Haryana Technical Association

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To,
Shri Sameer Gupta,
Advisor (Networks, Spectrum and Licensing-I),
Telecom Regulatory Authority of India,
4th, 5th, 6th & 7th Floor, Tower-F,
World Trade Centre, Nauroji Nagar,
New Delhi – 110029.

Subject: *Submission of Consumer Response by Haryana Technical Association to TRAI Consultation Paper No. 11/2025 on* ***"Review of Existing TRAI Regulations on Interconnection Matters"***

Dear Sir,

This is with reference to the Telecom Regulatory Authority of India (TRAI) Consultation Paper No. 11/2025 titled "Review of Existing TRAI Regulations on Interconnection Matters."

We are pleased to introduce Haryana Technical Association (HTA), a voluntary organisation comprising committed and socially conscious citizens. HTA was established and registered under the Societies Registration Act, 1860, on 21 August 2008, with the primary objective of creating awareness on issues related to health, sanitation, environment, technology, and consumer rights, and to work towards national integration. The Association has consistently pursued these objectives through the organisation of public meetings, declamation contests, paper-reading sessions, poster-painting competitions, and dissemination of awareness literature across Haryana.

The Haryana Technical Association has been working on a concept of "Social Engineering," aimed at educating citizens on the optimal and responsible use of available resources. Despite Haryana being among India's economically advanced states, we observe a noticeable gap in ground-level development and equitable access to essential services, which requires systematic attention and policy intervention.

HTA is a recognized Consumer Advocacy Group by the Telecom Regulatory Authority of India (TRAI), New Delhi, w.e.f. 08 August 2012, and has been actively engaged with issues concerning telecommunications, technology, and consumer welfare. In this capacity, we respectfully submit our response to the above-mentioned consultation paper from the perspective of end consumers, who remain the ultimate beneficiaries and key stakeholders of telecom services.

The enclosed submission places consumer interest at the forefront, with particular emphasis on quality of service, affordability, non-discriminatory access, service continuity, and transparency, especially in the context of interconnection arrangements impacting PSTN and mobile users.

We also take this opportunity to acknowledge, with sincere gratitude, the support and guidance extended by senior officers of the Haryana Administration in furtherance of our objectives. The constructive role played by the media during various awareness programmes has been highly commendable. Further, HTA has worked in close cooperation with several local NGOs across Haryana, thereby strengthening grassroots outreach and consumer awareness.

We trust that the Authority will kindly consider the views and suggestions contained in the enclosed response while finalising the regulatory framework, keeping in view the paramount importance of protecting consumer interests in an evolving telecommunications ecosystem. We remain grateful for the opportunity to participate in this consultative process.

Thanking you.

Yours sincerely,

For Haryana Technical Association (HTA)
(Recognized Consumer Advocacy Group)

Mr. Hitesh Dhanda
President

Ms. Vanshika
Member-cum-Legal Consultant

Q.1. **For PSTN to PSTN, PLMN to PSTN and PSTN to PLMN calls, should the interconnection level be mandated at the LSA level? If yes, should the existing POIs at LDCA/SDCA levels also be migrated to LSA level?**

1. Telecommunications services today form the backbone of democratic participation, economic activity, access to governance, emergency services, and social inclusion. For consumers, interconnection is not an abstract technical construct but the enabler of their right to communicate, to access information, and to remain connected without discrimination or disruption.
2. Consequently, interconnection regulation must be viewed through the prism of consumer rights and constitutional guarantees, rather than being treated as a matter of bilateral arrangements between service providers. Any regulatory framework that governs interconnection must ensure that end-users—who bear the cost, depend on continuity, and suffer the consequences of regulatory failure—remain the central focus.
3. The right to access telecommunication services is intrinsically linked to:
    - Article 19(1)(a) of the Constitution of India, which guarantees freedom of speech and expression, now exercised predominantly through telecom networks;
    - Article 21, which has been expansively interpreted to include the right to live with dignity, encompassing access to essential services, emergency connectivity, and digital inclusion; and
    - Article 14, which mandates non-arbitrary, non-discriminatory state action, including in regulatory frameworks governing public utilities.

    A fragmented, outdated interconnection regime that allows service availability to be contingent upon inter-operator negotiations at SDCA/LDCA levels fails the test of non-arbitrariness and results in unequal access to services across regions, directly impacting consumers' constitutional rights.
4. Delayed roll-outs, call failures, service non-availability, and degraded quality arising from obsolete SDCA/LDCA-level interconnection directly amount to deficiency in service, for which consumers have no contractual or bargaining power to seek redress.
5. When regulatory structures permit technical inefficiencies that increase costs and restrict availability, the resulting financial burden is invariably passed on to consumers, thereby violating the principle of consumer welfare that underpins sectoral regulation. Under the Consumer Protection Act, 2019, consumers are entitled

to services that meet reasonable standards of quality and performance; Protection against deficiency in service; and Freedom from unfair trade practices, including systemic delays or denial of service access.

6. The SDCA/LDCA-centric interconnection architecture was originally designed for legacy circuit-switched and hierarchical TDM networks, where traffic routing depended on physical exchange boundaries. In the present telecom ecosystem, which is predominantly IP-based, software-defined, and centrally managed, such structures have become technologically obsolete and no longer reflect contemporary network design or consumer usage patterns.
7. Lower-level interconnection requires calls to traverse multiple switching nodes and tandem exchanges before termination. Each additional handover introduces signal processing delays, codec conversions, and higher susceptibility to packet loss and jitter. For consumers, these results in distorted voice quality, intermittent audio, echo, and inconsistent call performance, particularly during peak traffic periods.
8. Legacy interconnection models involve complex signaling across multiple network layers, increasing the probability of signaling failures and congestion. Consumers experience longer call setup times, frequent call failures, and mid-call disconnections, despite adequate network coverage, thereby adversely impacting reliability and user confidence in telecom services.
9. Mandatory SDCA/LDCA-level interconnection requires operators to establish and maintain multiple physical Points of Interconnection, significantly increasing cost and deployment timelines. This acts as a deterrent to service expansion in smaller towns and semi-urban or rural areas, leading to delayed availability of fixed-line and broadband services and widening the digital divide for consumers in these regions.
10. Lower-level interconnection disproportionately burdens new and expanding service providers, particularly in fixed-line services. As a result, operators often refrain from entering or expanding in certain areas, limiting consumer choice, weakening competitive pressure, and reducing incentives to improve service quality or pricing.
11. Modern IP networks are capable of efficient traffic aggregation, redundancy, and routing at the LSA level. Maintaining SDCA/LDCA-level interconnection does not deliver any improvement in service quality, resilience, or reliability for consumers. Instead, it leads to duplication of infrastructure, inefficient capital deployment, and higher operational costs, which are ultimately passed on to end users.

12. Continued regulatory reliance on SDCA/LDCA-level interconnection creates artificial bottlenecks that delay service deployment, degrade quality of service, and increase costs, without serving any discernible public interest. Transitioning to LSA-level interconnection aligns with modern network architecture and is essential to safeguard consumer interest through better quality, faster roll-out, enhanced competition, and affordable services.
13. A market where the roll-out of services by one operator is effectively dependent on the cooperation or readiness of a competing operator directly undermines consumer interest. Consumers are deprived of timely access to services, not due to technical impossibility, but due to regulatory inertia. Fair competition is not an end in itself; it is a means to protect consumers by ensuring better quality, wider choice, and competitive pricing. Interconnection frameworks that allow strategic delay or technical veto power are inconsistent with both competition law principles and consumer welfare objectives.
14. The Authority's Recommendations dated 6 February 2025 on the Revision of the National Numbering Plan (NNP) mark a decisive shift towards an LSA-based, 10-digit closed numbering scheme for fixed-line services. This transition reflects the reality that modern telecommunications networks no longer operate on fragmented SDCA/LDCA hierarchies, but on centralized, IP-based architectures capable of intelligent routing at the LSA level. The recommendations explicitly recognize that effective implementation of an LSA-based numbering plan is contingent upon the availability of LSA-level IP interconnection.
15. Retaining SDCA/LDCA-level interconnection in parallel with LSA-based numbering would create a fundamental misalignment between numbering logic and network routing architecture. Numbering plans are intended to provide clarity, predictability, and uniformity in call routing. When numbering is centralized at the LSA level but interconnection remains decentralized, calls are forced to traverse unnecessary intermediate nodes, leading to routing inefficiencies, increased latency, and higher probability of call failure.
16. From a consumer perspective, such regulatory incoherence manifests in several tangible harms. Consumers may experience unexpected call failures, inconsistent call completion, incorrect call routing, and unpredictable call behavior, particularly for fixed-line and fixed-to-mobile calls. This is especially critical for emergency calls,

government helplines, healthcare services, and financial services, where routing errors or delays can have serious consequences.

17. Further, inconsistent alignment between numbering and interconnection frameworks complicates billing and charging transparency. Consumers may face ambiguity regarding whether a call is treated as local or long-distance, leading to billing disputes, unexpected charges, and erosion of trust in service providers. A harmonized LSA-based numbering and interconnection framework ensures that all intra-LSA calls are uniformly treated as local, enhancing tariff clarity and consumer confidence.
18. Additionally, maintaining SDCA/LDCA-level interconnection in an LSA-based numbering environment imposes avoidable operational complexity on service providers, increasing the likelihood of network misconfigurations and service outages. Such outages disproportionately affect consumers, who lack visibility into interconnection arrangements but bear the full impact of service disruption.
19. Most importantly, regulatory inconsistency during a fundamental numbering transition undermines consumer trust in the telecom ecosystem. Consumers expect numbering reforms to simplify communication, not introduce new uncertainties. A fragmented interconnection framework dilutes the benefits of numbering reform and risks transforming a consumer-friendly initiative into a source of confusion and dissatisfaction.
20. Therefore, from a consumer welfare standpoint, it is imperative that numbering reform and interconnection reform proceed in a synchronized manner. Aligning LSA-based closed numbering with mandatory LSA-level IP interconnection will ensure predictable call routing, improved service reliability, tariff transparency, and seamless user experience, thereby reinforcing consumer trust and safeguarding the public interest during India's transition to next-generation networks.
21. In light of constitutional mandates, consumer protection principles, and technological realities, the following reforms are essential to ensure that consumer interest remains paramount:

i. LSA-Level Interconnection as the Default: Interconnection for PSTN–PSTN, PLMN–PSTN, and PSTN–PLMN calls should be mandated at the LSA level, ensuring uniform service quality and seamless connectivity across the service area.

ii. Mandatory Migration with Consumer Safeguards: Existing SDCA/LDCA-level PoIs should be migrated to the LSA level within prescribed timelines, with strict

regulatory oversight to ensure no service disruption; no degradation of call quality; and no increase in consumer tariffs due to migration costs.

iii. Modernisation of Regulatory Instruments: The Telecom Interconnection Regulations, 2018 and the Guidelines annexed to the Reference Interconnection Offer Regulations, 2002 must be amended to remove obsolete SDCA-level provisions whose transition period has already lapsed; Replace legacy routing tables with LSA-centric IP-based routing logic; and Harmonize the definition of "local call" across mobile and fixed services, treating all intra-LSA calls as local.

22. Telecommunications regulation exists not to preserve legacy infrastructure, protect institutional convenience, or accommodate procedural inertia, but to serve the overarching public interest. At its core, telecom regulation is a social contract between the State, service providers, and consumers, wherein consumers—through tariffs, usage charges, and universal service contributions—fund the network, sustain its operations, and rely on its uninterrupted availability for everyday life, livelihoods, emergency response, governance, and democratic participation.
23. Consumers are the ultimate stakeholders of the telecommunications ecosystem. They experience, first-hand, the consequences of regulatory design choices—whether in the form of clear calls or dropped connections, timely service availability or prolonged delays, affordable tariffs or cost escalations, and seamless access or persistent fragmentation. When regulatory frameworks fail to evolve in step with technological reality, the burden of such failure is not borne by institutions, but by millions of consumers whose access to essential communication services is compromised.
24. An interconnection framework that remains technologically obsolete, economically inefficient, and procedurally fragmented fails consumers at every level. It degrades quality of service through avoidable routing inefficiencies, inflates costs through duplication of infrastructure, restricts access by delaying service roll-outs in underserved areas, and entrenches inequity by denying uniform service experience across regions. Such a framework undermines consumer confidence, weakens competition, and erodes the foundational principles of fairness and non-discrimination that must guide regulation of public utilities.
25. In this context, a decisive shift to LSA-level interconnection is not merely a matter of network optimisation or operational efficiency. It is a consumer rights imperative, essential to uphold the constitutional values of equality, dignity, and freedom of communication, as well as the statutory protections guaranteed under consumer

protection and telecom laws. Aligning interconnection policy with modern, IP-based architectures ensures that regulatory intent translates into tangible consumer benefits—better quality of service, faster deployment, wider choice, and transparent pricing.

26. Ultimately, the legitimacy of telecom regulation is measured not by the preservation of legacy systems, but by its ability to anticipate change, remove artificial barriers, and place consumers unequivocally at the center of the regulatory framework. Transitioning to LSA-level interconnection is therefore indispensable to fulfilling the fundamental objective of telecommunications regulation in India: to ensure reliable, affordable, and equitable access to communication services for all consumers, in a manner consistent with constitutional mandate and public interest.

Q2. For PSTN to PSTN, PLMN to PSTN, PSTN to PLMN and PLMN to PLMN, should interconnection be allowed at a level other than the LSA level, based on mutual agreement?

1. The interconnection arrangements must be governed by service quality, affordability, reliability, and non-discriminatory access, rather than the mutual convenience or bargaining position of service providers. Consumers are not parties to interconnection agreements, yet they bear the direct consequences of such arrangements in terms of call quality, service availability, and pricing.
2. LSA-level interconnection best aligns with modern IP-based network architecture and delivers tangible consumer benefits, including faster call setup, higher call completion rates, uniform quality of service across the service area, and efficient routing for PSTN–PSTN, PLMN–PSTN, PSTN–PLMN, and PLMN–PLMN calls. Accordingly, from a consumer welfare perspective, LSA-level interconnection should be the default and standard level.
3. Permitting interconnection at SDCA or LDCA levels solely on the basis of mutual agreement risks re-introducing fragmentation and inconsistency into the interconnection framework. Such arrangements may be driven by operator-specific considerations rather than consumer benefit, leading to uneven service quality, avoidable call routing inefficiencies, and increased operational costs that are ultimately passed on to consumers.
4. Allowing multiple interconnection levels can result in unequal consumer experiences within the same LSA, where consumers in certain districts or towns receive inferior

call quality or delayed service availability due to localized interconnection constraints. Such outcomes are inconsistent with the principle of equitable access to telecom services, which consumers reasonably expect within a licensed service area.

5. While flexibility between operators may be desirable, consumer interest requires regulatory certainty and uniformity. Interconnection arrangements based purely on mutual agreement, without regulatory guardrails, risk creating opaque and non-transparent outcomes that consumers cannot predict, challenge, or influence.
6. From a consumer perspective, interconnection at a level other than LSA may be permitted only in exceptional circumstances, where operators can demonstrably establish that the alternative arrangement improves quality of service; there is no increase in cost or tariffs for consumers; service availability and reliability are not compromised; and such arrangements do not delay or restrict service rollout.
7. Any deviation from LSA-level interconnection should be subject to prior regulatory oversight, transparent disclosure, and strict service-level obligations. Consumers should not be exposed to service degradation or uncertainty arising from private inter-operator arrangements.
8. Interconnection for PSTN–PSTN, PLMN–PSTN, PSTN–PLMN, and PLMN–PLMN calls should ordinarily not be allowed at levels other than LSA. Limited flexibility may be permitted only where consumer interest is clearly advanced and protected. Regulatory policy must ensure that interconnection frameworks serve consumers first, not legacy structures or private bargaining outcomes.

Q.3. Based on your response to Question 1 and 2 above, what changes, if any, are required in the level of interconnection / point of traffic handover as provided in the following - Telecommunication Interconnection Regulations (TIR), 2018, and Guidelines annexed to the Telecommunication Interconnection (Reference Interconnection Offer) Regulations, 2002?

Any modification to the level of interconnection or point of traffic handover must be guided by the principle that consumers are the ultimate stakeholders of telecommunications services. Regulatory provisions should therefore ensure reliable service, uniform quality, affordability, transparency, and non-discriminatory access across the Licensed Service Area (LSA).

- **Changes Required in the Telecommunication Interconnection Regulations (TIR), 2018**

1. From a consumer standpoint, the TIR, 2018 should be amended to clearly designate LSA-level interconnection as the default and standard level for PSTN–PSTN, PLMN–PSTN, PSTN–PLMN, and PLMN–PLMN traffic. This would ensure consistent call quality, predictable routing, and uniform consumer experience across the service area.
2. Provisions permitting or defaulting to SDCA or LDCA-level interconnection, including transitional allowances for legacy PoIs, should be removed. The continuation of such provisions beyond their relevance perpetuates fragmentation and directly undermines consumer interests through inefficiency and service degradation.
3. While mutual agreement between operators may be permitted in limited circumstances, the TIR should expressly provide that no deviation from LSA-level interconnection shall be allowed if it results in reduced service quality, delayed service availability, or increased costs to consumers. Consumer impact must be a mandatory consideration in approving any alternative arrangement.
4. The Regulations should incorporate explicit obligations requiring operators to ensure uninterrupted service, maintenance of quality of service standards, and consumer protection during any interconnection transition or migration. Consumers should not bear the risk of network reconfiguration or inter-operator disputes.

- **Changes Required in the Guidelines Annexed to the Reference Interconnection Offer (RIO) Regulations, 2002**

1. The traffic routing tables and interconnection scenarios provided in the RIO Guidelines, which are currently based on SDCA, LDCA, and TAX-centric hierarchies, should be comprehensively revised. From a consumer perspective, these legacy routing frameworks no longer reflect modern IP-based networks and lead to inefficient call handling and degraded service experience.
2. The Guidelines should be amended to establish LSA-level traffic handover as the primary reference point for local, intra-circle, and inter-circle calls. This will simplify routing logic, reduce unnecessary call hops, and directly improve call quality and reliability for consumers.
3. To ensure billing clarity and transparency for consumers, the Guidelines should align with an LSA-based framework by classifying all intra-LSA calls as local and inter-LSA calls as long-distance, uniformly across mobile and fixed-line services. This will reduce billing disputes and enhance consumer trust.
4. Definitions and frameworks tied exclusively to SDCA/LDCA-based switching hierarchies should be removed from the Guidelines, as their continued presence

creates regulatory ambiguity and operational inconsistency that ultimately harms consumers.

Both the TIR, 2018 and the Guidelines annexed to the RIO Regulations, 2002 require targeted amendments to institutionalise LSA-level interconnection as the norm, eliminate obsolete legacy provisions, and ensure that interconnection arrangements are transparent, predictable, and consumer-friendly. Such reforms are essential to safeguard service quality, affordability, equitable access, and consumer confidence, and to ensure that interconnection regulation remains aligned with contemporary technology and the public interest.

Q.4. Is there a need to mandate multi-path resiliency and redundancy in the Point of Interconnection (POI) framework to mitigate link failure at the primary POI in the case of:

i. **PSTN-PSTN interconnection,**
ii. **PLMN-PLMN interconnection, and**
iii. **PLMN-PSTN interconnection?**

If yes, kindly provide an appropriate architectural framework with diagram.

Q5. Is there a need to incorporate security provisions in the interconnection framework to ensure network security? If yes, kindly provide details along with an appropriate architectural diagram.

Answer of 4 &5

1. Multi-path resiliency and redundancy at the Point of Interconnection (PoI) is essential to ensure uninterrupted access to telecommunications services, which are recognised as critical public utilities. Any failure at a primary PoI—whether due to fibre cuts, equipment faults, congestion, or external disruptions—directly results in call failures and service outages for consumers. Such outcomes are inconsistent with the objectives of the TRAI Quality of Service (QoS) Regulations, which mandate reliability, call completion, and continuity of service across networks.
2. Accordingly, it is necessary to mandate multi-path redundancy and automatic failover mechanisms for PSTN–PSTN, PLMN–PLMN, and PLMN–PSTN interconnection. The interconnection framework should require operators to maintain geographically diverse, logically independent PoIs at the LSA level, ensuring that traffic is seamlessly rerouted in the event of link or node failure, without perceptible service degradation to consumers.

3. From a QoS and public safety standpoint, the absence of redundancy poses a serious risk to emergency communications, including access to services such as 112, healthcare helplines, disaster response, and law enforcement. Interconnection failures disproportionately affect such calls, undermining the State's obligation to ensure uninterrupted access to emergency services. A resilient PoI framework is therefore indispensable to fulfilling statutory and constitutional obligations relating to public safety and consumer protection.
4. In parallel, there is a clear need to incorporate mandatory security provisions within the interconnection framework. Interconnection points are high-risk gateways vulnerable to signalling attacks, spoofing, interception, and denial-of-service incidents, all of which manifest as service failures, fraud, or privacy breaches for consumers. Such risks directly undermine QoS standards and consumer trust in telecom networks.
5. To align with QoS Regulations and protect emergency service integrity, interconnection arrangements should require secure IP interconnection, including authentication, encryption, traffic segregation, and real-time monitoring at PoIs. Operators should be obligated to deploy appropriate security controls to prevent unauthorized access, ensure signalling integrity, and enable rapid detection and mitigation of security incidents, with defined accountability for service restoration.
6. In conclusion, from a consumer-centric compliance perspective, resiliency, redundancy, and security at the PoI must be treated as mandatory regulatory requirements, not optional engineering choices. Embedding these obligations within the interconnection framework is essential to uphold QoS standards, safeguard emergency communications, ensure service continuity, and reinforce consumer confidence in the reliability and safety of India's telecommunications infrastructure.

Q.6. **A. Should IP-based interconnection be mandated for new interconnections in the regulatory framework? Kindly justify your response.**

B. Should TSPs be mandated to migrate existing TDM based E1 interconnection to IP-based interconnection within a specified period? If yes, suggest timelines. Kindly justify your response.

1. Failures at the Point of Interconnection (PoI) have a direct and measurable impact on Call Drop Rate (CDR) as prescribed under the TRAI Quality of Service Regulations. Single-homed or non-redundant PoIs create concentrated failure points where even

minor link degradation or equipment faults result in abrupt call termination. Such failures are reflected as elevated call drop rates, despite adequate radio coverage and core network availability. Mandating multi-path resiliency and geographically diverse PoIs would significantly reduce PoI-induced call drops and ensure compliance with prescribed CDR benchmarks.

2. Similarly, the absence of redundancy and automatic failover at interconnection points adversely affects the Call Setup Success Rate (CSSR). When signalling traffic is routed through a single PoI or constrained path, congestion or signalling failure at that point leads to call setup delays, repeated call attempts, and call setup failures. This manifests as prolonged ringing, "network busy" messages, and failed call attempts experienced by users. Ensuring multiple interconnection paths with automated rerouting directly improves signalling reliability and enhances CSSR performance in line with QoS requirements.
3. PoI-level vulnerabilities also contribute materially to network congestion, particularly during peak traffic periods or partial outages. Concentrating traffic through limited interconnection points leads to saturation of signalling links and media gateways, resulting in congestion-induced call blocking and degradation of voice quality. Such congestion is not reflective of overall network capacity but is an outcome of inadequate interconnection design. A resilient, multi-path PoI framework distributes traffic load, prevents localized bottlenecks, and supports sustained QoS compliance even during abnormal traffic conditions.
4. Interconnection resilience is also intrinsically linked to the availability and reliability of emergency services, including access to emergency numbers such as 112 and other critical helplines. PoI failures can prevent emergency calls from being completed across networks, thereby compromising public safety. Ensuring redundant and secure interconnection paths is therefore essential to meet service continuity obligations and to ensure that emergency calls are neither blocked nor dropped due to interconnection-related failures.
5. In addition to resiliency, security at PoIs is integral to QoS assurance. Signalling attacks, spoofing, or denial-of-service incidents at unsecured interconnection points can artificially inflate call drops, degrade CSSR, and cause congestion-like symptoms. Incorporating mandatory security controls—such as authenticated signalling, traffic monitoring, and protection against anomalous traffic—helps maintain stable network

performance and prevents QoS degradation arising from malicious or unauthorized activity.

COMPLIANCE

Telecommunications networks constitute essential public infrastructure, and uninterrupted service continuity is a core objective of telecom regulation. Failures at the Point of Interconnection (PoI) have a systemic impact on network performance and directly impair compliance with the Quality of Service (QoS) standards prescribed by the Authority. Accordingly, the interconnection framework must incorporate mandatory provisions for resiliency, redundancy, and security to ensure reliable service delivery across networks.

Single-homed or non-redundant PoIs create concentrated points of failure, which significantly contribute to elevated Call Drop Rates (CDR). Call drops arising from PoI failures are independent of radio access or end-user conditions and are instead attributable to interconnection design deficiencies. Such failures result in abrupt call termination during active sessions and undermine compliance with prescribed CDR benchmarks. Mandating geographically diverse PoIs with automatic failover capabilities would substantially mitigate PoI-induced call drops and improve adherence to QoS norms.

Similarly, Call Setup Success Rate (CSSR) is adversely affected by congestion or signaling failures at inadequately provisioned interconnection points. When signaling traffic is routed through a single PoI or constrained path, even minor congestion can result in call setup delays, repeated call attempts, and failed call initiations. These outcomes are reflected in reduced CSSR performance and inconsistent user experience. Multi-path interconnection with intelligent rerouting ensures signaling resilience and supports sustained compliance with CSSR thresholds.

PoI-related constraints are also a significant contributor to network congestion, particularly during peak traffic periods, maintenance activities, or partial outages. Concentration of traffic at limited interconnection points leads to saturation of signalling links and media gateways, resulting in call blocking and degradation of voice quality. Such congestion is artificial in nature and does not reflect overall network capacity. A resilient interconnection architecture distributes traffic load

across multiple paths, prevents localized bottlenecks, and ensures stable network performance under varying traffic conditions.

Interconnection resiliency is further critical for ensuring uninterrupted access to emergency services, including emergency number 112 and other essential public safety and healthcare helplines. PoI failures can prevent emergency calls from being completed across networks, posing serious risks to life and public safety. Ensuring redundant and reliable interconnection paths is therefore integral to fulfilling statutory obligations relating to emergency service accessibility and continuity.

In addition to physical and logical redundancy, security at PoIs is essential for maintaining QoS compliance. Unsecured interconnection points are vulnerable to signalling manipulation, spoofing, and denial-of-service attacks, which can artificially inflate call drops, reduce call setup success, and induce congestion-like conditions. Incorporating mandatory security controls—such as authenticated signalling, traffic segregation, continuous monitoring, and anomaly detection—ensures network stability and prevents QoS degradation arising from malicious or unauthorized activities.

In conclusion, mandating multi-path resiliency, redundancy, and robust security at Points of Interconnection is necessary to ensure sustained compliance with QoS parameters relating to call drops, call setup success, and congestion management. Such measures are indispensable to safeguarding service continuity, ensuring reliable access to emergency services, and maintaining the integrity and reliability of India's telecommunications networks in line with regulatory objectives.

Q7. Should the existing processes of 'provisioning and augmentation of ports at POIs' under Chapter IV of the TIR 2018 in respect of following need revision:

i. Seeking of ports at POIs,

ii. Request for initial provisioning of ports, and

iii. Request for augmentation of POIs?

Kindly provide your response with justification.

1. Yes, the existing processes governing the seeking, provisioning, and augmentation of ports at Points of Interconnection (PoIs) under Chapter IV of the TIR 2018 require

revision. While these processes are framed as inter-operator procedures, their outcomes directly affect end users in the form of call failures, congestion, delayed service availability, and inconsistent quality of service. Any procedural rigidity or inefficiency in PoI provisioning ultimately manifests as consumer harm.

2. The current framework for seeking ports at PoIs is largely procedural and reactive, often dependent on bilateral correspondence and extended timelines. From the perspective of consumers, such delays result in congestion at existing PoIs, leading to increased call blocking and call setup failures during peak hours. The process should therefore be revised to ensure time-bound, transparent, and predictable port allocation mechanisms that proactively account for traffic growth and consumer demand.
3. Delays or disputes in the initial provisioning of ports at PoIs frequently translate into delayed launch of services in new areas or degraded service quality at the time of rollout. Consumers experience this as poor call completion, inability to connect across networks, or limited service availability despite network readiness. The existing process should be streamlined to mandate advance provisioning based on realistic traffic projections, with clearly defined timelines to ensure that consumers receive uninterrupted service from the outset.
4. The current approach to port augmentation is often triggered only after congestion has already occurred, resulting in temporary service degradation before relief is provided. From a consumer standpoint, this reactive model is inadequate. The framework should be revised to enable proactive and automated augmentation thresholds, ensuring that capacity expansion occurs before QoS parameters such as Call Setup Success Rate and congestion levels are adversely affected.
5. Port provisioning and augmentation processes must be explicitly aligned with QoS obligations under the applicable regulations. Failure to timely provision or augment PoIs directly impacts call drops, call setup success, and congestion. Revised procedures should clearly link PoI capacity obligations to QoS performance, ensuring that consumers are not subjected to persistent service degradation due to inter-operator delays
6. Consumers have no visibility into PoI-related constraints, yet bear the consequences of their inadequacy. The revised framework should introduce greater transparency, including clear responsibility for delays and enforceable accountability mechanisms, so that service deficiencies arising from PoI constraints are promptly addressed in the interest of consumers.

7. In conclusion, the processes under Chapter IV of the TIR 2018 relating to seeking, initial provisioning, and augmentation of PoI ports require revision to make them more proactive, time-bound, and aligned with service quality obligations. Streamlining these processes is essential to ensure congestion-free interconnection, timely service availability, and consistent quality of service for end users, thereby advancing the fundamental objective of telecom regulation to protect consumer interests.

Q.8.Should the existing framework for Interconnection process and timelines, as provided in the existing TRAI regulations including, The Telecommunication Interconnection Regulations (TIR) 2018, The Telecommunication Interconnection (RIO) Regulations, 2002, and The Telecommunication Interconnection (Charges and Revenue Sharing) Regulation 2001 be revised or continued.

Kindly indicate challenges, if any, currently being faced in the implementation of the framework by the TSPs and their possible remedies. Kindly provide your response with detailed justifications.

1. The existing framework governing interconnection processes and timelines under the Telecommunication Interconnection Regulations, 2018, the Telecommunication Interconnection (Reference Interconnection Offer) Regulations, 2002, and the Telecommunication Interconnection (Charges and Revenue Sharing) Regulation, 2001 requires comprehensive revision rather than continuation in its present form. While these regulations were appropriate for an earlier phase of network evolution, their implementation in the current IP-based, converged telecom environment has revealed structural and procedural limitations that directly impact service quality and consumer experience.
2. One of the principal challenges in the current framework is the excessive reliance on bilateral processes and manual coordination between Telecom Service Providers (TSPs) for interconnection provisioning, augmentation, and dispute resolution. Delays arising from prolonged negotiations, lack of uniform interpretation of regulatory provisions, and absence of enforceable timelines often result in congestion at interconnection points, delayed service roll-outs, and inconsistent call completion for end users. These delays are not transparent to consumers, yet they manifest as call failures, poor voice quality, and unavailability of services.

3. Another significant challenge lies in the continued dependence on legacy SDCA/LDCA-based constructs within the RIO Regulations and associated routing frameworks, which are increasingly incompatible with modern IP-based networks. This misalignment creates operational complexity for TSPs and increases the likelihood of routing inefficiencies, signaling failures, and avoidable congestion. For consumers, this results in longer call setup times, higher call drop rates, and fragmented service quality within the same Licensed Service Area.
4. The interconnection charging and revenue sharing framework under the 2001 Regulations also presents implementation challenges in the current environment. Charges and settlement mechanisms designed for circuit-switched traffic and distance-based routing no longer reflect the cost structures of IP-based networks. This mismatch often leads to disputes between operators, delayed settlements, and, in some cases, strategic under-provisioning of interconnection capacity. Such outcomes indirectly affect consumers through degraded service quality and constrained competition.
5. Further, the absence of explicit linkage between interconnection obligations and Quality of Service (QoS) compliance weakens the effectiveness of the regulatory framework. Interconnection-related congestion or failures frequently lead to breaches of QoS parameters such as Call Setup Success Rate and Call Drop Rate, yet accountability remains diffused across operators. Consumers have no effective mechanism to seek redress for service deficiencies arising specifically from interconnection constraints.
6. In view of these challenges, the interconnection framework requires revision to introduce **clearer, technology-neutral provisions, streamlined timelines, and stronger enforcement mechanisms**. The regulatory framework should move towards standardized, LSA-level interconnection with defined capacity planning norms, automated provisioning triggers, and time-bound augmentation processes. This would reduce disputes, eliminate operational ambiguities, and ensure predictable service delivery.

   Additionally, the interconnection charging and revenue-sharing regime should be reviewed to align with contemporary network architectures and usage patterns, thereby reducing disputes and ensuring that cost recovery mechanisms do not distort service provisioning decisions. Simplification and rationalization of these provisions

would ultimately benefit consumers by improving service reliability and enabling competitive pricing.

7. In continuation of the existing interconnection framework without revision would perpetuate inefficiencies and consumer harm. A comprehensive update of the interconnection regulations—across processes, timelines, and charging principles—is necessary to ensure alignment with modern networks, strengthen QoS compliance, reduce inter-operator friction, and safeguard the interests of end users who rely on uninterrupted, affordable, and high-quality telecommunications services.

Q.9. Whether there is a need to revise the existing process of disconnection of POIs as provided in the regulation 11 of the Telecommunication Interconnection Regulations (TIR) 2018? If yes, what specific changes should be done in the disconnection procedure?

Kindly justify your response.

1. The existing process for disconnection of Points of Interconnection (PoIs) as provided under Regulation 11 of the Telecommunication Interconnection Regulations, 2018 is, in principle, appropriate and strikes a reasonable balance between operational flexibility and regulatory oversight. The procedure adequately recognizes that disconnection of PoIs is a sensitive action with potential service implications and therefore requires structured notice and due process.

   However, from the perspective of ensuring service continuity, transparency, and consumer protection, certain procedural refinements are necessary to enhance predictability, reduce ambiguity, and prevent unintended disruption to end users.

2. Firstly, the disconnection process should be automated through a centralized online portal administered or overseen by the Authority. Automation would ensure that all stakeholders—including interconnected service providers and the regulator—are simultaneously and transparently informed of proposed disconnections, timelines, and underlying reasons. This would eliminate information asymmetry, reduce procedural delays, and prevent disputes arising from lack of timely communication.

3. Secondly, it is essential that the regulations explicitly ensure that emergency services and emergency call routing are not impacted by any PoI disconnection. Any disconnection that may affect access to emergency numbers such as 112 or other critical public safety services should require prior regulatory approval, along with

confirmation of alternate routing arrangements to safeguard uninterrupted access for users.

4. Thirdly, the introduction of a minimal usage threshold is recommended to objectively determine when a PoI has become functionally defunct. Where traffic consistently remains below a defined threshold over a specified period, the disconnection or retirement of such PoIs should be automatically triggered, subject to regulatory visibility. This would prevent the unnecessary maintenance of obsolete interconnection points while ensuring that consumers are not affected due to abrupt or unjustified disconnections.
5. Finally, the overall objective of the disconnection framework should be to ensure that disconnections are predictable, time-bound, and swift where justified, while fully safeguarding consumer interests. A transparent, automated, and usage-based disconnection process would reduce regulatory uncertainty, prevent strategic misuse of disconnection provisions, and ensure that service continuity for consumers remains uncompromised.
6. While the substantive provisions of Regulation 11 do not require fundamental revision, procedural enhancements through automation, explicit protection of emergency services, and objective usage-based criteria would significantly strengthen the effectiveness of the disconnection framework and align it with the overarching objective of protecting consumers and ensuring regulatory clarity.

Q.10. Is there a need to introduce a process for the surrender or closure of POIs in the regulatory framework? If yes, what should be the criteria, procedure, charges, and timelines, including the minimum retention period for POIs before a surrender or closure request can be made? Kindly justify your response.

1. Yes, there is a clear need to formally introduce a structured process for the surrender or closure of Points of Interconnection (PoIs) within the regulatory framework. At present, the absence of an explicit, standardized mechanism for PoI surrender or closure leads to procedural ambiguity, prolonged maintenance of redundant interconnection points, and avoidable disputes between service providers—outcomes that ultimately affect service quality and predictability for end users.
2. From a service continuity and consumer protection standpoint, a clearly defined surrender or closure process would ensure that obsolete or underutilized PoIs are

retired in an orderly, transparent, and non-disruptive manner, without compromising access to services or creating uncertainty for interconnected operators.

3. The criteria for surrender or closure should be objective, measurable, and technology-neutral. These may include sustained traffic below a defined minimum usage threshold over a continuous and specified period, migration of traffic to higher-level interconnection points (such as LSA-level PoIs), network modernization or transition to IP-based interconnection, or redundancy due to availability of alternative resilient PoIs. Such criteria would ensure that PoIs are closed only when they are no longer operationally necessary and do not serve a meaningful role in traffic exchange.
4. The procedure for surrender or closure should be standardized and automated through a centralized online portal to ensure transparency and simultaneous notification to all stakeholders, including the concerned service providers and the Authority. The process should require advance notice, disclosure of justification, confirmation of alternative routing arrangements, and certification that quality of service and emergency call access will not be adversely affected. Regulatory visibility and, where necessary, approval should be built into the process to prevent arbitrary or unilateral actions.
5. With respect to charges, the surrender or closure of PoIs should not impose additional financial burdens that could deter rational network optimization. Charges, if any, should be limited to recovery of actual and reasonable administrative or decommissioning costs, and should not be punitive in nature. Importantly, consumers should not bear any direct or indirect cost arising from PoI closure.
6. The timelines for processing surrender or closure requests should be clearly defined and time-bound to ensure predictability. Once a valid request meeting the prescribed criteria is submitted, the closure process should be completed within a reasonable and specified period, subject to confirmation of service continuity and compliance with quality standards. Delays in processing such requests can prolong the operation of redundant infrastructure, leading to inefficiencies without any consumer benefit.
7. A minimum retention period should also be prescribed to prevent frequent or strategic opening and closure of PoIs. Such a retention period would ensure network stability and allow sufficient time for traffic patterns to stabilize before closure is considered. However, this period should be reasonable and flexible, with exceptions permitted where PoIs become demonstrably redundant due to network consolidation, technological upgrades, or regulatory mandates.

8. Introducing a formal process for surrender or closure of PoIs—based on objective criteria, transparent procedures, reasonable timelines, and minimal charges—is necessary to modernize the interconnection framework. Such a process would promote efficient network management while safeguarding service continuity, quality of service, and consumer confidence in the telecommunications ecosystem.

Q.11. In order to safeguard the interest of TSPs arising due to financial obligations of interconnection, is there a requirement for furnishing bank guarantee by one TSP to the other TSP? If yes, please provide the process and methodology for determining the initial bank guarantee amount and any subsequent bank guarantee amount, if required. Kindly justify your response.

Q12. Should a procedure be established for addressing delays in the payment of interconnection-related charges? If yes, what should be the procedure to address such delays? Kindly provide your response with justification.

Answered 11&12

1. There may be a limited need for financial safeguards such as a bank guarantee (BG) to address genuine credit risk arising from interconnection-related financial obligations between TSPs. However, from a consumer standpoint, such safeguards must not become tools for delaying interconnection, restricting capacity, or disrupting services. As emphasized in earlier responses, interconnection arrangements should not allow financial disputes between TSPs to adversely impact service continuity, QoS, or consumer access, particularly for emergency services.
2. If a BG requirement is introduced, it should be objective, proportionate, and non-discriminatory, and applicable only where there is demonstrable payment risk. The initial BG amount should be determined based on historical interconnection charges, average billing over a defined period, and payment track record, rather than speculative or inflated estimates. Any subsequent revision of the BG should be data-driven and periodic, ensuring that financial safeguards do not become an entry barrier or a means to exert commercial pressure, which could ultimately limit competition and consumer choice (as highlighted in earlier questions on interconnection delays and PoI provisioning).
3. Consistent with earlier responses on PoI disconnection, resiliency, and QoS obligations, financial disputes must be clearly ring-fenced from technical interconnection and traffic exchange. Under no circumstances should delay in

furnishing or replenishing a BG, or disputes over interconnection charges, result in suspension, throttling, or degradation of interconnection capacity, as such actions directly harm consumers through call failures, congestion, and service outages.

4. Yes, a defined and transparent procedure should be established to address delays in interconnection-related payments. Such a procedure should prioritise early intimation, reconciliation, and time-bound resolution, including standardized billing, dispute-flagging mechanisms, and escalation timelines. Interest or late-payment charges, if applicable, should be regulated and reasonable, ensuring that financial discipline is maintained without incentivising aggressive recovery measures that could indirectly affect consumers.
5. As reiterated in responses to earlier questions on QoS, emergency services, and PoI disconnection, the Authority should retain regulatory oversight over both BG invocation and payment-delay resolution processes. This is essential to ensure that financial enforcement actions do not compromise QoS parameters (CDR, CSSR, congestion) or disrupt access to emergency services. The overarching objective must remain that commercial disagreements between TSPs are resolved predictably and transparently, without consumers bearing the consequences in terms of degraded service or restricted access.

Q.13. Is there a need to revise the financial disincentive framework as provided in these regulations. If yes, what specific changes should be done? Kindly justify your response.

1. No, there is no immediate need to revise the existing financial disincentive framework. From a consumer perspective, the current framework is adequate to deter non-compliance and protect service quality, provided it is **applied uniformly, transparently, and in a non-discriminatory manner across all service providers**.
2. Inconsistent or selective enforcement weakens regulatory effectiveness and ultimately harms consumers through degraded quality of service and delayed corrective action. Therefore, rather than revising the framework itself, the focus should be on **consistent enforcement and timely application of disincentives**, ensuring that service deficiencies affecting consumers are addressed promptly and equitably.

Q14. Is there a need to revise the existing SMS termination charge? If yes, what are the

considerations necessitating such a revision? If not, kindly provide justification.

1. There is no immediate need to revise the existing SMS termination charge, provided it remains cost-reflective. From a consumer perspective, stability in SMS termination pricing is important to ensure that essential communications—such as banking alerts, OTPs, and service notifications—remain reliable and affordable.
2. Any revision, if considered necessary in the future, should be based strictly on updated cost studies and should be carefully aligned with the Authority's anti-spam framework under the Telecom Commercial Communications Customer Preference Regulations (TCCCPR). Deterrent pricing, where applicable, should be targeted only at spam and unsolicited commercial SMS, and not at legitimate Application-to-Person (A2P) messages that serve critical consumer needs.
3. Such a calibrated approach would protect consumers from spam while ensuring uninterrupted delivery of genuine and essential SMS services without additional cost burden.

Q15. Is there a need to prescribe SMS carriage charges when an NLDO carries SMS between the LSAs? If yes, what principles and methodology should apply? If not, kindly provide justification.

1. From a consumer perspective, there is no immediate need to prescribe separate SMS carriage charges when an NLDO carries SMS traffic between LSAs, as introducing additional charge layers risks increasing the overall cost of SMS delivery without delivering any corresponding improvement in service quality. Such costs are likely to be passed on to consumers, particularly affecting essential communications such as banking alerts, OTPs, and public service messages. However, if the Authority considers prescribing SMS carriage charges in the future, it should be strictly guided by cost-based, transparent, and non-discriminatory principles, ensuring that charges reflect actual incremental carriage costs, avoid double recovery, and do not undermine the affordability or reliability of legitimate SMS services.

Q16. Is there a need to revise the existing access charge to be paid by the service provider to the originating provider for IN services? If yes, kindly provide detailed explanation; if not, kindly provide justification.

1. There is no immediate need to revise the existing access charge payable by the service provider to the originating provider for Intelligent Network (IN) services, provided that the charge remains cost-reflective, transparent, and uniformly applied. Stability in access charges is important to ensure that commonly used IN-based services—such as toll-free numbers, helplines, customer care services, and essential service platforms—remain affordable and widely accessible to consumers.
2. Frequent or unjustified revision of access charges risks increasing the cost of IN services, which may be passed on to consumers either directly or indirectly, thereby reducing access to critical customer support, grievance redressal, and public-interest services. Any revision, if considered in the future, should therefore be based strictly on updated cost studies and should demonstrably serve consumer interest by improving service quality or efficiency, rather than merely reallocating revenues among service providers.

Q17. Are there any difficulties that service providers encounter in complying with existing IN Regulations, 2006 in Multi-Operator and Multi-Network Scenario? Kindly describe these challenges in detail and suggest possible regulatory remedial measures to overcome these challenges

1. In a multi-operator and multi-network environment, service providers face several implementation challenges under the existing IN Regulations, 2006, which ultimately impact consumers. One key challenge arises from interoperability and coordination issues between networks, leading to call failures, delayed call routing, or inconsistent service experience when IN calls traverse multiple operators. Consumers experience this as failed toll-free calls, difficulty reaching customer care numbers, or inconsistent access to helplines across networks.
2. Another challenge relates to complex charging, settlement, and reconciliation mechanisms in multi-operator scenarios, which often result in disputes or delays between service providers. Such disputes, while commercial in nature, manifest as congestion, degraded service quality, or delayed restoration of IN services, leaving consumers without reliable access to essential platforms. Consumers have no visibility into these inter-operator issues, yet bear the full impact of service disruption.
3. Further, legacy IN frameworks were designed for circuit-switched environments and are increasingly strained in IP-based and converged networks. This creates operational complexity for service providers and increases the risk of service

inconsistencies, particularly for pan-India IN services that consumers expect to function seamlessly irrespective of their location or access network.

4. To address these challenges in the interest of consumers, regulatory remedial measures should focus on simplifying IN interconnection and charging arrangements, ensuring technology-neutral implementation, and strengthening interoperability standards. Clear timelines, standardized processes, and regulatory oversight are necessary to ensure that inter-operator complexities do not result in service degradation. Most importantly, commercial or technical disputes between service providers must be ring-fenced from consumer experience, ensuring uninterrupted access to IN services such as helplines, toll-free numbers, and customer support platforms.

Q.18 Is there a need to revise the Telecom Regulatory Authority of India (Transit Charges for Bharat Sanchar Nigam Limited's Cellone Terminating Traffic) Regulation, 2005? Kindly provide your response with justification.

1. From a consumer perspective, there is no immediate need to revise the Telecom Regulatory Authority of India (Transit Charges for Bharat Sanchar Nigam Limited's CellOne Terminating Traffic) Regulation, 2005 provided the existing transit charges remain cost-reflective, transparent, and applied in a non-discriminatory manner. Stability in transit charges is important to avoid unintended increases in call costs, which may otherwise be passed on to consumers, particularly those using services in rural and remote areas where BSNL continues to play a significant role.
2. However, it is important to ensure that the continued applicability of the 2005 Regulations remains aligned with present-day network architecture and traffic patterns. Any future review should be driven strictly by updated cost assessments and technological changes, and not by legacy considerations alone. Such a review, if undertaken, should ensure that transit charges do not distort competition, delay call routing, or adversely impact service quality. Overall, maintaining predictable and fair transit charges best serves consumer interests by ensuring affordability, continuity of service, and reliable inter-network connectivity.

Q.19. The existing interconnection regulatory framework provides for application of origination, carriage, transit, transit carriage and termination charges for various levels of interconnections for PSTN-PSTN, PLMN-PLMN, PLMN-PSTN. Based on the

interconnection regulatory framework suggested in your response in Questions 1, 2 and 3 above, should there be a review of these charges? Kindly justify your response.

1. Yes, there is a need to review the existing origination, carriage, transit, and termination charges to align them with the proposed LSA-level, IP-based interconnection framework discussed in response to Questions 1, 2, and 3. A review is necessary to ensure that interconnection charges remain technology-neutral, cost-reflective, and non-distortive, and that legacy charge elements tied to SDCA/LDCA-based architectures do not result in inefficiencies or unintended cost burdens on consumers.

Q.20.For termination of emergency calls/SMSs from one TSP's network to another TSP's network, should there be a provision of any additional charges other than applicable IUC? If so, what should be the charges and the basis thereof?

1. No additional charges should be levied for the termination of emergency calls or SMSs beyond the applicable IUC. Emergency communications are critical for life, safety, and public welfare, and any additional charging could indirectly hinder seamless and prompt access to emergency services. Ensuring free, uninterrupted, and priority handling of emergency communications across all networks is essential to protect consumers and uphold public interest.

Q.21. Should the International Termination Charges (ITC) for international incoming calls to India be revised? If yes, what are the considerations necessitating such a revision. Kindly provide your response with justification.

1. International Termination Charges (ITC) for incoming international calls to India should be reviewed only if there is clear evidence that existing charges are no longer cost-reflective or aligned with current network realities. Any revision must be supported by transparent and updated cost studies, keeping in view the transition to IP-based networks and the declining marginal cost of call termination.
2. Unwarranted upward revision of ITC is likely to increase the cost of international calling, affecting families, migrant workers, students, and businesses that rely on affordable cross-border communication. Higher charges may also incentivize call bypass and grey routes, leading to poor call quality, security risks, and consumer inconvenience.
3. At the same time, ITC should be calibrated carefully to deter fraudulent routing and ensure network integrity, without discouraging legitimate international traffic.

Stability and predictability in ITC are essential to maintain transparency in retail tariffs and avoid sudden cost shocks to end users.

4. Accordingly, ITC should be revised only on the basis of demonstrable cost justification, technological evolution, and public interest considerations, ensuring that international connectivity to India remains affordable, reliable, and secure.

Q.22. Is there a need to address the issue of telemarketing and robo-calls within the interconnection framework? If yes, kindly provide your inputs on the possible approaches. Kindly justify your response.

1. Yes, the issue of telemarketing and robo-calls must be addressed within the interconnection framework, as these calls cause widespread nuisance, fraud, and loss of trust for consumers and are enabled by seamless inter-network connectivity.
2. Unsolicited and automated calls typically originate on one network and rapidly spread across multiple networks through interconnection. If controls are applied only at the originating network, consumers continue to receive such calls once the traffic crosses into other networks. Addressing the problem at the interconnection level allows harmful traffic to be identified and contained before it reaches a large number of users.
3. Possible approaches include requiring caller identification, authentication, and traceability at Points of Interconnection, so that consumers are protected from spoofed or masked numbers. The interconnection framework should also support real-time detection and blocking of suspected spam or robo-call traffic, with clear safeguards to ensure that genuine calls are not affected.
4. In addition, there should be mandatory coordination and information-sharing between service providers at the interconnection stage to quickly identify repeat offenders and prevent continued nuisance to consumers. Such measures would significantly reduce unsolicited calls, protect consumers from fraud, and restore confidence in voice communication services.
5. Addressing telemarketing and robo-calls within the interconnection framework is therefore necessary to safeguard consumer interest, reduce harassment and misuse, and ensure that interconnection serves as an enabler of legitimate communication rather than a channel for abuse.

Q.23. Is there a need to revise 'The Telecommunication Interconnection (Reference Interconnect Offer) Regulation, 2002'? If yes, kindly provide the specific revisions. Kindly provide your response with justification.

1. Yes, there is a clear need to revise the Telecommunication Interconnection (Reference Interconnect Offer) Regulations, 2002, as the existing framework is largely anchored in legacy network architecture and no longer reflects the operational realities of modern, IP-based and converged telecom networks. Continuing with an out dated RIO framework indirectly harms consumers through inefficiencies, delays, and degraded quality of service.
2. The RIO Regulations should be revised to align interconnection arrangements with LSA-level, IP-based interconnection rather than SDCA/LDCA-centric hierarchies. Legacy routing tables, definitions, and handover models based on TAX, SDCA, and LDCA no longer serve any consumer-facing purpose and instead contribute to avoidable call routing complexity, higher call drops, and inconsistent service experience within the same service area.
3. Further, the RIO framework should be updated to incorporate clear, time-bound, and standardized processes for provisioning, augmentation, surrender, and closure of Points of Interconnection. Procedural ambiguity and prolonged bilateral negotiations under the current RIO often translate into congestion and call failures for consumers. A revised RIO must ensure predictability and faster resolution so that service quality is not compromised due to inter-operator delays.
4. The Regulations should also be revised to reflect contemporary charging principles, removing charge elements that are linked to obsolete distance- or hierarchy-based interconnection models. Simplified, cost-reflective, and technology-neutral charging structures would reduce disputes between operators, which currently spill over into service degradation experienced by consumers.
5. Additionally, the revised RIO should explicitly incorporate Quality of Service alignment and consumer safeguards, ensuring that interconnection disputes, capacity constraints, or financial disagreements do not result in call blocking, congestion, or disruption of emergency services. Greater transparency and regulatory oversight within the RIO framework would enhance accountability and protect end users from the consequences of inter-operator issues.

6. Revising the RIO Regulations is necessary to modernize the interconnection framework, eliminate legacy inefficiencies, and ensure that interconnection arrangements support reliable, affordable, and high-quality telecom services. Such revisions are essential to ensure that interconnection regulation continues to serve its fundamental purpose of protecting consumer interest in an evolving telecommunications ecosystem.

Q.24. For the purpose of interconnection, is there a need to revise the current categories of 'Services' and 'Activities' to determine Significant Market Power (SMP)? Kindly provide your response with justification.

1. There is a clear and pressing need to revise the existing categories of 'Services' and 'Activities' used for determining Significant Market Power (SMP) for the purpose of interconnection. The current framework is rooted in legacy, service-specific classifications that were designed for circuit-switched and siloed telecom networks. In today's environment, where voice, messaging, and data services are delivered over common IP-based infrastructure, such distinctions no longer capture the actual sources of market power exercised by service providers.
2. Service-based SMP categories fail to account for the fact that market power today often arises from control over network functions and bottleneck facilities rather than from the provision of a particular licensed service. Operators may exercise significant influence through control over termination, interconnection gateways, traffic aggregation points, numbering resources, or last-mile access, irrespective of whether such control is reflected in traditional service definitions. Retaining outdated categories risks under-regulation of dominant players and over-regulation of smaller operators, thereby distorting the interconnection framework.
3. Inaccurate SMP determination has direct implications for interconnection arrangements. Dominant operators may impose discriminatory terms, delay provisioning or augmentation of Points of Interconnection, or leverage their position to influence traffic routing. Such conduct adversely affects call quality, increases congestion, delays service rollout, and reduces competition. Consumers ultimately experience these failures as call drops, limited choice of service providers, and higher prices, undermining confidence in the telecom ecosystem.

4. The TRAI Act, 1997, particularly Sections 11(1)(a) and 11(1)(b), mandates the Authority to ensure orderly growth of telecommunications services, protect consumer interests, and facilitate effective interconnection among service providers. Revising SMP categories to reflect current market structures is essential for the Authority to fulfil these statutory responsibilities. A framework that does not reflect technological and market realities cannot effectively regulate interconnection or prevent abuse of market power.
5. The Competition Act, 2002 adopts a market-based approach to assessing dominance, focusing on economic strength, control over relevant markets, and the ability to operate independently of competitive forces. Sections 4 and 19 emphasize factors such as market share, control over infrastructure, entry barriers, and dependence of other players. Incorporating similar principles into SMP determination for interconnection would ensure a more accurate identification of market power and prevent regulatory arbitrage.
6. For interconnection purposes, SMP determination should evolve towards a market- and function-based framework that focuses on activities such as wholesale termination, access to essential interconnection facilities, traffic transit and aggregation, and control over numbering and routing resources. Such an approach would be technology-neutral and adaptable, allowing the Authority to regulate actual sources of dominance rather than formal service labels.
7. International regulators, including those in the European Union and the United Kingdom, assess SMP based on relevant markets and functional control rather than legacy service categories. Aligning India's SMP framework with such best practices would enhance regulatory certainty, promote competition, and ensure consistency in interconnection regulation.
8. Revising SMP categories also aligns with constitutional principles under Article 14, which prohibits arbitrary regulatory treatment, and with the Consumer Protection Act, 2019, which seeks to prevent unfair practices and deficiency in services. An updated SMP framework would reduce the risk of discriminatory interconnection practices that ultimately harm consumers through degraded service quality or restricted access.
9. Revising the categories of 'Services' and 'Activities' for determining SMP is essential to ensure that interconnection regulation remains effective, fair, and consumer-oriented. A modern, technology-neutral, and market-based SMP framework will strengthen competition, prevent abuse of dominance, and ensure that interconnection

arrangements serve their intended purpose of delivering reliable, affordable, and high-quality telecom services to consumers.

Q.25. Should the publication of Reference Interconnect Offers (RIOs) on the websites of Telecom Service Providers (TSPs) be mandated? Kindly justify your response.

1. Yes, the publication of Reference Interconnect Offers (RIOs) on the websites of Telecom Service Providers should be mandated, as this directly serves consumer interest by promoting transparency, fairness, and effective competition in interconnection arrangements.
2. Public availability of RIOs ensures predictability and non-discriminatory access to standard interconnection terms. When interconnection conditions are transparent, smaller operators and new entrants are able to interconnect on fair and known terms, which strengthens competition. Increased competition, in turn, benefits consumers through better quality of service, wider choice, and more competitive pricing. In contrast, opaque or selectively shared RIOs create information asymmetry that can enable preferential treatment and delay service expansion, ultimately harming end users.
3. Mandated publication of RIOs would also facilitate equitable access for diverse authorised entities under the evolving licensing framework, including access providers, carrier-only operators, neutral hosts, private 5G networks, and service-specific providers. Consumers benefit when all such entities can interconnect efficiently without dependence on prolonged bilateral negotiations or unequal access to information.
4. Further, requiring RIOs to be kept up-to-date and publicly accessible, with a clear timeline for publication of revisions (for example, within a prescribed period after any change), would prevent reliance on outdated or contradictory interconnection terms. This enhances regulatory certainty and reduces disputes that often spill over into congestion, call failures, or delayed service roll-outs experienced by consumers.
5. Overall, mandating public disclosure of RIOs supports competitive neutrality, reduces information asymmetry, and prevents discriminatory practices by dominant operators. By lowering negotiation friction and enabling efficient interconnection, such a measure ultimately contributes to improved service quality and more affordable telecom services for consumers.

Q26. Should there be any interconnection charges? If yes, kindly provide details about the following:

a. **the types of infrastructure charges to be levied,**
b. **the guiding principles for determining such charges along with ceiling, if required, and**
c. **determination of time-based escalation methodology, if required.**

Kindly provide your response with justification

Yes, there is a need to retain interconnection charges, but only to the extent that they are strictly necessary, cost-reflective, and designed to support effective and reliable telecom services for consumers. Interconnection is a foundational public-interest function that enables seamless communication across networks. Any charging framework must therefore be carefully structured so that it does not become a barrier to interconnection, competition, or service quality, nor result in avoidable cost burdens being passed on to consumers.

A. Types of Infrastructure Charges to be Levied

1. Interconnection charges, if levied, should be imited to essential and objectively verifiable infrastructure elements that are directly attributable to interconnection. These may include:
2. Charges for actual physical interconnection infrastructure, such as ports, interfaces, and transmission links at Points of Interconnection (PoIs), where such infrastructure is genuinely required.
3. Charges for logical or IP-based interconnection capacity, where applicable, reflecting actual resource usage rather than legacy physical hierarchies.
4. One-time installation or activation charges, where unavoidable, provided they reflect actual costs and are not used as entry barriers.
5. Charges linked to obsolete constructs, such as distance-based carriage, hierarchical switching levels (SDCA/LDCA/TAX), or duplicative infrastructure that no longer serves a consumer-facing purpose, should be phased out. Retaining such charges increases complexity and costs without improving service quality for consumers.

B. Guiding Principles for Determining Interconnection Charges

1. The determination of interconnection charges must be guided by clear consumer-oriented principles:
    i. Charges should be based on audited, transparent cost studies reflecting current IP-based network architecture and declining marginal costs.

Inflated or notional cost elements ultimately translate into higher retail tariffs.

ii. Charges should apply uniformly across PSTN, PLMN, IP, and future technologies, ensuring that consumers are not indirectly penalized due to legacy regulatory constructs.

iii. Charges must be applied uniformly across all service providers, including dominant and PSU operators, to prevent preferential treatment that could reduce competition and consumer choice.

2. A simplified charging structure reduces disputes between operators, which often manifest as congestion, call failures, or delayed service rollout affecting consumers.
3. Given the essential nature of interconnection, the Authority should consider prescribing regulatory ceilings for interconnection charges to prevent excessive pricing, especially in segments where market power exists. Such ceilings act as a consumer safeguard, ensuring that interconnection remains affordable and widely available.

C. Time-Based Escalation Methodology

1. As a general principle, automatic time-based escalation of interconnection charges should be avoided, as it risks increasing costs without any corresponding improvement in service quality. Escalation mechanisms, if permitted at all, should be:
   i. Linked strictly to objective cost indices (such as inflation or energy costs), and not to revenue or traffic growth;
   ii. Subject to periodic regulatory review, rather than automatic annual increases; and
   iii. Applied symmetrically across operators, ensuring that escalation does not distort competition or create artificial cost pressures.
2. Importantly, any escalation framework must ensure that efficiency gains from technology evolution are passed on to consumers, rather than allowing interconnection charges to rise in a manner disconnected from actual costs.
3. Consumers have a legitimate right to seamless, affordable, and high-quality telecom services, which is only possible when interconnection is efficient and non-restrictive. Excessive or poorly designed interconnection charges can delay network expansion, reduce competition, and increase retail prices, all of which directly harm consumers. Conversely, a rational, transparent, and tightly regulated interconnection charging framework supports faster service rollout, better quality of service, and fair pricing.

4. Interconnection charges should exist only as a facilitative mechanism, not as a revenue-generating or gatekeeping tool. Charges must be limited to essential infrastructure, determined on cost-reflective and technology-neutral principles, capped where necessary, and reviewed periodically to reflect efficiency gains. Such an approach best upholds consumer rights, ensures effective telecom services, and aligns interconnection regulation with the broader public interest.

Q27. Whether following sections of The Telecommunication Interconnection (Charges and

Revenue Sharing) Regulations, 2001:

a. **Section IV which contains 'Revenue Sharing Arrangements' i.e. interconnection usage charges.**
b. **Schedule I and II which contains rates of interconnection usage charges.**

Still hold relevance, in view of the subsequent issuance of the Regulation 4 under Section IV which specifies rates of 'Interconnection Usage Charges (IUC) under 'The Telecommunication Interconnection Usage Charges Regulations, 2003'. Additionally, is there an alternative way to organize these two regulations to enhance clarity and ease of understanding?

Kindly provide your response with justification.

1. From the standpoint of consumers, Section IV and Schedules I and II of the Telecommunication Interconnection (Charges and Revenue Sharing) Regulations, 2001 no longer hold independent or operative relevance, in light of the subsequent issuance of Regulation 4 under Section IV and the notified rates under the Telecommunication Interconnection Usage Charges (IUC) Regulations, 2003. The coexistence of multiple overlapping instruments governing interconnection usage charges creates regulatory ambiguity, which indirectly harms consumers by prolonging inter-operator disputes and delaying corrective action when service quality is affected.
2. Consumers are not party to interconnection charging arrangements, yet they experience the consequences of regulatory overlap in the form of call congestion, call failures, and delayed service roll-outs when operators differ on applicable charges or revenue-sharing terms. Retaining legacy schedules that have been functionally superseded increases interpretational complexity without delivering any consumer-facing benefit.

3. In terms of regulatory organisation, there is a strong case for consolidating all operative provisions relating to interconnection usage charges into a single, updated regulation, while clearly repealing or deeming inoperative redundant schedules and provisions. Such consolidation would enhance transparency, reduce compliance uncertainty, and limit scope for disputes that spill over into consumer experience.
4. A simplified and clearly structured interconnection charging framework also advances consumer rights to clarity, predictability, and uninterrupted access to telecom services. When regulatory instruments are easy to understand and uniformly applied, service providers are better positioned to focus on network quality and service delivery rather than prolonged commercial disagreements.
5. Rationalising and reorganising the interconnection charging regulations by removing obsolete provisions and consolidating operative ones is necessary to protect consumer interest. Regulatory clarity at the interconnection level ultimately translates into better quality of service, faster dispute resolution, and more reliable communication services for consumers.

Q.28. Is there a need for change, if any, required in respect of following:

i. Port Technology

ii. Port Size (Capacity)

iii. Port Charges, Any other related aspect

Kindly provide a detailed response with justification.

1. Yes, changes are required in respect of port technology, port size, and port charges, primarily to ensure that interconnection arrangements support reliable, affordable, and high-quality telecom services for consumers.
2. Port technology should transition fully to modern, IP-based and scalable interfaces, as legacy technologies increase call failures and service disruptions that directly affect consumers. Port size (capacity) must be planned proactively based on traffic growth and QoS benchmarks, rather than reactively, so that congestion at Points of Interconnection does not lead to call blocking or degraded call quality experienced by end users. Port charges should be strictly cost-reflective, transparent, and non-discriminatory, ensuring that interconnection costs do not become an entry barrier or translate into higher tariffs for consumers.
3. Additionally, interconnection port provisioning and augmentation should be time-bound and aligned with QoS obligations, so that commercial or technical delays

between service providers do not result in service deficiencies for consumers. Overall, rationalising port-related parameters is necessary to protect consumers' right to seamless connectivity, service reliability, and fair pricing in an evolving telecom environment.

Q.29. Should port charges be uniform across all services and technologies? Kindly provide detailed response for the following categories specifically:

a. **Fixed Line Service/ Mobile Service/ NLD service/ ILD service, and**
b. **E1 (TDM) based interconnection and IP based interconnection.**

In case non-uniform charges are suggested, what methodology should be followed for calculation of port charges for above mentioned categories of services and technologies. Kindly provide a detailed response with justification

1. Port charges should be largely uniform across services and technologies to ensure transparency, non-discrimination, and protection of consumers from higher costs being passed on through tariffs. Differentiating port charges across fixed, mobile, NLD, or ILD services does not offer any direct consumer benefit and risks distorting competition and delaying service availability.
2. Similarly, uniform charging should be the norm across E1 (TDM) and IP-based interconnection, with any limited variation permitted only where strictly cost-based and time-bound to support transition to IP networks. Where non-uniform charges are unavoidable, they must be determined through a transparent, audited, cost-reflective methodology, with regulatory oversight to ensure service quality and affordability for consumers are not adversely affected.

Q.30.Whether use of 'Erlang' as a unit of traffic in various interconnection regulations is sufficient and are the current procedures for demand estimation as provided in the Telecommunication Interconnection (Port Charges) Regulation 2001 and the TIR 2018 still effective and practical, in view of adoption of IP based interconnection?

a. **If yes, kindly provide justification in support of your response.**
b. **If no, kindly provide alternate metrics and demand estimation methods for IP-based interconnection along with detailed explanation.**

In either case, kindly provide suitable diagrammatic representation

1. The continued use of Erlang as the sole unit of traffic measurement and the associated demand estimation procedures prescribed under the Telecommunication

Interconnection (Port Charges) Regulation, 2001 and the TIR, 2018 are no longer fully sufficient or effective in the context of IP-based interconnection. While Erlang-based models were appropriate for legacy circuit-switched (TDM) networks, their direct application to IP networks fails to capture traffic behaviour accurately, leading to outcomes that directly affect consumers in the form of congestion, call failures, and degraded quality of service

2. In circuit-switched networks, Erlang measured continuous voice occupancy and was useful for predicting blocking probability. However, IP-based networks carry packetized, burst, and multi-service traffic (voice, video, signaling, data) over shared infrastructure. Relying on Erlang alone underestimates peak traffic bursts, signaling loads, and packet-level congestion. As a result:
    i. Ports may appear "adequately dimensioned" on paper but still experience congestion.
    ii. Consumers face call setup failures, poor voice quality, call drops, and delayed call connections, especially during peak hours.
    iii. Interconnection disputes arise due to mismatched capacity assumptions, delaying augmentation and prolonging consumer suffering.
    iv. Emergency calls and critical services may be affected during congestion, posing risks to public safety.
3. Thus, outdated traffic metrics translate directly into QoS degradation, undermining consumers' right to reliable and effective telecom services.
4. Erlang assumes:
    i. Continuous circuit occupation,
    ii. Predictable traffic patterns,
    iii. Voice-only traffic.
5. IP networks, by contrast:
    i. Carry packet-based, variable-bit-rate traffic,
    ii. Experience short but intense traffic spikes,
    iii. Handle voice, video, data, signaling, and messaging together.
6. This mismatch means Erlang-based demand estimation does not reflect real network stress points, particularly at Points of Interconnection (PoIs).
7. To protect consumers and ensure realistic capacity planning, Erlang should be supplemented (not necessarily eliminated) with IP-appropriate metrics, such as:

i. Busy Hour Traffic in Mbps/Gbps: Measures actual bandwidth consumption during peak usage, better reflecting congestion risk.

ii. Packets Per Second (PPS): Captures signaling and packet-processing load, critical for call setup success.

iii. Busy Hour Call Attempts (BHCA): Reflects call initiation stress on signaling systems, directly linked to call setup failures.

iv. Peak-to-Average Traffic Ratios: Accounts for bursty traffic behaviour common in IP networks.

v. QoS-linked Indicators: Capacity planning should be tied to thresholds for call drop rate, call setup success rate, latency, and packet loss.

8. These metrics together provide a consumer-relevant view of network stress, ensuring capacity is augmented before service quality degrades.

9. Demand estimation for IP-based interconnection should shift from static, Erlang-only models to a hybrid, performance-driven approach including:

i. Historical traffic analysis using bandwidth and PPS data,

ii. Predictive modeling based on traffic growth trends,

iii. Automatic augmentation triggers linked to QoS degradation indicators,

iv. Mandatory buffer capacity to protect against sudden traffic surges.

v. Such an approach ensures that consumers do not suffer degraded service while operators debate capacity adequacy.

A. Legacy (Erlang-Based, Consumer Risk):

Calls → Erlang Estimate → Fixed Port Capacity

↓

Congestion

↓

Call Failures / Poor QoS (Consumer Harm)

B. Proposed IP-Based

Calls + Signaling + Data

↓

Mbps + PPS + BHCA Analysis

↓

QoS-Linked Capacity Planning

↓

Proactive Port Augmentation

↓

Reliable Calls & Better QoS (Consumer Benefit)

10. In view of IP-based interconnection, exclusive reliance on Erlang is inadequate and outdated. While Erlang may continue as a supplementary indicator for voice traffic, it must be combined with bandwidth-, packet-, and signaling-based metrics to ensure realistic demand estimation. Updating demand estimation methods is essential to protect consumers from congestion, call failures, and service degradation, and to uphold their right to seamless, reliable, and high-quality telecom services in a modern network environment.

Q.31. Should the current provisions for submission, inspection and getting copies of interconnection agreements under 'The Register of Interconnect Agreements Regulations, 1999' using floppy disks and print copies be dispensed with and be made online?

a. If yes, what changes do you suggest for the online process, timelines, related charges and any other aspect?

b. If not, kindly provide justification.

1. Yes, the current provisions under The Register of Interconnect Agreements Regulations, 1999 that require submission and inspection through floppy disks and physical print copies should be dispensed with and replaced by a fully online system. Retaining outdated physical processes no longer serves any public purpose and indirectly harms consumers by delaying regulatory oversight, prolonging inter-operator disputes, and allowing service quality issues to persist unresolved.
2. From the consumer's standpoint, timely regulatory visibility into interconnection agreements is critical because deficiencies or disputes in such agreements often manifest as call failures, congestion, delayed service rollout, or inconsistent quality of service. An online system would enable faster scrutiny, greater transparency, and more effective regulatory intervention, thereby safeguarding consumers' right to reliable and uninterrupted telecom services.

(a) Suggested changes for the online process

i. The submission, inspection, and access to interconnection agreements should be carried out through a secure centralized online portal maintained by or under the supervision of the Authority. All agreements, amendments, and

revisions should be uploaded in standardized digital formats within a clearly prescribed timeline (for example, within a fixed number of days from execution or modification). Automated acknowledgements and version control should be built in to prevent ambiguity or concealment of operative terms.

ii. Inspection and access to such agreements should also be enabled digitally for authorized stakeholders, with appropriate confidentiality safeguards, so that regulatory scrutiny is not delayed by procedural hurdles. No or minimal charges should be levied for online submission or inspection, as excessive fees would discourage transparency and ultimately harm consumers by weakening regulatory oversight.

iii. Additionally, the online framework should allow the Authority to flag inconsistencies, outdated agreements, or non-compliance in real time. This would help prevent prolonged interconnection issues that otherwise degrade service quality for consumers.

(b) Justification from a consumer-interest standpoint

i. Consumers are not parties to interconnection agreements, yet they are the first to suffer when such agreements are opaque, outdated, or disputed. Continuing with manual and obsolete submission methods undermines regulatory efficiency and delays corrective action. Moving to an online, time-bound, and transparent system strengthens accountability, improves regulatory responsiveness, and ensures that consumer interests are protected through faster resolution of interconnection-related issues.

ii. Digitising the submission and inspection of interconnection agreements is essential to modernise regulation, enhance transparency, and ensure that consumer welfare remains paramount in the administration of the interconnection framework.

Q.32. Is there a need to incorporate provisions for financial disincentives in interconnection regulations to deter non-compliance? If yes, kindly provide specific scenarios and mention the concerned regulations, where financial disincentives would be applicable, along with their quantification.

Kindly justify your response.

Yes, there is a clear need to incorporate well-defined and proportionate financial disincentives in interconnection regulations to deter non-compliance, particularly

where such non-compliance directly impacts service quality, availability, and continuity for consumers. Financial disincentives should not be generic or punitive, but targeted, scenario-specific, and linked to measurable consumer harm.

1. **Delay or Denial in Provisioning / Augmentation of POIs:** Financial disincentives should apply where a TSP fails to provision or augment Points of Interconnection within the timelines prescribed under Chapter IV of the Telecommunication Interconnection Regulations (TIR), 2018, without valid justification. Such delays result in congestion, call failures, and deterioration of QoS experienced by consumers. A graded financial disincentive, escalating with the period of delay, would ensure timely capacity provisioning and prevent consumers from suffering prolonged service degradation.
2. **Non-Compliance with QoS-Linked Interconnection Obligations**: Where interconnection-related non-compliance leads to sustained breaches of QoS parameters such as Call Setup Success Rate (CSSR), Call Drop Rate (CDR), or congestion norms attributable to inadequate interconnection capacity, financial disincentives should be levied under the relevant QoS Regulations read with TIR, 2018. The quantification should be linked to the duration and extent of QoS degradation, ensuring that consumers are not subjected to recurring poor service without accountability.
3. **Unilateral Disconnection or Restriction of Interconnection:** Any unilateral disconnection, throttling, or restriction of interconnection in violation of Regulation 11 of TIR, 2018, particularly without adherence to due process or where emergency services are affected, should attract stringent financial disincentives. Such actions have immediate and severe consequences for consumers, including inability to make calls or access emergency services. Higher penalties are justified in such scenarios due to the critical nature of the harm caused.
4. **Failure to Publish or Update Reference Interconnect Offers (RIOs):** Non-compliance with obligations relating to publication, updation, or transparency of Reference Interconnect Offers under the RIO Regulations, 2002, once mandated, should also attract financial disincentives. Lack of transparency leads to discriminatory interconnection practices, delayed negotiations, and eventual service issues for consumers. Penalties should be proportionate and linked to the duration of non-compliance.

5. **Persistent Non-Compliance or Repeated Violations:** For repeated or systemic violations of interconnection regulations—such as chronic delays, repeated QoS breaches, or misuse of interconnection arrangements—progressively higher financial disincentives should be prescribed. This ensures deterrence and prevents habitual non-compliance that ultimately undermines consumer trust and service reliability.
6. **Quantification and Safeguards**: Financial disincentives should be clearly quantified in the regulations, with defined slabs linked to the nature of violation, duration, and consumer impact. At the same time, safeguards should ensure that penalties do not become a substitute for compliance; corrective action and restoration of service quality must remain the primary objective.
7. Consumers have no role in inter-operator arrangements, yet they bear the consequences of non-compliance through call failures, congestion, and service disruption. A clearly articulated financial disincentive framework creates accountability, ensures timely compliance, and reinforces the principle that interconnection obligations are public-interest duties, not merely commercial arrangements.

Q.33. What should be the mechanism and timelines for transition of existing interconnection agreements between the service providers to the new regulatory framework that will emerge from this consultation process?
Kindly provide detailed response with justification.

1. The transition of existing interconnection agreements to the new regulatory framework emerging from the present consultation should be carried out in a structured, time-bound, and regulator-driven manner, with due emphasis on ensuring continuity of services and protection of consumer interest. Any uncertainty or delay in transition has the potential to adversely affect service quality and availability for end users.
2. While inputs from service providers are necessary to assess operational and technical feasibility, the process and timelines for migration should be prescribed by the Authority, after due consultation, and should not be left solely to bilateral arrangements between operators. This is essential to ensure uniformity, predictability, and adherence to regulatory objectives.
3. The Authority may consider constituting a dedicated, time-bound implementation group, comprising representatives of service providers and technical experts, under

the supervision of the Authority. The mandate of such a group should be limited to addressing implementation issues, standardising migration practices, and facilitating compliance with timelines fixed by the Authority.

4. The transition may be undertaken in a phased manner, based on objective criteria such as network technology (legacy TDM and IP-based interconnection), category of service (fixed, mobile, NLD, ILD), and traffic volumes. Priority may be accorded to interconnections carrying higher traffic and those critical from a consumer service perspective.
5. Any temporary continuation of legacy TDM-based interconnection arrangements should be explicitly time-bound and permitted only where necessary to avoid service disruption. Such transitional arrangements should not be open-ended and should be subject to periodic review by the Authority.
6. The Authority should prescribe clear cut-off dates by which all interconnection agreements are required to be aligned with the new regulatory framework. To ensure effective monitoring, interim milestones and reporting obligations may be specified.
7. It should be expressly provided that no transition-related activity, interconnection dispute, or commercial disagreement shall result in disruption of traffic, degradation of quality of service, or impairment of access to emergency services. Compliance with applicable Quality of Service regulations must be maintained throughout the transition period.

Q.34. What should be the interconnection framework for satellite-based telecommunications networks with other telecom networks? Further, whether the interconnection frameworks for MSS and FSS satellite-based telecommunications networks should be distinct? Please provide your response along with end-to-end diagrammatic representation and justification in respect of the following:

a. Satellite - Satellite network interconnection

b. Satellite - PLMN interconnection

c. Satellite - PSTN interconnection

1. Satellite-based telecommunications networks operate on technical and operational principles that are materially different from terrestrial telecom networks. Mobile Satellite Services (MSS) and Fixed Satellite Services (FSS) rely on space-based transmission, wide-area coverage, and gateway-centric traffic handling, and therefore cannot be subjected to interconnection frameworks designed for

terrestrial switching hierarchies. TRAI's recognition of satellite communications dated 18th September 2024, as a separate service category is therefore appropriate and must be reflected in the interconnection regime.

2. Interconnection involving satellite networks should be structured around a ground-based gateway model, as all interaction between satellite systems and other telecom networks necessarily occurs at earth stations. Accordingly, interconnection with terrestrial networks should be permitted only at designated satellite gateways, using IP-based interfaces, ensuring technical compatibility, regulatory oversight, and network security.
3. Interconnection between satellite networks themselves, where required, may be governed through commercial and technical arrangements mutually agreed between the concerned operators at their respective gateways, without imposing mandatory regulatory routing obligations that may not be necessary in all cases.
4. For interconnection with PLMN and PSTN networks, satellite traffic should be handed over at the gateway level, with appropriate interworking to ensure numbering integrity, emergency call routing, lawful interception, and quality of service. This approach enables seamless interoperability while avoiding impractical interconnection requirements within the satellite segment.
5. While MSS and FSS serve different user profiles and use cases and should continue under separate authorisations, the interconnection framework at the gateway level may remain common, subject to service-specific obligations. Such a framework ensures clarity, operational efficiency, and continuity of services, particularly for users in remote, maritime, and disaster-affected areas who depend on satellite connectivity.

Q.35.Are there any specific regulatory models from other countries that have successfully addressed interconnection related issues and challenges which can be adapted in the Indian telecom sector? If yes, kindly provide details of such international best practices.

Yes, several international regulatory models have addressed interconnection challenges in a manner that places service continuity, quality, and consumer welfare at the centre, and these offer useful lessons for India.

1. The US Federal Communications Commission (FCC), through its 2025 Notice of Proposed Rulemaking to phase out TDM-based interconnection by 2028, **(https://docs.fcc.gov/public/attachments/FCC-25-73A1.pdf)** provides a strong

consumer-oriented example. The FCC's approach is grounded in the recognition that legacy TDM interconnection causes avoidable call failures, higher costs, and operational inefficiencies, all of which ultimately harm consumers. By mandating a structured transition to all-IP interconnection, with clear timelines and safeguards for emergency services and service continuity, the FCC seeks to ensure that consumers benefit from improved call quality, faster call setup, and more reliable networks while avoiding abrupt disruptions.

2. Similarly, **Ofcom (UK)** has adopted a market- and technology-neutral interconnection framework, facilitating migration from legacy PSTN to IP-based networks with explicit consumer safeguards. Ofcom's regulatory model emphasises transparency in interconnection arrangements, advance notice of network changes, and continuity of access to emergency services, ensuring that consumers are not adversely affected during technology transitions.
(https://www.ofcom.org.uk/siteassets/resources/documents/about-ofcom/foi/2024/april/voip-and-pstn.pdf?v=285708)
3. In the European Union, regulators under the **BEREC framework (https://www.berec.europa.eu/en/working-groups/regulatory-framework?language_content_entity=en)** focus on simplifying interconnection by removing obsolete charging and routing constructs and encouraging IP-based interconnection at higher network levels. This has reduced inter-operator disputes and congestion, leading to more consistent service quality for end users.

These international practices demonstrate that clear regulatory direction, time-bound migration from legacy technologies, and consumer-protection safeguards are key to resolving interconnection challenges. Adapting such models in India—particularly a planned transition to all-IP interconnection with regulatory oversight—would enhance service reliability, reduce call failures, and ensure that consumers benefit directly from technological evolution rather than bearing its costs.

Q36. Kindly mention any other challenges or concerns related to the regulations being reviewed in this consultation paper?

Without prejudice to the detailed submissions made in response to the preceding questions, it is noted that the issues raised in this consultation paper comprehensively address the key aspects of the interconnection regulatory framework. Most operational, technical, and commercial concerns affecting service

delivery and consumer experience have been adequately covered. However, it may be useful for the Authority, while finalising the regulatory framework, to ensure that interconnection obligations are consistently aligned with Quality-of-Service enforcement, so that inter-operator issues do not translate into persistent service degradation for end users. Strengthening transparency, digitisation of processes, and time-bound implementation would further support effective regulatory oversight.

Additionally, as networks transition to IP-based architectures, the Authority may consider maintaining a clear and predictable migration roadmap to avoid prolonged coexistence of legacy arrangements that could otherwise impact service quality and consumer confidence.

Subject to the above observations, no further comments are offered.