ICRIER and Vodafone Idea Centre for Telecom (InViCT)

Counter Comments on Consultation Paper

Review of Existing TRAI Regulations on Interconnection Matters

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ICRIER AND VODAFONE IDEA CENTRE FOR TELECOM

About InViCT

The ICRIER and Vodafone Idea Centre for Telecom (InViCT), established by the Department of Telecommunications (DoT) as a Telecom Centre of Excellence, provides research, advisory, and policy support in the areas of telecom policy, governance, and regulation. InViCT's research activities encompass studying policies, regulations, and practices related to telecom and associated ICT sectors. Through publications, seminars, workshops, and conferences, the Centre disseminates knowledge and fosters engagement among policymakers, industry, regulators, and academia within the telecom sector.

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Introduction

The ICRIER and Vodafone Idea Centre for Telecom (InViCT) appreciates the opportunity to provide inputs for this timely and crucial endeavor by the Authority to streamline, consolidate, and future-proof the interconnection regime of the country.

As India marches towards Viksit Bharat 2047, the digital ecosystem will play a pivotal role, with the telecommunications infrastructure as its foundation. The telecommunications landscape of the country has undergone a significant transformation since the Authority had promulgated the first Interconnection Regulation in 1999. It is indeed a positive step by the Authority to consolidate and update the nine principal regulations and their subsequent amendments. However, beyond consolidation, it is also important to use this opportunity to rework the interconnection framework in its entirety, considering the central role played by mobile networks, optical fiber and IP technology, even as some of the fixed line network components continue to be based on the Time Division Multiplexing (TDM).

This submission consists of three sections — principles, processes, and proposals, five each.

Principles

Any regulatory intervention must be based on some foundational principles. These include:

1. Regulatory Simplicity and Predictability

The Authority has been engaged in fostering a robust regulatory regime for interconnection since its early years and in the process has promulgated nine principal regulations, followed by amendments to most of those from time to time. However, such multiplicity inevitably leads to the unintended consequence of creating overlaps and gaps, thereby creating regulatory uncertainty and unnecessary delays as well as avoidable complexity and prolonged litigation. In addition, some of the measures need a rethink due to the changes in the market structure, while others such as the mandate to submit copies on floppy disks have become obsolete.

Accordingly, considering the tectonic shifts across the technology and the markets as well as the evolutions within the law, licensing and overall regulatory regimen, it is necessary to unbundle and reconfigure the whole institutional scaffolding of the digital ecosystem.[1] Within the telecommunications sector, the ensuing transition from TDM to IP networks and the ability to simultaneously transmit voice, data, and multimedia content warrants a holistic review of the extant interconnection regime, in particular.

[1] Maheshwari, D., & Sharma, B. (2025). *Governing Digital India: A Report on Institutions and Instruments*. Centre for Social and Economic Progress. https://csep.org/wp-content/uploads/2025/10/GOVERNING-DIGITAL-INDIA.pdf

2. Transparency, Non-Discrimination, and Equivalence of Inputs (EOI)

As enunciated in the World Bank's Telecommunications Handbook[2], the following must be duly incorporated within the interconnection framework:

- Transparency is a policy objective intended to discourage anti-competitive behavior by dominant operators. Standard terms and procedures for interconnection to dominant operators must be published, and regulators should maintain public registries of interconnection agreements to allow for meaningful comparison of rates and benchmarks.

- Avoidance of "undue" or "unjust" discrimination is critical, ensuring that no interconnecting competitor is placed at a significant disadvantage. The regulator must insist and ensure that the interconnecting parties are treated on an equal and reciprocal basis as "peers" or "co-carriers," rather than as customers or subscribers.

- Discrimination can be detected and remedied more effectively if the dominant firms are required to provide "comparably efficient" arrangements to affiliates and third-party competitors alike. In cases where a vertically integrated supplier provides both wholesale and retail services, an "imputation approach" or test should be applied to mitigate vertical price squeezing.

The Authority must ensure that there is no discrimination across the licensees—whether they are in the public or in the private sector, whether they operate fixed line or mobile service, whether they are incumbent or new entrants.

The Authority must also do away with the outdated distinction between "interconnection seeker" and "interconnection provider", barring exceptional circumstances based on transparent, fair, and reasonable grounds, with the underlying rationale recorded in writing.

As noted in the consultation paper itself, Equivalence of Inputs (EOI) is an extension of the non-discriminatory principle, which requires one service provider to provide another service provider with the same price and non-price inputs as it provides to its own divisions, subsidiaries, or partners. This principal aids in sustaining competition, encouraging innovation, and ensuring fairness. Any incident of vertical price squeeze or abuse of gatekeeping facility must be dealt by the Authority in a firm and time bound manner.

It is also notable that the Body of European Regulators for Electronic Communications (BEREC) considers the EOI principle as a reliable method in achieving effective protection from discrimination.[1] Several countries, including New Zealand and the United Kingdom, have already

[2] Intven, Hank [editor]; Oliver, Jeremy; Sepulveda, Edgardo. *Telecommunications Regulation Handbook (English)*. Washington, D.C.: The World Bank. http://documents.worldbank.org/curated/en/390451468780890888

adopted EOI to ensure that vertically integrated operators provide the same terms and conditions to third-party service providers as they do to their own affiliates.

3. Interoperability

Interoperability lies at the core of telecommunications, enabled by technical standards across fixed and mobile networks as well as across TDM and IP. As underscored in the ITU Resolutions 2022 and 2024[3,4]:

- The global migration from circuit-switched to packet-switched (IP-based) networks requires new concepts, such as "all over IP".

- Legacy mechanisms used in circuit-switched networks for roaming, numbering, charging, and security are often unsuitable for the interconnection of 4G, IMT-Advanced, and IMT-2020 networks.

- Effective voice and video interconnection across these systems requires translation from ITU-T E.164 number formats to Universal Resource Identifiers (URIs), with ENUM serving as a potential solution for such translation.

- Standardization must focus on the deployment of signaling protocols for VoLTE/ViLTE interconnection, emergency calls on VoLTE-based networks, and overall quality of service (QoS).

- International interoperability worldwide depends on developing framework and signaling architectures that address naming, numbering, addressing, and routing.

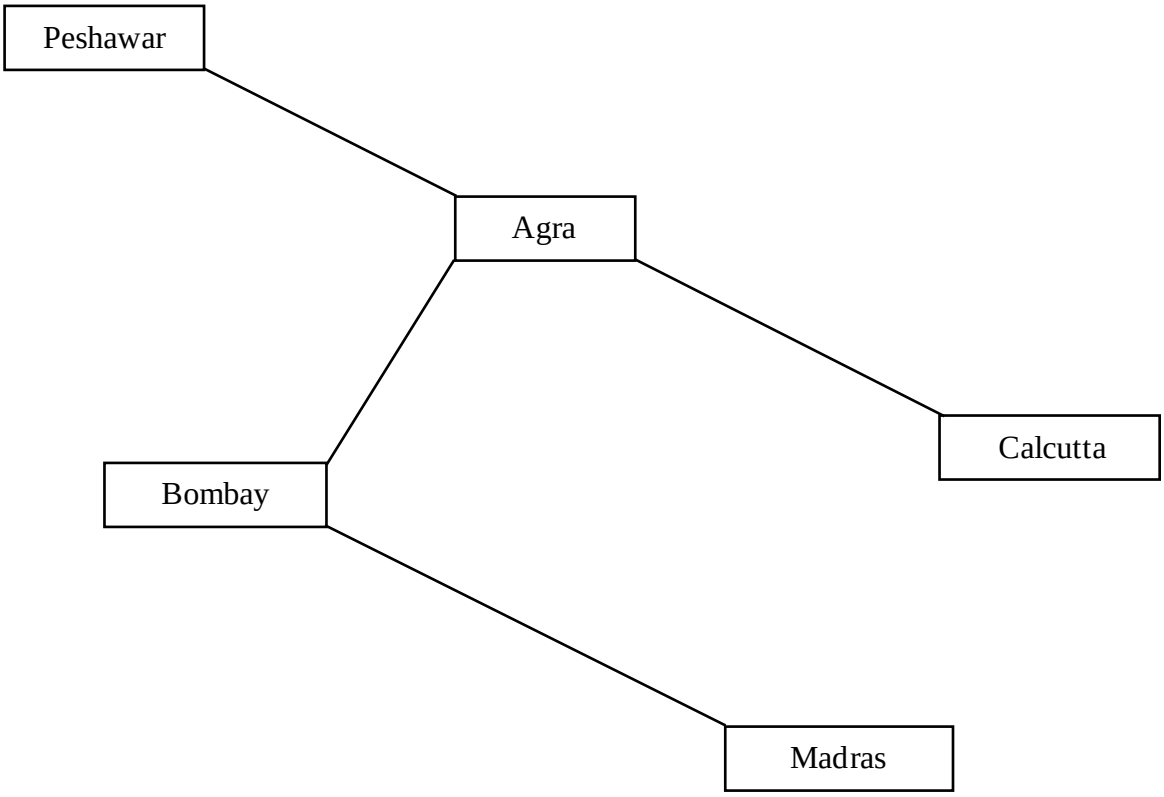
- Member states must maintain administrative control over these international telecommunication resources to ensure sovereignty.

Use of the NG.118 Parameter forms published by the GSM Association may be considered to "minimize interoperability issues when deploying Internet Protocol Multimedia Subsystem, IMS services between Service Providers by outlining comprehensive service parameters to be exchanged when establishing interworking" within the realm of all-IP interconnection.[5]

[3] International Telecommunication Union. (2016). *Resolution 93 – Interconnection of 4G, IMT-2020 networks and beyond*. https://www.itu.int/dms_pub/itu-t/opb/res/T-RES-T.93-2022-PDF-E.pdf
[4] International Telecommunication Union. (2024). *Resolution 93 – Interconnection of International Mobile Telecommunications networks*. https://www.itu.int/dms_pub/itu-t/opb/res/T-RES-T.93-2024-PDF-E.pdf
[5] GSM Association. (2019). *NNI Parameter forms*. https://www.gsma.com/newsroom/wp-content/uploads//NG.118-v1.0.pdf

4. Resilience

Considering that most aspects of human life are increasingly dependent on the digital ecosystem, it is pertinent that the underlying telecommunications infrastructure remains resilient, both in terms of its strategic architecture and operational parameters. It would not be out of place to mention that during the 1857 revolution, the telegraph network in the country had come to a grinding halt once operations at Agra were disrupted. The reason was a lack of triangulation, even as the network of telegraph lines exceeded 6,400 kilometers (4,000 miles), as schematically depicted in the figure below.



Source: Lahiri Choudhury, D.K. (2010). *Telegraphic imperialism: Crisis and Panic in the Indian Empire, c. 1830.* Palgrave Macmillan.

This implies that there must be path-redundancy wherever feasible and incentives for the same must be in-built. Beyond just physical connectivity, it is also crucial to ensure that unilateral action by an interconnecting party does not lead to any disruption in services of other service providers and their subscribers or partners.

It is also critical that the proposed interconnection framework does not intrude or stray into other issues such as security notwithstanding their own significance. While network security is different subject altogether, nonetheless, the Authority may consider putting reasonable and requisite norms to retard and mitigate spread of cyber threats through the points of interconnection.

5. Cost Orientation and Unbundling

Going by the first principles, the interconnection charges must be cost-oriented to prevent dominant operators from deterring market entry through excessive charges for ports or termination. Hence, these charges should approximate forward-looking long-run incremental costs (LRIC); additionally, network elements should be unbundled and charged separately so that the operators only pay for the specific facilities they require.[6] Internal cost inefficiencies of any operator must not be passed through to other interconnecting operators.

Where reciprocal costs and traffic are expected to be reasonably balanced, "bill and keep" arrangements serve as an efficient alternative to traditional cost-based interconnection—a practice prevalent in the majority of the Internet exchange points (IXPs) globally, including those in India operated by the National Internet Exchange of India (NIXI) and others.

Last but not the least, any costs or charges related to universal service obligations must be identified separately and not at all be bundled with or within the interconnection charges. Digital Bharat Nidhi, the statutory fund under the Telecommunication Act, 2023, is the right mechanism for the same.

Processes

The regulatory process also entails certain key processes such as the following:

1. Open and Inclusive Consultation

The present consultation on interconnection initiated by the Authority is a commendable effort to gather stakeholder perspectives on the existing regulatory framework and the potential revisions it requires. Such consultations should be conducted in an open and inclusive manner among all stakeholders, including but not limited to the service providers, to ensure that diverse viewpoints are duly considered and unintended consequences mitigated to the extent feasible, thereby providing predictable, consistent and pro-competition regulatory regime.

2. Automation and Digitization

It should be ensured that digitization and automation replace manual processes to achieve efficient, accurate, and timely provision of telecommunications services. To this end, outdated practices involving physical documentation and manual procedures for the registration of interconnection agreements should be eliminated. Instead, the registration of interconnection agreements and other aspects of points of interconnection provisioning should be digitized and carried out through an online portal.

[6] Intven, Hank [editor]; Oliver, Jeremy; Sepulveda, Edgardo. *Telecommunications Regulation Handbook (English)*. Washington, D.C.: The World Bank. http://documents.worldbank.org/curated/en/390451468780890888

3. Standardization

Technical standards form the bedrock of telecommunication networks and have been evolving at a rapid pace in recent years due strides in technology, especially across IP networks, mobility, AI and a plethora of new services. Any imposition or mandate for continuing with archaic standards must be disincentivized. Instead, there should be positive incentives to adopt and use future-ready standards.

4. Accounting Separation

Considering that interconnection charges should reflect the underlying costs and the work done by the respective operators, the accounting separation regime should be commensurately reviewed and updated accordingly, an activity the Authority is already undertaking.

5. Oversight and Dispute Resolution

As brought out by the World Bank's, Telecommunications Regulation Handbook[7] and the ITU's Resolutions[8,9]:

- An independent regulator or third party should be empowered to resolve interconnection disputes quickly and fairly.

- To identify and reduce discrimination, regulators may implement structural or accounting separations, requiring a dominant firm to separate its competitive operations from its monopoly functions.

- Regulators must also intervene to ensure non-discriminatory rationing of network access and prevent anti-competitive barriers caused by network congestion.

Continuous consultations and exploratory activities among operators are necessary to prioritize and resolve problems related to the interconnection of IP-based IMT networks.

Proposals

The instant consultation paper and the comments available on the Authority's website pertain to several key issues. The proposals hereunder are thematically arranged and must be considered alongside the principles and the processes mentioned earlier.

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[7] Intven, Hank [editor]; Oliver, Jeremy; Sepulveda, Edgardo. *Telecommunications Regulation Handbook (English).* Washington, D.C.: The World Bank. http://documents.worldbank.org/curated/en/390451468780890888

[8] International Telecommunication Union. (2016). *Resolution 93 – Interconnection of 4G, IMT-2020 networks and beyond*. https://www.itu.int/dms_pub/itu-t/opb/res/T-RES-T.93-2022-PDF-E.pdf

[9] International Telecommunication Union. (2024). *Resolution 93 – Interconnection of International Mobile Telecommunications networks*. https://www.itu.int/dms_pub/itu-t/opb/res/T-RES-T.93-2024-PDF-E.pdf

1. The level of interconnection should be at licensed service area (LSA)-level and IP-based.

The genesis of the 300-odd Long Distance Charging Areas (LDSA) and the 2,600-odd Short Distance Charging Areas (SDCA) lies in the national numbering and routing plans conceived and implemented in the area of only fixed telephony using circuit-switched analog technology almost six decades back when the long-distance network was based on copper cables, had extremely low bandwidth, and tele-density itself was abysmally low.

While the number of fixed lines had increased significantly at the time of introduction of the first interconnection regulation in 1999, most of the domestic long-distance network even at that time consisted of copper cables. Until the implementation of the Telecom Tariff Order effective April 1, 1999, the leased line tariffs and the subscriber trunk dialing (STD) tariff were also kept artificially high to heavily cross-subsidize local calls and fixed line rentals.

However, over the past quarter century, most of the national long-distance networks have already been fiberized and almost entirely IP-based. Moreover, besides enhancing the channel and bandwidth capacity over the long-distance network, there has also been further reduction in long distance tariffs.

In fact, for several years, a voice call within India has the same tariff, whether it is from or to a fixed line or a mobile; or, whether it is within the same SDCA, or across different LDCAs, or even across LSAs. Effectively, tariff for a local call is same as that for a long-distance call within India.

Considering the competitive telecom market and infrastructure that is mobile and IP-centric, continuation with the archaic TDM based sub-LSA level interconnection regime does not serve any meaningful purpose.

Unsurprisingly, the Body of European Regulators for Electronic Communications (BEREC) recommends in its 'Final Report on IP interconnection'[10] that the telecom regulators in EU member states devise an appropriate interconnection regime for an all-IP world and to focus on the migration towards IP based Next Generation Networks (NGNs).

2. Expeditious and time-bound migration of interconnection regime from TDM to IP and Erlang to Bandwidth based on LRIC.

The IP networks today predominantly carry multimedia and other data traffic as compared to voice calls and SMS traffic. Accordingly, urgent migration to IP-based ports is the need of the hour. Since the underlying cost structure as well as the capabilities and capacities of the IP-based networks built using optical fiber are fundamentally different from that of the TDM-based networks, fresh cost estimations are also necessary.

[10] EUR-LEX - 32013H0466 - 2013/466/EU: *Commission Recommendation of 11 September 2013 on Consistent Non-discrimination Obligations and Costing Methodologies to Promote Competition and Enhance the Broadband Investment Environment*. (2013, September 11). https://eur-lex.europa.eu/eli/reco/2013/466/oj/eng

In view of the rapidly growing data traffic, the timely provision of interconnection serves one and all. Aggressive but achievable timelines must be mandated along with stringent financial disincentives to deter instances or tendencies of indulging in deliberate delay, denial or disruption.

3. Interconnection for non-person-to-person (P2P) traffic may warrant differential treatment.

With the advent and adoption of new age IP-based services such as video-conferencing, application to person (A2P), telemarketing and robo-communication entail uni-directional traffic — a situation unsuitable and likely unforeseen for the "Bill and Keep" norm. Accordingly, a differential regime may be considered for such activities.

In this context, it is noteworthy that in 2003 the Authority had notified port charges payable by the Internet Service Providers (ISPs) to their respective Basic Service Operators (BSOs) vide the 29th Amendment of the Telecommunications Tariff Order. However, these port charges were exactly the same as those notified in December 2001 vide the Telecommunication Interconnection (Port Charges) Regulation, 2001. Clearly, the Authority had consciously kept the ISPs outside the ambit of the interconnection regime; else the ISPs would have been entitled to receive the termination charges from the BSOs.

4. International termination charges should be reciprocal.

Asymmetry in international call termination charges distorts the market and hence, should be made reciprocal.

5. There should be no termination charges for emergency communication.

Considering that emergency communication is a licensing mandate, termination charges for the same is an anomaly and must be done away henceforth.

Conclusion

This submission presents suggestions to inform the Authority's ensuing review of the interconnection regulatory regime, structured around principles, processes, and proposals. The principles emphasize regulatory certainty, transparency, interoperability, resilience, and cost orientation; the processes discuss open consultations, digitization, standardization, accounting separation, and effective oversight; and the proposals offer targeted recommendations on the level of interconnection, migration to IP-based regimes, traffic-specific treatment, and termination charging arrangements.

The InViCT team hopes these inputs will be useful in shaping an efficient, forward-looking, and robust interconnection framework, and would be pleased to clarify or elaborate on any aspect of the submission should the Authority so desire.