02nd September 2026

Shri Tejpal Singh ji,
Advisor (QoS-I),
The Telecom Regulatory Authority of India (TRAI),
New Delhi
India.

Subject: Draft Amendments in 'The Standards of Quality of Service of Access (Wireline and Wireless) and Broadband (Wireline and Wireless) Service Regulations, 2024' - Response

Ref: Consultation Paper dated 5th August 2026

Dear Sir,

In reference to the captioned draft amendment to the Quality of Service (QoS) Regulation, 2024; issued for stakeholder consultation, we hereby enclose our inputs, as Practitioners of economic regulation, regulatory compliance, competition analysis and public policy.

We hope our submission will provide some useful perspective on this important consumer-protection matter, that closely intersects with impact on networks and services.

We again thank the Authority for providing this opportunity for commenting on this Paper, and remain available should it require any further inputs in regards to our submission.

Best regards,

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Response to TRAI's
***Draft* 'The Standards of Quality of Service of Access (Wireline and Wireless) and Broadband (Wireline and Wireless) Service Regulations, 2024'**

Respondents – Mithlesh Vikal & Saurabh Malhotra; Practitioners

Executive Summary:

We appreciate the Telecom Regulatory Authority of India (TRAI) for providing an opportunity to submit comments on the proposed amendments to the Quality of Service (QoS) framework. The TRAI's continued efforts towards consumer protection to strengthen the quality, reliability, transparency and resilience of telecom networks, while ensuring that the regulatory framework remains proportionate, technology-neutral and conducive to sustained investment; are noteworthy.

India's digital ecosystem has reached an inflection point where Quality of Service is no longer a simple operational Service Level Agreement (SLA)—it is cornerstone of national economic resilience, digital trust, and healthy market competition. Aligning TRAI's draft QoS amendment regulations with international benchmarks requires a holistic framework bridging regulatory mandates, operator capabilities, and protection of consumer rights.

In this response, our overall position is supportive of many of TRAI's proposals but conditional as well. We support the objectives of the proposed amendments while recommending calibrated implementation where necessary, need for clear measurement methodologies, appropriate assessment periods, recognition of network and geographic realities, and safeguards against unintended consumer harm or investment impacts.

We are aligned with TRAI's objectives of consumer protection and transparency, allowing growth of technological innovation and sector resilience, particularly as India moves into an increasingly 5G-led environment. The present exercise is also an opportunity to improve transparency, network resilience and restoration while establishing proportionate rules for new technologies and service models.

We urge TRAI to align the new framework with the triad of ***Affordability, Competition and Sustainability i.e. A.C.S.***, as its present draft amendment intersects each of these.

- **Affordability**: Ensuring that telecom consumers do not face degradation or discrimination in services for the price of service, nor should regulatory compliance costs trigger tariff increase that exclude low-income users.

- **Competition**: Maintain a dynamic market where both, incumbent players (MNOs, VNOs, other authorised entities) and the new entrants can innovate, deploy technology and services efficiently, and scale it while preserving the competitive process, and consumers retain the choice to opt what serves them best.

- **Sustainability**: Safeguarding long-term capital expenditure (Capex) capacity to allow for continued investments in nationwide fibre rollout, 5G optimization and monetisation, and future 6G readiness.

For instance, **Network Slicing on 5G inherently involves treating traffic differently**. **If left unregulated,** commercial discrimination could turn into a competition concern, *tipping* content and service/application providers to partner exclusively with the telecom operators offering the "fastest" preferential slice. Hence, TRAI's framework on slicing must keep a stronger oversight from all aspects, not merely from a network or technology capability angle. Differentiation should not mean discrimination. Simultaneously, balancing this with letting technological developments evolve without unnecessary restrictions, requires a fine regulatory action.

Another instance, for example, can be, if a service provider provisions a slice offering enhanced internet/broadband speed (i.e. eMBB) **as a separate tariff offering, it should be able to deliver the advertised upload/download speeds** because ultimately the price is being charged for a committed better service quality.

Considering the key issues identified in TRAI's draft QoS amendment framework, our comments and recommendations also broadly cover the following areas:

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1. **Apply A.C.S framework while upgrading the QoS Regulation**

2. **Smart Regulation for Modern 5G Networks**
   i. Clarify what slicing means in reference to a network architecture type (4G/5G NSA, 5G SA)
   ii. Issue guidance on permissible differentiation. Slicing should differentiate traffic purely on functional requirements (like latency or data volume constraints) rather than on content
   iii. Removal of a network slice should not be triggered solely by the inability to reduce PRB utilisation below 80%
   iv. Given slice is dynamic in nature, advance notice of 21 days may not always be feasible. Similarly, removal within 30 days. Both these timelines should be kept reasonably flexible
   v. We recommend an initial reporting-only period of three to four quarters before the ≤1% benchmark becomes subject to the financial-disincentive framework
   vi. Explore network slice as a service (NSaaS) as a wholesale offering

3. **Quality of Experience Score**
   i. Publish a clear methodology including weightages for the categories and the calculation formula, before enforcing the framework. Duly consider aspects outside of network control
   ii. Before making QoES a mandatory KPI, let the Score be first analysed, published for 12-18 months allowing stakeholders to familiarise with the metric.

4. **Accurate Coverage and Data Integrity**
   i. Improved coverage maps are in the interest of consumer and they should be accurate to the extent possible
   ii. TRAI should carefully consider whether prescribing the 98% accuracy obligation on service providers for coverage maps is desirable at this stage. We find only France (ARCEP) as the country having this as a definite approach.
   iii. It is recommended that TRAI should first work with the service providers to find out the accuracy levels as of today, and accordingly look at setting a benchmark, as a goal to achieve over a period than being an accuracy compliance from day zero.

5. **Network Resilience and Outage Controls**
   i. Silence calls – define the measurement methodology precisely including what constitutes such a call
   ii. Each affected call be counted only once, irrespective of the number of ≥4-second RTP gaps occurring within that call, in line with TRAI's own IDT approach at present
   iii. We support timely restoration and MTTR as an important network resilience cum consumer protection indicator. The proposed ≤10-hour benchmark is ok, but its application should recognise practical constraints, particularly in rural, remote and difficult-to-access areas.
   iv. We welcome greater clarity provided on outages and defining what constitutes the same. TRAI may also consider a standard digital notification including intimation about credit mechanism

6. **Balanced Enforcement and Honest Speeds**
   i. We recommend harmonised digital reporting formats, greater use of automated data submission
   ii. FDs - distinguish intentional misreporting from inadvertent data-quality errors
   iii. Percentile-based measurement for speed-related parameters can better represent network performance across a population of measurements than a single-point value. However, define detailed methodology and sampling process as well.

7. **Automated Consumer Compensation and Service Quality**
   i. The proportional-rent-rebate approach for postpaid subscribers, and validity-extension approach for prepaid subscribers, are both administratively straightforward and proportionate to the duration of the outage.
   ii. Consider a standard digital notification and credit mechanism so that consumers are informed without needing to lodge a separate claim.

Now we set out our detailed response to the **Consultation Paper**, covering the key aspects across these areas.

Response to TRAI's

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Preamble & Contextual Overview:

Historically, TRAI's QoS framework has provided foundational pillars for service quality regulation in India.

In its very first QoS Regulation published[1] in year 2000, the Authority explained the *Purpose of laying down Quality of Service Parameters* as follows:

"*...3. The purpose of laying down Quality of Service Parameters is to:*
i) Create conditions for customer satisfaction by making known the quality of service which the service provider is required to provide and the user has a right to expect.
ii) Measure the Quality of Service provided by the Service Providers from time to time and to compare them with the norms so as to assess the level of performance.
iii) To generally protect the interests of consumers of telecommunication services..."

In our view, the purpose and the intent of latest QoS Regulations have not deviated from that, albeit the evolution has become more sophisticated, bringing in many crucial business and network dynamics into play over the years.

The Indian QoS regulations have evolved from a pure 2G voice-era of early 2000 to a dynamic landscape of multiple technologies, varied services, and totally upended consumer behaviour, as illustrated in the image[2] below.

[1] Regulation on Quality of Service of Basic and Cellular Mobile Telephone Services, 2000 (2 Of 2000), Dated 05 July 2000
[2] AI Generated Image

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The scale of Indian market has crossed a massive billion plus telecom consumers today. The evolution - from legacy voice-centric requirements to a framework today – to covering broadband, 4G, 5G, network slicing, outages, restoration, consumer compensation and transparency - have all been natural next steps, and TRAI's regulation has kept pace with this evolution. In a simple table, this can be summarised as below:

Aspect	The 2000s Voice era	Today's Data era
Primary Need	Connectivity and voice reachability	Constant internet access and high-speed data
Billing Sensitivity	Counting minutes and peak/off-peak hours	Managing data caps, speed throttling, or unlimited tiers
Screen Attention	Seconds or minutes per interaction	Hours of daily screen time across apps
Value Metric	Network coverage and call clarity	App ecosystem, ecosystem integration, data speeds in addition to call clarity

The utility of connectivity has gone beyond merely connecting (a basic expectation today) to - have an always-on network service whether voice or data. Now, telecom connectivity is the foundational layer of enabling socio-economic empowerment, not merely a QoS performance metric; hence its measurement has to be aligned to the expectations as such.

As per ITU (ITU-T Supp. 9 of E.800 Series), main purposes of QoS regulation are:

- helping customers be aware of the QoS provided by telecommunication operators/ ISPs through networks (mobile and fixed), so that they can make their own choices;
- checking claims made by operators;
- understanding the state of the market;
- maintaining / improving QoS in the presence of competition;
- maintaining / improving QoS in the absence of competition;
- helping operators to achieve fair competition; and
- making interconnected networks work well together.

Given this background, it is important to have certain regulatory principles that should (continue to) underpin TRAI's reformed QoS framework.

Regulatory Principles:
India's digital networks are entering a new era where quality of service is not merely a technical metric but a cornerstone of consumer trust, competition, and national resilience. The telecommunications ecosystem in India stands at a critical juncture.

As the country transitions into an advanced digital economy—underpinned by transition towards 5G Standalone (5G-SA) architectures, increasing fiberization, and cloud-native network slicing—telecom connectivity is no longer a commercial utility alone. It is a foundational infrastructure for national economic productivity, financial inclusion, governance, and public safety.

While TRAI should draw upon global best practices, which too are evolving, its QoS framework must rest on some key regulatory principles, as listed below:

- **Consumer protection** — QoS obligations should translate into measurable improvements in overall consumer experience, not just in pockets or categories.
- **Transparency** — Consumers should receive meaningful information to make informed decisions without creating duplicate reporting for service providers.
- **Competition & non-discrimination** - QoS obligations should help operators and service providers achieve fair competition in the market, and Regulator should prevent risks of market distortion.
- **Technology Neutrality** — Regulation should focus on outcomes rather than prescribing a particular network architecture. However, if a technology is meant to be deployed under certain prerequisite attributes, that should clearly be explainable and understood e.g. 5G slicing on SA architecture.
- **Proportionality** — Benchmarks, reporting and financial consequences should be proportionate to the risk and controllability of the parameter.

- **Network Resilience** — The framework should incentivise redundancy, capacity expansion and timely restoration.
- **Innovation** — New technologies such as 5G network slicing should be accommodated within a clear regulatory framework in a non-discriminatory way with consumer protection as the baseline.

Since the QoS regulation has a cost and the costs should be assessed against the benefits, efforts should be focused where there are known problems. Additionally, problem areas can change so there needs to be a degree of flexibility as well as in monitoring. The framework should preserve market competition, measurable performance, practical implementation, technological neutrality and a clear linkage between regulated parameters and consumer experience.

With this background, and accordingly, we structure our subsequent response in the following broad segments:

One, *the new issue related to inclusion of network slicing*,
Two, *the Quality of Experience Score*, and,
Three, *the rest relating to some of the amendments to existing regulatory parameters.*

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(A) Network Slicing:

Telecom networks are public networks, created on the strength of public good (e.g. wireless spectrum) serving the common public. When new innovations like slicing come, that can customise service quality and experience to an individual level, it becomes fundamental that its application and the regulatory framework are aligned in a way that do not lead to consumer harm or competition concerns, while the same time preserving its utility as a differentiating factor to the intended user/consumer.

It is also a fact that mobile operators deal with dynamically changing traffic patterns and congestion within a finite network capacity where traffic of one user can have significant effect on overall network performance. The 5G network slicing can let an operator run several virtual networks on top of one physical 5G network, with each virtual "slice" tuned to a different kind of service — for example, one for everyday mobile use, one for business customers, and one for services requiring instant response like remote surgery or factory robots.

It is also understood that not all slices are equal. For example, 4G networks can only do this in a limited way. In 5G, slice comes in two forms: NSA (Non-Standalone), which still leans on 4G infrastructure, and SA (Standalone), which is a fully independent 5G network. SA is generally considered the version best suited to advanced, fine-grained slicing.

Dimension	4G / LTE	5G NSA	5G SA
Can it slice the network?	Only in a limited, coarse way	Radio is 5G, but core is still 4G — limited slicing	Yes — full, granular slicing end-to-end
QoS differentiation	Basic, network-wide classes	Somewhat improved, but constrained by 4G core	Fine-grained, per-service, dynamic
Best suited for	Today's everyday mobile use	Faster 5G speeds using existing 4G investment	Advanced/critical use cases (industrial, healthcare, low-latency)

TRAI should clarify and define in its QoS Regulation as to what it means by network slicing for purpose of QoS benchmark parameter. It is equally important for consumer to know which network the slice relates to i.e. whether 4G or 5G NSA or 5G SA, and whether slice falls back on non 5G/NSA in between.

Answering this transparently to the consumer is fundamental for purpose of experience expected from the slice, as all three have different capabilities at network levels. An end-to-end 5G slice on a SA network (from radio till core network) will be different experience compared to say a 4G slice. Markets like Singapore already have 5G SA networks deployed progressively, in guidance with Regulator IMDA's decisions.

Further, the onset of network slicing introduces important policy question: how should differentiated service quality be reconciled with net neutrality principles? Differentiation based on legitimate technical requirements — such as enterprise security, latency, reliability or mission-critical applications — should be distinguished from discriminatory treatment of ordinary internet traffic.

While in enterprise or B2B scenario, it is normally addressed at SLA level, now since its utility is also explored in a normal consumer service (broadband/internet/voice), it is foundational that network slicing does not lead to worsening-off or downgrade in experience for a normal consumer who is not on a slice.

In simpler terms, **slicing should lead to better QoS and QoE for a consumer** without impacting or compromising the capacity available for any other (non-slice) consumer - which means that **a trade-off (up-to an acceptable level) *should not mean or turn* into one at the cost of other**. It is an important question to debate that **standard consumer traffic should not be throttled to commercialise high performance "slices"** while equally important is that **operator retains the ability to monetise the differentiated services** through slicing.

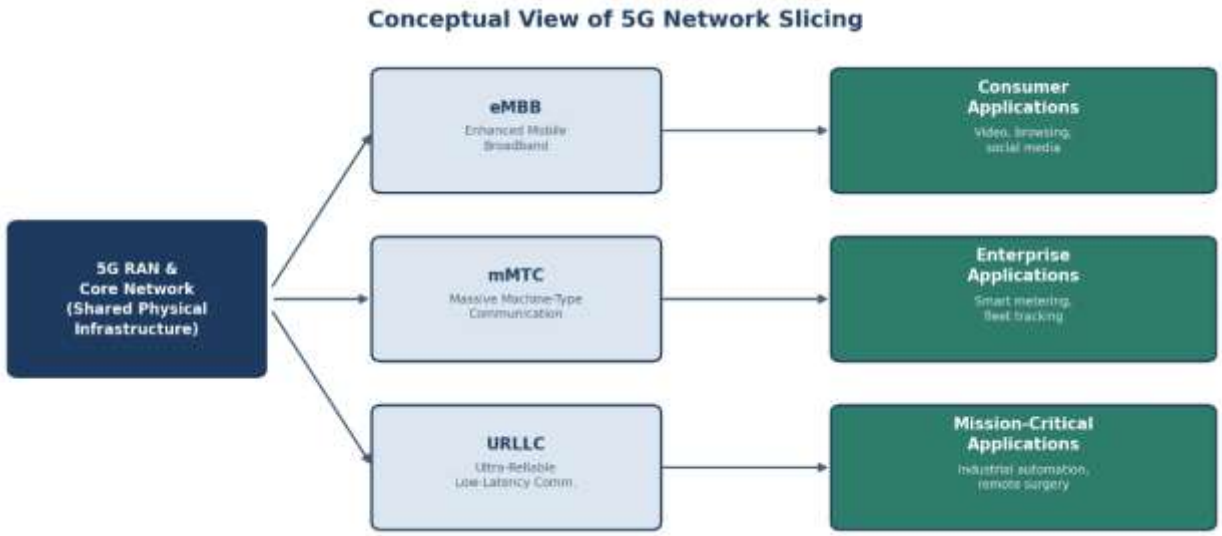
It is thus our opinion that TRAI should have discussed Net Neutrality in context of this paper, and in view of its own 2016 Order that decided against content-based discrimination/paid prioritisation/throttling. Since it is an integral aspect of network capabilities, any discussion on slicing in isolation can have unintended consequences.

Allow specialised/differentiated services if technology allows such innovation but keep baseline internet access protected without discrimination. **We recommend that TRAI issue guidance on permissible differentiation**.

Technical Aspects

5G Network Slicing and PRB Utilisation

5G network slicing enables multiple logical service environments to operate over common physical infrastructure with differentiated requirements such as throughput, latency, reliability and priority.



The TRAI needs to look at Slicing from the lens of affordability, competition and sustainability, as well as from network readiness from a diverse deployment (4G, 5G NSA, 5G SA).

From a consumer standpoint, slicing could create a visible two-tier experience: a faster, more reliable tier for those who pay more or are served by premium slices, and a standard tier for everyone else. This is why it is crucial to ensure that for non-slice consumer, it does not turn out to be a poor or downgraded experience on the same public network.

Differentiated QoS could become a paid-for premium layer — TRAI's proposal to treat each slice as its own tariff offering opens the door to this. But this should not create a risk of "monetising congestion". TRAI's congestion checks and mandatory capacity top-ups are meant to stop ordinary users' experience from being used as a lever to sell premium slices. For basic/ordinary users to keep getting acceptable QoS, the baseline standards need to stay enforceable and independent of how much operators earn from premium slices.

Possible safeguards: transparent, non-discriminatory terms for accessing slices; independent monitoring and reporting (as TRAI has proposed); and continuing to apply net-neutrality principles to consumer internet access even as specialised services are allowed.

Done well, slicing lets operators use network capacity more efficiently — matching resources to what each service actually needs, rather than over-building for every use case. Congestion monitoring like TRAI's proposed capacity checks, supports more efficient and demand-based network planning. Slicing can support enterprise and mission-critical use cases — industrial automation, connected healthcare — that are valuable for India's broader digital and industrial goals. **Operators can also look at offering network slice as a service (NSaaS) to smaller and nice service providers like VNOs, M2MSPs etc**.

The network slicing should differentiate traffic purely on functional requirements (like latency or data volume constraints) rather than content. From a regulatory standpoint, the Allocation and Retention Priority (ARP) values must be balanced so that safety/mission critical slices receive proper priority without giving commercial apps unauthorized advantages over open internet traffic.

Thus, differentiated services should ideally be supported by appropriate capacity and resource planning rather than by systematically degrading the baseline experience of non-priority customers.

- Issue clear guidance on permissible service differentiation.
- Distinguish legitimate service requirements from discriminatory traffic treatment.
- Ensure priority slices do not intentionally degrade baseline services.
- Encourage capacity augmentation where differentiated services are materially scaled.
- Clarify interaction between enterprise/private slices and public-network neutrality principles.
- Ensure no 'congestion' monetisation

Is Physical Resource Block (PRB) Utilisation an Appropriate Congestion Indicator?

PRB utilisation is a widely understood indicator of radio-resource loading, and we support its use as a congestion signal. However, PRB utilisation alone does not fully capture user-perceived quality of experience. A cell can register high PRB utilisation while still meeting latency and throughput commitments for every active slice, particularly where scheduler-level prioritisation (via 5QI and ARP values, as referenced in the Consultation Paper) is functioning correctly; conversely, a cell well below the 80% threshold could still exhibit localised degradation due to backhaul constraints, interference or hardware issues that PRB utilisation does not directly measure.

The proposed use of PRB utilisation above 80% as an indicator of potential congestion merits a calibrated approach. An important radio-level capacity indicator, but PRB should not automatically be treated as synonymous with end-to-end customer QoS degradation. Therefore:

- clarify application across spectrum bands, carrier aggregation, SA/NSA deployments and different network configurations.
- do not treat a single radio-level indicator as a standalone measure of end-to-end QoS.
- clarify slice-wise compliance obligations for eMBB, URLLC, mMTC and enterprise/specialised slices.

As per 3GPP TS 28.552, as adopted by TEC, the PRB utilisation is a measure of radio resource usage/load and is not, by itself, a measure of end-to-end QoS or suitability of a cell for network slicing. Persistent utilisation above 80% may also result from sustained traffic demand and efficient utilisation of available radio resources.

Therefore, we recommend that slice removal from network should not be triggered solely by the inability to reduce PRB utilisation below 80%. Such removal should be considered where sustained high utilisation is accompanied by demonstrable capacity constraints or deterioration in relevant QoS, throughput or slice-performance indicators, despite reasonable capacity augmentation measures. This would maintain the objective of proactive capacity management while ensuring that network-slicing decisions are based on actual network performance and customer impact rather than a single utilisation threshold.

Phased Implementation

We believe that commercial 5G SA architecture deployments are at a relatively early stage in India, corollary - network-slicing would also be. Reliable, granular per-slice PRB monitoring, together with the systems needed to report this data in the format and manner the Authority may prescribe, may also require operators to build or adapt network-analytics and reporting pipelines.

We accordingly recommend a phased implementation window – an initial reporting-only period of three to four quarters before the ≤1% benchmark becomes subject to the financial-disincentive framework under Regulation 16 – to allow operators to establish reliable measurement systems and validate data quality before compliance consequences attach.

While an advance notice prior to launching any new network slice is important as it enables adequate time for planning and rollout, the Authority should keep in mind that **a slice is also dynamic in nature** and not necessarily will always require a strict 21-day advance notice. Similarly, there may be use cases when removing a slice within a strictly defined time-period may not be possible. **Therefore, TRAI should duly consider these timelines for safeguard and keep them reasonably modular.**

In summary, 5G Standalone is best suited for advanced slicing; 5G NSA and 4G can do this in a relative limited way. The TRAI's draft QoS rules formally recognise network slicing in India, paired with capacity, congestion and consumer internet traffic safeguards in line with net neutrality and/or TRAI's own 2016 Order preserving open internet.

(B) Quality of Experience Score (QoES)

The draft QoS framework in the Consultation proposes a new clause to Regulation 15(1) that would allow TRAI to publish a "Service wise Quality of Experience Score (QoES)" for service providers, based on network performance, consumer service and consumer perception data collected from multiple sources. The Authority's stated objective is to supplement objective network KPIs with consumer-centric perspectives to develop a more rounded understanding of how network performance, service delivery and customer interactions collectively shape consumer experience.

Under TRAI's proposed QoES framework, the score (to be published on TRAI website, press releases or advertisements for public information) would draw on four data sources already available under the principal regulations:

- Compliance reports submitted under Regulation 13.
- Customer satisfaction survey results under Regulation 11.
- Drive test results under Regulation 7(3).
- Audit findings under Regulation 14.

We support the intent behind introducing a QoES framework. Consumer experience is not fully captured by technical QoS parameters alone, and a well-designed QoE score could help consumers make informed choices while incentivising operators to improve service quality. **However, QoES is influenced by multiple factors,** including network performance, devices, applications, location and consumer usage. **The methodology should** clearly establish the service provider's responsibility and appropriately account for factors beyond its control to **ensure a fair and meaningful score**.

Having said that, the current TRAI proposal leaves several critical elements unspecified:

- **Calculation methodology**: No formula or aggregation approach is specified. Lack of methodological detail makes it difficult to assess how the score would be computed or meaningfully represented
- **Weightages**: No indication of how much each of the three broad categories (network performance, consumer service, consumer perception) would contribute to the final score

- **Normalisation**: No guidance on how different metrics (e.g., downtime percentages vs. survey satisfaction scores) would be compared and combined
- **Frequency**: No timeline for calculation or publication.
- **Independent verification** - reliance on operator self-reporting for network performance and consumer service data, without adequate independent verification
- **Regulatory consequence**: Whether the score would carry any compliance or financial implications
- **Application diversity** – how would an application-specific QoE be addressed as user experience varies significantly across voice, video, browsing and gaming

International Precedents:

Kenya provides the most directly relevant precedent. **The Communications Authority of Kenya operates a three-component QoS framework with explicit weightings: End-to-End Drive Test QoS (60%), Network Performance QoS (25%), and Quality of Experience (15%).**

Importantly, Kenya currently applies an 80% compliance threshold to this combined score[3], though the Communications Authority of Kenya has proposed[4] raising this to 90% alongside more granular county-level assessment. On a separate note, we also find Kenyan Authority's consumer-oriented approach of short flyers[5] to keep consumers up to date with important terms, quite useful. TRAI may also consider such leaflets at its end for consumer awareness.

ITU-T G.1052 (2024), the global standard for QoE assessment of mobile applications, provides a structured methodology with weighted aggregation across use cases, user aspects and network scenarios. ITU-T P.10/G.100 defines QoE as "the degree of delight or annoyance of the user of an application or service," explicitly recognising its subjective nature.

Recommendations:

- Publish a clear methodology before finalising the framework, including weightages for the three categories and the calculation formula. This could be modelled on Kenya's explicit 60/25/15 weighting or adapted from ITU-T G.1052's structured approach.
- Strengthen independent data collection by supplementing operator reports with third-party drive tests, SIM-based monitoring or structured crowdsourced data.
- TRAI MySpeed app could be further developed for this purpose, with appropriate bias correction e.g. the App may have a smaller installed base vis a vis overall subscriber base or may have a gap in its findings vis a vis IDTs /OADTs.

Before making the QoES a mandatory KPI under the Regulation, we recommend a phased approach where the Score is first analysed and published for 12-18 months allowing operators and consumers to familiarise themselves with the metric. Thereafter, post score stabilisation and credibility establishment, it could be linked to enhanced monitoring or compliance action for persistently poor performers.

(C) Some of the Other draft amendments

(i) Coverage Maps and Accuracy

Coverage Maps have become an important tool to reflect reasonable service levels and enable consumers to make meaningful comparisons of the coverage offered by different mobile providers. As evident from TRAI's own quoted examples, and a few others, coverage maps today are a generally accepted practice. India is already among such leading nations.

[3] Refer section 2.4 of the referenced document below
[4] https://www.ca.go.ke/sites/default/files/2026-01/Review%20of%20Mobile%20QoS%20Framework%20.pdf
[5] https://www.ca.go.ke/sites/default/files/CA/Consumer%20Protection/Quality-of-Service.pdf

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The Consultation Paper proposes changing the benchmark for service-wise geospatial coverage maps published on operators' websites from **≥ 99% availability-of-map reporting, to ≥ 98% accuracy** of the published map itself, assessed monthly, together with a validation mechanism to check published coverage against on-ground conditions. TRAI's rationale, drawn from its own drive-test findings, is that areas shown as covered on published maps have in some instances been found deficient at ground level, undermining the purpose of publishing coverage information in the first place.

While we support the objective of improving the accuracy and transparency of coverage information through maps, **the proposed benchmark of 98% accuracy needs deeper deliberation before implementation**. If TRAI believes that its drive tests show divergence to coverage as indicated in operators' maps, that could be due to multiple other factors. Coverage is dynamic and can be affected by terrain, building penetration, device capability, indoor conditions, spectrum characteristics, temporary outages and network loading.

International comparison indicates that a single, universal 98% coverage-map accuracy benchmark does not exist across regulators. Of the regulators examined, France (ARCEP) seems to be the only one that validates coverage-map accuracy against a percentage threshold in the same sense as TRAI's proposal (98%, raised by ARCEP from 95% in March 2020).

The UK (Ofcom), USA (FCC), Germany (Bundesnetzagentur) and Finland (Traficom) use different constructs altogether — signal-strength/error-margin models, probability-of-service modelling, or plain coverage-extent percentages — rather than a map-accuracy percentage of the kind proposed by TRAI. However, they do perform rigorous checks of operator supplied maps data. The **BEREC** does not prescribe a common EU-wide benchmark and leaves verification to individual national regulators, while **Canada** (CRTC) has not yet adopted a fixed benchmark, with a structured methodology still under public consultation. Even **Australia**, which has recently prescribed a Coverage Map Standard[6], does not prescribe such an accuracy benchmark. In markets like **Indonesia,** we could not find a coverage map mandate.

Methodology and Safeguards

Coverage maps are, by necessity, based on predictive modelling rather than exhaustive physical measurement, since 100% field verification of national coverage is not feasible for any operator or regulator. While mathematically if applied with the right set of assumptions and standards, they should be close to the results that may be obtained using field surveys, however expecting them to be accurate on a benchmark of the kind proposed, requires reiteration of data sets, probabilities and statistical analysis. This takes time and learning. We believe **this should be given a transition phase with a clear guideline** or SoP that should be modular to accommodate unique changes/dynamics of individual networks and terrains.

As BEREC's Common Position (referenced in Annexure-I of the Consultation Paper) recognises, signal prediction is presently the only practical methodology for estimating coverage across an entire country's landmass; drive testing and crowdsourced data serve a verification, rather than a primary-generation, role.

We recommend that the Authority's validation framework recognise this distinction explicitly – evaluating whether published maps fall within a defined statistical tolerance of field measurements, rather than requiring point-for-point accuracy, which no predictive methodology can guarantee. Hence:

- Grid resolution and measurement points should be specified with sufficient precision to allow consistent validation across operators (comparable international practice ranges from 50m to 100m grid cells).
- Indoor and outdoor coverage should continue to be treated as distinct categories, given the materially different propagation characteristics and consumer expectations involved.
- Rural, remote and hilly terrain should be assessed against terrain-adjusted benchmarks or with a reasonable tolerance band, given the greater prediction uncertainty inherent in such geographies compared to dense urban areas.

[6] Telecommunications (Mobile Network Coverage Maps) Industry Standard 2026

- Validation should combine operator self-certification with independent or Authority-conducted sample-based verification (drive tests, crowdsourced data, or third-party audits), consistent with the layered approach adopted by most international regulators.

International Coverage-Map Benchmark Comparison

This comparison supplements the discussion in "Coverage Maps and Accuracy" above. It reviews how eight regulators — the UK (Ofcom), the USA (FCC), Germany (Bundesnetzagentur), Finland (Traficom), France (ARCEP), BEREC/EU and Canada (CRTC) and Australia — approach coverage-map methodology, whether each applies a fixed accuracy percentage, how verification is conducted, and the relevance of each to TRAI's proposed 98% coverage-map accuracy requirement.

Regulator	Methodology Used	Fixed Accuracy %?	Verification	Relevance to TRAI's Proposed 98%
UK — Ofcom	Predicted signal-strength (dBm) models from operator data, blended with continuous real-user crowdsourced data (Opensignal).	Found no mandate or reference to "accuracy" level of 98%. Regulator obtains[7] maps info in 50mx50m grid from Telcos, and validates it from various sources including independent survey /audits. Own coverage checker tool[8,9] created basis data obtained from Telcos & other sources. It assesses coverage levels based on signal strengths[10].	Continuous crowdsourced data; no periodic formal audit.	Uses different metric to TRAI's proposed coverage-map accuracy check.
USA — FCC	Standardised propagation modelling under the Broadband Data Act; providers file coverage polygons twice yearly; no field testing at time of filing.	90% cell-edge probability of service (a modelling input, not a map-accuracy figure). No mandate like a 98% accuracy level of maps though extensive granular levels of information seeking as to how data to be submitted to FCC, rigorously verified.	Public "Challenge" process via the FCC Speed Test app; sufficient failed tests trigger a formal challenge.	A probability-of-service model, conceptually different from a map "accuracy" percentage.
Germany — Bundesnetzagentur	Operator submissions (twice yearly) combined with the regulator's own crowdsourced "dead spot" app and field-inspection team.	No map accuracy %. However rigorous data monitoring and checks are applied[11] by the Regulator[12]. Minimum signal strength & availability at 95% of locations and in time is required.	Cross-checked by the regulator's own radio monitoring/inspection service — an added step most regulators do not have.	Extensive validation of coverage data. In case of Fixed, address level precision and technically feasible speed.

[7] https://www.ofcom.org.uk/mobile-coverage-checker/frequently-asked-questions
[8] https://www.ofcom.org.uk/phones-and-broadband/coverage-and-speeds/map-your-mobile-mobile-coverage-checker-update
[9] https://www.ofcom.org.uk/siteassets/resources/documents/phones-telecoms-and-internet/comparing-service-quality/2025/map-your-mobile-2025-threshold-methodology.pdf?v=401713
[10] https://www.ofcom.org.uk/siteassets/resources/documents/phones-telecoms-and-internet/comparing-service-quality/2025/map-your-mobile-2025-threshold-methodology.pdf?v=401713
[11] https://www.bundesnetzagentur.de/SharedDocs/Pressemitteilungen/EN/2025/20250704_MesskonzeptMoFu.html
[12] https://gigabitgrundbuch.bund.de/GIGA/DE/Breitbandatlas/Dokumente/start.html

Finland — Traficom	Signal-strength limits by frequency, modelled under theoretical "ideal conditions"; operator submissions updated roughly annually.	No mandates on accuracy benchmark; TSPs publish[13] their maps, and Regulator also publishes[14] plain coverage % (e.g., households with a given minimum speed).	Reactive — investigated on receipt of complaints; no mandatory nationwide validation.	No comparable accuracy benchmark exists.
France — ARCEP	Digital simulation/modelling based on tower location, transmit power and terrain, published on ARCEP's "Mon réseau mobile" platform.	98% reliability threshold (raised from 95% in March 2020); smaller/sparser zones may still be assessed against 95%.	Formal field/drive-test audits by ARCEP, supplemented by a vetted crowdsourced channel.	The direct source of TRAI's proposed figure and the closest comparator in methodology.
BEREC / EU	Issues Common Positions/guidance harmonising terminology across ~33 NRAs, each free to use its own model.	No binding EU-wide benchmark; and could not be independently confirmed as a BEREC standard.	Left entirely to individual NRAs; BEREC prescribes no common verification mechanism.	No EU-wide 98% (or equivalent) standard exists.
Canada — CRTC	Mandatory Annual Facilities Survey (~20 operators); historically self-reported with no standardised verification.	No fixed benchmark adopted yet; a structured propagation-modelling standard (recommended in an April 2025 CRTC-commissioned report) was under public consultation. Its recommendations have been published[15].	Not yet decided — the validation framework is still at the design/consultation stage.	Fixed accuracy percentage is not yet an established international norm even among mature regulators; Canada is moving toward an Ofcom/ BEREC-style approach rather than a single %.
Australia	Based on predictive modelling assumptions[16]	No fixed accuracy identified. Coverage levels defined as Good, Moderate, Basic and No Coverage.	Could not be identified from regulation	Fixed accuracy % not yet standardised by ACMA

Key takeaway:

Among the regulators reviewed, only France's ARCEP seems to validate coverage maps against a percentage-based reliability threshold in the same sense as TRAI's proposal, Importantly, it is understood that operators send their coverage maps data to ARCEP which then validates and publishes[17] it to public on periodic basis.

[13] https://traficom.fi/en/telephone-and-broadband/telephone-and-broadband-users/mobile-network-coverage
[14] https://bittimittari.fi/en/about-internet-connections
[15] https://crtc.gc.ca/eng/publications/reports/farrpoint2025.htm
[16] https://www.legislation.gov.au/F2026L00381/asmade/text
[17] https://en.arcep.fr/news/press-releases/view/n/mobile-coverage-maps-081220.html

Recommendation:

TRAI should carefully consider whether prescribing the 98% accuracy obligation on service providers for coverage maps is desirable at this stage. Improvising coverage maps are in the interest of consumer and they should be accurate to the extent possible (given statistical, mathematical and network realities) with a certain level of confidence. **The 98% accuracy benchmark should be considered for adaptation basis the evidence (over a large set of network & coverage data matched with field data) and validation methodology over a long period of observation**. This should be a benchmark to strive for than day zero compliance.

We recommend that TRAI first work with the service providers to find out the reliability (accuracy) levels as of today, and accordingly look at setting a benchmark, as a goal to achieve over a period than being an accurate compliance from day zero. TRAI should look at publishing analysis of such data on accuracies achieved over a period of time, in the form of graphs etc. for stakeholders to know how it is trending over a time. **Once the stabilisation happens say in 12 months, the accuracy benchmark can kick-in post that (instead of currently prescribed date of 01st October 2026).** Accordingly, any compliance violation disincentive if applicable, should be recalibrated.

Assessment Periodicity: We note TRAI's proposed monthly assessment cycle for this new KPI. As a transition measure for a newly introduced parameter, **we recommend an initial quarterly (3-month) assessment cycle instead**, moving to the monthly cycle once measurement systems have stabilised.

(ii) Silence Call Rate

We support the objective of reducing silent calls and improving voice service experience. However, a benchmark such as a silence call rate of ≤1% should be accompanied by a standardised measurement methodology. Counting every RTP gap of ≥4 seconds as a separate instance may result in **multiple counting of the same call** and overstate the incidence of silence calls.

We recommend that each affected call be counted only once, irrespective of the number of ≥4-second RTP gaps occurring within that call. This would provide a more accurate call-level measure of customer experience and avoid inflation of the KPI. This approach is also consistent with TRAI's measurement methodology for silent calls under IDT, wherein **multiple silence events within the same call were treated as a single event.**

Silence Call	A call which has ≥ 4 sec continuous RTP gap is considered as a Silence Call. Silence call rate = (count of silence call / Total calls established) *100 If a call observes multiple silence count >=4 sec in a particular established call it has been taken as one silent event.

Source: IDT Reports published by TRAI.

Further, **we also recommend that the Authority may kindly**:

- define precisely what constitutes a silent call.
- clarify exclusions for terminating-network or handset-related causes outside of operator control.
- specify sample size, measurement points and assessment period.
- ensure consistent methodology across technologies and network configurations (e.g. across VoLTE, circuit-switched and emerging 5G voice, given that detection mechanisms can differ materially across these technologies)

We support the Authority's stated intent to reassess, based on drive-test and complaint data, whether this parameter should eventually be brought within the compliance-and-disincentive framework of Regulation 16.

(iii) Mean Time to Repair (MTTR)

We support timely restoration and, recognise MTTR as an important network resilience cum consumer protection indicator. The proposed ≤10-hour benchmark is directionally appropriate, but its application should recognise practical restoration constraints, particularly in rural, remote, difficult-to-access areas and now even in highly dense urban areas.

From a conceptual and operational level, we believe that a reasonable timeline for repair is in the interest of the consumer, while duly accounting for any practical constraints. Such acceptable constraints, if any, should be part of general guidance to service providers e.g. defining treatment of force majeure and circumstances outside the TSP's reasonable control (consider appropriate treatment of major external infrastructure failures), recognise access constraints, including permissions from local authorities, RWAs, landlords and site owners.

Feasibility Across Geographies

A uniform 10-hour MTTR benchmark is achievable in most urban and semi-urban locations where technician deployment, spares and access are relatively straightforward. In rural, hilly and remote geographies, restoration is frequently constrained by factors outside an operator's direct and immediate control:

- Fibre cuts caused by third-party excavation, road-widening or agricultural activity, particularly in areas with limited alternate routing;
- Power outages affecting both the fault site and any nearby facility from which repair equipment or replacement parts must be sourced;
- RWA, municipal or road-owning-agency permissions required before excavation or aerial-cable repair can commence;
- Restricted or delayed site access in security-sensitive, high-altitude or weather-affected locations; and
- Force majeure events, including floods, landslides and extreme weather, which can affect multiple sites simultaneously and strain repair-crew capacity.

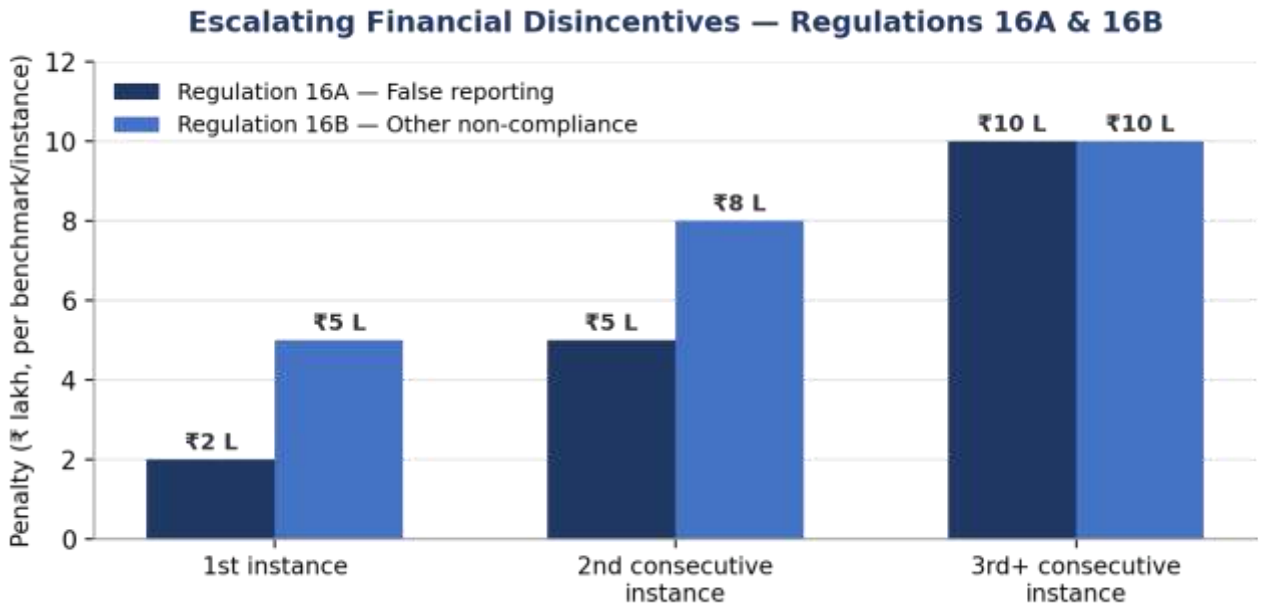
Figure: Outage-to-restoration process, showing points at which external dependencies can affect MTTR

(iv) Compliance & Reporting

The framework should improve regulatory visibility without creating multiple parallel reporting systems. **We recommend harmonised digital reporting formats and greater use of automated data submission** from existing network management and performance systems subject to service provider authentication and authorisation.

- Adopt common digital templates and definitions across QoS parameters.
- Enable automated submission from existing operator systems where technically feasible.
- Provide a clear data dictionary and calculation methodology for every new parameter.
- Introduce validation mechanisms before treating an anomalous report as false reporting.
- Avoid duplicate reporting where the same information is already available to TRAI.

(v) False reporting safeguards: Financial consequences should distinguish intentional misreporting from inadvertent data-quality errors. A defined validation and rectification process would reduce disputes and improve regulatory credibility. The chart below just shows the progressively increasing financial disincentives.



(vi) Consumer Compensation for Prolonged Outages

We welcome greater clarity brought about prolonged network outages, particularly where an outage exceeds 24 hours, and where consumer compensation is being suggested. A transparent and predictable mechanism can strengthen consumer confidence as well as give necessary actionable clarity to the service providers. However, for this to be effective:

- Clearly specify the methodology for proportional rebates or prepaid validity extensions.
- Prefer automated credits/validity adjustments to minimise customer disputes.
- Link compensation to the duration and impact of the qualifying outage.
- Provide transparent criteria for force majeure and events outside the operator's reasonable control.
- Avoid disproportionate financial exposure that could ultimately increase the cost of services.

TRAI may also consider a standard digital notification and credit mechanism so that consumers are informed without needing to lodge a separate claim.

The proportional-rent-rebate approach for postpaid subscribers, and validity-extension approach for prepaid subscribers, are both administratively straightforward and proportionate to the duration of the outage. **We recommend that TRAI encourage – and, over time, expect – automated crediting of these compensations,** since automation reduces disputes, lowers administrative burden on both operators and the Authority's grievance redressal machinery, and improves consumer trust that compensation will in fact be delivered.

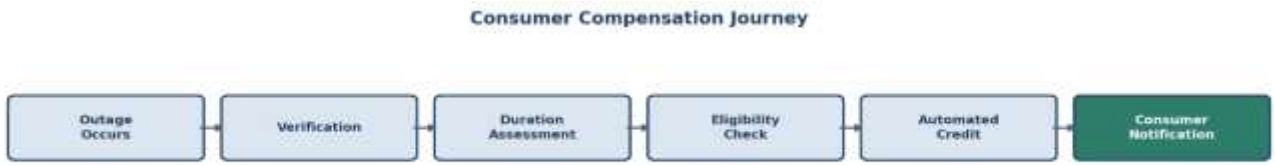


Figure: Illustrative consumer-compensation journey for significant network outages

(vii) Speed Benchmarks and Percentile-Based Measurement

We support percentile-based measurement for speed-related parameters because it can better represent network performance across a population of measurements than a single-point value. The choice of the 80th or 90th percentile should, however, be aligned with the objective of the parameter and supported by a statistically meaningful sample.

- Define detailed test methodology.
- Distinguish network capability from conditions affected by customer equipment or local environment.
- Use sufficiently large and representative samples.
- Consider consumer-facing dashboards that explain performance in simple terms.

Advantage	Watch-out / practical friction
Percentile measurement is statistically more robust than a simple average would be and/or to distortion from a small number of the test samples.	Requiring 100% of tariff offerings to individually meet the percentile benchmark is strict — especially for smaller, legacy, or soon-to-be-discontinued tariff plans having very few subscribers.
Technology-wise (4G vs 5G) typical-speed declaration closes the reported 10–20x measurement gap and gives consumers a genuinely comparable figure.	Tariff offerings with a lower subscriber base can be tested against a 5% subscriber-base sample rather than the full base (para 2.12(ii)(e)) — **this is a welcome relief.**

Response to TRAI's

***Draft* 'The Standards of Quality of Service of Access (Wireline and Wireless) and Broadband (Wireline and Wireless) Service Regulations, 2024'**

The A.C.S. lens:

Affordability

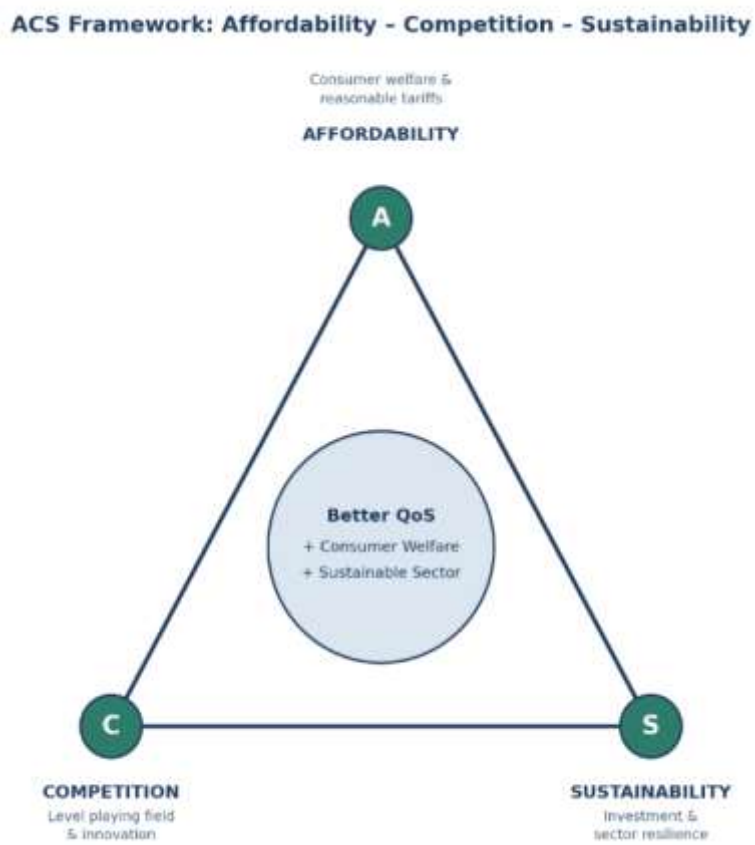
- QoS rules should not unnecessarily inflate tariffs by monetising congestion.
- Consumer compensation for significant outages should protect consumers without destabilising pricing: automated, presumptive crediting achieves this more efficiently than a claims-based process.
- Compliance costs across new parameters should remain proportionate to the harm being addressed and the maturity of the underlying technology (slicing e.g. is still an early-stage commercial capability).

Competition

- Benchmarks should be fair and scalable across operators and service providers of different size and network vintage as well as services (e.g. VNOs or niche service providers like M2MSPs).
- Ensure that network slicing should not become a vector for anti-competitive advantage or entrench market dominance risks; consistent 5QI/ARP application and clear ex-ante guidance (e.g. on differentiation, non-discriminatory access) can help guard against some of this.
- Reporting requirements, once finalised, should be applied consistently across providers and technologies.

Sustainability

- Enforcement timelines should account for the operational realities of network architectures, rural and remote restoration, third-party and force-majeure dependencies.
- The overall framework should support, not discourage, continued investment in network resilience, capacity augmentation and 5G-SA rollout.
- New-technology adoption – particularly network slicing – should not be discouraged by disproportionate or prematurely stringent compliance requirements during its early commercial phase. However, it should be closely monitored.



Response to TRAI's

***Draft* 'The Standards of Quality of Service of Access (Wireline and Wireless) and Broadband (Wireline and Wireless) Service Regulations, 2024'**

Key Recommendations:

No.	Aspect	Suggested Recommendation
1	Overall objective	Aligned with TRAI's objective of improving QoS, transparency, resilience and consumer protection.
2	Technical definitions	Provide precise definitions and measurement methodologies for all new parameters.
3	Network slicing	Permit and clarify what constitutes a network slice. Treat PRB >80% primarily as a congestion/capacity indicator unless a clear customer-impact methodology is established. TRAI already punishes cells for crossing 80% PRB. We recommend that disincentive should only kick in if it's shown to hurt customer experience actually — not just from raw number.
4	Slice-wise obligations	Clarify obligations for eMBB, URLLC, mMTC, enterprise and specialised slices.
5	Phased implementation	Provide a reasonable transition period for systems, network changes and reporting integration, where necessary
6	Coverage accuracy	Align with improvised coverage maps requirements with transparent, repeatable and proportionate validation. However, among comparable international regulators, only France (ARCEP) seems to validate coverage maps against a percentage-based reliability threshold in the sense TRAI proposes; we believe this should be first observed for 3-4 quarters with large sample data and field test, and then an appropriate % benchmark may be prescribed.
7	MTTR	Retain the ≤10-hour objective while recognising rural access, permissions, force majeure and external constraints.
8	Compensation	Clear, proportionate and preferably automated compensation for qualifying outages exceeding 24 hours.
9	Reporting	Harmonise digital reporting and introduce safeguards against disputes over inadvertent data errors.
10	Net neutrality	Issue guidance on permissible differentiation and ensure priority services do not rely on degrading baseline services.

Conclusion:

TRAI's objective of strengthening the QoS framework for next-generation telecom networks is noteworthy. The transition to 5G and beyond requires a framework capable of addressing network slicing, differentiated services, digital coverage information, outages, restoration and consumer compensation - all integrated within the principles of *Affordability, Competition and Sustainability*.

Simultaneously, effectiveness will depend on robust measurement methodologies, proportional obligations, and the ability to accommodate India's unique market characteristics, including its very large subscriber base, affordability sensitivity, diverse geography and continuing investment requirements.

We therefore recommend that TRAI finalise the amendments through a balanced, outcome-oriented and technology-neutral approach and in the best interest of consumer while allowing service providers flexibility to deploy new evolutions.