNL needs to be instructed to develop a standardized wholesale

backhaul service exclusively for PM-WANI PDOs at a government approved tariff cap.

- Semi-urban (partially served): Viability gap funding for backhaul provisioning where commercial solutions exist but are not economically viable for PM-WANI PDOs. Competitive tendering with preference for local operators. Subsidised access to BSNL or state-owned fibre networks.
- Urban areas high footfall: Direct public investment for backhaul not required. Wholly mandatory wholesale access and ROW provision by municipalities to ensure commercial viability of backhaul infrastructure installation.

Specific measures:

- Accelerate BharatNet last mile extension in all Gram Panchayat locations with a completion deadline that is publicly monitored along with utilization figures for dark fiber.
- Require mapping of district level backhaul infrastructure, showing fiber coverage, wireless coverage, and coverage gaps with plans for extensions at the state level with dedicated budgets.
- In geographies where terrestrial backhaul is economically unviable in the short term, enable and subsidise SATCOM-based backhaul options for PM-WANI PDOs with defined minimum service levels.
- All funded backhaul infrastructure must be open-access, available on non-discriminatory terms to any licensed PM-WANI PDO or PDOA, to prevent public investment from generating private monopoly outcomes.

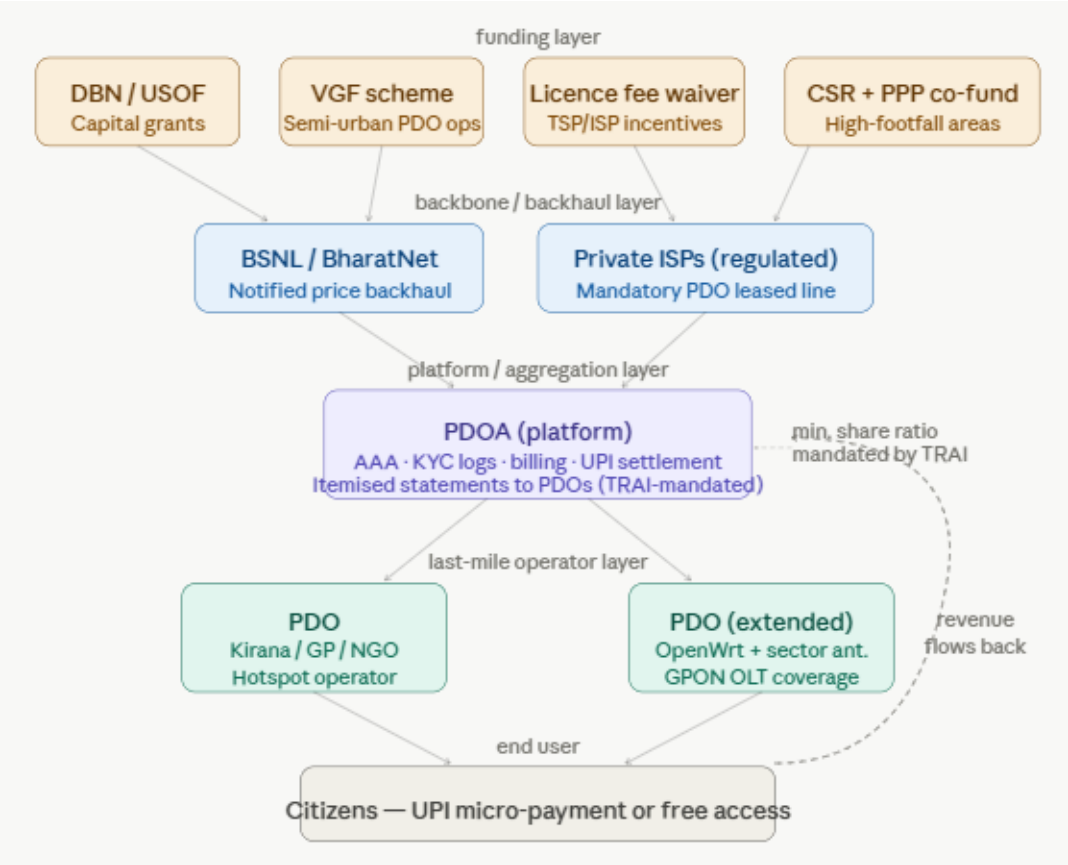

Image 5: PM-WANI Architecture: Full Stack

Chapter D: Facilitative Role of States and Local Bodies

Right-of-Way Challenges

Q14: Are there any RoW challenges faced by service providers in accessing public places or street furniture to install Public Wi-Fi hotspots?

Wi-Fi installation is constrained by RoW-related time and cost factors, which are both well-known and persistent barriers to Wi-Fi deployment. In particular, small PDOs face difficulties negotiating the municipality because of a lack of leverage.

Challenges involved: There is no standard municipal register available that has all the required data on public infrastructure (including lamp posts, bus shelters, and facades of buildings) to allow for installing Wi-Fi in those places. Small-scale installation projects cannot benefit from any form of deemed approval process. There are ad hoc fee structures applicable in order to gain access to street furniture. Lack of coordination between power distribution companies and municipalities.

Recommendations:

- Mandate that all municipal organizations exceeding a certain minimum population threshold shall be required to maintain a register of the street furniture and infrastructure available for the installation of Wi-Fi, at standardized rates and with fast-tracking within a period of seven working days.
- The Indian Telegraph Right-of-Way Rules 2016 shall need to be amended to include Wi-Fi access points installed on public infrastructure. There will have to be deemed approval procedures for Wi-Fi installations below the threshold requirement.
- Require electricity distribution companies to provide standardised power tapping arrangements at designated Wi-Fi locations within defined timelines and at regulated costs.

State Government, Fiberisation Incentives, and Local Body Roles

Q15: What facilitative roles can State Governments play in accelerating Public Wi-Fi deployment? Should States deploy Wi-Fi at municipal and gram panchayat level?

Q16: What measures can incentivise States/municipalities to undertake city- and town-level fiberisation?

Q17: What facilitative roles can local bodies play in accelerating the deployment and sustainable operation of Public Wi-Fi networks?

All these three questions have been considered in conjunction because all the three are components of one implementation level, which is the sub-national institutional framework and plays a decisive role in translating national PM-WANI policy into practice.

State government actions (Q15):

- Make mandatory designation of all Gram Panchayats as hubs for PM-WANI possible through government directives of the state government to be achieved within one year using funds from state Finance Commission allocations or from MGNREGS infrastructure, to be monitored district-wise.
- Establish State Wi-Fi Mission similar to Kerala KFON or Andhra Pradesh APSFL with a nodal agency, district-wise implementation plan, and access to performance website.
- Make public Wi-Fi provision a budget line in digital infrastructure rather than being part of a scheme.
- Utilise the state's government building structures at block/sub-district levels to establish the hotspots, allowing both official government usage as well as community public usage via the same infrastructure.
- Allocate funding for activating CSO demand, hiring PDOs and supporting digital literacy by the state rural development/IT department, as an institutional annual allocation.

Fiberisation incentives (Q16):

- Give Centre to State performance grants for fibreisation targets that are quantifiable; Gram Panchayats with fibre connection, urban wards with at least one fibre PoP; delivered through SASCI or Digital Infrastructure Fund.
- Integrate mandatory fibre duct-laying obligations into all new state and municipal road construction and repair works, requiring a 'dig-once' approach with standardised duct specifications.
- Require that all state-funded fibre infrastructure, including KFON-type models, is available to PM-WANI PDOs and ISPs on non-discriminatory, open-access terms.
- Give tax refunds to local bodies who fulfill certain fiberization goals in given time periods. Link the local fiberization strategy with performance of Smart City Mission & AMRUT projects.

Local body roles (Q17):

- As per their power of enforcement, the Panchayats and Urban Local Bodies should make the office of Panchayat, CSC, and school premises as compulsory points of PM-WANI services with proper availability of electricity and security provisions.
- Local bodies should undertake personal communication campaigns to persuade local shop owners, SHG members, and entrepreneurs to become PM-WANI PDOs through assistance from government officials at block level and CSOs.
- The Panchayats and ULBs should themselves utilize the services of Wi-Fi to deliver their services, call meetings, accept payments, and fill up grievances forms through Wi-Fi facilities.
- The local bodies should be provided with easy-to-use monitoring dashboards to record information about the uptime of Wi-Fi, number of users availing services, and any problems faced by the users.
- The Anganwadi centres, health sub-centres, and ASHAs should all be made as PM-WANI access points.

Chapter E: Incentivising Service Providers

Incentivising TSPs, ISPs, and Backhaul Provisioning

Q18: What regulatory or policy incentives, schemes or programs are required to promote active participation of TSPs and ISPs in Public Wi-Fi deployment?

Q19: What regulatory or fiscal incentives, schemes or programs may be required in the provisioning of bandwidth and backhaul for Public Wi-Fi networks?

TSP/ISP participation incentives and backhaul provisioning incentives are two aspects of the same policy challenge: making it commercially and operationally attractive for licensed network operators to serve the public Wi-Fi ecosystem without creating new forms of market concentration. They are addressed together.

A key criterion that will apply to all the incentives discussed here is that they have to encourage openness and non-discrimination. Incentives based on blocking access to the Internet, giving preference to certain platforms, or differential pricing must not be considered.

Incentives for deployment participation (Q18):

- Reduced licence fees: reduction of annual license fee liabilities for TSPs and ISPs which set up Wi-Fi hot spots satisfying independent quality, availability and open access requirements.
- Spectrum assignment benefits: allow certified public Wi-Fi deployments in rural service areas to count towards spectrum utilisation obligations, reducing the cost of spectrum holdings for operators who invest in public access.
- Priority leasing of fiber owned by the government: give ISPs participating in the program priority rights to lease fiber from BharatNet and government-owned fiber for Wi-Fi backhaul, with no exclusivity.
- Mandatory open access for wholesale bandwidth: ensure that any TSPs or ISPs who have a substantial share of the market provide regulated wholesale bandwidth to PM-WANI PDOs at non-discriminatory tariffs.
- CSR credit linkage: allow public Wi-Fi deployment in underserved areas to qualify under Schedule VII of the Companies Act for CSR credit, making it attractive for corporate ISPs to cross-subsidise rural deployments from urban revenues.

Incentives for backhaul provisioning (Q19):

- Have a TRAI-mandated price cap regulation for backhaul costs in case of PM-WANI PDOs, where low cost backhaul will be a regulated right rather than a market-based activity of ISPs.
- Require BSNL to provide PM-WANI Backhaul Services with a government notified price cap per month, available on an open access basis for any registered PDO.
- Capital subsidy for backhaul infrastructure in rural areas through USOF/Digital Bharat Nidhi, with a ring-fenced annual allocation specifically for PM-WANI backhaul.
- Tax incentives, investment-linked deductions or accelerated depreciation, for private investment in backhaul infrastructure in declared underserved areas.
- Mandatory leased-line provisioning obligation: if a registered PM-WANI PDO in a licensed service area requests a leased-line connection, the licensed ISP must provide it within a defined timeframe at a regulated price ceiling. ISPs should not have discretionary power to refuse a registered PDO. This obligation should be enforceable by TRAI through ISP licence conditions.
- Mandatory Infrastructure Sharing for Towers: Compel all licensed ISP and TSP operators to share their tower facilities by providing rack space, antenna mounting points, and power supply for the PM-WANI PDOs using wireless backhaul services at tariff-based costs.
- Approve and subsidise GPON OLT and sector antenna configurations for PM-WANI PDOs. Equipment grants or duty waivers for GPON OLT and sector antenna procurement should be provided to registered PDOs deploying area-wide coverage architectures.
- Get hardware compatibility certification for OpenWrt routers such as MikroTik router class, to be compliant with PM-WANI regulations. The cost of this type of hardware is far less than that of proprietary certified routers; they can also be upgraded without replacing any hardware since upgrading can be done using software updates.

Chapter F: Incentivising Private Entities

Commercial Establishments, Community Institutions, and System Integrators

Q20: What measures can be adopted to incentivise private enterprises, commercial establishments, shop owners, community institutions, etc., to install Public Wi-Fi hotspots?

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?

Incentivising commercial establishments and community institutions (Q20):

Kirana store owners, tea stall operators, pharmacists, barbers, and local market vendors are the most natural PDO base for PM-WANI at the last mile. They have existing community presence, electricity, physical space, and customer footfall. The barriers to their participation are not motivation, it is legal anxiety (addressed in Q4/Q5), unfavourable economics (the 50-60 metre coverage and revenue problem), and lack of awareness and support.

- Grants for one-time acquisition of equipment to pay for a Wi-Fi router and installation fees for PDOs registered under PM-WANI program operating in underserved areas, provided by nodal agencies set up by the state governments in collaboration with district administration.
- Bandwidth subsidy for three years for PDOs having poor revenues, based on their performance and reducing each year.
- Simplified GST composition scheme for PDOs operating under the PM-WANI program.
- A visible, standardised PM-WANI Operator Certification issued to all active PDOs, functioning as a quality and authenticity mark that increases customer trust and commercial footfall for the hosting establishment.
- Partnerships between PDOs and libraries, SHGs, cooperatives, churches, and community-based organizations without any commercial motives for PDO setup at community centers, where all equipment installation and backhauling are provided in exchange for access.

On system integrators (Q21):

System Integrators play an important part where technical challenges and multiple vendors are involved, specifically in urban institutional environments and rural clusters sponsored by the government. The issue raised by DEF is not against System Integrators per se but with the possibility of using such a model to exercise monopoly control over the deployed infrastructure.

- System integrator roles must be limited to technical coordination and project management. Integrators must not acquire exclusive aggregator or operator rights over the infrastructure they deploy.
- All government-funded system integrator contracts must include open-access clauses ensuring that deployed infrastructure is available to multiple licensed PDOAs and PDOs on non-discriminatory terms.
- Civil society organisations having the proven track record of last mile implementation capability must be officially recognized as system integrators, apart from technology companies alone. The W4C program of DEF is nothing but this example.
- Technical specification standards must be made by TRAI for all PM-WANI deployments which must be satisfied by any official integrator, including equipment standards, security considerations, uptime considerations, and open internet considerations..

Chapter G: Technical Architecture, Authentication, and Interoperability

Centralised Authentication and Payment Platform

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?

DEF believes that the centralisation of an authentications and payments gateway in PM-WANI will be supported by certain governance caveats. A centralized system is capable of eradicating duplicated registration, roaming, and creating homogeneity among user experience. At no cost should the centralized system become the sole point of data collection, commercial exploitation, or exclusivity.

- A government-managed or government-supervised independent body should maintain the centralised authentication registry, compatible with DigiLocker and UPI, as the backbone of PM-WANI user authentication.
- The platform should follow an open-API model where mandatory interoperability is required for all certified PDOAs. There shouldn't be any form of locking in that would hinder a newly-certified PDOA from becoming integrated into the central registry system.
- UPI integration for payment processing must be mandatory and standardised across all PDOAs, the current fragmentation of payment portals adds unnecessary friction for users and operators alike.
- Privacy by design: the central platform should hold only the minimum necessary data, device token and authentication credential, with no commercial profiling of user behaviour and no retention beyond operational necessity.
- An independent regulatory agency, comprising members from TRAI, DoT, the civil society, and an appointed ombudsman for the consumer/user, will govern the activities of this platform.

- C-DOT is the most appropriate entity for initial development and management, given its public mandate, technical capability, and existing involvement in PM-WANI's technical architecture.

Interoperability and Seamless Roaming

Q24: What steps are required to achieve interoperability and seamless roaming among Public Wi-Fi networks? Should inter-hotspot roaming be made mandatory, and should a 'super-aggregator' be introduced?

Seamless roaming is essential for PM-WANI to qualify as a true broadband alternative and not just a collection of isolated services at each location. An authorized user having to rekey their log-in credentials or generate a new OTP with every switch in network would revert to using mobile data connectivity.

- Mandate technical interoperability across all certified PM-WANI PDOAs through a standardised roaming protocol, so that a user registered on one PDOA's network is automatically authenticated on any other PDOA's PM-WANI network.
- Adopt OpenRoaming or an equivalent technically sound open federation framework for the roaming protocol of PM-WANI, aligning India's public Wi-Fi system with the international trend towards carrier Wi-Fi federation.
- Dismiss the super-aggregator concept, whereby one new monopoly is created to serve as the aggregator of all roaming done through PDOA, essentially repeating the same market concentration issues that PDOA sought to prevent. Rather, mandate federated interconnectivity standards that allow for multiple PDOAs to interconnect.
- Govern revenue settlement for roaming sessions through TRAI-published guidelines, preventing the roaming architecture from becoming a mechanism for dominant PDOAs to extract rents from smaller ones.
- Publish a phased interoperability roadmap with TRAI-mandated implementation deadlines for all existing PDOAs, with monitoring and public reporting.

Chapter H: Monetisation and Sustainability

Monetisation Models

Q25: What monetisation models are most appropriate for rural, urban, and high-footfall locations, respectively?

DEF's consistent view on sustainability is that it should never come at the expense of openness. Any monetisation strategy which limits access to certain platforms, charges higher rates based on content and application type, or builds a wall around services is not acceptable because it will defeat the development purpose of having public Wi-Fi and the rights of users who have no other choice.

Rural and underserved areas:

- Hybrid Business Model Based on the Community: Basic access offered through subsidy from the Government (DBN or State budget) with potential for premium subscriptions based on cost through higher data usage or session duration. All income shared among the infrastructure fund, PDOA, and PDO.
- Access bundled with services: provision of connectivity subsidized or even free as part of government's integration with their service delivery portal, essentially the government subsidizing connectivity from the savings made through efficiencies in service delivery..
- Community cooperative operator model: PDOs structured as member-owned cooperatives, where revenue is pooled and shared among community members who collectively operate and maintain the network. This model, directly drawn from DEF's W4C experience, generates both financial sustainability and community ownership of the infrastructure.

Urban and semi-urban areas:

- Freemium model: Provide free services for basic needs (minimum 100 MB per session or 30 minutes per session), with an option to provide premium services with

faster speed and/or more storage space. Good fit for airports, public parks, and governmental organizations.

- Public service advertisement-supported access: free connectivity in exchange for opt-in display of government public service announcements and civic information at login. Strictly limited to public interest content, commercial advertising on publicly subsidised infrastructure would be inappropriate.
- Plans with bundled TSP services: plans with the availability of public Wi-Fi bundled with TSP subscription plans, thereby enabling TSPs to earn revenue via offloading traffic and offering subscription upgrades to their users.

High-footfall commercial locations:

- PPP revenue share model: revenue from user fees and anonymous analytics aggregation that is divided among the venue owner, operator, and infrastructure supplier on the basis of terms openly stated.
- Premium access model: paying for access based on time and/or volume is acceptable for airport venues and high-value transit stations provided minimum service quality and public access criteria are met.

Additional Comments and Observations

Q26: Please provide any additional comments, observations, or suggestions related to the proliferation of Public Wi-Fi in the country.

1. Measure outcomes, not deployment numbers.

India's public Wi-Fi discourse has been dominated by a single metric: the number of hotspots deployed or registered. This is an output metric. It measures nothing about whether any user was actually served. DEF recommends that TRAI mandate a Public Wi-Fi Outcome Index tracking: (a) proportion of registered hotspots that are functional and actively used in each reporting period; (b) demographic profile of users, proportion who are women, elderly, first-time internet users; (c) use cases being served, government services, education, health, livelihoods; and (d) geographic equity, proportion of deployed hotspots in rural and underserved areas versus urban and commercially viable areas. Without this index, public investment will continue to be optimised for deployment numbers at the expense of inclusion outcomes.

2. Civil society is essential infrastructure, not a peripheral stakeholder.

The gap between a functioning Wi-Fi hotspot and a first-time rural user who is actually online and doing something useful is bridged almost entirely by civil society. In DEF's W4C deployments, sites with trained community facilitators, local youth who had been through a structured digital literacy programme and were available on-site to guide users, showed sustained usage rates that were multiples of comparable unassisted deployments. When facilitators were withdrawn due to funding gaps, usage fell sharply within weeks. A facilitator is no longer an option but is the last mile. DEF proposes the development of a new Civil Society Implementation Partner category for the PM-WANI scheme, including eligibility criteria, funding arrangements, monitoring of performance every quarter, etc. Organisations like DEF, with proven credentials in implementation of the last mile, need to be formally acknowledged in the system.

3. The open internet is the foundation.

As DEF has argued consistently since its first TRAI submission in 2014-15, the internet must remain an open platform where users have unrestricted access to lawful content. This principle is not a technicality. For a first-time rural user accessing a public hotspot, it is the difference between entering the full internet and entering a curated subset of it that serves the commercial interests of a platform partner. If any such arrangement that does not hold true to this guiding principle is made, either in the form of zero rating, platform exclusivity, content blocking, or application-specific pricing, such an attempt must be resisted. This is where TRAI needs to step up its game while developing the policies for Public WiFi.

DEF continues to be committed to aiding TRAI in its processes, and in helping create a public WiFi model which is just, transparent, and based on the reality faced by India's most marginalized sections. DEF can even help present practical examples, through PM-WANI hotspots in DEF centre clusters.

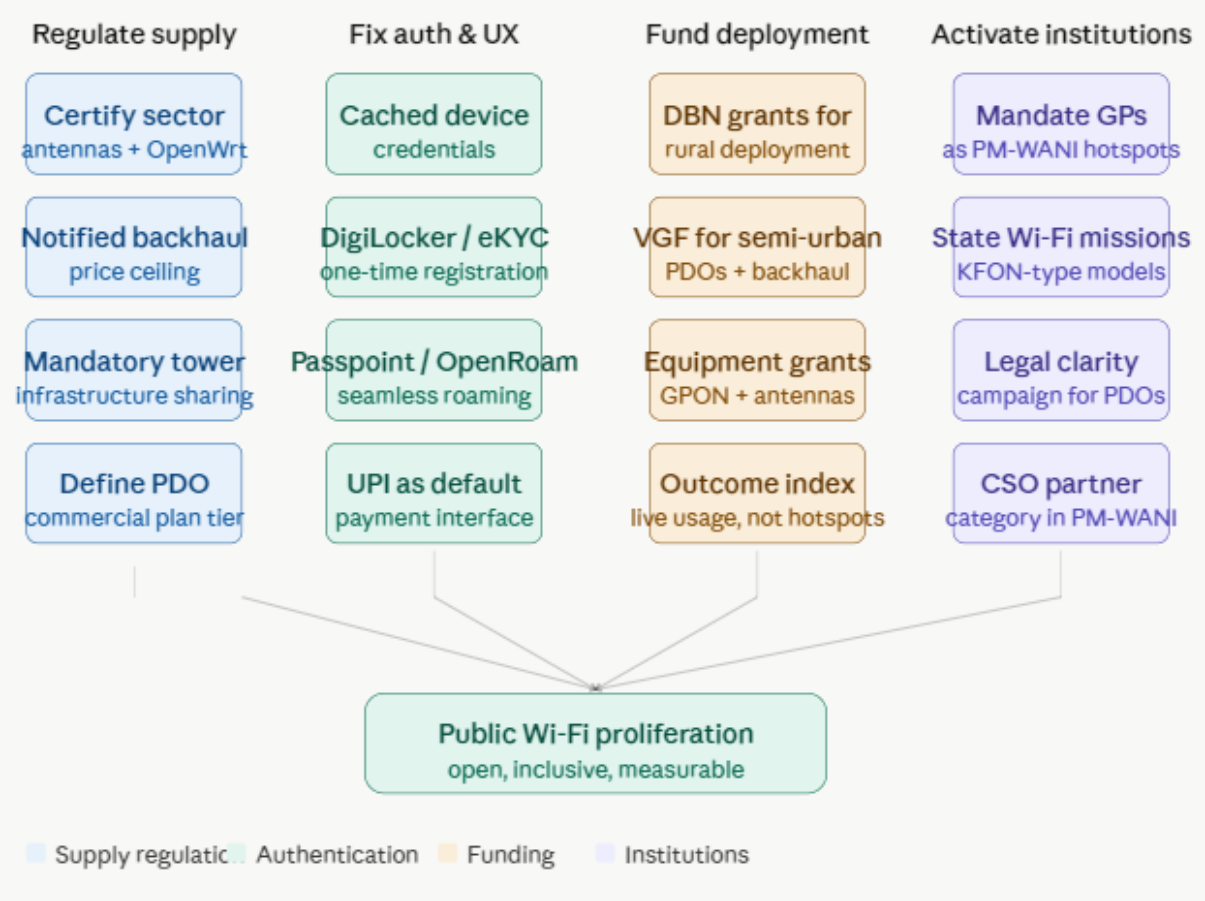

Image 6: Policy Action Framework: Four Pillars

About Digital Empowerment Foundation

The Digital Empowerment Foundation (DEF), founded in 2002, works to bridge the digital divide by empowering marginalised communities, especially in rural areas, with access to critical information, digital tools, and community-led infrastructure. Recognising that lack of access leads to exclusion, DEF has developed hyperlocal models of digital empowerment led by local women social entrepreneurs, called SoochnaPreneurs, who are equipped with digital skills and infrastructure to serve village-level communities.

Through more than 2,500 SoochnaPreneurs across 29 states and 250+ districts, DEF has reached over 10,000 villages and served 40 million people. Its work enables communities to access rights, health services, jobs, financial opportunities, and business support through empathetic, locally trusted, and community-driven models.

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