TO BE PUBLISHED IN THE GAZETTE OF INDIA, EXTRAORDINARY, PART III, SECTION 4

TELECOM REGULATORY AUTHORITY OF INDIA

Notification

New Delhi, 9th November, 2026

The Telecommunication Interconnection (Port Charges) (Third Amendment) Regulations, 2026

(11 of 2026)

No. RG-1/(2)/2026-NSL-I--- In exercise of the powers conferred upon it under section 36 read with sub-clauses (ii), (iii) and (iv) of clause (b) of sub-section (1) of section 11 of the Telecom Regulatory Authority of India Act, 1997 (24 of 1997), the Telecom Regulatory Authority of India hereby makes the following regulations further to amend the Telecommunication Interconnection (Port Charges) Regulation, 2001 (6 of 2001), namely:-

1. These regulations may be called the Telecommunication Interconnection (Port Charges) (Third Amendment) Regulations, 2026.

2. These regulations shall come into force with effect from 1st January 2027.

3. In regulation 1 of the Telecommunication Interconnection (Port Charges) Regulation, 2001 (hereinafter referred to as the "principal regulations"),
   (1) for sub-regulation (iii), the following sub-regulation shall be substituted, namely:-
   "(iii) In these regulations, "Port" means a termination point on an equipment or a distribution frame that provides a point of access or interconnection for the exchange of traffic between two interconnecting telecommunication networks, enabling ingress and egress of such traffic. A Port shall be:-
   (a) an E1 Port, with a bandwidth of 2.048 Mbps; or
   (b) an IP Port, with bandwidth expressed in Mbps or Gbps.";
   (2) in sub-regulation (v), for the words "Schedule I", the word "Schedules" shall be substituted.

4. In regulation 2 of the principal regulations, after the words "notified on 14.12.2001,", the words "as amended from time to time," shall be inserted.

5. After regulation 2B of the principal regulations, the following regulation shall be inserted, namely:-
   "**2C. Port charges on or after 1st January 2027 for IP-based interconnection**.— (1) Every interconnection provider shall charge, on or after 1st January 2027, the Port charges as specified in Schedule IV to these regulations and raise the demand note or the invoice, as the case may be, to the interconnection seeker.
   (2) Nothing contained in the Schedule IV to these regulations shall apply in case the interconnection provider and the interconnection seeker mutually agree to charge and pay charges lower than those specified in the Schedule IV to these regulations.".

6. In regulation 3 of the principal regulations, in sub-regulation (iii), for the words "as per Schedule I herein", the words "in accordance with Schedules III and IV, as applicable" shall be substituted.

7. For regulation 4 of the principal regulations, the following regulation shall be substituted, namely:-
   "**4. Review.—** The provisions of these regulations may be reviewed by the Authority as and when required.".

हरिन्द्र कुमार/Harinder Kumar, ITS
सचिव/Secretary
भारतीय दूरसंचार विनियामक प्राधिकरण
Telecom Regulatory Authority of India
नई दिल्ली/New Delhi

8. For regulation 5 of the principal regulations, the following regulation shall be substituted, namely:-

"5. Financial Disincentive. –

Consequences for contravention of the provisions of these regulations.— (1) If any service provider contravenes the provisions of regulation 3, it shall, without prejudice to any penalty which may be imposed under the terms and conditions of its license or authorisation or any other action that may be taken under any Act, or the rules or regulations or orders made, or directions issued, thereunder, be liable to pay an amount, by way of financial disincentive, as provided in the Schedule V to these regulations.

(2) No order for payment of financial disincentive shall be made by the Authority unless the service provider has been given a reasonable opportunity of representing against the contravention observed by the Authority.

(3) The Authority may decide not to impose any financial disincentive, or impose a lower amount of financial disincentive, for reasons to be recorded in writing.".

9. After regulation 5 of the principal regulations, the following regulation shall be inserted, namely:-

"**5A. Payment of financial disincentives**.— (1) The amount payable by way of financial disincentive under these regulations shall be remitted to such head of account as may be specified by the Authority.

(2) If the service provider fails to make payment of financial disincentive under regulation 5, within a period of twenty-one days from the date of issue of the order for payment of financial disincentive, or as stipulated in the order for payment of financial disincentive, it shall be liable to pay simple interest at a rate which shall be two percent above the one year Marginal Cost of Funds-based Lending Rate (MCLR) of the State Bank of India existing as on the beginning of the Financial Year in which last day of the stipulated period falls.

Explanation: For the purposes of this regulation, a part of the month shall be reckoned as a full month for calculation of interest and a month shall be reckoned as an English calendar month.".

10. For regulation 6 of the principal regulations, the following regulation shall be substituted, namely:-

"**6. Removal of Difficulties.**— In order to remove any difficulties in the interpretation or application of the provisions of these regulations, the Authority may issue necessary clarifications or guidelines, which shall be final and binding.".

11. After the Schedule III to the principal regulations, the following Schedule shall be inserted, namely:-

"SCHEDULE IV

(See regulation 2C)

Port Charges for IP port

Capacity of IP port	Ceiling for port charge per port per annum (in ₹)
1 Gbps	5.6 lakh
10 Gbps	42.3 lakh

Note 1: The interconnection provider and the interconnection seeker may, with mutual agreement, interconnect using IP port capacity other than the capacities specified above. The IP port charges for such capacity shall be determined in a transparent manner by the service provider providing the IP port, analogous to the methodology as applied for determining the charges for the 1 Gbps and 10 Gbps IP ports specified in this Schedule.

Note 2: The port charges and corresponding periods of applicability specified in Schedules I, II, and III shall apply solely to E1 ports.".

हरिन्द्र कुमार/Harinder Kumar, ITS
सचिव/Secretary
भारतीय दूरसंचार विनियामक प्राधिकरण
Telecom Regulatory Authority of India
नई दिल्ली/New Delhi

12. After Schedule IV so inserted, the following Schedule shall be inserted, namely:-

"SCHEDULE V

(See regulation 5)

Sl. No.	Contravention under regulation	Amount of financial disincentive for each instance of contravention
1	Failure to comply with the reporting requirement under regulation 3 within stipulated time	(i) Up to twenty-five thousand rupees per day for delay up to fifteen days; and (ii) Up to fifty thousand rupees per day for each day of delay beyond fifteen days: Provided that the total amount of financial disincentive under item (i) and item (ii) above shall not exceed rupees fifteen lakh per Service Area for each instance of contravention.

".

13. The heading "Annexe-A" in the Explanatory Memorandum to the principal regulations shall be deleted.

(Harinder Kumar)
Secretary
हरिन्द्र कुमार/Harinder Kumar, ITS
सचिव/Secretary
भारतीय दूरसंचार विनियामक प्राधिकरण
Telecom Regulatory Authority of India
नई दिल्ली/New Delhi

Note 1. The principal regulations were published vide F. No. 311-6/2001-TRAI (Econ.) dated 28.12.2001 (6 of 2001) and subsequently amended vide notification Nos. --

(i) 409-10/2006-FN dated 02.02.2007 (1 of 2007) (First Amendment);

(ii) 409-3/2011-I&FN dated 18.09.2012 (18 of 2012) (Second Amendment);

Note 2. The Explanatory Memorandum explains the objects and reasons of 'The Telecommunication Interconnection (Port Charges) (Third Amendment) Regulations, 2026' (11 of 2026).

हरिन्द्र कुमार/Harinder Kumar, ITS
सचिव/Secretary
भारतीय दूरसंचार विनियामक प्राधिकरण
Telecom Regulatory Authority of India
नई दिल्ली/New Delhi

Explanatory Memorandum
to
The Telecommunication Interconnection (Port Charges) (Third Amendment) Regulations, 2026

1. Introduction

1.1. Interconnection in telecom refers to the commercial and technical arrangements that allow authorized entities or licensees to connect their telecommunication equipment, networks, and services, enabling their users to access the users, services, and networks of other authorized entities or licensees. Port in the interconnection refers to a termination point on an equipment or a distribution frame that provides a point of access or interconnection for the exchange of traffic between two interconnecting telecommunication networks, enabling ingress and egress of such traffic.

1.2. The Authority has undertaken a review of 'The Telecommunication Interconnection (Port Charges) Regulation, 2001', which was notified on the 28th December 2001, and came into force from the date of notification. These regulations established the framework for levying port charges, defining the commercial and technical terms under which service providers interconnect their networks and exchange telecommunication traffic. These regulations were subsequently amended and notified on the 02nd February 2007 and the 18th September 2012.

1.3. The Authority now notifies 'The Telecommunication Interconnection (Port Charges) (Third Amendment) Regulations, 2026'. This explanatory memorandum contains details on the background, rationale and considerations underlying this amendment, to enable stakeholders to understand the issues addressed and the Authority's approach in formulating these regulations.

2. Present exercise to review the regulatory framework for interconnection in India

2.1. The Authority issued a pre-consultation paper dated the 03rd April 2025 and subsequently issued a consultation paper on the 'Review of existing TRAI Regulations on Interconnection matters' on the 10th November 2025 to seek the views of the stakeholders on various aspects of these regulations. The stakeholders were requested to submit their written comments and counter-comments by the extended last dates of the 15th December 2025 and the 29th December 2025, respectively. An open house discussion was held with the stakeholders on the 28th January 2026. The issues raised in the consultation paper, submissions of stakeholders through comments, counter-comments and during the open house discussion, have been examined in the succeeding paragraphs.

3. Analysis of the issues related to interconnection

3.1. In the consultation paper dated the 10th November 2025, the Authority sought views from the stakeholders on the various issues related to port charges for interconnection. The relevant issues which have been discussed in this explanatory memorandum are as follows:

a. Examination of the need to review port technology, port capacity, and port charges in view of the technological advancement from E1/TDM based interconnection to IP-based interconnection.
b. Examination of the need to have uniform port charge across all services, i.e., fixed line service/ mobile service/ NLD service/ ILD service, and technologies, i.e., E1/TDM based interconnection and IP based interconnection.
c. Necessary financial disincentive framework.

हरिन्द्र कुमार/Harinder Kumar, ITS
सचिव/Secretary
भारतीय दूरसंचार विनियामक प्राधिकरण
Telecom Regulatory Authority of India
नई दिल्ली/New Delhi

A large number of views were received from stakeholders in response to the questions in the consultation process. The submissions received from the stakeholders have been summarized in the subsequent sections followed by the analysis and views of the Authority on these issues.

3.2. **Examination of the need to review port technology, capacity, and charges in respect of IP-based interconnection, uniform port charges across services and technologies, and necessary financial disincentive framework.**

3.2.1. The existing licensing framework, regulatory framework and the Telecommunications (Authorisation for Provision of Principal Telecommunication Services) Rules, 2026 under the Telecommunications Act, 2023, issued by the Central Government in respect of these issues are, *inter alia,* as follows:

3.2.2. Chapter IV of the Unified License issued by the Department of Telecommunications contains, *inter alia*, the following provisions relating to network interconnection:

> *"27.3 Interconnection between the networks of different Licensees for carrying circuit switched traffic shall be as per national standards of CCS No.7 and for carrying IP based traffic as per Telecom Engineering Centre (TEC) standards as amended from time to time by Telecom Engineering Centre (TEC) and also subject to technical feasibility and technical integrity of the Networks and shall be within the overall framework of interconnection regulations/ directions/ orders issued by the TRAI/ Licensor from time to time. For inter-networking between circuit switched and IP based network, the Licensee shall install Media Gateway Switch. Further, the Licensor may direct the LICENSEE to adopt any other technical standards issued by TEC on interconnection related issues."*

3.2.3. The Telecommunication Interconnection (Port Charges) Regulation, 2001, as amended from time to time, provides the following in respect of the provision of port for interconnection:

> *"2B. Port charges on or after the 1st October, 2012. –*
> *(1) Every interconnection seeker shall, on or after the 1st day of October, 2012, make his demand, for every Point of Interconnection for the total number of Ports required by him on or after the said date to the interconnection provider.*
> *(2) Every interconnection seeker shall make demand under sub regulation (1) on the basis of traffic projection (in Erlangs) on half yearly basis.*
> *(3) Every interconnection provider shall charge, on or after the 1st day of October, 2012, the Port charges in accordance with the Port charges specified in Schedule III to these regulations and raise the demand note or the invoice, as the case may be, for the Ports demanded on or after the said date by the interconnection seeker under sub-regulation (1) and (2).*
> *(4) The Port charges for every Port demanded, allotted and provided before the 1st day of October, 2012 shall be charged on or after the said date in accordance with the Port charges specified in Schedule III to these regulations and the interconnection provider shall raise the demand note or the invoice, as the case may be, for such Ports provided by him before the aforesaid date accordingly.*
> *(5) Nothing contained in the Schedule III to these regulations shall apply in case the interconnection provider and the interconnection seeker mutually agree to charge and pay charges lower than those specified in the Schedule III to these regulations."*

हरिन्द्र कुमार/Harinder Kumar, ITS
सचिव/Secretary
भारतीय दूरसंचार विनियामक प्राधिकरण
Telecom Regulatory Authority of India
नई दिल्ली/New Delhi

3.2.4. The Central Government vide notification dated the 23rd June 2026 has issued the Telecommunications (Authorisation for Provision of Principal Telecommunication Services) Rules, 2026 under the Telecommunications Act, 2023, wherein sub-rules (2), (3) and (4) of rule 32, *inter alia,* provide the following:

> *"(2) The network service operator while undertaking interconnection or peering with the telecommunication network of any other network service operator or network service operator licensee shall ensure—*
>
> *(a) that the transmission systems for interconnection or peering meet the requirements under section 19 of the Act in respect of standards and interface requirements;*
>
> *(b) that interconnection and peering, as required, is established on Internet Protocol interface for carrying Internet Protocol-based traffic, as per the standards, including those notified under section 19 of the Act:*
>
> *Provided that the network service operator shall convert circuit switched traffic to Internet Protocol based traffic before sending circuit switched traffic to the telecommunication networks of another network service operator or network service operator licensee;*
>
> *(c) establishment and maintenance of one or more points of interconnection and peering of sufficient capacity as are reasonably required for transmission and reception of messages in conformity with the standards and conformity assessment measures as may be notified by the Central Government under section 19 of the Act; and*
>
> *(d) that interconnection and peering is technically compatible and effective.*
>
> *(3) The network service operator shall provide and update the details of interconnection and peering undertaken with any other network service operator or network service operator licensee to the Central Government on the portal.*
>
> *(4) The network service operator that has an agreement for interconnection or peering with other network service operator or network service operator licensee, whose authorisation or license, is the subject of revocation, surrender or expiry, shall disconnect any interconnection or peering, and where it has provided any telecommunication resource, withdraw such telecommunication resources on the effective date of revocation, surrender or expiry."*

3.2.5. During the consultation process stakeholders were invited to provide their views on the need to review port technology, port capacity, and port charges in view of the technological advancement from E1/TDM based interconnection to IP-based interconnection.

3.2.6. The next question sought the stakeholders' views on the need to have uniform port charges across all services, i.e., fixed line service/ mobile service/ NLD service/ ILD service, and technologies, i.e., E1/TDM based interconnection and IP based interconnection.

3.2.7. Another question sought stakeholders' views on necessary financial disincentives in interconnection regulations to deter non-compliance, along with their quantification.

a) Views of the stakeholders on the need to review port technology, capacity, and charges in respect of IP-based interconnection, uniform port charges across services and technologies, and necessary financial disincentive framework.

3.2.8. Many stakeholders have suggested that the existing regulatory framework for port charges is based on E1/TDM technology and needs revision in the light of technological and market evolution towards IP

हरिन्द्र कुमार/Harinder Kumar, ITS
सचिव/Secretary
भारतीय दूरसंचार विनियामक प्राधिकरण
Telecom Regulatory Authority of India
नई दिल्ली/New Delhi

technology. Stakeholders have further emphasized the need to redefine the concept of "port" in The Telecommunication Interconnection (Port Charges) Regulation, 2001, to encompass IP-based interface, along with a review of port technology, capacity, and associated charging mechanism in the regulatory framework.

3.2.9. Many stakeholders have highlighted the adoption of IP-based packet-switched networks for 4G, 5G, VoLTE, or VoNR by TSPs and the replacement of E1/TDM circuit-switched systems. Many TSPs have migrated to IP-based mobile networks and IP-TAX/NGN switches within their own networks. However, for the purpose of interconnection among TSPs, E1/TDM-based ports are still in use. This dual TDM-IP network architecture causes interoperability issues, transcoding delays, inefficient capacity utilization, higher capital and operational costs and slower augmentations. Use of TDM at certain POIs along with IP interconnection degrades inter-operator call quality. IP-based networks deliver end-to-end VoLTE/VoNR calls, and it would give better call quality experience for inter-TSP calls, currently available mainly within TSPs' IP-based networks.

3.2.10. Further, the stakeholders have indicated that TDM based equipment has now become outdated, is no longer readily available in the market and has reached its end-of-life. There is difficulty in getting the OEMs' support as well as manpower required to manage this equipment.

3.2.11. One stakeholder suggested that IP interconnection should be mandated for all new interconnections to enable VoLTE/VoNR, HD voice, lower costs, and future services like 5G.

3.2.12. The stakeholders have also cited the regulatory practices being adopted by the regulators of other countries regarding migration to IP-based interconnection. As per one of the stakeholders, Federal Communications Commission (FCC) of the United States is considering eliminating its legacy TDM interconnection obligations by 2028. Several other countries including Australia, Brazil, Canada, members of the European Union, Singapore and South Africa have already initiated or completed migration toward IP-based interconnection frameworks.

3.2.13. **Port technology:** The stakeholders have submitted that the existing regulatory framework for port technology based on E1/TDM is no longer aligned with modern telecom network architectures based on IP technology. The stakeholders have emphasized that modern telecom networks are predominantly IP-based, packet-switched, and centralized, rendering existing port technology mentioned in regulations no longer relevant. Accordingly, the stakeholders have recommended to include the IP-based port technology in the regulations.

3.2.14. **Port capacity:** The stakeholders have submitted that the existing mechanism of defining port capacity in terms of fixed E1 units, i.e., 2.048 Mbps, is no longer in line with the evolving network architecture based on IP technology and evolving traffic requirements. The stakeholders have suggested that port capacity should be redefined in terms of scalable, higher bandwidth metrics such as Gbps, or multiples thereof, to appropriately reflect the flexible and high-capacity nature of IP-based networks.

3.2.15. **Port charges:** Stakeholders have submitted that the existing port charges, which are based on historical cost structure, do not reflect the current cost structure, particularly in view of technological advancements and increased traffic volumes. Further, the stakeholders have emphasized the need to continue with the principles of transparency, uniformity, and reciprocity in the charging mechanisms while determining port charges in case of IP-based technology. One stakeholder has proposed that E1/TDM-based port charges be phased out and replaced with IP-based port charges. Additionally, the

हरिन्द्र कुमार/Harinder Kumar, ITS
सचिव/Secretary
भारतीय दूरसंचार विनियामक प्राधिकरण
Telecom Regulatory Authority of India
नई दिल्ली/New Delhi

stakeholders have suggested that port charges for IP-based technology may be determined based on the relevant parameters such as capacity, usage, and cost-per-bit.

3.2.16. Regarding the network elements to be considered for computation of the port charge for IP-based interconnection, two service providers have furnished information on the relevant network elements, namely routers and SBCs (Session Border Controllers), as presented in the following table. For a 10 Gbps IP port, the router costs furnished by the two TSPs are broadly comparable. However, the SBC costs of ₹2,60,933 and ₹72,29,000, respectively, are not directly comparable, as they have been determined on different costing bases. One TSP has furnished the SBC cost on a per-session basis, whereas the other TSP has furnished the hardware and software cost of the SBC along with the corresponding bandwidth requirement per session. Accordingly, the two reported SBC costs cannot be directly adopted or compared for determining the SBC cost attributable to the relevant IP port capacities. To ensure uniformity and comparability, the SBC cost used for port charges has therefore been derived on a common basis corresponding to the relevant port capacity and the number of concurrent sessions supported by such capacity. The methodology and assumptions used for determining port charges are explained in the subsequent section b) containing the analysis of the issues and views of the Authority.

S. No.	Parameter	TSP-1		TSP-2
		1Gbps	10 Gbps	10 Gbps
1.	Router cost (1+1)	₹ 51,200	₹ 1,64,800	₹ 1,68,192
2.	Session border controller cost	₹ 2,60,933 (For 1000 sessions)	₹ 2,60,933 (For 1000 sessions)	₹ 72,29,000
3.	AMC charges post warranty for router and SBC	₹ 74,912	₹ 1,02,176	Not provided
4.	Useful life of equipment	7 years	7 years	8 years
5.	Weighted average cost of capital (WACC)	12 %	12 %	Not provided
6.	Warranty period	3 years	3 years	Not provided

Note: For conversion of costs from USD to INR, conversion rate of 1 USD = ₹ 93.4404, as provided at RBI portal[1], as on 21.04.2026, has been taken.

3.2.17. While submitting the above costing and other related information, service providers intimated that equipment is deployed in 1+1 configuration for redundancy purposes. Therefore, to determine the port charge for a POI, cost of two routers and two SBCs has been taken into account. One service provider has provided SBC cost in terms of SBC session, whereas the other service provider has provided hardware and software cost of the SBC along with bandwidth per session of 40 Kbps for AMR-NB (Adaptive Multi-Rate Narrowband) and AMR-WB (Adaptive Multi-Rate Wideband) codecs at 40% loading in respect of 10 Gbps link. Useful life of the equipment has been mentioned as seven years and eight years respectively by these service providers. One service provider has also informed that the warranty period of the equipment is 3 years and annual maintenance contract (AMC) charge post warranty has also been mentioned at the rate of 6% for router and SBC session cost. This service

[1] https://www.rbi.org.in/scripts/referenceratearchive.aspx

हरिन्द्र कुमार/Harinder Kumar, ITS
सचिव/Secretary
भारतीय दूरसंचार विनियामक प्राधिकरण
Telecom Regulatory Authority of India
नई दिल्ली/New Delhi

provider has also taken weighted average cost of capital (WACC) of 12% while calculating monthly port charge.

3.2.18. Many stakeholders have stated that port charges should be applied uniformly across different service types, i.e., fixed line service, mobile service, national long-distance service, international long-distance service to avoid cross-subsidies between services. However, a few stakeholders have submitted that differential port charges may be applied based on the service type due to distinct technical characteristics, network architecture, cost structure, resource consumption, and traffic handling capabilities across services.

3.2.19. Regarding the need to incorporate provisions for financial disincentives in interconnection regulations to deter non-compliance, some stakeholders stated that the financial disincentives are not required, arguing that a mature telecom market and existing regulatory provisions are sufficient to ensure compliance without additional penalties. Other stakeholders argued in favour of a need for financial disincentives. One stakeholder stated that appropriate provisions for financial disincentives should be incorporated into the regulations to deter non-compliance by private and PSU operators alike. Other stakeholders recommended financial disincentives as a deterrent to ensure compliance with inter-operator rights and obligations. They emphasized that financial disincentives should be applied only in extreme cases, after giving service providers an opportunity for hearing and conclusive proof of non-compliance.

b) Analysis of the issues and views of the Authority on the review of port technology, capacity, and charges in respect of IP-based interconnection, uniform port charges across services and technologies, necessary financial disincentive framework

3.2.20. The Authority has examined the comments furnished by the stakeholders during the consultation process for review of the Telecommunication Interconnection (Port Charges) Regulation, 2001. The existing regulatory framework in respect of port charges was formulated for the E1/TDM-based circuit-switched telecom network architecture, whereas modern telecom networks have transitioned to IP-based packet-switched network architecture.

3.2.21. The Authority, in its consultation paper, had specifically sought detailed inputs from the stakeholders, along with appropriate justification, regarding the need for any changes in port technology, port capacity, and port charges in the context of IP-based interconnection.

3.2.22. With regard to port technology, the Authority observes that due to adoption of technologically advanced IP-based telecom networks, the continued use of E1/TDM-based interconnection alongside IP-based interconnection has resulted in dual telecom network architecture. Such an arrangement leads to inefficiencies, requirement of additional network elements for protocol conversion, increased latency due to transcoding, and higher capital and operational expenditure. Further, such interconnection, based on two-technology arrangement, may impact end-to-end service quality, particularly when compared to native IP-based communication, which enables enhanced voice quality through technologies such as VoLTE and VoNR.

3.2.23. The Authority also takes note of the technological obsolescence of E1/TDM-based equipment. The limited availability of such equipment in the market, along with reduced vendor support and challenges in maintenance, indicates that the continued reliance on E1/TDM-based technology is neither

हरिन्द्र कुमार/Harinder Kumar, ITS
सचिव/Secretary
भारतीय दूरसंचार विनियामक प्राधिकरण
Telecom Regulatory Authority of India
नई दिल्ली/New Delhi

sustainable nor efficient. In this context, migration towards IP-based interconnection appears to be necessary and unavoidable.

3.2.24. With regard to port capacity, it is noted that the fixed capacity of E1/TDM interconnection ports of 2.048 Mbps is no longer appropriate in the context of modern IP-based telecom networks, where capacity is provisioned dynamically and at significantly higher bandwidths. Accordingly, the capacity metrics should be aligned with the prevailing practices, i.e., by using higher-order bandwidth units such as Mbps and Gbps for IP-based interconnection. It is, therefore, considered that the port capacity, i.e., concurrent session handling capacity and interconnection bandwidth capacity, required at the point of interconnection, for IP-based interconnection between two service providers, shall be mutually agreed between the concerned service providers subject to fulfilling the requirements prescribed under Schedule III to the Telecommunication Interconnection (Third Amendment) Regulations, 2026, relating to the maximum call handling capacity and augmentation of the concurrent session handling capacity or interconnection bandwidth capacity at the POI, as applicable.

3.2.25. The definition of 'port' in the Telecommunication Interconnection (Port Charges) Regulation, 2001, as amended from time to time, was originally formulated in the context of E1/TDM-based technology as follows:

> *" 'Port' means a place of termination on a Switch/ distribution frame to provide a point of access or interconnection for ingress and egress of traffic between the two Interconnecting Networks. The bandwidth of the Port shall be 2.048 Megabits per second."*

In view of the adoption of IP-based telecom networks, this definition requires appropriate revision to reflect the characteristics and functionalities of IP-based interconnection. Accordingly, the revised definition shall be as follows:

> 'Port' means a termination point on an equipment or a distribution frame that provides a point of access or interconnection for the exchange of traffic between two interconnecting telecommunication networks, enabling ingress and egress of such traffic. A Port shall be:
> (a) an E1 Port, with a bandwidth of 2.048 Mbps; or
> (b) an IP Port, with bandwidth expressed in Mbps or Gbps.

3.2.26. Regarding the port charges, the Authority observes that the existing regulatory framework for port charges is based on the cost structure linked to E1/TDM-based technology and may not accurately reflect the cost structure of the IP-based technology. Therefore, there is a need to devise a framework for port charges for IP-based technology, while ensuring that it remains aligned with the principles of fairness, transparency, reciprocity, and non-discrimination.

3.2.27. The network elements to be considered for calculation of port charges should be based on the principle of "incremental or additional" costs directly attributable to the provision of interconnection by the interconnection provider and also shall be cost based. This is in accordance with the regulation 3 of the Telecommunication Interconnection (Charges and Revenue Sharing) Regulation, 2001, as amended from time to time, as given below:

> *"3. Interconnection Charges*
> *(i) Interconnection charges shall be cost based, unless as may be specified otherwise.*

हरिन्द्र कुमार/Harinder Kumar, ITS
सचिव/Secretary
भारतीय दूरसंचार विनियामक प्राधिकरण
Telecom Regulatory Authority of India
नई दिल्ली/New Delhi

(ii) For determining cost based interconnection charges, the main basis shall be "incremental or additional" costs directly attributable to the provision of interconnection by the interconnection provider."

3.2.28. The Authority is of the view that the regulatory framework for IP-based port charges should be based on appropriate parameters such as network elements involved, useful life of equipment, and capacity of the port in terms of bandwidth and concurrent session handling capacity at the IP interconnection point.

3.2.29. In the consultation paper, the Authority also sought information from the stakeholders about which specific network elements and equipment should be considered for accurate and transparent calculation of port charges. Two of the service providers provided cost-related information in respect of port charges for IP-based interconnection. In view of the information furnished, the Authority finds that the network elements which are directly attributable to the provision of IP-based interconnection by the interconnection provider are routers and SBCs.

3.2.30. The comments and information submitted by the service providers have been examined. It is noted that routers and SBCs are deployed in a 1+1 configuration to provide redundancy. Accordingly, the cost of two routers, along with the cost of two SBC(s), is required to be considered for determining the port charges applicable to a POI.

3.2.31. In the Telecommunication Interconnection (Port Charges) (Second Amendment) Regulations, 2012, the following parameters were considered for determination of port charges:

i. Useful life of equipment: 10 years;
ii. Method of depreciation: Straight line method;
iii. Rate of return (pre-tax Weighted Average Cost of Capital): 15%; and
iv. Overhead on CAPEX recovery: 10%.

3.2.32. It is seen that in the present exercise, two service providers have taken the useful life of equipment as 7 years and 8 years. The Authority is of the view that it would be appropriate to continue with the useful life of 10 years, as considered in the Telecommunication Interconnection (Port Charges) (Second Amendment) Regulations, 2012, for determining port charges. It is noted that a useful life of 10 years is appropriate for determining port charges, as telecom network equipment generally has a longer economic and operational life than the technological upgrade cycle of individual components. A 10-year useful life, therefore, provides a reasonable basis for recovering the capital cost over the economic life of the assets and avoids front-loading the cost burden on interconnection providers.

3.2.33. Similarly, it would be appropriate to continue with the straight-line method of depreciation for the purpose of the present exercise of determination of port charges for IP-based interconnection. The straight-line method of depreciation provides for uniform allocation of the depreciable cost of the equipment over its useful life.

3.2.34. One service provider has considered a weighted average cost of capital (WACC) of 12%. In simple terms, the WACC is the rate of return applied to the capital invested to ensure recovery of costs, including a reasonable return on capital employed. In the context of port charges, WACC is applied to the capital invested in the setup for providing interconnection to determine the return component of the port charge, ensuring that port charge recovers all incremental or additional costs associated with capital invested. The Authority considers a WACC of 15% to be a reasonable rate of return on the capital employed. Accordingly, a WACC of 15% is continued for the present exercise for the determination of port charges for IP-based interconnection.

हरिन्द्र कुमार/Harinder Kumar, ITS
सचिव/Secretary
भारतीय दूरसंचार विनियामक प्राधिकरण
Telecom Regulatory Authority of India
नई दिल्ली/New Delhi

3.2.35. Similarly, the Authority had also taken into account overhead on CAPEX recovery at the rate of 10% in the 2012 amendment. It would be appropriate to continue to take overhead on CAPEX recovery at 10%, for the purpose of determining port charges. Further, AMC charges post the warranty period should not be separately considered for the purpose of port charge computation in order to avoid duplication, as CAPEX recovery along with overhead is considered sufficient to account for such costs.

3.2.36. One service provider has furnished the SBC cost on a per-session basis, from which the SBC cost for 1 Gbps and 10 Gbps IP ports has been derived. The other service provider has furnished the hardware and software cost of the SBC for a 10 Gbps IP port, along with the indicated bandwidth requirement of 40 Kbps per session for AMR-NB and AMR-WB codecs at 40% loading. Since the cost information has been furnished on different bases, a direct comparison of the reported SBC costs would not provide a uniform basis for determining the SBC component of IP port costs. Accordingly, for the first service provider, the SBC cost has been derived using the per-session cost furnished by it and the corresponding port capacity. For the second service provider, the SBC cost has been determined based on the hardware and software cost furnished by it and the applicable capacity and bandwidth assumptions mentioned above.

3.2.37. When determining the SBC cost and bandwidth requirements for IP-based telecom networks, the voice codec deployed by the service provider plays an important role, as different codecs have different bit rates and overheads. The amount of bandwidth required depends on the codec used (such as G.711, G.729, AMR codec, etc.) and includes not only the actual voice data but also extra overhead added by the headers of Real-Time Transport Protocol (RTP), User Datagram Protocol (UDP), IP, and Ethernet. The bandwidth requirement also depends on the packetization interval (i.e., the duration of voice samples per RTP packet, commonly 20 ms), as smaller intervals increase packet rate and overhead. Although RTP can use silence suppression to avoid sending packets during quiet periods and reduce average bandwidth usage, network planning must assume the worst case where no silence suppression occurs, meaning continuous transmission of voice in both the directions. For example, with the G.711 codec sending 20 ms of voice per packet, each stream requires about 64 kbps for voice data alone, but after adding protocol overhead this increases to about 87.2 kbps per stream. Similarly with the G.729 codec, sending 20ms of voice per packet, requires bandwidth of approximately 31.2 kbps[2]. In the case of AMR codec (e.g., 12.2 kbps mode), which is used in illustration furnished by one service provider, the bandwidth requirement is approximately 38 (~40) kbps including overheads[3]. In view of the above, 1 Gbps and 10 Gbps links utilizing AMR codec can handle 10,486 and 1,04,858 concurrent sessions respectively.

3.2.38. The average costs, where data from both service providers is available, of routers and SBCs have been considered for arriving at the port charges for 1 Gbps and 10 Gbps IP ports. The detailed calculations are given in Annexure-I and Annexure-II. Accordingly, the ceiling for port charge per port per annum for 1 Gbps and 10 Gbps IP port shall be as follows:

[2] https://www.cisco.com/c/en/us/td/docs/voice_ip_comm/cust_contact/contact_center/crs/express_12_5_1_su2/design/guide/uccx_b_1251su2_solution-design-guide.pdf

[3] http://www.3gpp.org/ftp/Specs/archive/26_series/26.071/26071-j00.zip

हरिन्द्र कुमार/Harinder Kumar, ITS
सचिव/Secretary
भारतीय दूरसंचार विनियामक प्राधिकरण
Telecom Regulatory Authority of India
नई दिल्ली/New Delhi

Capacity of IP port	Ceiling for port charge per port per annum (in ₹)
1 Gbps	5.6 lakh
10 Gbps	42.3 lakh

The interconnection provider and the interconnection seeker may, with mutual agreement, interconnect using IP port capacity other than those specified above. The IP port charge for such capacity shall be determined in a transparent manner by the service provider providing the IP port, analogous to the methodology as applied in Annexure-I and Annexure-II for determining the charges for the 1 Gbps and 10 Gbps IP port.

3.2.39. Regulation 2 of the principal regulations provides that the definitions contained in the Telecommunication Interconnection (Charges and Revenue Sharing) Regulation, 2001 shall apply to these regulations. Regulation 2 has been amended by inserting the words "as amended from time to time", so that the definitions contained in that regulation, as amended from time to time, are also applicable to these regulations. Further, consequent to the insertion of Schedule IV, sub-regulation (v) of regulation 1 of the principal regulations has been amended to refer to "Schedules" in place of "Schedule I", and sub-regulation (iii) of regulation 3 has been amended to refer to Schedules III and IV, as applicable, in place of Schedule I.

3.2.40. The Authority has considered the submissions made by the stakeholders regarding the applicability of uniform vis-à-vis non-uniform port charges for different service types, namely fixed line service, mobile service, national long-distance service, and international long-distance service. In this context, the justification provided by some stakeholders for differential port charges, on the basis of differences in technical characteristics, network architecture, or cost structures across services, is not tenable in an IP-based interconnection. For IP-based interconnection, the underlying network architecture and port infrastructure are inherently not service-specific. The same port is capable of handling traffic of different service types without requiring any material differentiation in terms of provisioning, operation, or resource utilisation. Permitting differential port charges based on service type would introduce avoidable complexity in interconnection arrangements. In view of the above, the Authority finds that there is no justifiable basis for prescribing differential port charges for different service types in the IP-based interconnection. Accordingly, the Authority is of the view that port charges shall be applied uniformly across all service types.

3.2.41. The Authority has also reviewed the provisions relating to review under regulation 4 of the principal regulations. The existing review provision contained separate clauses enabling the Authority to review and modify Port Charges *suo motu* or on a reference from an affected party. Since both clauses pertained to the same power of review and modification of Port Charges, the provision involved overlap and duplication. The Authority is of the view that a single review provision would provide greater clarity and avoid repetition in the regulations. Further, the review power should not be confined to a specific charge component and should extend to the provisions of the regulations as a whole. Accordingly, the review provision has been rationalised to provide that the provisions of these regulations may be reviewed by the Authority, as and when required.

3.2.42. The existing provision contained in regulation 6 of the principal regulations on interpretation has also been examined. This provision stated that, in case of any dispute regarding the interpretation of the regulations, the decision of the Authority shall be final and binding. The Authority observed that this provision had certain limitations. It covered only the interpretation of the provisions and not difficulties in their application. Further, it did not provide for issuing clarifications or guidelines in respect of the

हरिन्द्र कुमार/Harinder Kumar, ITS
सचिव/Secretary
भारतीय दूरसंचार विनियामक प्राधिकरण
Telecom Regulatory Authority of India
नई दिल्ली/New Delhi

regulations. To address these limitations, the existing provision has been substituted with a "Removal of Difficulties" provision. Under the revised provision, the Authority may issue necessary clarifications or guidelines to remove any difficulty in the interpretation or application of the regulations.

3.2.43. The Authority has examined the comments received from the stakeholders regarding necessary financial disincentive framework in the Telecommunication Interconnection (Port Charges) Regulation, 2001. The Authority observes that financial disincentives play an important role in ensuring compliance with the obligations of service providers under the regulations, as well as in safeguarding the rights of service providers under the interconnection regulatory framework.

3.2.44. The Authority has considered the nature and potential impact of non-compliance with these regulations. Regulation 3 of the principal regulations prescribes reporting requirements essential for the Authority to effectively monitor compliance with these regulations. Accordingly, failure to comply with these reporting requirements may attract financial disincentives.

3.2.45. It has also been considered that a fixed financial disincentive, irrespective of the duration of the contravention, may not adequately distinguish between a short delay and continued non-compliance. Therefore, a graded financial disincentive has been prescribed, with a lower rate for delay up to fifteen days and a higher rate where the delay continues beyond fifteen days. The higher rate for prolonged delay is intended to encourage service providers to take timely corrective action and ensure compliance at the earliest.

3.2.46. For clarity, the maximum financial disincentive may be determined on an accumulated basis according to the number of days of delay. For example, in case of a contravention where the applicable rates are ₹25,000 per day for the first fifteen days and ₹50,000 per day for each day beyond fifteen days, if the delay is for twenty days, the financial disincentive would be ₹3.75 lakh for the first fifteen days and ₹2.5 lakh for the next five days, making a total financial disincentive of ₹6.25 lakh, subject to the applicable ceiling.

3.2.47. At the same time, there should be a reasonable ceiling on the financial disincentive so that the financial liability does not continue to increase indefinitely. Accordingly, an overall ceiling of ₹15 lakh per Service Area for each instance of contravention of regulation 3 of the principal regulations has been prescribed.

3.2.48. Also, the quantum of financial disincentive should not be determined solely by reference to the number of days of delay, and accordingly the Authority may, for reasons to be recorded in writing, decide not to impose any financial disincentive or impose a lower amount, having regard to the facts and circumstances of the case.

3.2.49. A service provider should be given a reasonable opportunity to represent against the contravention before financial disincentive is imposed. This will ensure fairness and enable the Authority to consider the submissions of the service provider before determining the financial disincentive.

The financial disincentive imposed on a service provider should be paid within the period specified in the order. To ensure timely payment and discourage delay, simple interest on the outstanding amount of financial disincentive has been provided in case of delayed payment. It is considered that linking the rate of interest to the one-year Marginal Cost of Funds-based Lending Rate (MCLR) of State Bank of India, with an additional two percent, would provide an objective basis for determining the applicable

हरिन्द्र कुमार/Harinder Kumar, ITS
सचिव/Secretary
भारतीय दूरसंचार विनियामक प्राधिकरण
Telecom Regulatory Authority of India
नई दिल्ली/New Delhi

rate. Accordingly, the service provider shall be liable to pay simple interest on the outstanding amount at the said rate applicable at the beginning of the financial year in which the last day of the stipulated period falls. It has also been provided that a part of the month shall be reckoned as a full month for calculation of interest and a month shall be reckoned as an English calendar month.

***

03/11/2026

हरिन्द्र कुमार/Harinder Kumar, ITS
सचिव/Secretary
भारतीय दूरसंचार विनियामक प्राधिकरण
Telecom Regulatory Authority of India
नई दिल्ली/New Delhi

Annexure-I

Calculation of Ceiling of Annual Port Charges for 1 Gbps IP-port

Item	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8	Year-9	Year-10
(A) Capital cost of 1 Gbps IP-port (₹)	27,87,983									
(B) Depreciated value, by applying 10% per annum depreciation on (A) based on straight line method (₹)	27,87,983	25,09,185	22,30,387	19,51,588	16,72,790	13,93,992	11,15,193	8,36,395	5,57,597	2,78,798
(C) Reasonable return (WACC) @ 15% on (B) (₹)	4,18,198	3,76,378	3,34,558	2,92,738	2,50,919	2,09,099	1,67,279	1,25,459	83,640	41,820
(D) Capital cost recovery (₹) = (C) + Depreciation @ 10% on (A)	6,96,996	6,55,176	6,13,356	5,71,537	5,29,717	4,87,897	4,46,077	4,04,258	3,62,438	3,20,618
(E) Overhead @ 10% on Capital cost recovery (₹) = 10% of (D)	69,700	65,518	61,336	57,154	52,972	48,790	44,608	40,426	36,244	32,062
(F) Cost of 1 Gbps IP-port (₹) = (D) + (E)	7,66,695	7,20,694	6,74,692	6,28,690	5,82,689	5,36,687	4,90,685	4,44,683	3,98,682	3,52,680
Average annual cost (averaged over ten years) (₹)	**₹ 5,59,688**									

हरिन्द्र कुमार/Harinder Kumar, ITS
सचिव/Secretary
भारतीय दूरसंचार विनियामक प्राधिकरण
Telecom Regulatory Authority of India
नई दिल्ली/New Delhi

Annexure-II

Calculation of Ceiling of Annual Port Charges for 10 Gbps IP-port

Item	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6	Year-7	Year-8	Year-9	Year-10
(A) Capital cost of 10 Gbps IP-port (₹)	2,10,79,413									
(B) Depreciated value, by applying 10% per annum depreciation on (A) based on straight line method (₹)	2,10,79,413	1,89,71,472	1,68,63,530	1,47,55,589	1,26,47,648	1,05,39,706	84,31,765	63,23,824	42,15,883	21,07,941
(C) Reasonable return (WACC) @ 15% on (B) (₹)	31,61,912	28,45,721	25,29,530	22,13,338	18,97,147	15,80,956	12,64,765	9,48,574	6,32,382	3,16,191
(D) Capital cost recovery (₹) = (C) + Depreciation @ 10% on (A)	52,69,853	49,53,662	46,37,471	43,21,280	40,05,088	36,88,897	33,72,706	30,56,515	27,40,324	24,24,132
(E) Overhead @ 10% on Capital cost recovery (₹) = 10% of (D)	5,26,985	4,95,366	4,63,747	4,32,128	4,00,509	3,68,890	3,37,271	3,05,651	2,74,032	2,42,413
(F) Cost of 10 Gbps IP-port (₹) = (D) + (E)	57,96,839	54,49,028	51,01,218	47,53,408	44,05,597	40,57,787	37,09,977	33,62,166	30,14,356	26,66,546
Average annual cost (averaged over ten years) (₹)	**₹ 42,31,692**									

हरिन्द्र कुमार/Harinder Kumar, ITS
सचिव/Secretary
भारतीय दूरसंचार विनियामक प्राधिकरण
Telecom Regulatory Authority of India
नई दिल्ली/New Delhi