BROADBAND INDIA FORUM
"Think Tank for Digital Transformation"

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World Trade Centre, Nauroji Nagar,
New Delhi – 110029.

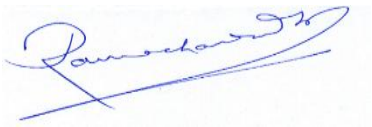
Dear Sir,

Subject: BIF Response to TRAI Consultation Paper No. 11/2025 on "Review of Existing TRAI Regulations on Interconnection Matters"

This is with reference to the TRAI Consultation Paper No. 11/2025 titled "Review of Existing TRAI Regulations on Interconnection Matters." Please find enclosed herewith the response of the Broadband India Forum (BIF) on the above-mentioned consultation paper for your kind consideration and perusal.

Kind regards,

Yours sincerely,



T.V. Ramachandran,
President,
Broadband India Forum

BIF's Response to TRAI Consultation Paper No. 11/2025

I. INTRODUCTION

We thank the Authority for initiating a comprehensive review of the interconnection framework. Interconnection remains a foundational element of the Indian telecom sector, ensuring network interoperability, competitive neutrality, consumer choice and quality of service.

This submission adopts a technology-neutral, pro-competition and forward-looking approach aligned with international best practices, while also giving due consideration to a public sector operator's concern.

A.1 The Telecommunication Interconnection Regulations, 2018.

Q1. 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?

BIF Response:

The existing interconnection for PSTN to PSTN, PLMN to PSTN and PSTN to PLMN calls is at multiple hierarchical levels such as SDCA or LDCA while currently all the operators have moved from circuit switched network to packet switched network.

With increasing adoption of IP-based core networks and integrated services, a single IP-based core switch can serve the entire LSA, reducing the need for multiple distributed interconnection points at SDCA or LDCA levels.

Further, concentrating interconnection at the LSA level preserves operational simplicity, reduces capital and operational expenditure.

Interconnection at the LSA (Licensed Service Area) level as a default can simplify routing and promote uniformity. An interconnection level per LSA would reduce administrative complexity and enable simpler charging. It also aligns with all-IP network designs, where packet routing naturally aggregates regionally.

We recommend the LSA is mandated as the default interconnect point. However, there may be cases wherein TSPs may like to have interconnect at more places in a single LSA for the purpose of handling traffic or enhancing redundancies or balancing load, therefore, TSPs may be permitted additional interconnection at another location in the LSA when both the parties mutually concur.

If LSA-level interconnect is mandated, legacy POIs at LDCAs and SDCAs would need to be phased out. In practice, all existing LDCA/SDCA POIs would then be consolidated into LSA-level Points of Interconnection (POIs) to maintain a single routing point per area. Any such migration should be done with sufficient transition time. This will also address required change in some remaining existing legacy routing for emergency calls in some existing POIs.

The public sector operator, in its comments to the Pre-consultation Paper, had highlighted significant legacy investments in SDCA/LDCA infrastructure undertaken due to earlier licence and regulatory mandates. While these historical obligations warrant recognition, perpetuating sub-LSA mandatory POIs would compromise efficiency and hinder transition to converged IP networks. Therefore, a time-bound transition period for the public sector operator be permitted to optimize legacy infrastructure. TRAI may consider a time-bound glide path with continued utilization of BSNL's lower-level POIs where traffic justifies it.

For interconnection purposes, the Licensed Service Area (LSA) must remain aligned with the "Service Area" defined under the Unified License, and should not be expanded to a pan-India construct even in case of proposed Unified Service Authorisation. The present LSA framework is integral to the technical design of Indian networks i.e. numbering plan allocation, routing architecture, lawful interception boundaries and regional traffic engineering are all configured at this level. Commercially, operators deploy networks, incur costs, report revenues and discharge licensing obligations on an LSA basis. Converting interconnection to a pan-India unit would disrupt these established technical and regulatory structures, create settlement ambiguities and distort competitive balance. Having the UL-defined LSA will ensure technical stability and commercial clarity.

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?

BIF Response:

In addition to the LSA level interconnection, which should be mandated, interconnecting at smaller location by mutual agreement should be allowed. Such smaller location interconnections by agreement may allow operators to optimize network load, reduce latency and handle high local traffic more efficiently, if and where needed.

The regulatory regime should explicitly permit such agreements without requiring formal approval, while ensuring fair reference offers (RIOs) are updated to reflect any new mutually agreed POIs. In all cases, agreements must comply with technical and security standards. Allowing this flexibility avoids entry barriers and leverages technological neutrality. To preserve pro-competition, the default burden remains on the requesting carrier to justify a new POI.

Q3. 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:

a) Telecommunication Interconnection Regulations (TIR), 2018, and

i. Guidelines annexed to the Telecommunication Interconnection (Reference Interconnection Offer) Regulations, 2002?

BIF Response:

The TIR 2018 should be amended to clarify that while LSA-level interconnection will be the norm, carriers may establish additional POIs at smaller levels by mutual consent. For example, insert a clause stating that "In addition to LSA-level POIs, interconnection at any technically feasible location may be permitted upon mutual agreement."

The RIO 2002 guidelines should also be updated similarly.

Sub-LSA POIs should continue to be permitted by mutual agreement, especially wherever it is cost-efficient or improves QoS. To address public sector operator's concern, TRAI may direct that where a TSP requests closure of a POI below LSA, it must:

- demonstrate adequate capacity at alternative POIs, and
- give the public sector operator a reasonable transition time.

Further, all amendments should emphasize a technology-neutral wording to accommodate both traditional (E1) and IP interconnect.

In the interest of transparency, TIR should be amended to explicitly require all TSPs to publish and adhere to uniform baseline interconnect terms and RIO templates should standardise minimum obligations so that no operator is forced into asymmetric concessions under commercial pressure.

The primary changes to the Telecommunication Interconnection Regulations, 2018 relate to processes and metrics for augmenting POI capacity, rather than the physical level or location of

interconnection. Amendments include revising the capacity utilization threshold for requesting more ports to over 85%, extending the provisioning timeframe to 42 working days, and requiring a six-month traffic forecast from service providers.

Q4. 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.

BIF Response to Q4 & Q5:

There are sufficient existing conditions as regards to cyber security and redundancies in the telecom network. Further, QoS regulations of TRAI indirectly require TSPs to maintain sufficient redundancies to meet QoS. Therefore, there is no need of additional regulations through interconnect rules.

Q6. (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.

BIF Response:

(a) Yes, new interconnections should by default be IP-based. Modern 4G/5G and broadband networks are inherently packet-switched and continuing to allow TDM for new interconnections would lock-in outdated technology. Mandating IP for new interconnects promotes forward-looking, software-driven networks and leverages cost efficiencies of packet switching.

(b) Carriers should be given a fixed transition period to migrate remaining TDM POIs to IP. This allows time for installation of soft-switches or media gateways. Some countries are already moving similarly, e.g. the FCC is considering eliminating its legacy TDM interconnection obligations by 2028. A 3-to-4-year timeline from regulation enactment should be appropriate in Indian context. After that, carriers should be free to refuse new TDM interconnect requests. In justifying this, note that the marginal cost of an additional IP link is very low. Mandating IP aligns with international practice of an “all-IP” future and avoids perpetual maintenance of multiple parallel systems.

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.

BIF Response:

TRAI has already issued the Telecommunication Interconnection (Amendment) Regulations, 2018, to modify certain aspects of Chapter IV which revises the following :

- The timeframe for a service provider to request additional ports was changed from 30 days to 60 days.
- The projected capacity utilization threshold required to trigger a request for augmentation was increased from 60% to 85%.
- Mandatory half-yearly traffic forecasts from every service provider were introduced to help in better network dimensioning.

The current port provisioning process (notice periods etc.) can be streamlined using automation. For example, formal requests could be submitted via a secure online portal with standardized SLAs. Augmentation should be dynamic: if traffic exceeds a utilization threshold (e.g. 85%), an automated alert can trigger capacity expansion with minimal manual paperwork. Bilateral escalation channels (and possibly peer-pressure penalties) should exist for disputes. In summary, the regulatory framework should replace any lengthy manual procedures with digital workflows and clear timelines. This supports rapid scaling (cost-efficient growth) and reduces entry barriers by speeding up interconnect setup.

Q8. 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.

BIF Response:

In general, the existing timelines to connect a POI port or to augment are reasonable and ensure predictability, but they should be updated to reflect current capabilities. For instance, with modern OSS/BSS and automated systems, default provisioning could be shortened. Any revisions should ensure strict transparency (publicly track request status) and include penalties for missing deadlines.

A notable challenge today is manual dependencies i.e. some carriers may experience delays in acquiring equipment or backhaul. Remedies include:

(1) Moving reporting and dispute resolution to online portals (reducing paperwork overhead).
(2) If vendors or infrastructure delay provisioning, regulators should be able to assess based on standardized logs.

Overall, the structure of the current framework may be maintained but updated for digital execution. Aligning with international best practices on SLAs (for example, some OECD countries publish performance targets for interconnect provisioning) can help.

While the earlier orders indicated that every operator will give a projected demand, this may lead to concerns, in case based on a large demand by an operator, the other operator procures capacity, but the corresponding traffic growth does not happen. To address such concerns, there may be a need to fix non-refundable PoI booking charges. Some additional aspects that also need to be included are:

Clear and enforceable directions should be issued to ensure that no operator is treated as a perpetual “seeker” beyond the initial two-year period stipulated under the regulations. This will promote fairness and prevent indefinite dependency on other operators for interconnection.

The **bifurcation of PoI capacity**, as envisaged under the *Telecommunication Interconnection Regulations (TIR), 2018*, should be implemented retrospectively from 2018. This must include

defined accountability mechanisms and strict redressal timelines to address delays and disputes effectively.

PoIs should be deemed commissioned within 42 days from the date of application, regardless of pending procedural formalities. Upon completion of this period, the applicant should be permitted to roll out services without further delay. This measure will significantly reduce bottlenecks and accelerate service deployment.

Q9. 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.

BIF Response:

The disconnection process as provided in the regulation 11 of the Telecommunication Interconnection Regulations (TIR) 2018 is appropriate. The only suggestion is the same should be automated through online portal so that all stakeholders are duly and simultaneously informed. It must be ensured that emergency calls are not severed without regulator's approval. Further, introducing a minimal usage threshold (below which a POI is considered defunct) should automate retirements. The goal must be to make disconnection predictable and swift when justified, without leaving regulators or competitors uncertain.

Q10. 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.

BIF Response:

Yes, a formal process for voluntarily closing a POI should be established. Criteria would include reduced traffic for a minimum period. Carriers should notify the other TSP in advance, and the terminating TSP should either confirm closure or plan migration. A sensible retention period (e.g. 3–6 months after request) would allow for any last-minute changes. This avoids dormant POIs lingering indefinitely. The regulation should specify that surrendering a POI extinguishes any future claims to that POI, ensuring clarity. Automating this through the online portal would improve efficiency. The framework should not require onerous conditions. It should facilitate pruning of unnecessary interconnect points as networks evolve.

Q11. 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.

BIF Response:

There is need to re-look at provision of bank guarantee between the two TSPs for interconnect from the perspective of abolishing this. In case it is to be kept that should be due to some exceptional circumstances, like recent past defaults and to avoid delay in provisioning of the PoI.

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.

BIF Response:

Yes. Delayed interconnect payments harm cash flow and trust. We suggest a standard procedure which should be transparent and provided in the RIO comprising of late fees / penalty, default interest and suspension. The process must encourage timely settlement. The default interest rate should be such that discourages delay in payment and compensates the affected part adequately.

Q13. 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.

BIF Response:

No, there is no need of revision of financial disincentive system. However, there is need to ensure uniform and non-discriminatory application across all operators to maintain a level playing field.

A.2 SMS Termination Charges Regulations, 2013

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.

BIF Response:

The SMS termination charge should remain cost-reflective. Thus, if revised, it should be based on updated cost studies.

As SMS termination charge is used as a deterrent for spam, this regulatory review is, therefore, closely coordinated with TRAI's anti-spam regime (TCCCPR) for termination pricing for spam A2P SMS, which is and has to be pegged higher to act as deterrent to unsolicited messages. There is a need to separate Spam SMSs from genuine A2P (e.g. bank OTP), and deterrent is applicable only on spam SMS.

Further, all international SMS traffic (including A2P messages) must be routed through ILDO gateways for ensuring regulatory oversight and prevention of bypassing the ILD networks. Considering the fact that the interconnection framework serves as the backbone, ensuring all stakeholders involved (MNOs, aggregators, ILDOs) adhere to standardized routing and reporting processes, therefore, TRAI should ensure enforcement of SMS Aggregation directions for routing of all international SMS through ILDOs with definitive cost of SMS termination in line with the SMS termination charges defined for inter access operator handover.

Q15. Is there a need to prescribe SMS carriage charges when an NLDO carries SMS between LSAs? If yes, what methodology?

BIF Response:

Currently, TRAI rules are silent on SMS carriage fees. There is a need to prescribe SMS carriage charges when a National Long-Distance Operator (NLDO) carries SMS traffic between two different Licensed Service Areas (LSAs). The TRAI currently regulates certain aspects of SMS charges, particularly for commercial messages, and historically has set ceilings for long-distance voice carriage charges.

Further, most SMS are generally B2P ie business to person. Therefore, there must be carriage charges for carrying the SMS between LSAs. The carriage charges must be flat rather than on distance basis.

A.3 Intelligent Network Services in Multi-Operator and Multi-Network Scenario Regulations, 2006.

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.

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.

BIF Response to Q16-17:

The current IN access charge (for toll-free and similar numbers) was set over a decade ago. Given that IN service architecture has since migrated to soft-switches and IMS, the original assumptions may no longer hold. We recommend revisiting it on a cost basis, ensuring that no party is left bearing unreasonably disproportionate cost for providing an IN service.

Further, there is a practical challenge with respect to access of UAN (full charge) number by users having prepaid SIM with unlimited outgoing facility. In case of UAN full charge, the calling party pays at higher rate than normal call charges. Thus, such users are denied UAN full charge services unless there is talk time balance in the user's phone. This issue needs to be addressed suitably to avoid exclusion of these users from using UAN full charge service.

IN interconnect charges should be strictly reciprocal across all operators ensuring parity and compliance with the principle of non-discrimination.

Additionally, the IN-interconnection regulation while it allows direct access to subscribers for ILDO/NLDOs through calling cards has not ever come into actual implementation by any of the service providers. Therefore, there is need to review.

Also, there is a need for determination of termination charges for International Toll-Free services along with interconnection point determination in line with IUC applicable for ILD termination traffic.

A.4 The Telecom Regulatory Authority of India (Transit Charges for BSNL's Cell One Terminating Traffic) Regulations, 2005

Q18. 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.

BIF Response :

This regulation specifically prohibited BSNL in 2005 from charging transit fees for reaching its CellOne network. Today, the "CellOne" networks have been absorbed into BSNL's main network. No specific transit charge can be reintroduced. Therefore, there cannot be any change in interconnection charges, if this regulation remains or repealed. This regulation is no longer extant as underlying basis is no more existing.

A.5 The Telecommunication Interconnection Usage Charges Regulations, 2003

Q19. **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.**

BIF Response :

Yes, the interconnection regulatory framework should be reviewed to account for the evolution of telecommunications technology and for the reasons mentioned in previous questions. This review aims to ensure the framework remains relevant and effective.

Q20. 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?

BIF Response:

No additional charges should be levied specifically for emergency calls or SMS. Emergency communications must be provided at no extra cost to users and with absolute priority. Requiring extra fees would deter timely connectivity in critical situations. Instead, the interconnect framework should obligate carriers to accept and route emergency traffic like any other traffic, subject only to the normal usage charge (if any). In practice, most countries treat emergency calls as exempt from special charges, and Indian regulations on emergency services also imply carriers must cooperate without extra compensation.

Q21. 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.

BIF Response:

Yes, revising ITC merits consideration.

It is seen that outgoing traffic has remained consistently low in last 10 years (only 4.7 billion minutes in 2014-15 and declining to 0.72 billion minutes in 2024-25). The incoming ILD traffic dominates ILD traffic (It was 37.5 billion minutes in 2014-15 and has too declined to 11.17 billion minutes in 2024-25). The volume of international voice traffic traditionally carried over Public Land Mobile Networks (PLMN) has migrated to OTT.

It is noted that the decline in incoming ILD traffic has continued even though ILD termination charges for calls terminating in India have been kept relatively low as compared to calls originating from India and terminating in other countries. These low charges in India may be helping making calls affordable for users abroad or may be allowing disproportionately more revenue share to foreign telecom operators. Further, the foreign telecom operators charge much higher termination charges for calls originating from India to other countries.

The IUC regime is based on voice minutes for cost assessment and revenue settlement and in an IP-based, all-data environment, where voice is one of many applications using the packet switched network, the existing model may not fully capture evolving usage patterns or cost structures.

However, in case of ITC, the key factor for consideration is that the current international termination charges for incoming calls to India are highly asymmetrical as compared to the termination charges levied by TSPs of other countries for the outgoing international call from India. Though the trend of incoming ILD traffic shows that the traffic is declining but the decline rate has slowed down in last few years even with increasing use of OTT.

Thus, the termination rate ceiling of ₹ 0.65 per minute must be revised upwards to support balanced revenue share between Indian telecom operators and foreign telecom operators. This move will not impact any tariffs for Indian consumers and it will increase foreign exchange inflow to the country.

Q22. **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.**

BIF Response:

Telemarketing/robocall fundamentally exploits interconnection.

Unsolicited and fraudulent calls often originate from one network but target subscribers across all networks.

Since termination charges are low and call setup is seamless across operators, the interconnection layer becomes the easiest path for mass unsolicited calls. Strengthening interconnection checks ensures cross-network protection instead of relying only on access-network enforcement.

Existing frameworks (UCC, DLT, header/CLI regulation) address identity but not interconnection behaviour

TRAI's UCC and DLT frameworks ensure registration, header management, and scrubbing, but:

They do not impose technical interconnection-level controls (rate limiting, STIR/SHAKEN-type authentication, machine-call detection).

They do not restrict bulk call origination patterns that abuse inter-operator gateways. They cannot effectively block fraudulent calls originating outside licensed networks. Thus, interconnection-level obligations fill a systemic gap.

Robocalls lead to fraud, phishing (vishing), and harassment. Addressing them at interconnection strengthens network trust, reduces consumer grievances, and aligns with global best practices (FCC, Ofcom, ACMA).

Thus, it is necessary to address telemarketing and robo-calls within the interconnection framework because interconnection is where cross-network harm occurs, and where systemic, scalable controls can be most effectively enforced. Embedding authentication, analytics, and rate controls at the interconnection layer will significantly reduce UCC, improve consumer safety, and align India with global best practices in telecom security.

Nations globally are moving towards interconnection-layer call authentication: U.S. STIR/SHAKEN requires authenticated caller ID information at interconnects. UK and EU operators increasingly adopt analytics-driven blocking at interconnect. Singapore mandates CLI validation & anomaly detection at interconnect points.

It may be worthwhile for the Authority to also consider whether the continuing misuse of P2P interconnection routes for unsolicited commercial communication and robo-calls indicates a broader structural issue that merits clearer treatment within the interconnection framework. Mandatory interconnection is fundamentally designed for person-to-person communication, whereas A2P traffic is commercial, high-volume and originated by identifiable enterprise entities. In light of this distinction, it may be appropriate to explore whether A2P traffic should continue to traverse mandatory P2P interconnection paths or whether a more controlled, contractual mode of delivery, through direct arrangements with terminating access providers or authorised aggregators, could better support consumer protection and network integrity.

Such an approach could potentially strengthen accountability of originating entities, allow terminating networks to apply authentication and anti-spam controls more effectively and reduce opportunities for misclassification of A2P traffic as P2P. At the same time, any movement of A2P traffic outside the mandatory interconnection regime would need to be accompanied by robust mechanisms to

ensure that enterprises do not revert to P2P channels, thereby preserving the integrity of interpersonal communication networks.

In this context, a balanced regulatory direction may lie in examining how P2P interconnection can be reserved for genuine interpersonal communication, while A2P communication is managed through appropriate contractual and regulatory instruments such as DLT and commercial communication rules.

A.6 The Telecommunication Interconnection (Reference Interconnect Offer) Regulations, 2002.

Q23. 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.

BIF Response:

TSPs having Significant Market Power (SMP) status in accordance with 'The Telecommunication Interconnection (Reference Interconnect Offer) Regulations, 2002', are mandated to publish a RIO, which outlines the **technical and commercial terms for interconnection based on the model RIO provided in the regulations**. The RIO serves as the **foundational framework** for all interconnection agreements involving the issuer TSP of the RIO. This enables interconnection seekers to either fully accept the RIO terms and directly enter into an agreement with the service provider or use it as a basis for negotiation to finalize an interconnection agreement.

There is a need to revise 'The Telecommunication Interconnection (Reference Interconnect Offer) Regulation, 2002.

The RIO 2002 framework requires comprehensive modernisation to align with the current technological, regulatory and market landscape. The telecommunications ecosystem has evolved significantly with IP-based, virtualised, software-defined and multi-layer network architectures becoming the norm, while the existing RIO still reflects a TDM-era design.

Therefore, a revised RIO should incorporate IP based interconnection as the default standard and it should include support for virtual or cloud-hosted POIs.

The revised RIO should also consolidate the provisions of TIR-2018, IUC Regulations, port provisioning rules and the new Telecommunications Act, ensuring the RIO acts as a single, clean template without duplicating existing regulations.

RIO should clarify interconnection responsibilities across vertically and horizontally related entities and time-bound negotiation and provisioning obligations to ensure smaller or specialised entities are not disadvantaged.

International practice shows that Equivalence of Inputs (EOI) principles ensure fair access where a vertically integrated operator may otherwise have an incentive to discriminate. Embedding EOI in RIO will help upholding fair competition.

The RIO should also be capable of supporting future-ready interconnect models, including virtual POIs.

Finally, the RIO should be streamlined so that new entrants can quickly understand baseline interconnect obligations and negotiate with clarity.

In summary, the RIO should be transformed from a legacy, TDM-oriented template into a modular, technology-neutral and IP-native reference offer consistent with India's evolving telecom architecture.

Q24. 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.

BIF Response:

Yes. The definition and categorisation of Significant Market Power (SMP) within the RIO needs revision to reflect both the technological environment and the market structures under the Telecommunications Act, 2023.

With the shift to different kinds of main authorisations (unified, access and long distance), SMP may manifest differently across layers. For example: an entity may be dominant in access services but not in backhaul or interconnect transit. The carrier-only operators may face disadvantage when interconnecting with vertically integrated entities.

The RIO should therefore include updated definitions of "market", based on substitutability of services and "activities", reflecting roles under respective service authorisations.

To address upcoming needs and markets, SMP should be assessed for:

- VoLTE/Vo5G termination,
- IP transit and interconnect gateway services.

Further, the market has moved from being highly fragmented to more consolidated and, as mentioned earlier, technologically advanced IP-based networks have replaced the traditional circuit-switched systems. The current framework of SMP designation and selective RIO publication needs to be updated to reflect contemporary market dynamics.

The updated SMP categories should be consistent with competition principles to ensure that entities with substantial market power cannot distort interconnection access or conditions. There is a need for a level playing field across diverse authorised entities. For example, dominant operators may foreclose rivals through high fees or discriminatory terms, especially when vertically integrated and in such cases the SMP rules should ensure transparent and non-discriminatory pricing, equivalence of inputs (EOI), prohibition of unfair delay in signing interconnect agreements and access to POIs on reasonable terms.

Q25. Should the publication of Reference Interconnect Offers (RIOs) on the websites of Telecom Service Providers (TSPs) be mandated? Kindly justify your response.

BIF Response:

Yes. Requiring carriers to publish their RIO and any Reference Interconnect Agreements online increases transparency, predictability and non-discriminatory access to interconnection. This approach is common internationally (many regulators demand public RIOs for ease of comparison). Mandating an updated RIO on a government or self-regulatory portal would help new entrants and smaller carriers quickly access standard interconnect terms. It also helps catch any stale or contradictory information.

Further such publication will facilitate equitable access for diverse authorised entities. Under the new licensing regime, interconnecting entities may include access providers, carrier-only operators, neutral hosts, private 5G networks and service-specific providers. Publicly available RIOs allow all such entities to access baseline interconnect terms without asymmetry or dependence on bilateral negotiation.

Such publication will support competitive neutrality and will reduce information asymmetry. Publication of RIOs further prevents dominant operators from offering preferential terms to affiliated entities.

The regulation should state a timeline (e.g. within 15 days of any change) for RIO publication. Overall, making RIOs public encourages competitive offers and reduces negotiation friction, benefiting industry efficiency and consumer prices.

A.7 The Telecommunication Interconnection (Charges and Revenue Sharing) Regulations, 2001.

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.

BIF Response:

We assume that the question pertains to Infrastructure costs and our response is accordingly made. In many markets carriers no longer levy access charges for voice, so India could move towards minimal or zero fixed fees. If any infrastructure charge persists, it should be capped by regulation.

If imposed, infrastructure charges should be limited to cost-recovery for actual assets provided at interconnect. For example, a reasonable port charge or colocation fee could be allowed to cover switching equipment rental at the POI site. These should clearly defined. Any ceilings or escalation (e.g. indexed to CPI) must be transparent and non-discriminatory across operators. The principles should be cost-based (e.g. amortized equipment costs), technology-neutral, non-discriminatory and ensure full reciprocity.

There should not be any hidden “facilities rent” beyond this scope. Given IP efficiencies, most of today’s costs are variable, so infrastructure fees should be modest.

Guiding Principles for Determining Charges.

The guiding principles set by TRAI for interconnection charges emphasize fairness, transparency, and cost-orientation:

- **Cost-Based Pricing:** Interconnection charges should generally be based on the actual costs incurred by the provider.
- **Incremental/Additional Costs:** The main basis for determining cost-based charges is the "incremental or additional" costs directly attributable to providing the interconnection.
- **Non-Discrimination:** Service providers must not discriminate between different service providers when levying charges.
- **Transparency and Reasonableness:** Charges and the terms and conditions should be transparent and reasonable.
- **Reciprocity:** Charges are generally determined on a reciprocal basis, where operators charge each other symmetrically for similar services.

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’.

i. **Additionally, is there an alternative way to organize these two regulations to enhance clarity and ease of understanding?**

Kindly provide your response with justification.

BIF Response:

The 2001 Regulations might still hold relevance in general principles, reporting requirements, or other aspects not related to the specific rates of IUC. We suggest repealing Section IV and Schedules I/II of the 2001 regulations to eliminate confusion. Instead, all IUC rates should be in line with rates as mentioned in subsequent regulations issued after 2003 "Interconnection Usage Charges Regulations".

A.8 The Telecommunication Interconnection (Port Charges) Regulations, 2001

Q28. Is there a need for change, if any, required in respect of following:

i. **Port Technology**
ii. **Port Size (Capacity)**
iii. **Port Charges**
iv. **Any other related aspect**

Kindly provide a detailed response with justification.

BIF Response:

Yes, with the proliferation of new and emerging technologies, such as IP-based voice (VoIP), IP Multimedia Subsystem (IMS) and 5G networks, there is a need for change.

(i) Port Technology: The regulations should explicitly recognise modern interfaces as per TEC standard titled 'IP Based Interconnection between Service Providers Networks', which include Dense Wavelength Division Multiplexing (DWDM) based links, optical or electrical Synchronous Digital Hierarchy (SDH) connections, Ethernet 1Gb/s, 10Gb/s, 100Gb/s ports, rather than just E1/TDM.

(ii) Port Size (capacity): Historic limits (E1 /TDM-centric) are obsolete which do not meet high bandwidth and low latency requirements of present. The regulations should allow any capacity that is technically required and standardize charges per capacity unit.

(iii) Port Charges: The old ceiling rates need revision to cover new technology costs.

(iv) Other: The rules could also cover Quality of Service parameters. The TEC standard titled 'IP Based Interconnection between Service Providers Networks' also provides for quality of service (QoS) as well as it outlines parameters and measures to maintain end-to end voice quality including latency, jitter, packet loss and overall network efficiency.

Q29. 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.

BIF Response:

In our view, port charges should be uniform per capacity across services and technologies to avoid cross-subsidies between services.

Q30. 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.

BIF Response:

No, 'Erlang' based traffic estimation which was designed for circuit-switched voice, are no longer the relevant and practical for IP traffic.

The CP rightly mentions that applying an Erlang model alone and directly to IP traffic may not be appropriate for accurate capacity planning, potentially resulting in either under-provisioning (leading to congestion, packet loss, and poor quality of service) or over-provisioning (resulting in inefficient resource utilization and higher operational costs that could be passed on to consumers).

Congestion avoidance and congestion management techniques together with QoS parameters play a vital role in telecom IP interconnection.

In IP networks, capacity is better measured in bits per second or concurrent sessions. We, therefore, suggest migrating to "IP capacity units" (e.g. in Gbps) and require demand forecasts in those terms.

For any remaining legacy (e.g. Erlang/radio capacity) formulas, a one-time conversion factor should be allowed.

The use of 'Erlang' as a unit of traffic measurement in legacy interconnection regulations such as the 2001 Port Charges regulations and TRAI's 2018 Interconnection Regulation is not fully sufficient for IP-based interconnection scenarios. Erlang, which measures voice traffic intensity in circuit-switched networks, does not map well to the bursty, packet-based nature of modern IP networks. As a result, the traditional procedures for demand estimation may be outdated given the industry's adoption of IP-based interconnections.

Limitations of Erlang in IP-Based Networks.

Erlang's Origin: The Erlang unit was developed for circuit-switched, voice-centric PSTN networks, effectively quantifying the average number of simultaneous voice calls (traffic intensity) on a given circuit.

Mismatch in Packet Networks: IP networks carry a diverse range of services (VoIP, video, Internet), each with distinct traffic patterns—bursty bursts, variable bandwidth, and no fixed call holding time—which makes the traditional Erlang calculation less relevant.

Existing TRAI Regulations: Both the 2001 and 2018 regulations use Erlang models (such as Erlang B) to estimate voice traffic and points of interconnection (POI) port requirements, which is practical for legacy but not ideal for IP-based port calculations.

Alternate Metrics and Approaches for IP Demand Estimation- Due to the above limitations, demand estimation for IP interconnection should move to packet and bandwidth-centric metrics:

- IP-Layer Capacity (RFC 9097): IETF recommends using 'Maximum IP-Layer Capacity', defined as the maximum number of IP-layer bits transmitted and correctly received per second between two points. It is measured in Mbps or Gbps rather than voice-hour units.
- Active Measurement Techniques: Demand should be estimated using traffic profiling (average/peak Mbps per measurement interval), packet loss, round-trip delay, and throughput capacity, as recommended in IETF RFC 9097. These should be evaluated at the busiest hour to ensure adequate interconnection provision.
- Burst and Quality Metrics: Metrics like packet delay variation (jitter), one-way packet loss, concurrent session count, session setup rate, and bandwidth concurrency are relevant for determining IP POI requirements.
- Dynamic Adjustment: Unlike fixed-circuit needs, IP interconnection can scale dynamically—so Live traffic monitoring and capacity triggers (e.g., a threshold of 70% sustained bandwidth utilization at interconnect) can be used as augmentation criteria.

Therefore, we recommend to adopt IP Layer capacity method for measurement of traffic.

A.9 Register of Interconnect Agreements Regulations, 1999.

Q31. 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.

BIF Response:

Yes, 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. The floppy-disk and paper-based filing system is archaic and inefficient

We suggest moving all interconnect agreements and related filings to an online portal, where signed agreement files (e.g. PDFs) can be uploaded within a given deadline. The TRAI portal can automatically log timestamps, eliminating paper handling.

B. Generic Questions pertaining to all existing interconnection regulations

Q32. 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.

BIF Response:

Financial disincentives act as effective deterrents. The CP mentions that while procedural timelines and obligations have been prescribed under the existing regulations, stakeholders' experience indicates that non-compliance with interconnection commitments, including delays or deviations from agreed terms, can adversely impact service rollout, competition and consumer welfare. Thus, introduction of financial disincentives provision as a regulatory tool can serve as a deterrent for non-compliance, helping maintain the effective regulation of the interconnection framework.

There is a need for financial disincentives to deter non-compliance with interconnection regulations, as they are a crucial tool for enforcing rules and ensuring the stability of the telecom ecosystem. A hybrid approach, combining fixed penalties with the flexibility of discretionary enforcement, can provide both predictability and a powerful deterrent.

The financial disincentives could be applied on scenarios of missing port provisioning deadlines, failing to meet augmentation timelines, non-payment of interconnect bills and unauthorized use of a POI.

Quantification should be so that the carriers have a strong incentive to meet obligations.

Q33. 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.

BIF Response:

The mechanism and timelines for transition of existing interconnection agreements between the service providers to the new regulatory framework must be a phased and structured transition.

The factors that there is a diversity of providers and varying technological maturity are to be considered alongside the technology transformation that has already taken place in form of IP based networks.

To start with, the effective date of new framework can be after 3-6 months of publication of the corresponding regulations. Any new agreements or renewals must comply with the new regulatory framework that will emerge from the CP.

The current agreements can continue for a year or so after the effective date during which period the carriers should negotiate amendments to existing agreements reflecting updated terms. A final "switch-over" deadline can be 18-24 months from the date of publication of the regulations.

Q34. 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**

BIF Response :

TRAI in its recommendation dated 18th Sep, 2024 has rightly classified Satcom as separate service. We emphasise that the Satellite services (i.e. Mobile Satellite Service (MSS) and Fixed Satellite Service (FSS) differ from terrestrial services and hence there must be separate authorisation for the Satellite Services.

Satellite communication networks are inherently different from terrestrial networks in terms of topology, mobility and transmission medium. From an interconnection perspective, the point of interaction between satellite systems and terrestrial networks invariably occurs on the ground. Accordingly, a uniform, technology-neutral interconnection framework should be adopted, under which all interconnection between satellite networks and terrestrial networks is effected at designated earth-based gateways. The gateway-level Points of Interconnection (POIs) should use IP-based interfaces, consistent with the evolution of terrestrial interconnect towards all-IP architectures.

For the purposes of interconnection regulation, satellite operators—whether providing Mobile Satellite Services (MSS) or Fixed Satellite Services (FSS)—should interconnect with terrestrial networks through gateway-level Points of Interconnection (POIs) using IP-based interfaces, consistent with the evolution of terrestrial interconnect towards all-IP architectures.

The Satellite-to-satellite interconnection, where applicable, should be addressed through mutually agreed arrangements at the respective ground gateways.

The regulatory framework should clearly recognise the distinction between MSS and FSS, while ensuring that interconnection obligations, charging principles, QoS, security and lawful interception requirements at the gateway level are met.

Q35. **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.**

BIF Response:

The FCC's 2025 Notice of Proposed Rulemaking (https://docs.fcc.gov/public/attachments/DOC-415055A1.pdf) to phase out TDM interconnection by 2028 underscores a path toward all-IP.

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

BIF Response: No comments.