



भारतीय दूरसंचार विनियामक प्राधिकरण
Telecom Regulatory Authority of India



CONSULTATION PAPER
ON
DRAFT AMENDMENTS
IN
‘THE STANDARDS OF QUALITY OF SERVICE OF
ACCESS (WIRELINE AND WIRELESS) AND
BROADBAND (WIRELINE AND WIRELESS) SERVICE
REGULATIONS, 2024’

New Delhi, India

5th August 2026

World Trade Center, Tower-F, Nauroji Nagar, New Delhi-110029

Website: www.trai.gov.in

The document seeking comments from stakeholders contains following information:

- 1. The draft notification for proposed amendment in ‘The Standards of Quality of Service of Access (Wireline and Wireless) and Broadband (Wireline and Wireless) Service Regulations, 2024’ with explanatory note.**
- 2. Annexure-I: Global Best Practices for Publication of Coverage Map**
- 3. Annexure-II: Clarification letter dated 20th March 2025 issued by TRAI.**
- 4. Annexure-III: Clarification letter dated 21st April 2025 issued by TRAI.**
- 5. Annexure-IV: Principal regulations incorporating proposed amendment for ease of reference. This will however not be a part of final notification to be issued for amendment.**
- 6. Annexure-V: List of Acronyms**

Stakeholders are requested to submit their comments or feedback on the draft amendments or any other relevant provisions in ‘The Standards of Quality of Service of Access (Wireline and Wireless) and Broadband (Wireline and Wireless) Service Regulations, 2024’ by 26th August 2026 and counter comments by 7th September 2026.

The inputs/ comments/ counter-comments may be sent in following format with due justification, preferably in electronic form, to Advisor (QoS-I), TRAI on the email id adv-qos1@traigov.in, which will be posted on TRAI’s website www.traigov.in.

S. No.	Para number of draft notification	Input/ Comment/ Counter- Comment	Justification with supporting reference, if any

For any clarification/information, Shri Tejpal Singh, Advisor (QoS-I) may be contacted at email: adv-qos1@traf.gov.in

DRAFT NOTIFICATION FOR PROPOSED AMENDMENTS

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

TELECOM REGULATORY AUTHORITY OF INDIA

NOTIFICATION

New Delhi | Dated: _____ 2026

F. No. RG-17/(3)/2022-QoS: In exercise of the powers conferred upon it by section 36, read with sub-clauses (i) and (v) 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 Standards of Quality of Service of Access (Wireline and Wireless) and Broadband (Wireline and Wireless) Service Regulations, 2024 (06 of 2024)”, namely:-

**THE STANDARDS OF QUALITY OF SERVICE OF ACCESS (WIRELINE
AND WIRELESS) AND BROADBAND (WIRELINE AND WIRELESS)
SERVICE (FIRST AMENDMENT) REGULATIONS, 2026 (XX of 2026)**

1. Short title and commencement.—

- (a) These regulations may be called the Standards of Quality of Service of Access (Wireline and Wireless) and Broadband (Wireline and Wireless) Service (First Amendment) Regulations, 2026.
- (b) These shall come into force with effect from 1st October 2026.

- 2. In sub-regulation (1) of regulation 2 of the Standards of Quality of Service of Access (Wireline and Wireless) and Broadband (Wireline and Wireless) Service, 2024 (06 of 2024), (hereinafter referred to as the principal regulations), after serial number (s), following shall be inserted, namely: -

“(sa) “**Physical Resource Block**” or “**PRB**” is the fundamental unit of radio resource allocation in 4G LTE and 5G New Radio (NR) networks. It represents a defined portion of radio spectrum over a specific time interval and serves as the basic scheduling unit through which a cell allocates radio resources to user equipment (UE) for data transmission and reception.”

3. In regulation 4 of the principal regulations, against serial number (ii) of table under sub-regulation (1), the name of parameter shall be substituted as “Fault incidences (No. of faults per 100 subscribers /month)”.
4. In regulation 6 of the principal regulations, -
 - (a) Against serial number (i), (iv) and (xiv) of table under sub-regulation (1), following shall be substituted, namely: -

S. No.	Name of Parameter	Bench mark	Assessment period	Effective date
(i)	Accuracy of service wise geospatial coverage map published on service provider’s website	≥ 98%	Monthly	01.10.2026
(iv)	Percentage of significant network outage reported to the Authority within 24 hrs of start of the outage Note: Significant Network Outage is defined as an event where access service (wireless) in a district remains unavailable for a continuous period	100%	Monthly	01.10.2026

	exceeding four (4) hours, or where more than ten percent (10%) of subscribers in the Licensed Service Area (LSA) experience complete loss of service for a continuous period exceeding four (4) hours. Rebate to the subscribers for significant network outages of more than 24 hrs: • For post-paid subscribers registered in the district or affected post-paid subscribers, as applicable: Proportional rent rebate, as per plan charges, for affected number of days shall be credited in next bill. • For the pre-paid subscribers registered in the district or affected			
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	pre-paid subscribers, as applicable: The validity of subscribed tariff offering shall be increased by equal number of affected days.			
(xiv)	Tariff offerings in which 80 th percentile value of measured download and upload speed is $\geq$ offered typical download and upload speed for 4G/5G technology	100%	Monthly	01.10.2026

(b) In table under sub-regulation (1), after serial number (xiv), following shall be inserted, namely: -

S. No.	Name of Parameter	Bench mark	Assessment period	Effective date
V. Network Slicing				
(xv)	Cells having daily PRB utilisation > 80% (in 5G network)	$\leq 1\%$	Monthly	01.10.2026

(c) In sub-regulation (2), the words “technology wise” shall be inserted before the words “typical download and upload speed” and word “consumers” shall be substituted with word “subscribers”.

(d) After sub-regulation (2) of the principal regulations, following sub-regulations shall be inserted, namely: -

“(3) Every service provider, planning to create a new network slice in their 5G network, shall submit the details of proposed and existing network slice parameters, at least twenty one (21) days in advance to the Authority, clearly demonstrating the availability of sufficient capacity in the cell(s) which are part of different slices, in such manner and format as may be directed by the Authority, from time to time.”

5. In regulation 7 of the principal regulations, in table under sub-regulation (1), after serial number (vi), following shall be inserted, namely: -

S. No.	Name of Parameter	Bench mark	Assessment period	Effective date
(vii)	Silence Call Rate	$\leq 1\%$	Monthly	01.10.2026

6. In regulation 9 of the principal regulations, -

- (a) Against serial number (iv) and (vii) of table under sub-regulation (1), following shall be substituted, namely: -

S. No.	Name of Parameter	Bench mark	Assessment period
(iv)	Tariff offerings in which 90 th percentile value of measured download and upload speed is $\geq$ offered typical download and upload speed	100%	Quarterly
(vii)	Fault incidences (No. of faults per 100 subscribers/month)	≤ 5	Quarterly

(b) In table under sub-regulation (1), after serial number (ix), following shall be inserted, namely: -

S. No.	Name of Parameter	Benchmark	Assessment period
(x)	Mean Time-To-Repair (MTTR)	≤ 10 hours	Quarterly
(xi)	Percentage of significant network outage reported to the Authority within 24 hrs of start of the outage Note: Significant Network Outage is defined as an event where broadband (wireline) service in a district remains unavailable for a continuous period exceeding four (4) hours, or where more than ten percent (10%) of subscribers in the Service Area experience complete loss of service or material degradation in service quality for a continuous period exceeding four (4) hours. Material degradation in service quality shall mean a reduction of twenty percent (20%) or more in the download or upload speed experienced by a subscriber vis-à-vis the declared typical download or upload speed.	100%	Quarterly

	Rebate to the subscribers for significant network outages of more than 24 hrs: • For post-paid subscribers registered in the district or affected post-paid subscribers, as applicable: Proportional rent rebate, as per plan charges, for affected number of days shall be credited in next bill. • For the pre-paid subscribers registered in the district or affected pre-paid subscribers, as applicable: The validity of subscribed tariff offering shall be increased by equal number of affected days.		
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(c) In the explanation under sub-regulation (2), the words “**fixed wireless and**” shall be deleted.

7. In regulation 10 of the principal regulations, -

(a) Against serial number (ii) of table under sub-regulation (1), following shall be substituted, namely: -

S. No.	Name of Parameter	Benchmark
(ii)	Resolution of billing/ charging complaints within one week	100%

(b) Following proviso to the sub-regulation (1) shall be deleted, namely: -

“Provided that the service provider providing both access service (wireline) and broadband (wireline) service shall meet the benchmarks for both the services on aggregated basis.”

(c) In the explanation under sub-regulation (1), the words “**fixed wireless and**” shall be deleted.

8. In regulation 15 of the principal regulations, -

(a) In sub-regulation (1), after clause (d), following clause shall be inserted, namely: -

“(e) Service wise Quality of Experience Score (QoES) of service providers based on various parameters of network performance, consumer service, and consumer perception collected through multiple sources;”

(b) In sub-regulation (3), after the words “manner and format,”, the words “**as broadly specified under Schedule III and**” shall be inserted and the words “**by consumers**” shall be deleted.

9. In regulation 16 of the principal regulations, -

(a) In sub-regulation (1), after the words “one lakh per benchmark”, the words “**per compliance report**” shall be inserted.

(b) Sub-regulation (2), Sub-regulation (3) and Sub-regulation (4) shall be deleted, namely: -

“(2) If the compliance report furnished by the service provider under regulation 13 is found to be false, it shall, without prejudice to the terms and conditions of its license or authorization, or the Act or rules or regulations or orders made, or, directions issued thereunder, be liable to pay an amount, by way of financial disincentive, not exceeding rupees two lakhs per benchmark, for which such false report has been furnished, for the first contravention as the Authority may, by order, direct:

Provided that if the compliance report furnished by the service provider under regulation 13 is found to be false for the same parameter consecutively in two or more subsequent months or quarters, as applicable, the service provider shall be liable to pay, by way of financial disincentives, an amount not exceeding rupees five lakhs for the second consecutive false reporting and not exceeding rupees ten lakhs for each consecutive false reporting occurring thereafter.

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

(4) 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.”

10. After regulation 16 of the principal regulations, following regulations shall be inserted, namely: -

“16A. Consequences for the failure of service providers to submit correct compliance reports. - (1) If the compliance report furnished by the service provider under regulation 13 is found to be false, it shall, without prejudice to the terms and conditions of its license or authorization, or the Act or rules or regulations or orders made, or, directions issued thereunder, be liable to pay an amount, by way of financial disincentive, not exceeding rupees two lakhs per benchmark per compliance report, for which such false report has been furnished, for the first contravention as the Authority may, by order, direct:

Provided that if the compliance report furnished by the service provider under regulation 13 is found to be false for the same parameter consecutively in two or more months or quarters, as applicable, the service provider shall be liable to pay, by way of financial disincentives, an amount not exceeding rupees five lakhs for the second consecutive false reporting and not exceeding rupees ten lakhs for each consecutive false reporting occurring thereafter.

Explanation: If, upon examination of the information in the compliance report or in any other report pertaining to the performance of QoS parameters furnished by the service provider, the Authority finds that there is a mismatch in the data or value of any parameter reported by the service provider and the performance calculated by the Authority from value or the data given by the service provider in its report or observed during the audit, to the extent that absolute value of difference exceeds 1% of the prescribed benchmark, then such events shall also be considered as false reporting.”

“16B. Consequences for the failure of service providers to comply with any other provisions of the regulations.- (1) If a service provider fails to comply with any of the provisions of the regulations excluding provision mentioned in sub-regulation (1) of regulation (7), it shall, without prejudice to the terms and conditions of its license, or the Act or rules or regulations or orders made, or directions issued, thereunder, be liable to pay an amount, by way of financial disincentive, not exceeding rupees five lakh per instance of such non-compliance as the Authority may, by order, direct:

Provided that if the service provider fails to comply the same provision of the regulations consecutively in two or more subsequent months or quarters, as applicable, he shall be liable to pay, by way of financial disincentives, an amount not exceeding rupees eight lakhs for the second consecutive contravention and not exceeding rupees ten lakhs for each consecutive contravention occurring thereafter:

Provided that this regulation shall not be applicable if any non-compliance attracts the provision of regulation 16 or regulation 16A or regulation 17 or regulation 18.”

11. In regulation 17 of the principal regulations, -

(a) In sub-regulation (1), the words “**subject to the maximum amount of rupees ten lakhs**” shall be deleted.

(b) In sub-regulation (1), following proviso shall be deleted, namely:

“Provided that no order for payment of any amount by way of financial disincentive shall be made by the Authority unless the service provider has been given a reasonable opportunity of representing against the contravention of the regulation observed by the Authority.”

(c) In sub-regulation (1), following proviso shall be inserted, namely: -

“Provided that if service provider fails to submit the compliance report within a period of three (3) months from due date then be liable to pay an amount, by way of financial disincentive, not exceeding rupees ten lakhs per report.”

(d) Sub-regulation (2) shall be deleted, namely: -

“(2) 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.”

12. After regulation 17 of the principal regulations, following regulations shall be inserted, namely: -

“17A. Common provisions for financial disincentives.- (1) No order for payment of any amount by way of financial disincentive, under regulation 16 or regulation 16A or regulation 16B or regulation 17, shall be made by the Authority unless the service provider has been given a reasonable opportunity of representing against the contravention of the regulation observed by the Authority.

(2) The amount payable by way of financial disincentive under regulation 16 or regulation 16A or regulation 16B or regulation 17 shall be remitted to such head of account as may be specified by the Authority.”

13. In regulation 18 of the principal regulations, after the words “regulation 16”, the words “or regulation 16A or regulation 16B” shall be inserted.

14. In **Schedule-I** of the principal regulations, –

(a) For para 1.1, following para shall be substituted, namely: -

“1.1. **Cell Bouncing Busy Hour (CBBH):** CBBH should be system generated one-hour period in a day during which the cell experiences the maximum traffic.”

(b) In para 3.2.1, following amendments shall be made, namely: -

i. Heading of the para 3.2.1, shall be substituted as “Fault incidences (No. of faults per 100 subscribers/ month)”.

ii. The formula under para 3.2.1, shall be substituted, with following formula, namely: -

$$" = \frac{\text{Total number of faults reported during the assessment period}}{\text{Total number of connections at the end of the assessment period}} \times 100"$$

(c) Under para 3.2.2, following shall be inserted after sub-para (v), namely-

“(vi) Service providers shall ensure that complaint registration facilities remain accessible to subscribers at all times, including during network-wide or localized service disruptions. In case of such disruptions, all affected subscribers shall be either enabled to register complaints or be automatically mapped to system-generated fault tickets. Such instances shall be duly recorded and included in Quality of Service reporting metrics.”

(d) The para 4.1.1 shall be substituted with following para, namely:

“4.1.1. **Accuracy of service wise geospatial coverage map published on service provider’s website**

(i) Broad guidelines for publication of service wise geospatial coverage map by service providers on their website including

methodology for validation of Coverage maps are detailed in **Schedule-III**.

(ii) To report the performance against this parameter, service providers shall conduct physical or virtual drive test, as is already required under regulation 7, especially covering the locations where consumer feedback has been received in previous three months, to assess the accuracy of their coverage maps. The supporting data shall be reported to the Authority in the format and manner which may be prescribed from time to time.”

(e) In para 4.1.3 following amendments shall be made, namely-

i. In the heading, the words, “(Services not available in a district for more than 4 hours)” shall be deleted.

ii. Sub-para (i), shall be substituted with following para, namely: -

“Significant Network Outage is defined as an event where access service (wireless) in a district remains unavailable for a continuous period exceeding four (4) hours, or where more than ten percent (10%) of subscribers in the Licensed Service Area (LSA) experience complete loss of service for a continuous period exceeding four (4) hours due to any reason. All ‘cells’ physically located in the district shall be considered for deciding SNO.”

iii. Sub-para (iii), shall be substituted with following sub-para, namely:-

“(iii) If any such significant network outage continues for more than 24 hours, the service provider shall provide proportional rent rebate, as per subscribed tariff offering, for actual number of days of service outage to postpaid subscribers registered in the affected district(s) or affected post-paid subscribers, as applicable in next billing cycle. In the case of pre-paid subscribers registered in the affected district(s) or affected pre-paid subscribers, as applicable the validity of their applicable active tariff offering, at the time of the

start of the SNO, shall be increased by the equal number of days for which service outage continues.”

- (f) In para 4.3.1 following amendments shall be made, namely-
- In sub-para (ii), the words “QCI=5” shall be substituted with the words “QCI=1”.
 - In sub-para (ii), the words “The corresponding parameter for VoNR i.e QCI flow indicator is captured in gNodeB in 5G Stand Alone (SA) mode.” shall be substituted with the words “Similarly, in VoNR scenario, the performance against this parameter is calculated on 5QI=1 bearers dropped abnormally in gNodeB.”
 - In the table under sub-para (iv), after NDM, two rows for following DCR codes shall be inserted, namely: -

DCR Code	Stands for	Reason or purpose
NVS	No Voice Service is being provided on 5G Cell	In case, only data service is being offered, and no voice service is being offered through 5G RAN.
FCM	Performance of cell excluded due to force majeure	In case performance of certain cells is excluded for certain days due to force majeure, as per provisions of the regulations.

- (g) Under the para 4.4.4, following amendments shall be made:
- Heading of the para 4.4.4, shall be substituted as “Tariff offerings in which 80th percentile value of measured download and upload speed is $\geq$ offered typical download and upload speed for 4G/ 5G technology”.

- ii. In sub-para (iii), the words “**technology wise typical download and upload speed offered to the subscribers for each tariff offering**” shall be substituted for the words “typical download and upload speed offered to the subscribers”.
- iii. In sub-para (v), the word “**measured**” shall be substituted for the word “typical”.
- iv. In sub-para (vi), before the words “each plan offered by the service provider”, the words “**4G/ 5G technology in**” shall be inserted.
- v. In sub-para (vi), at the end, the words “**for 4G/ 5G technology**” shall be inserted.
- vi. Sub-para (vii), shall be substituted with following para, namely: -
“(vii) **Measured** download or upload speed shall be the 80th percentile of respective download and upload speeds obtained after arranging the results of test calls in **descending order for each technology in each tariff offering.**”
- vii. Sub-para (viii), shall be substituted with following para, namely: -
“(viii) The service provider will maintain the declared typical download or upload speed for the committed plan period. If **measured** download or upload speed, **in any technology of any plan**, is found to be lower than the declared **typical download or upload speed** during assessment period, then the service provider shall notify the same to the affected customers and **take corrective action, before submission of next compliance reports, to meet** typical download and upload speed.”
- viii. After sub-para (ix), following sub-para shall be inserted, namely: -
“(x) **Service provider shall include all tariff offerings for reporting the performance against the parameter. However, if some of the selected tariff offerings are having same offered typical download and upload speed, then such tariff offerings may be considered a part of a group for the purpose of measurement and reporting of performance against this parameter. In that case, selection of subscribers from different tariff offerings of a group shall be in proportion to the subscriber base of each tariff offering.**

(xi) However, in case of more than one network slices in the 5G network, each eMBB network slice shall be considered a part of separate tariff offering. Further, compliance to this QoS parameter is to be ensured separately for each network slice.

(xii) A tariff offering shall be considered 'Non-compliant' if, for at least one technology, the 80th percentile value of the measured download speed is lower than the offered typical download speed, or the 80th percentile value of the measured upload speed is lower than the offered typical upload speed, or both are lower than their respective offered typical speeds.

(xiii) The performance against the parameter, for the assessment period, shall be measured through the following formula:

$$= \left(1 - \frac{\text{Number of 'Non-compliant' tariff offerings}}{\text{Total number of tariff offerings}}\right) \times 100$$

(h) After para 4.4.4, the following para shall be inserted, namely: -

“4.5 Network Slicing

4.5.1 Cells having daily PRB utilisation >80% (in 5G network)

(i) A Physical Resource Block (PRB) is the fundamental unit of radio resource allocation in 4G LTE and 5G New Radio (NR) networks. It represents a defined portion of radio spectrum over a specific time interval and serves as the basic scheduling unit through which a cell allocates radio resources to user equipment (UE) for data transmission and reception. The higher level of PRB utilization for number of days, either continuously or periodically, indicates network congestion.

(ii) PRB Utilization in 5G NR is a measure of how fully the physical resource blocks are being used in the network. Ideally, it should be managed to avoid congestion while utilizing available capacity efficiently.

(iii) The performance against this parameter shall be measured through the following formula:

$$= \frac{\sum_{\text{First day of assessment period}}^{\text{Last day of assessment period}} \text{Total number of 5G cells whose Downlink or Uplink or Combined PRB utilisation exceeds 80\% during CBDH}}{\sum_{\text{First day of assessment period}}^{\text{Last day of assessment period}} \text{Total number of 5G cells in the LSA}} \times 100$$

Where CBDH is an hour during which total data download and upload is maximum in 24 hours of the day.

Note: - The measurement of Physical Resource Block (PRB) utilization is standardized by 3GPP and adopted by TEC in its document¹ ‘*Management and orchestration: 5G performance measurements*’.”

(iv) Performance of all Cells including those cells which are part of Carrier Aggregation (CA) are to be included while calculating the performance using above mentioned formula.

(v) Whenever PRB utilisation exceeds 80% for any five days in a month, service provider must take necessary action to augment the capacity in timely manner so that PRB utilisation reduces below 80%. However, in case PRB utilisation cannot be reduced below 80% even after a period of month then such cells must be removed from network slicing. In other words, service provider will ensure that the same cells reported in PMR of a month with more than 80% PRB utilization for more than five days are not repeated beyond two consecutive months.

(vi) In addition, before launch of any new network slice, service provider must ensure that sufficient capacity is available in the network and shall submit the details, as per the format and manner prescribed by the Authority, before launch of such network slicing.”

¹ https://tec.gov.in/pdf/3gpp/TSDSI_Doc_1657/rel17/TS-28.552%20V1.8.0.pdf

- (i) In para 5.3, at the end of the sub-para (ii), following text shall be inserted namely: -

“However, in cases where frequency hopping phenomenon is used in GSM network, GSM voice samples with Rx Qual between 0 to 5 may be considered as good voice quality, while maintaining supporting evidence.”

- (j) After para 5.6, the following para shall be inserted, namely: -

“5.7. Silence Call Rate

- (i) A call which has any instance of continuous RTP gap ≥ 4 sec is considered as a ‘Silence Call’.
- (ii) The performance against the parameter shall be calculated through the following formula:

$$\text{Silence call rate} = \frac{\text{Count of silence call instances during TCBH}}{\text{Total calls established during TCBH}} \times 100$$

- (iii) A call may have multiple instances of RTP gap of ≥ 4 sec. Each of such instance, within a call, will be added to calculate total instances for all calls during the TCBH to calculate the numerator value.

- (k) Under the para 6.2.1, following words shall be inserted after the words “less than one lakh”, namely: -

“or 5% of the subscriber base of each tariff offering, whichever is lower.”

- (l) Under the para 6.2.4, following amendments shall be made:

- i. Heading of the para 6.2.4, shall be substituted as “Tariff offerings in which 90th percentile value of measured download and upload speed is $\geq$ offered typical download and upload speed”.
- ii. Sub-para (v), shall be substituted with following para, namely: -
- “(v) Measured download or upload speed shall be the 90th percentile of respective download and upload speeds obtained after arranging the results of test calls in descending order for each tariff offering.”

- iii. Sub-para (vi), shall be substituted with following para, namely: -
- “(vi) The service provider will maintain the declared typical download or upload speed for the committed plan period. If **measured** download or upload speed, offered in any plan to the consumers, is found to be lower than the declared **typical download or upload speed** during assessment period, then the service provider shall notify the same to the affected customers and **take corrective action, before submission of next compliance reports, to meet** typical download and upload speed.”
- iv. After sub-para (vii), following sub-paras shall be inserted, namely:-
- “(viii) Service provider shall include all tariff offerings for reporting the performance against the parameter. However, if some of the selected tariff offerings are having same offered typical download and upload speed, then such tariff offerings may be considered a part of a group for the purpose of measurement and reporting of performance against this parameter. In that case, selection of subscribers from different tariff offerings of a group shall be in proportion to the subscriber base of each tariff offering.
- (ix) A tariff offering shall be considered 'Non-compliant', if 90th percentile value of the measured download speed is lower than the offered typical download speed, or the 90th percentile value of the measured upload speed is lower than the offered typical upload speed, or both are lower than their respective offered typical speeds.
- (x) The performance against the parameter, for the assessment period, shall be measured through the following formula:

$$= \left(1 - \frac{\text{Number of 'Non-compliant' tariff offerings}}{\text{Total number of tariff offerings}}\right) \times 100$$

- (m) Heading of the para 6.3.1, shall be substituted as “Fault incidences (No. of faults per 100 subscribers/ **month**)”.

(n) After para 6.3.2, following two paras shall be inserted, namely: -

“6.3.3. Mean Time-To-Repair (MTTR)

Same as provided in para 3.2.3 above”

“6.3.4. Percentage of significant network outage reported to the Authority within 24 hrs of start of the outage

- (i) Significant Network Outage is defined as an event where broadband (wireline) service in a district remains unavailable for a continuous period exceeding four (4) hours, or where more than ten percent (10%) of subscribers in the Service Area experience complete loss of service or material degradation in service quality for a continuous period exceeding four (4) hours. Material degradation in service quality shall mean a reduction of twenty percent (20%) or more in the download or upload speed experienced by a subscriber vis-à-vis the declared typical download or upload speed.
- (ii) All such SNOs shall be reported to the Authority within 24 Hrs. from the start of any such outage including material degradation. After restoration of the outage, the service provider shall report the summary of root cause along with details of action taken.
- (iii) If any such significant network outage continues for more than 24 hours, the service provider shall provide proportional rent rebate, as per subscribed tariff offering, for actual number of days of service outage to postpaid subscribers registered in the affected district(s) or affected post-paid subscribers, as applicable in next billing cycle. In the case of pre-paid subscribers registered in the affected district(s) or affected pre-paid subscribers, as applicable, the validity of their applicable active tariff offering, at the time of the start of the SNO, shall be increased by the equal number of days for which service outage continues.

(iv) The outage duration of more than 12 hours in a calendar day shall be considered equal to one full day for the calculation of rent rebate or extension of validity.

(v) However, recorded and reported force majeure incidences can be excluded for the calculation of rent rebate or extension of validity.”

(o) In para 7.1.2., following amendments shall be made: -

- i. In the heading, the words “four weeks” shall be substituted with words “one week”.
- ii. In the formula, the words “four weeks” shall be substituted with words “one week”.

(p) Under sub-para (ii) of para 7.1.7, the formula shall be substituted with following formula, namely: -

$$= \left\{ 1 - \left(\frac{\text{Number of deposits not refunded within 45 days}}{\text{Total number of instances which requires refund of deposits}} \right) \right\} \times 100$$

(q) After para 7.1.7, following para shall be inserted, namely: -

“8. Modification in the Schedule

In view of technological advancement, the details mentioned in the schedule can be modified by the Authority through direction or order.”

15. After Schedule II of the principal regulations, following schedule shall be inserted, namely: -

“Schedule-III

Broad guidelines for publication of service wise geospatial coverage map by service providers on their website

The Schedule provides the broad guidelines for publication of service wise geospatial coverage map by service providers on their website as specified in sub-regulation (3) of Regulation 15 of the Standards of Quality of Service of

Access (Wireline and Wireless) and Broadband (Wireline and Wireless) Service Regulations, 2024. However, the Authority may issue detailed guidelines prescribing manner and format for publication of service wise geospatial coverage map by service providers on their website from time to time.

1. Preparation and display of Coverage Map

- 1.1.** Service providers providing access service (wireless) shall publish on their website **technology-wise (2G/3G/4G/5G) geospatial coverage maps** for all geographical areas where wireless voice or wireless broadband services are available for subscription.
- 1.2.** The service provider shall display the network coverage maps based on actual measurement (physical or through network analytics) or using standard prediction models and prepared using prescribed technical parameters, grid resolutions, and signal strength thresholds to classify coverage as Excellent, Good, Fair, or No Coverage. However, service provider must ensure that the accuracy of published coverage map should be equal to or better than 98% as prescribed in sub-regulation (1) of regulation 6. Further, service provider shall undertake self-validation of its coverage map to ensure accuracy of the published coverage information. The Authority may also conduct audit *inter-alia* covering compliance for methodology for generation of coverage maps and accuracy of published coverage maps as per the process mentioned in para 5.
- 1.3.** Service providers are free to adjust displayed coverage levels to reflect real world service performance where signal strength alone does not ensure expected quality.
- 1.4.** All spatial data must conform to relevant OGC (Open Geospatial Consortium) standards².
- 1.5.** The coverage map shall be prepared using following parameters:

² <https://www.ogc.org/standards/>

Parameter	Requirement
Coordinate Reference System (CRS)	WGS-84 (EPSG:4326)
Coordinate Type	Latitude and Longitude
Units	Decimal Degrees (upto 7 decimal places)
Granularity	Grid (Hexagon shaped) based coverage
Resolution of coverage map	Urban areas: 50 meters × 50 meters or better Rural areas: 100 meters × 100 meters or better

1.6. The coverage for each technology shall be displayed in different coverage levels (Excellent, Good, Fair, No Coverage), which are broadly described as follows:

Coverage Levels	Description
Excellent	Possibility of using mobile voice, SMS and data services outdoors and, in most cases, indoors.
Good	Possibility of using mobile voice, SMS and data services outdoors in most cases, and indoors in some cases.
Fair	Possibility of using mobile voice, SMS and data services outdoors in most cases, but probably not indoors.
No Coverage	Unlikely to be able to use mobile voice, SMS and data services, whether indoors or outdoors.

1.7. The coverage for different coverage levels (Excellent, Good, Fair, No Coverage) of each technology shall be displayed based on signal strength thresholds (measured in outdoor) at the cell edges considering 50% loading of the cell, as detailed below in Table-1:

Table-1: Threshold level of signal strength at 50% cell loading (in dBm) for different coverage levels of various technologies

S. No.	Technology	Parameter	Threshold level of signal strength at 50% cell loading (in dBm)			
			Excellent	Good	Fair	No Coverage
1	2G	RSSI	≥ -75	< -75 and ≥ -85	< -85 and ≥ -95	< -95
2	3G	RSCP	≥ -80	< -80 and ≥ -90	< -90 and ≥ -99	< -99
3	4G	RSRP	≥ -85	< -85 and ≥ -100	< -100 and ≥ -110	< -110
4	5G	SS-RSRP	≥ -85	< -85 and ≥ -100	< -100 and ≥ -110	< -110

Note: (i) RSSI stands for Received Signal Strength Indicator

(ii) RSCP stands for Received Signal Code Power

(iii) RSRP stands for Reference Signals Received Power

(iv) SS-RSRP stands for Synchronisation Signal Reference Signal Received Power

1.8. Any area having signal strength below the above-mentioned threshold level of 'No Coverage' at 50% cell loading may be considered as no coverage area for the respective technology.

1.9. Network coverage with proposed signal strengths, provided in para 1.7, is necessary and minimum but not the sufficient condition to deliver services categorised with expected performance as mentioned in para 1.6 i.e. 'Excellent', 'Good' and 'Fair' as it may depend upon other factors like backhaul performance, cell loading etc. Therefore, service providers are free to align the coverage map to provide ground level service performance expected under 'Excellent', 'Good' and 'Fair' category. For example, by

signal strength, any grid may qualify for 'Excellent' but actual service performance experienced by users is in 'Good' category then service provider may show this grid under 'Good' category instead of 'Excellent'.

1.10. The mobile coverage shall be displayed using a distinct base colour for each technology and gradient shades representing different coverage levels (Excellent, Good, Fair, No Coverage). The base colour and gradient shades for each coverage level shall be specified by the Authority through further directions or orders.

1.11. By default, combined coverage map, covering all available technologies in the areas, will be displayed on service provider website. While displaying combined coverage map, signal strength of any technology better than prescribed threshold for 'No coverage' for that technology may be considered for displaying as covered. Further, the preference shall be given to higher generation technology in combined coverage map. For example, if in any area, coverage (better than prescribed threshold limit for 'No coverage') of all technologies i.e. 2G, 3G, 4G and 5G is available, then in combined coverage map, the area will be shown as covered with 5G.

1.12. While displaying the coverage map, the display of cell or base station location is optional.

2. Periodic updating of coverage map

2.1. Coverage maps shall be updated by service providers at the earliest following any change in network coverage, such as cell commissioning, decommissioning, network optimization activities or any other reason significantly affecting the coverage in the LSA. However, service provider is free to update the coverage map at any frequency, but not later than three (3) months from the occurrence of any such change.

2.2. The log of changes made in coverage map shall be maintained for the purpose of audit.

2.3. Service provider is mandatorily required to publish the date of the last update of respective LSA at the bottom of the coverage map.

3. Placement of the map on the service provider website

3.1. To ensure adequate visibility and ease of access for users, a tab namely 'Service Quality' shall be created in the top navigation bar on 'Home' or landing page of the service providers' website.

3.2. Under this tab, a sub-menu namely 'Coverage Map' shall be created. On selecting/ clicking the 'Coverage Map' sub-menu, the user should be navigated to the published coverage map.

4. Functional Features of Coverage Map

4.1. Service providers shall ensure that coverage maps incorporate user-friendly features to facilitate ease of access, understanding and navigation for consumers.

4.2. The detailed guidelines of such features may be prescribed by the Authority from time to time through further directions or orders.

5. Validation of Coverage maps

5.1. Service providers shall undertake self-validation of its coverage map to ensure accuracy of the published coverage information.

5.2. The Authority may conduct audit and validate the coverage maps using signal strength samples collected through Independent Drive Test (IDT)

conducted by TRAI or those captured through TRAI Apps with latitude and longitude or combination thereof.

5.3. Such validation shall be conducted at LSA level. All signal strength samples collected during the month for the LSA (for all technology) shall be considered for validation of accuracy of coverage map provided by the service provider in respective compliance report (performance monitoring report).

5.4. The Authority may conduct validation of coverage map at any time, for, corresponding to a month to compare with the performance reported in compliance report for that month, without prior notice to the service provider.

5.5. Process for validation:

5.5.1. Margin of error of +3 dBm shall be added in measured signal strength of each sample from TRAI Apps to account for any prediction error. However, 0 dBm margin of error shall be added in the samples collected through independent drive test (IDT) conducted by TRAI that are conducted through drive test tools.

5.5.2. After adding margin of error, coverage levels (Excellent, Good, Fair, No Coverage) of each sample based on prescribed signal strength will be determined.

5.5.3. Now the coverage level at the location of sample (based on latitude and longitude) shall be checked from the published coverage map. If published coverage level is shown better than the identified coverage level of sample, then the sample will be considered as '*inaccurate*' sample, otherwise it will be considered as '*accurate*' samples.

5.5.4. Subsequently, accuracy of coverage map shall be determined using following formula:

$$= \frac{\text{Count of accurate samples for all technologies}}{\text{Total number of samples in the LSA for all technologies during the month}} \times 100$$

Example:

- Suppose measured signal strength of a 4G sample collected through TRAI Myspeed App is -90 dBm.
- After adding margin of error, revised coverage levels of sample will become -87 dBm for which prescribed coverage level is ‘Good’ for 4G.
- In case published coverage map shows ‘Excellent’ coverage level at the location of sample, then this sample will be considered as ‘*inaccurate*’ sample. However, if published coverage map shows either ‘Good’ or ‘Fair’ or ‘No Coverage’ at the location of sample, then this sample will be considered as ‘*accurate*’ sample.

5.6. In case calculated accuracy of published coverage map is lower than the reported accuracy of published coverage map by service provider in respective compliance report then it may attract the provision of financial disincentives as per regulation 16A. However, in case reported accuracy of published coverage map is not meeting the prescribed benchmark of 98% for QoS parameter namely, “Accuracy of service wise geospatial coverage map published on service provider’s website”, then it may attract the provision of financial disincentives as per regulation 16(1).

6. User Feedback Mechanism

6.1. User should be able to provide feedback or challenge network coverage indicated on map or report issue observed in coverage through a feedback button on the map.

6.2. To capture specific details, the user may be asked to provide or auto-capture the minimum required details like location, phone number and

option to upload screenshot of test undertaken through TRAI Apps with signal strength observed.

6.3. The user feedback shall be duly considered for improvement of network performance, rectification of coverage-related issues, and undertaking necessary corrective measures. The coverage maps may be updated accordingly in the subsequent cycle as prediction tool also take into account field level measurement data to improve prediction accuracy. Further, to improve prediction accuracy in urban areas, where large buildings and structures affect radio signal propagation characteristics, the use of 3D digital maps is essential to achieve prediction accuracy.

6.4. In addition, for areas where coverage is depicted as better than actual, as identified through consumer feedback or during the Authority's validation, the service provider shall highlight such area distinctly in an amber colour with hexagonal grid of circumradius (center to vertex) of 30 meter and continue to display such marking until the actual network performance aligns with the published coverage.

6.5. Further, the user responses will also be shared with TRAI through APIs.

7. Sharing of published coverage map with TRAI

7.1. Submission Modes

Each service provider shall submit the details of service-wise geospatial coverage map through Application Programmable Interfaces (APIs) in following format:

Mode	Format	Purpose
API	REST API (JSON/GeoJSON)	Service provider's system transmits data directly to TRAI's GIS platform. Enables near-real-time ingestion.

Metadata	JSON/File	A mandatory companion file submitted with every coverage dataset. Identifies the service provider, technology, service area, and date of update.
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7.2. Core Schema

The Core Schema contains following minimum set of data fields that every service provider must provide for each coverage record:

Field	Type	Mandatory	Description
TSP_Code	String	Yes	TRAI-assigned short code for the service provider.
Technology	Enum	Yes	Network technology: 2G, 3G, 4G, or 5G.
LSA	String	Yes	TRAI assigned code of Licensed Service Area of the submitted data.
STATE_UT	String	Yes	TRAI assigned code of State or Union Territory of the coverage cell.
DISTRICT	String	Yes	TRAI assigned code of District within the State/UT where the coverage cell falls.
AREA_TYPE	Enum	Yes	Urban or Rural classification of the coverage cell.
GRID_CELL_ID	String	Yes	Unique identifier for each cell in TRAI's standardised reference grid.

			Format: LSA_AREATYPE_ROW_COL (e.g., DL_U_0042_0187).
Geometry	Grid	Yes	Spatial grid polygon defining the geographic extent of coverage.

7.3. Signal Fields

For each coverage cell, signal strength values in dBm are required to be submitted. Details of technology wise field for which signal strength is to be submitted is as given below:

Field (In dBm)	Type	Mandatory	Technology
SS_RSRP_dBm	Float	Yes	5G
RSRP_dBm	Float	Yes	4G
RSCP_dBm	Float	Yes	3G
RSSI_dBm	Float	Yes	2G

7.4. Metadata File (Mandatory Along with Coverage Data)

A Metadata file is required alongside every coverage data submission. This contextual information is essential for TRAI to catalogue, validate, and process submissions accurately. Without the metadata file, a coverage submission is considered incomplete and will not be accepted by the platform.

Metadata Item	Description
TSP_Code	TRAII-assigned short code for the service provider. Must match TSP_Code in the coverage dataset.
Technology	Network technology: 2G, 3G, 4G, or 5G. Submit each technology separately.

LSA	TRAI assigned code of Licensed Service Area of the submitted data.
Date of update	DD-MM-YYYY. Date on which updated coverage map published.

7.5. API Endpoints

This section lists the specific API endpoints through which service provider will interact with TRAI's platform. An API endpoint is simply a web address (URL) where a specific action can be performed programmatically.

API	Endpoint	Method
Authentication — Obtain authentication token. Required for all subsequent API calls.	/api/v1/token	POST
Upload Coverage — Submit one coverage dataset (single TSP, technology, and period).	/api/v1/coverage/upload	POST
Bulk Upload Coverage — Submit multiple coverage datasets in one call.	/api/v1/coverage/upload/batch	POST
Upload Metadata — Submit the mandatory metadata file for the coverage dataset.	/api/v1/coverage/metadata	POST
Status — Check processing status of a submitted dataset.	/api/v1/coverage/status	GET

Validation — Retrieves the results of TRAI's validation checks. Lists errors or warnings for correction and resubmission.	/api/v1/coverage/validation	GET
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7.6. Reference Grid Framework (GRID_CELL_ID)

Service providers are required to report against a single standardised reference grid published by TRAI, where every cell carries a unique GRID_CELL_ID. Service providers shall populate signal values against these fixed GRID_CELL_IDs instead of their own geometries. Reference grid is a fishnet of equal-sized hexagonal cells covering India, aligned to WGS-84 (EPSG:4326). TRAI will generate and publish this grid once. Service providers shall download it, populate signal and coverage attributes per cell, and submit it via API. The grid geometry shall be static — only attribute values change across reporting periods.

7.6.1. GRID_CELL_ID Structure

Format: LSA_AREATYPE_ROW_COL. Each segment encodes spatial context directly in the ID.

Segment	Meaning	Example	Notes
LSA_Code	Licensed Service Area code	DL, MUM, RJ	Matches TRAI LSA codes
AREA_TYPE	U = Urban, R = Rural	U, R	Determines resolution applied
ROW	North-south grid index	0042	Zero-padded 4-digit integer
COL	East-west grid index	0187	Zero-padded 4-digit integer

Full Example	DL_U_0042_0187 – Delhi LSA, Urban cell, row 42, column 187
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7.6.2. Process of Grid Generation

Generated once by TRAI before the first reporting cycle. Grid geometry is fixed thereafter.

Step 1 - Fix resolution. As mentioned in para 1.5 above.

Step 2 - Generate fishnet. Using PostGIS or GeoPandas, create equal-sized polygons in WGS-84, clipped to India’s administrative boundary per LSA.

Step 3 - Tag Urban/Rural. Overlay Survey of India (SoI) Village Boundary with Category of Village in Urban /Rural or Urban Ward Boundaries. Each cell gets U or R tag, which determines its resolution tier.

Step 4 - Assign GRID_CELL_IDs. Index each cell by LSA, area type, row, and column. Store in PostGIS as the master reference layer.

Step 5 - Publish to TSPs. Expose via portal or API: GET /api/v1/reference-grid?lsa=DL. Service providers shall use this as their submission template.

7.7. Publication of map by TRAI

TRAJ may use the data regarding service-wise geospatial coverage map shared by service provider to display combined coverage map for multiple service providers or multiple technologies on its website.

7.8. In view of technological advancement, the details mentioned in the schedule can be modified by the Authority through direction or order.

7.9. Further details as necessary shall be specified by the Authority through directions or orders.”

(Harinder Kumar)
Secretary

Note.1. – The principal regulations were published in the Gazette of India, Extraordinary, Part III, Section 4 dated 5th August 2024 vide notification number RG-17/(3)/2022-QoS dated 2nd August 2024.

Note 2. – The Explanatory Memorandum explains the objectives and reasons for proposed amendment mentioned in ‘The Standards of Quality of Service of Access (Wireline and Wireless) and Broadband (Wireline and Wireless) Service (First Amendment) Regulations, 2026 (xx of 2026)’.

Explanatory Memorandum

1. Background

- 1.1.** The Quality of Service (QoS) framework is a cornerstone of telecom regulation, aimed at safeguarding consumer interests and ensuring the provision of reliable and efficient services by telecom service providers. Given the importance of telecommunications services and their increasing role in digital inclusion and economic activity, it is imperative to periodically review and update QoS standards to keep pace with technological advancements and evolving telecom networks.
- 1.2.** The Telecom Regulatory Authority of India (TRAI), in exercise of its mandate under the TRAI Act 1997, prescribes standards of Quality of Service (QoS) for various telecom services from time to time. In view of technological advancements and the shift towards converged telecom networks, the earlier QoS framework was comprehensively reviewed and consolidated into a unified framework. Accordingly, *The Standards of Quality of Service of Access (Wireline and Wireless) and Broadband (Wireline and Wireless) Service Regulations, 2024 (06 of 2024)*³ was notified on 2nd August 2024 which came into effect from 1st October 2024. These Regulations prescribe QoS parameters, benchmarks, and reporting requirements for both access and broadband services provided on wireline and wireless media to ensure delivery of satisfactory services to consumers.
- 1.3.** After the release of revised QoS Regulations, 2024, TRAI has issued several directions as listed in **Table-1** for smooth and effective implementation of various provisions of the QoS Regulations, 2024.

³ [QoS Regulations 2024](#)

**Table-1: List of directions issued by TRAI subsequent to the
notification of the QoS Regulations, 2024
(In the order of latest to oldest)**

S. No.	Directions	Date of Issue
1.	Direction regarding publication of the performance with respect to the benchmark of QoS parameters by service providers on their website. ⁴	09/09/2025
2.	Amendment to the Direction dated 19 th September 2024 revising formats of compliance report (performance monitoring report) of various services and detailed guideline for submission to the Authority. ⁵	03/01/2025
3.	Direction regarding publication of service wise geospatial coverage map by service providers on their website. ⁶	22/11/2024
4.	Direction prescribing formats for timely submission of data for audit of performance monitoring report. ⁷	24/10/2024
5.	Direction prescribing formats of compliance report (performance monitoring report) of various services and detailed guideline for submission to the Authority. ⁸	19/09/2024

1.4. TRAI has conducted regular meetings with service providers to facilitate effective implementation of the regulations by addressing operational and technical challenges. TRAI has also discussed QoS regulations during various consumer outreach programs. Based on feedback

⁴ [TRAI's direction dated 09.09.2025.pdf](#)

⁵ [TRAI's direction dated 03.01.2025.pdf](#)

⁶ [TRAI's direction dated 22.11.2024.pdf](#)

⁷ [TRAI's direction dated 24.10.2024.pdf](#)

⁸ [TRAI's direction dated 19.09.2024.pdf](#)

received during these interactions, along with experience gained from implementation, ongoing technological developments and consumer need for good quality reliable digital connectivity, it has been considered necessary to further strengthen the regulatory framework by introducing appropriate provisions and modifying certain existing ones.

2. Proposed amendment in QoS Regulations 2024

2.1. In order to address the issues identified during implementation of the QoS Regulations 2024 and to further strengthen the QoS regulatory framework, the Authority now proposes to make certain amendments to *The Standards of Quality of Service of Access (Wireline and Wireless) and Broadband (Wireline and Wireless) Service Regulations, 2024 (06 of 2024)*, as summarised below:

- (i) Address QoS issues arising from emerging 5G capabilities such as network slicing.
- (ii) Review of framework for publication of coverage map
- (iii) Modification in some of the existing provisions for more effective monitoring of the Quality of Service
- (iv) Correction of typographical errors/ minor inconsistencies in the regulations which were noticed during implementation of the QoS Regulations, 2024. While certain issues have already been clarified, it is considered appropriate to incorporate the relevant clarifications and new provisions in the Regulations in order to maintain accuracy, clarity and uniformity in the implementation of the QoS framework.

2.2. The proposed amendments to the QoS Regulations, 2024 are mentioned in draft notification. Following sections elaborates the explanatory note for each of the proposed amendments in the ‘The Standards of Quality of Service of Access (Wireline and Wireless) and Broadband (Wireline and Wireless) Service Regulations, 2024’ dated 02nd August 2024.

2.3. Addition of new definition at serial number (sa) under Regulation 2(1)

(i). Existing Provision

In the principal regulations, there is no such definition.

(ii). Explanatory note for the proposed amendment

- a) Detailed explanation for addition of new QoS parameter namely “Cells having daily PRB utilisation >80% (in 5G network)” is given in section 2.8 below.
- b) Accordingly, definition of PRB is proposed to be added at serial number (sa) under Regulation 2(1).

(iii). Proposed Provision

“(sa) “Physical Resource Block” or “PRB” is the fundamental unit of radio resource allocation in 4G LTE and 5G New Radio (NR) networks. It represents a defined portion of radio spectrum over a specific time interval and serves as the basic scheduling unit through which a cell allocates radio resources to user equipment (UE) for data transmission and reception.”

2.4. Amendment in serial number (ii) of table under Regulation 4(1)

(i). Existing Provision

“(ii). Fault incidences (No. of faults per 100 subscribers)”

(ii). Explanatory note for the proposed amendment

- a) Subsequent to notification of QoS Regulations, service providers intimated that in old QoS regulations, the parameter was “*Fault incidences (No. of faults/100 subscribers /month)*”. However, by omitting “per month” in the QoS parameter in present regulations, its effective benchmark has increased from “<7 per month” to “<5 per quarter” due to assessment period being quarterly.

- b) However, explanatory memorandum does not reflect that the intention of the Authority was to make the benchmark highly stringent i.e. from “<7 per month” to “<5 per quarter” for this QoS parameter immediately.
- c) After examination of the matter, clarification was issued vide TRAI letter dated 20th March 2025 (Copy enclosed as **Annexure-II**).
- d) Accordingly, vide proposed amendment, the clarification issued vide letter dated 20th March 2025 is proposed to be incorporated in the regulations.
- e) Further, formula prescribed in paragraph 3.2.1 of Schedule-I for calculating the performance of this parameter is also proposed to be amended to align with the proposed amendment.

(iii). Proposed Provision

*“(ii). Fault incidences (No. of faults per 100 subscribers/**month**)”*

2.5. Amendment in serial number (i) of table under Regulation 6(1)

(i). Existing Provision

“(i). Availability of service wise geospatial coverage map on service provider’s website for percentage of working cells (Benchmark $\geq 99\%$)”

(ii). Explanatory note for the proposed amendment

- a) The objective of the Authority in mandating the publication of coverage maps by the service providers under the QoS Regulations is to provide consumers with reliable and accurate information on network availability and support informed decision-making. However, at present, there is no provision requiring the coverage maps to be accurate or to reflect on-ground network conditions experienced by users. During the drive tests, it has been noted that the certain areas shown to have coverage, as per coverage maps, are actually deficient in the coverage level at the ground.
- b) Coverage maps published without accuracy would be of little utility to subscribers and may not serve the intended purpose of

transparency. Since such maps are based on predictive modelling without right inputs like 3D maps, clutter, antenna height or tilt, attenuation characteristic of different objects etc., they may not reflect on-ground network conditions thereby limiting their usefulness and may lead to incorrect conclusions regarding service availability. Therefore, it is essential to ensure their accuracy as well as to establish a mechanism for its validation in line with global trends.

- c) Such a provision will also encourage service providers to improve their modelling practices and align their published coverage with actual performance on the ground.
- d) Further, as detailed in **Annexure-I**, many global telecom regulators have recognized the importance of accuracy of coverage maps and have incorporated validation mechanisms to assess the accuracy of coverage maps. For example, ARCEP, the Regulatory Authority of France, publishes theoretical coverage maps based on the coverage data provided by the service providers, and verifies their reliability through field measurements, applying stringent reliability threshold of 98%.
- e) Considering that certain global regulators have adopted the benchmark of 98%, therefore, the Authority has proposed to adopt the same benchmark (i.e. 98%) to align with global practices.
- f) The Authority has also taken into account the fact that variations may arise between the coverage level depicted by service provider in the published coverage map and that observed by the Authority during the validation process due to several dynamic factors like handset quality variation, therefore, a margin of 3 dBm has been provided to each sample, collected through MySpeed App, during validation, to account for such variations. However, the data collected during drive tests are more precise and collected through high quality engineered class handset, no margin will be allowed and signal strength recorded during drive tests shall be used for verification/audit of coverage map accuracy.

- g) Accordingly, considering the necessity of ensuring accuracy of coverage maps and aligning with global practices, the Authority proposes to amend the above mentioned QoS parameter for publication of coverage map.
- h) Further, measurement methodology prescribed for this parameter in para 4.1.1 of **Schedule-I** is also proposed to be amended to align with the proposed amendment.

(iii). Proposed Provision

“(i). Accuracy of service wise geospatial coverage map published on service provider’s website (Benchmark $\geq$ 98%)”

2.6. Amendment in serial number (iv) of table under Regulation 6(1)

(i). Existing Provision

“(iv). Percentage of significant network outage (services not available in a district for more than 4 hours) reported to the Authority within 24 hrs of start of the outage.

Compensation to the subscribers for significant network outages of more than 24 hrs:

- *For post-paid subscribers registered in the district: Proportional rent rebate, as per plan charges, for affected number of days shall be credited in next bill.*
- *For the pre-paid subscribers registered in the district: The validity of subscribed tariff offering shall be increased by equal number of affected days.”*

(ii). Explanatory note for the proposed amendment

- a) Vide QoS Regulations dated 02.08.2024, reporting of significant network outage to the Authority was made mandatory. This provision has enabled Authority to get information regarding major outages in the network affecting bulk customers, on priority.

- b) Further, service provider is also required to rectify the outage on priority and submit a root cause analysis along with action taken to avoid recurrence of such events.
- c) However, it was noticed that sometime service is not affecting the whole district but large subscriber base of either a single or multiple districts are affected for quite long time, and such events are not reported to the Authority.
- d) Accordingly, it is proposed to amend the definition of significant network outage (SNO) in respect of access service (wireless). As per proposed definition, events meeting any one or both of the below mentioned criteria will be categorised as SNO:
 - access service (wireless) in a district remains unavailable for a continuous period exceeding four (4) hours, or
 - where more than ten percent (10%) of subscribers of access service (wireless) in the Licensed Service Area (LSA) experience complete loss of service for a continuous period exceeding four (4) hours.
- e) Further, such SNO need to be reported to authority within 24 hrs of start of the outage and in case outages are not rectified within 24 hrs then rent rebate to the affected postpaid subscribers or extension of plan validity of prepaid subscribers is to be given.
- f) Accordingly, measurement methodology prescribed for this parameter in sub-para (i) and (iii) of para 4.1.3. of **Schedule-I** is also proposed to be amended to align with the proposed amendment.

(iii). Proposed Provision

“(iv). Percentage of significant network outage reported to the Authority within 24 hrs of start of the outage.

Note: Significant Network Outage is defined as an event where access service (wireless) in a district remains unavailable for a continuous period exceeding four (4) hours, or where more than ten percent (10%) of subscribers in the Licensed Service Area (LSA)

experience complete loss of service for a continuous period exceeding four (4) hours.

Rebate to the subscribers for significant network outages of more than 24 hrs:

- For post-paid subscribers registered in the district **or affected post-paid subscribers, as applicable**: Proportional rent rebate, as per plan charges, for affected number of days shall be credited in next bill.
- For the pre-paid subscribers registered in the district **or affected pre-paid subscribers, as applicable**: The validity of subscribed tariff offering shall be increased by equal number of affected days.”

2.7. Amendment in serial number (xiv) of table under Regulation 6(1)

(i). Existing Provision

“(xiv). Percentile value of measured test samples for which download and upload speed is $\geq$ offered typical download and upload speed in tariff offerings. (Benchmark 80th Percentile)”

(ii). Explanatory note for the proposed amendment

- a) The existing QoS parameter assesses compliance based on the 80th percentile value of measured test samples for which the download and upload speeds are greater than or equal to the offered typical download and upload speeds.
- b) In response, service providers are submitting combined performance for all tariff offerings citing that no tariff offering is being offered on the basis of download/ upload speeds.
- c) However, the present framework does not give a clear indication about number of tariff offerings meeting the offered typical download and upload speeds. Further, it is also a complex method to ascertain the compliance against the prescribed benchmark.

- d) Therefore, the Authority has proposed to reframe the name of QoS parameter for better understanding and greater clarity. The proposed reframed QoS parameter will give an indication about percentage of tariff offerings in which 80th percentile value of measured download and upload speeds are greater than or equal to the offered typical download and upload speeds.
- e) Further, benchmark for reframed QoS parameter has been kept as 100% to ensure that 80th percentile value of measured download and upload speeds is greater than or equal to the offered typical download and upload speeds for all tariff offerings.
- f) It is also clarified that the regulation does not prescribe any criteria for deciding typical speeds, however service provider is free to indicate typical speeds, which shall be available to the subscribers in respective tariff offerings, after taking into consideration of various factors like dimensioning of the network, loading etc.
- g) Further, existing regulation used different percentile values like 80th percentile and 10th percentile (wrongly mentioned in place of 20th percentile) at different places, which causes ambiguity. Accordingly, to have a uniform approach, it is clarified that 80th percentile value of test samples is to be taken **after arranging the result of test samples in descending order** and the value so obtained should be greater than or equal to the offered typical speeds in order to ensure compliance to the QoS parameter.
- h) In accordance with the proposed amendment in regulation 6(2), service provider is required to declare typical speed for each technology (4G or 5G, whichever is applicable) separately and accordingly performance is also to be measured and complied separately for each technology in respective tariff offering.
- i) In case of more than one network slices in the 5G network, each eMBB network slice shall be considered a part of separate tariff offering. Further, compliance to this QoS parameter is to be ensured separately for each network slice.

- j) Accordingly, measurement methodology prescribed for this parameter in para 4.4.4 of **Schedule-I** is also proposed to be amended to align with the proposed amendment. A formula for calculating the performance against the QoS parameter has also been proposed to be introduced in the measurement methodology.

(iii). Proposed Provision

“(xiv). Tariff offerings in which 80th percentile value of measured download and upload speed is $\geq$ offered typical download and upload speed for 4G/5G technology. (Benchmark 100%)”

2.8. Addition of new QoS parameter at serial number (xv) of table under Regulation 6(1)

(i). Existing Provision

In the principal regulations, there is no such QoS parameter.

(ii). Explanatory note for the proposed amendment

- a) IMT-2020 (5G) networks are designed to support a wide range of services and applications with diverse functional, performance, and user-specific requirements. These include varying needs for network performance like latency, data rates, jitter etc. and security for different use cases. Accordingly, IMT-2020 network architecture support different quality of services for different use cases. These use cases may include user groups requiring higher data rates, enterprises requiring low latency, roaming users or mobile virtual network operators requiring different data rates. To efficiently meet these heterogeneous requirements, network slicing enables a single physical network to be partitioned into multiple logically isolated network slices wherein each slice is optimized for a specific service or use case.

- b) IMT-2020 (5G) supports three primary usage scenarios⁹, each with distinct capability requirements:
- i. **Enhanced Mobile Broadband (eMBB):** Provides high data rates, supports dense user populations and high mobility, and delivers an improved user experience for advanced broadband applications.
 - ii. **Massive Machine Type Communications (mMTC):** Enables connectivity for a very large number of low-power devices transmitting small amounts of non-time-critical data, with an emphasis on long battery life.
 - iii. **Ultra-Reliable Low-Latency Communications (URLLC):** Supports mission-critical applications requiring extremely low latency and high reliability, such as industrial automation, remote surgery, smart grids, and transportation safety.
- c) These diverse usage scenarios highlight the need for flexible network capabilities, which can be efficiently supported by 5G network technologies such as network slicing. Even within each primary usage scenario, there may be different network performance requirement to meet specific use case.
- d) Network slicing is a unique proposition supported by 5G-SA architecture which enable service providers to offer quality of service which is aligned with respective use case unlike previous generations of network technologies (2G,3G,4G) which expected the use cases to adapt with the offered network performance.
- e) While network slicing enables use case aligned network performance, it is important to ensure that the network capacity is sufficient to support network performance expected to be delivered to respective subscriber or device group. Before discussing the

⁹ <https://www.itu.int/rec/T-REC-Y.3112-201812-I/en>

proposed provisions in the regulation, it is pertinent to examine the global trends in adoption of network slicing based services.

f) **Global Regulatory Approaches for Network Slicing:**

- i. **BEREC (European Union):** The Body of European Regulators for Electronic Communications (BEREC) has examined 5G network slicing enabled services within the framework of the EU Open Internet Regulation. In its *Guidelines on the Implementation of the Open Internet Regulation*¹⁰, BEREC states that specialized services may be provided only where sufficient network capacity is available and where their provision is not detrimental to the availability or general quality of Internet Access Services. Further, such services should not be offered as a substitute for Internet Access Services. On 3 June 2026, BEREC released a *Draft Further Guidance on 5G Network Slicing*¹¹ for public consultation. The draft recognizes that network slicing can enable innovative services requiring specific performance characteristics, such as low latency, high reliability, or guaranteed bandwidth. At the same time, BEREC emphasizes that the use of network slicing should not undermine end-users' rights to access an open internet or degrade the quality of Internet Access Services (IAS). Overall, the draft seeks to facilitate innovation enabled by 5G network slicing while preserving the objectives of the Open Internet Regulation.
- ii. **Ofcom (UK):** Ofcom's revised Net Neutrality Guidance¹², based on the Open Internet framework, permits specialised or differentiated services provided that such services are not to the

¹⁰https://www.berec.europa.eu/sites/default/files/files/document_register_store/2022/6/BoR_%2822%29_81_Update_to_the_BEREC_Guidelines_on_the_Implementation_of_the_Open_Internet_Regulation.pdf

¹¹ https://www.berec.europa.eu/en/public-consultations-calls-for-inputs/public-consultation-on-the-draft-berec-further-guidance-on-5g-network-slicing?language_content_entity=en

¹² <https://www.ofcom.org.uk/internet-based-services/network-neutrality/ofcom-revises-net-neutrality-guidance>

detriment of the availability or general quality of ordinary internet access services for end-users.

- iii. **ARCEP (France):** In its report titled “*The State of the Internet in France*”¹³, ARCEP noted that the EU Open Internet Regulation¹⁴ is based on the principle of technological neutrality and, therefore, does not inherently prohibit the use of network slicing. In this regard, ARCEP highlighted that both the European Commission and BEREC have concluded that there is no *a priori* incompatibility between network slicing and the Open Internet Regulation. At the same time, ARCEP emphasized that the implementation of network slices, including the number and configuration of slices, the services supported, and the quality of service associated with each slice, should be assessed on a case-by-case basis to evaluate their potential impact on the availability and overall quality of Internet Access Services.
- iv. **FCC, (USA):** The FCC stated that it would monitor slicing-based services to ensure they are not used to evade open internet protections such as the prohibitions on paid prioritization, throttling, and unreasonable discrimination.
- g) The examination of existing global regulatory frameworks reveals that most of the QoS regulatory regimes recognise the importance of network slicing supported use cases for different user or device groups to deliver required network performance like data rates, latency, security, device density etc. The global regulatory approach thus far has been largely to enable network slicing use cases

¹³ https://en.arcep.fr/uploads/tx_gspublication/ARCEP-RA2025-TOME_3-UK-Norme_A.pdf

¹⁴ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32015R2120#:~:text=Regulation%20%28EU%29%202015%2F2120%20of%20the%20European%20Parliament%20and, networks%20within%20the%20Union%20%28Text%20with%20EEA%20relevance%29>

providing safeguards for its impact on QoS of public Internet access services.

- h) While network slicing support new uses cases for different business models, it is driven by efficient utilization of network resources with their efficient dynamic allocation among different slices. Since all network slices operate within overall capacity supported by a cell, it is important to monitor availability of resources so that allocation of resources to one or more slices, especially during periods of high network traffic, is not to the detriment of the QoS of slice(s) with relatively lower QoS performance requirement. Therefore, optimized network slice configuration, adequate network QoS performance and timely capacity planning and augmentation is essential to ensure each network slice gets adequate network resource. In absence of such measures, users may experience degraded QoS performance like slow data rates or increased latency during higher network traffic especially during cell busy hours. Each cell may have different busy hour based on the user traffic pattern. For example, the cells in office complex may have busy hour(s) during office time while the cells covering roads and open areas may have busy hours in morning and evening traffic peaks.
- i) At the time of framing of existing QoS Regulations in 2024, network slicing was still at an evolving stage with limited commercial deployments and use cases. In response to the questions in consultation paper dealing with impact of network slicing on QoS of normal internet subscribers, telecom service providers had responded that the implementation of network slicing would not adversely affect the Quality of Service (QoS) experienced by general subscribers. Considering uses cases were still emerging in the country and the submissions of the service providers, the Authority decided to observe emerging global regulatory approach and evolving use cases in the country before examining QoS requirement dealing with network slicing.

- j) However, following commercial launches of network slice-based services on 5G Standalone (5G-SA) networks by some telecom service providers in India, the Authority considers it appropriate to examine different aspects of network slicing, its possible impact on QoS and need for QoS requirements under QoS regulations at this stage.
- k) The Authority is of the view that as long as the service providers provisions sufficient capacity in each cell under network slicing, the QoS for each slice can be ensured in line with the view expressed by other regulators. Accordingly, the Authority has decided to introduce new QoS parameter “Cells having daily PRB utilisation > 80% (in 5G network) (Benchmark $\leq$ 1%)”. The parameter monitors the performance of each cell for each day during CBDH (i.e. during an hour in which total data download and upload is maximum in 24 hours of the day) and calculates the performance based on cell-days during which cells’ PRB utilization (for downlink or uplink or combined) exceeds the prescribed threshold (80%), thereby reflecting both the occurrence and repetition of high radio resource utilization across the assessment period. Though the QoS parameter will monitor the PRB utilisation at cell level, but for granular monitoring, the service provider shall be required to submit the details of PRB utilisation separately for each slice for each cell.
- l) The parameter is intended to serve as an indicator of sustained radio resource congestion. Persistent high PRB utilization may indicate the need for network optimization, radio or backhaul capacity augmentation, spectrum enhancement or other relevant remedial measures by the service provider. The parameter will also enable the Authority to monitor whether the deployment of network slicing has any impact on the quality of service experienced by the subscribers.

- m) Whenever PRB utilisation exceeds 80% for any five days in a month, service provider must take necessary action to augment the capacity in timely manner so that PRB utilisation reduces below 80%. However, in case PRB utilisation cannot be reduced below 80% even after a period of a month then such cells must be removed from network slicing. In other words, service provider shall ensure that the same cells reported in PMR of a month with more than 80% PRB utilization for more than five days are not repeated beyond two consecutive months.
- n) Further, different network slices, providing same service like internet service, shall assign same 5QI values as prescribed in 3GPP standard¹⁵ for that service with equal ARP (Allocation and Retention Priority) value.
- o) In addition, to ensure due diligence by the service provider before launch of any new network slice, service provider must ensure that sufficient capacity is available in the network and shall submit the details, as per the format and manner prescribed by the Authority. In addition, the service providers, having more than one network slices in the 5G-SA network, shall undertake quarterly assessment of network capacity requirements for next two quarters and initiate timely remedial action to ensure that the cell capacity utilization of any cell (both in radio and backhaul) does not exceed 80% during cell busy hours.
- p) Any such assessment shall include but not be limited to (a) existing loading of each cell during cell busy hour (b) back haul capacity utilization, projected network traffic growth (c) download/upload data rates declared in different tariff offerings (d) latency requirement to ensure that network slicing does not affect the QoS

¹⁵ [3GPP TS 23.501](#)

performance applicable to different groups of users in the network. The summary and outcomes of such assessment will be shared with the Authority as may be prescribed by the Authority.

- q) Accordingly, measurement methodology for this parameter along with formula for calculating the performance against the QoS parameter is also proposed to be included as per para 4.5 of **Schedule-I** to align with the proposed amendment.

(iii). Proposed Provision

Following new QoS parameter is proposed to be inserted at serial number (xv) of table under Regulation 6(1):

“V. Network Slicing

(xv) Cells having daily PRB utilisation >80% (in 5G network)”

2.9. Amendment in Regulation 6(2)

(i). Existing Provision

“(2). Every service provider shall, in all its tariff offerings for broadband (wireless) service, indicate the typical download and upload speed generally available to the consumers.”

(ii). Explanatory note for the proposed amendment

- a) Under QoS regulations 2024, service providers were mandated to indicate typical download and upload speed generally available to subscribers in each tariff offerings.
- b) In this regard service providers submitted that they are not offering any tariff plan based on download/ upload speed. Accordingly, they are indicating a common typical download and upload speed for all tariff offerings. It is observed that this typical speed is generally decided based on the speed observed in the lowest technology.
- c) However, performance reported against download/ upload speed is quite high in comparison to indicated typical speed. Measured

download/ upload speed is found to be as high as 10 to 20 times of indicated typical download/ upload speed. This may be due to measurement done in highest available technology. This type of reporting is not giving true relevant information to the customers.

- d) Detailed information regarding typical speed declared and measured speed may be seen in the PMR of access service (wireless) published on TRAI portal¹⁶.
- e) Therefore, the Authority has proposed to revise regulation 6(2) so that service provider should indicate typical download/ upload speed available in each technology (4G or 5G, whichever is applicable) separately for each tariff offering.

(iii). Proposed Provision

*“(2). Every service provider shall, in all its tariff offerings for broadband (wireless) service, indicate the **technology wise** typical download and upload speed generally available to the **subscribers**.”*

2.10. Addition of new sub-regulation under Regulation 6

(i). Existing Provision

In the principal regulations, there is no such sub-regulation.

(ii). Explanatory note for the proposed amendment

- a) As explained in section 2.8 above, before launch of any new network slice, service provider must ensure that sufficient capacity is available in the network and shall submit the details, as per the format and manner prescribed by the Authority, before launch of such network slicing.
- b) Accordingly, sub-regulation (3) is proposed to be added under Regulation 6.

¹⁶ <https://tra.gov.in/release-publication/qos-reports/pmr-reports>

(iii). Proposed Provision

“(3) Every service provider, planning to create a new network slice in their 5G network, shall submit the details of proposed and existing network slice parameters, at least twenty one (21) days in advance to the Authority, clearly demonstrating the availability of sufficient capacity in the cell(s) which are part of different slices, in such manner and format as may be directed by the Authority, from time to time.”

2.11. Addition of new QoS parameter “Silence Call Rate” at serial number (vii) of table under Regulation 7(1)

(i). Existing Provision

In the principal regulations, there is no such QoS parameter.

(ii). Explanatory note for the proposed amendment

- a) During Independent Drive Tests (IDTs), large percentage of calls observed as silence call. The percentage is as high as 22% in some of the cases. Similar instances are also being reported by the consumers. Call silence instances substantially impact quality of call and overall consumer experience.
- b) Present QoS Regulations does not prescribe any QoS parameter with respect to silence call rate as it is expected that the call should be dropped by the network if continuous silence period exceeds user perceptible limit.
- c) However, considering that it is a critical parameter for ensuring good QoS to consumers and number of instances being observed by subscribers and during the drive tests, it is proposed to introduce a new QoS parameter ‘Silence Call Rate’ having benchmark $\leq 1\%$. Performance against this parameter need to be monitored by the service provider and reported to the Authority. The Authority is of the view that it is important to monitor the silence call rate. However, presently, non-compliance against this parameter is not being considered to attract the provision of regulation 16.

- d) Need to include this parameter in regulation 6 may be examined by the Authority based on on-ground experience during drive test and subscriber complaint. Therefore, service providers are required to closely monitor the performance and take remedial action in a time bound manner.
- e) Accordingly, measurement methodology for this parameter is also proposed to be included as per para 5.7 of **Schedule-I** to align with the proposed amendment.

(iii). Proposed Provision

“(vii). Silence Call Rate (Benchmark $\leq 1\%$)”

2.12. Amendment in serial number (iv) of table under Regulation 9(1)

(i). Existing Provision

“(iv). Percentile value of measured test samples for which download and upload speed is $\geq$ offered typical download and upload speed in tariff offerings. (Benchmark 90th Percentile)

(ii). Explanatory note for the proposed amendment

- a) The existing QoS parameter assesses compliance based on the 90th percentile value of measured test samples for which the download and upload speeds are greater than or equal to the offered typical download and upload speeds.
- b) In response, service providers are submitting the details of offered typical download/ upload speeds and 90th percentile value of measured download/ upload speeds for selected top tariff offerings, based on number of subscribers, so that at least 75% of prepaid as well as postpaid subscribers are covered in these selected tariff offerings.
- c) However, the present framework does not give a clear indication about number of tariff offerings meeting the offered typical download and upload speeds. Further, it is also a complex method to ascertain the compliance against the prescribed benchmark.

- d) Therefore, the Authority has proposed to reframe the name of QoS parameter for better understanding and greater clarity. The proposed reframed QoS parameter will give an indication about percentage of tariff offerings in which 90th percentile value of measured download and upload speeds are greater than or equal to the offered typical download and upload speeds.
- e) It is also proposed that service provider shall include all tariff offerings for reporting the performance against the parameter. However, in order to reduce compliance burden, it is proposed to modify the provision of para 6.2.1 of schedule-I so that for tariff offerings having lower subscriber base, service provider can select 5% of the subscriber base for testing.
- f) Further, benchmark for reframed QoS parameter has been kept as 100% to ensure that 90th percentile value of measured download and upload speeds is greater than or equal to the offered typical download and upload speeds for all tariff offerings.
- g) It is also clarified that the regulation does not prescribe any criteria for deciding typical speeds, however service provider is free to indicate typical speeds after taking into consideration of various factors like dimensioning of the network, loading etc.
- h) Further, existing regulation used different percentile values like 90th percentile and 10th percentile at different places, which causes ambiguity. Accordingly, to have a uniform approach, it is clarified that 90th percentile value of test samples is to be taken after arranging the result of test samples in descending order and the value so obtained should be greater than or equal to the offered typical speeds in order to ensure compliance to the QoS parameter.
- i) Accordingly, measurement methodology prescribed for this parameter in para 6.2.4. of **Schedule-I** is also proposed to be amended to align with the proposed amendment. A formula for calculating the performance against the QoS parameter has also been proposed to be introduced in the measurement methodology.

(iii). Proposed Provision

“(iv). Tariff offerings in which 90th percentile value of measured download and upload speed is $\geq$ offered typical download and upload speed. (Benchmark 100%)”

2.13. Amendment in serial number (vii) of table under Regulation 9(1)

(i). Existing Provision

“(vii). Fault incidences (No. of faults per 100 subscribers)”

(ii). Explanatory note for the proposed amendment

a) The amendment proposed for this parameter is the same as that proposed for the corresponding parameter under Access Service (Wireline), therefore explanatory note provided in section 2.4 may be referred.

(iii). Proposed Provision

*“(vii). Fault incidences (No. of faults per 100 subscribers/**month**)”*

2.14. Addition of new QoS parameter “Mean Time-To-Repair (MTTR)” at serial number (x) of table under Regulation 9(1)

(i). Existing Provision

In the principal regulations, there is no provision for “Mean Time-To-Repair (MTTR)” for broadband (wireline) service.

(ii). Explanatory note for the proposed amendment

a) QoS Regulations dated 02.08.2024 aligned most of the QoS parameters across services. However, the QoS parameter “Mean Time-To-Repair (MTTR)” having benchmark “ $\leq$ 10 hours” was prescribed for access service (wireline) but was omitted in broadband (wireline) service.

b) The consumer dependency on broadband services has increased considerably during recent times. Consumer cannot afford long duration fault in their broadband connection. Therefore, it is

essential to monitor average time taken to rectify the fault of broadband (wireline) service similar to access service (wireline).

- c) Apart from that, ITU also conducts annual survey with respect to QoS in different countries. ITU in its survey *inter-alia* seek the performance against parameter namely “Fault resolution period for fixed-broadband service, in hours” for broadband (wireline) service. However, TRAI is not able to provide any input with respect to this parameter as presently it is not being monitored.
- d) In view of above, the Authority is of the view to introduce above mentioned QoS parameter for broadband (wireline) service keeping same benchmark as prescribed for access service (wireline).
- e) Further, measurement methodology for this parameter is also proposed to be aligned with the methodology provided for access service (wireline) as per para 3.2.3 of **Schedule-I** of principal regulations.

(iii). Proposed Provision

Following new QoS parameter shall be added as serial number (x) of table under sub-regulation (1) of Regulation 9 for broadband (wireline) service:

“(x). Mean Time-To-Repair (MTTR) (Benchmark ≤ 10 hours)”

2.15. Addition of provision regarding reporting of Significant Network Outage to the Authority for broadband (wireline) service at serial number (xi) of table under Regulation 9(1)

(i). Existing Provision

In the principal regulations, there is no provision for reporting of “Significant Network Outage” for broadband (wireline) service similar to access service (wireless).

(ii). Explanatory note for the proposed amendment

- a) Vide QoS Regulations dated 02.08.2024, reporting of significant network outage to the Authority was made mandatory in respect of

access service (wireless). This provision has enabled Authority to get information regarding major outages in the network affecting bulk customers on priority.

- b) Further, service provider is also required to rectify the outage on priority and submit a root cause analysis along with action taken to avoid recurrence of such events.
- c) In present days, Broadband (wireline) service has become an important service for the customer. Customer cannot afford long duration outage of broadband (wireline) service.
- d) Such incidences are also not reported to the Authority. Generally, Authority gets the information through media.
- e) In order to have the direct and faster information from service provider, it is proposed to include the provision of reporting of significant network outage in respect of broadband (wireline) service to the Authority on similar line to access service (wireless). It will help to monitor resolution practices apart from taking preventive action for avoiding recurrence of such event so that customer can get better services.
- f) Accordingly, as per proposed definition, events meeting any one or both of the criteria mentioned below will be categorised as Significant Network Outage (SNO) for broadband (wireline) service:
 - Broadband (wireline) service in a district remains unavailable for a continuous period exceeding four (4) hours, or
 - more than ten percent (10%) of subscribers in the Service Area experience complete loss of service or material degradation in service quality for a continuous period exceeding four (4) hours. Material degradation in service quality shall mean a reduction of twenty percent (20%) or more in the download or upload speed experienced by a subscriber vis-à-vis the declared typical download or upload speed.
- g) Further, such SNO need to be reported to authority within 24 hrs of start of the outage and in case outages are not rectified within 24

hrs then rent rebate or plan validity extension is to be given to the subscribers.

- h) In addition, performance regarding monitoring of such events will be monitored through new QoS parameter namely “Percentage of significant network outage reported to the Authority within 24 hrs of start of the outage (Benchmark 100%)”.

(iii). Proposed Provision

Following new QoS parameter shall be added as serial number (xi) of table under sub-regulation (1) of Regulation 9 for broadband (wireline) service:

“(xi). Percentage of significant network outage reported to the Authority within 24 hrs of start of the outage (Benchmark 100%)

Note: *Significant Network Outage is defined as an event where broadband (wireline) service in a district remains unavailable for a continuous period exceeding four (4) hours, or where more than ten percent (10%) of subscribers in the Service Area experience complete loss of service or material degradation in service quality for a continuous period exceeding four (4) hours. Material degradation in service quality shall mean a reduction of twenty percent (20%) or more in the download or upload speed experienced by a subscriber vis-à-vis the declared typical download or upload speed.*

Rebate to the subscribers for significant network outages of more than 24 hrs:

- ***For post-paid subscribers registered in the district or affected post-paid subscribers, as applicable:*** *Proportional rent rebate, as per plan charges, for affected number of days shall be credited in next bill.*
- ***For the pre-paid subscribers registered in the district or affected pre-paid subscribers, as applicable:*** *The validity of*

subscribed tariff offering shall be increased by equal number of affected days.”

2.16. Amendment in Explanation under Regulation 9

(i). Existing Provision

“Explanation: For the purposes of this regulation, broadband (wireline) service shall include all fixed wireless and wireline medium including copper, fibre, cables etc.”

(ii). Explanatory note for the proposed amendment

- a) On examination of performance monitoring reports (PMRs), it was observed that some of the service providers are including the performance of broadband connections (like 5G FWA) provided through access service (wireless) in the PMR of broadband (wireline) service despite separate QoS parameters prescribed for broadband service provided through access service (wireless) under regulation 6 of the regulations.
- b) Therefore, proposed amendment in explanation is being issued to clarify that performance of any broadband connection provided through wireline medium are to be reported under broadband (wireline) service and broadband connection provided through access service (wireless) are to be reported in the PMR of access service (wireless).

(iii). Proposed Provision

“Explanation: For the purposes of this regulation, broadband (wireline) service shall include all wireline medium including copper, fibre, cables etc.”

2.17. Amendment in serial number (ii) of table under Regulation 10(1)

(i). Existing Provision

“(ii). Resolution of billing/ charging complaints within four weeks (Benchmark 100%)”

(ii). Explanatory note for the proposed amendment

- a) Considering the digitization of subscriber records, the availability of digital channels for financial transactions, and the implementation of centralized metering and billing systems by service providers, the Authority felt that four week time for resolution of billing/ charging complaints is too long and needs revision. Accordingly, it is proposed to revise the timeline for resolution of billing/ charging complaints to one week from four week.
- b) Further, formula prescribed in para 7.1.2 of **Schedule-I** for calculating the performance of this parameter is also proposed to be amended to align with the proposed amendment.

(iii). Proposed Provision

*“(ii). Resolution of billing/ charging complaints within **one week** (Benchmark 100%)”*

2.18. Deletion of Proviso under Regulation 10(1)

(i). Existing Provision

“Provided that the service provider providing both access service (wireline) and broadband (wireline) service shall meet the benchmarks for both the services on aggregated basis.”

(ii). Explanatory note for the proposed amendment

- a) On examination of performance monitoring reports (PMRs) submitted as per the provision of above-mentioned proviso, following issues were observed:
 - Only four service providers submitted the combined performance of ‘Customer Service’ related parameters in PMR of access (wireline) report. However, the PMR of access service (wireline) was submitted on LSA basis whereas PMR of broadband (wireline) service was submitted on 'All India' basis. Therefore, it was not

possible to compare service area wise performance from both the PMRs.

- Further, some service provider used total subscriber base of access service (wireline) and broadband (wireline) services to compute the performance of 'Customer Service' related parameters. This approach results non-uniform measurement method across the service providers against this parameter.
 - Therefore, vide TRAI letter dated 20th March 2025 (Copy enclosed as **Annexure-II**) clarification was issued that service providers are advised to submit the performance of 'Customer Service' related parameters separately for access service (wireline) and broadband (wireline) service in respective PMR from quarter ending March 2025 onwards. All the service providers are submitting the PMR as per the clarification issued vide letter dated 20th March 2025.
- b) Accordingly, with the proposed amendment, the clarification issued vide letter dated 20th March 2025 is being incorporated in the regulations.

(iii). Proposed Provision

Proviso under regulation 10 (1) is proposed to be deleted.

2.19. Amendment in explanation under Regulation 10

(i). Existing Provision

"Explanation: For the purposes of this regulation, broadband (wireline) service shall include all fixed wireless and wireline medium including copper, fibre, cables etc."

(ii). Explanatory note for the proposed amendment

- a) The amendment proposed in explanation under regulation 10 is the same as that proposed for explanation under regulation 9, therefore the explanatory note provided in section 2.16 may be referred.

(iii). Proposed Provision

“Explanation: For the purposes of this regulation, broadband (wireline) service shall include all wireline medium including copper, fibre, cables etc.”

2.20. Amendment in Regulation 15(1)

(i). Existing Provision

“(1). The Authority may publish, in such manner and in such format, as may be decided by the Authority from time to time –

- (a) the compliance reports of benchmarks of each QoS parameter reported to it by the service providers under regulation 13;*
- (b) the results of the customer satisfaction surveys undertaken by the Authority under regulation 11;*
- (c) the results of drive tests undertaken by the Authority under sub-regulation (3) of regulation 7;*
- (d) the findings of audit undertaken by the Authority under regulation 14;*

through its website or through press releases or through advertisements in the print or electronic media, for the information to the public.”

(ii). Explanatory note for the proposed amendment

- a) In India, the performance of telecommunication networks is comprehensively monitored through an established Quality of Service (QoS) regulatory framework, which prescribes objective benchmarks for key technical parameters
- b) As telecom services continue to evolve in scale, complexity, and usage, there is value in supplementing objective network performance indicators with additional consumer-centric perspectives that reflect service outcomes and user perception. Such perspectives help in developing a more rounded understanding of

how network performance, service delivery, and customer interactions collectively shape the overall experience of consumers.

- c) In view of this, a Quality of Experience (QoE) Framework can be envisaged as a complementary framework that builds upon the existing QoS regime factoring key technical and non-technical performance indicators that affect consumer experience. The QoE Framework seeks to bridge the gap by integrating network performance, consumer service, and consumer perception into a single, transparent assessment mechanism.
- d) Accordingly, provision has been added to publish performance of service providers based on various parameters of network performance, consumer service, and consumer perception collected through multiple sources.

(iii). Proposed Provision

“(1). The Authority may publish, in such manner and in such format, as may be decided by the Authority from time to time -

- (a) the compliance reports of benchmarks of each QoS parameter reported to it by the service providers under regulation 13;*
- (b) the results of the customer satisfaction surveys undertaken by the Authority under regulation 11;*
- (c) the results of drive tests undertaken by the Authority under sub-regulation (3) of regulation 7;*
- (d) the findings of audit undertaken by the Authority under regulation 14;*
- (e) **Service wise Quality of Experience Score (QoES) of service providers based on various parameters of network performance, consumer service, and consumer perception collected through multiple sources;***

through its website or through press releases or through advertisements in the print or electronic media, for the information to the public.”

2.21. Amendment in Regulation 15(3)

(i). Existing Provision

“15(3). Every service provider providing access service (wireless) shall publish on its website the service wise geospatial coverage maps in such a manner and format, as may be directed by the Authority from time to time, for the geographical areas where wireless voice or wireless broadband service is available for subscription by consumers.”

(ii). Explanatory note for the proposed amendment

- a) Considering the significance, TRAI, through Regulation 15(3) of QoS Regulations, 2024, mandated service providers providing access service (wireless) to publish service-wise geospatial coverage maps on their websites for the benefit of consumers. This was the first step towards transparency and consumer empowerment.
- b) In this regard, TRAI also issued a Direction¹⁷ dated 22nd November 2024, prescribing detailed guidelines for publication of coverage maps with effective from 1st April 2025.
- c) However, as explained in section 2.29, certain modifications are required to be carried out in the Direction dated 22nd November 2024. In this regard, the Authority is of the opinion that key requirements for publication of service wise geospatial coverage maps by service provider may be included in the regulations itself.
- d) Accordingly, it is proposed to modify sub-regulation (3) of regulation 15 to include a reference of Schedule-III, which details broad guidelines for publication of service wise geospatial coverage maps by service provider.
- e) Proposed Schedule-III is attached with the draft notification.
- f) Subsequent to the issue of amendment of the regulations, Direction dated 22nd November 2024 will be superseded.

¹⁷ [TRAI's direction dated 22.11.2024](#)

(iii). Proposed Provision

*“(3). Every service provider providing access service (wireless) shall publish on its website the service wise geospatial coverage maps in such a manner and format, **as broadly specified under Schedule III and** as may be directed by the Authority from time to time, for the geographical areas where wireless voice or wireless broadband service is available for subscription.”*

2.22. Amendment in Regulation 16(1)

(i). Existing Provision

“(1). If a service provider fails to meet the benchmark of QoS parameters specified under sub-regulation (1) of regulation 4 or sub-regulation (1) of regulation 6 or sub-regulation (1) of regulation 9 or sub-regulation (1) of regulation 10, it shall, without prejudice to the terms and conditions of its license, or the Act or rules or regulations or orders made, or directions issued, thereunder, be liable to pay an amount, by way of financial disincentive, not exceeding rupees one lakh per benchmark for the first contravention as the Authority may, by order, direct.”

(ii). Explanatory note for the proposed amendment

- a) Regulation 16 prescribes consequences for the failure of service providers to meet the benchmark of Quality of Service parameters.
- b) Financial disincentive is applicable for contravention of benchmark in each LSA separately.
- c) However, in Regulation 16(1), inadvertently, word “per compliance report” is not explicitly mentioned.
- d) Therefore, proposed amendment is being issued to remove ambiguity and make the provision clearer.

(iii). Proposed Provision

“(1). If a service provider fails to meet the benchmark of QoS parameters specified under sub-regulation (1) of regulation 4 or sub-regulation (1) of regulation 6 or sub-regulation (1) of regulation 9 or sub-regulation (1) of

*regulation 10, it shall, without prejudice to the terms and conditions of its license, or the Act or rules or regulations or orders made, or directions issued, thereunder, be liable to pay an amount, by way of financial disincentive, not exceeding rupees one lakh per benchmark **per compliance report** for the first contravention as the Authority may, by order, direct.”*

2.23. Deletion of sub-regulation (2), (3) and (4) of Regulation 16 and addition of Regulation 16A

(i). Existing Provision

“(2). If the compliance report furnished by the service provider under regulation 13 is found to be false, it shall, without prejudice to the terms and conditions of its license or authorization, or the Act or rules or regulations or orders made, or, directions issued thereunder, be liable to pay an amount, by way of financial disincentive, not exceeding rupees two lakhs per benchmark, for which such false report has been furnished, for the first contravention as the Authority may, by order, direct:

Provided that if the compliance report furnished by the service provider under regulation 13 is found to be false for the same parameter consecutively in two or more subsequent months or quarters, as applicable, the service provider shall be liable to pay, by way of financial disincentives, an amount not exceeding rupees five lakhs for the second consecutive false reporting and not exceeding rupees ten lakhs for each consecutive false reporting occurring thereafter.

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

(4) 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.”

(ii). Explanatory note for the proposed amendment

- a) The existing Regulation 16(2) provides for imposition of financial disincentives in case compliance report furnished by the service provider is found to be false.
- b) Regulation 16 has two sub-regulations. The sub-regulation (1) of regulation 16 deals with the issue of non-compliance to prescribed benchmark whereas sub-regulation (2) of the regulation 16 deals about false reporting. Further, both sub-regulation (1) and sub-regulation (2) of regulation 16 are mutually exclusive of each other. Applicability of sub-regulation (1) and sub-regulation (2) in different scenario is explained in following table:

Sl. No.	Non-compliance	False Reporting	Applicable sub-regulation
1.	No	No	None of the sub-regulation
2.	Yes	No	Only sub-regulation 16(1)
3.	Yes	Yes	Both sub-regulation 16(1) & 16(2)
4.	No	Yes	Only sub-regulation 16(2)

- c) Therefore, the applicability of provision of sub-regulation (1) and (2) of regulation 16 is clear. However, to avoid any ambiguity, it is proposed to delete sub-regulation (2) from regulation 16 and include it in new regulation 16A after regulation 16 having heading “Consequences for the failure of service providers to submit correct compliance reports”.
- d) Further, during the implementation of the regulations, several instances have been observed where the information furnished by the service providers in the Performance Monitoring Reports (PMRs) did not match with the performance calculated by TRAI using primary data submitted by the service providers along with the PMR or in other reports or records required under the regulations. This

mismatch indicates that the primary data submitted to TRAI is incomplete/different from what is used by the service provider for calculation of performance being reported in PMRs.

- e) Such instances constitute false reporting and will attract the provision of proposed sub-regulation (1) of regulation 16A, however, to avoid any ambiguity it is proposed to add explanation under sub-regulation (1) of regulation 16A to provide more clarity.
- f) Where the difference between the reported performance and the performance calculated by the TRAI is up to 1% of the prescribed benchmark, provision of proposed regulation 16A shall not be applicable. However, in respect of QoS parameter, where prescribed benchmark is in the nature of “higher-is-better (HIB)” e.g., Call setup success rate $\geq 98\%$, prescribed limit of 1% will be applied over the value (100-prescribed benchmark).
- g) Further, if any mismatch is identified during an audit or through any other mechanism, it shall also attract the provision of proposed regulation 16A.

(iii). Proposed Provision

Sub-regulation (2), (3) and (4) of Regulation 16 are proposed to be deleted. Further, following regulation is proposed to be inserted as regulation 16A:

“16A. Consequences for the failure of service providers to submit correct compliance reports. - (1) If the compliance report furnished by the service provider under regulation 13 is found to be false, it shall, without prejudice to the terms and conditions of its license or authorization, or the Act or rules or regulations or orders made, or, directions issued thereunder, be liable to pay an amount, by way of financial disincentive, not exceeding rupees two lakhs per benchmark per compliance report, for which such false report has been furnished, for the first contravention as the Authority may, by order, direct:

Provided that if the compliance report furnished by the service provider under regulation 13 is found to be false for the same parameter consecutively in two or more months or quarters, as applicable, the service provider shall be liable to pay, by way of financial disincentives, an amount not exceeding rupees five lakhs for the second consecutive false reporting and not exceeding rupees ten lakhs for each consecutive false reporting occurring thereafter.

Explanation: *If, upon examination of the information in the compliance report or in any other report pertaining to the performance of QoS parameters furnished by the service provider, the Authority finds that there is a mismatch in the data or value of any parameter reported by the service provider and the performance calculated by the Authority from value or the data given by the service provider in its report or observed during the audit, to the extent that absolute value of difference exceeds 1% of the prescribed benchmark, then such events shall also be considered as false reporting.”*

2.24. Addition of Regulation 16B

(i). Existing Provision

Principal regulations do not contain any provision corresponding to the proposed Regulation 16B.

(ii). Explanatory note for the proposed amendment

- a) QoS Regulations, 2024 prescribe various provisions for service providers relating to monitoring, reporting of service performance, publication of information, consumer transparency, and other regulatory requirements.
- b) Regulations 16, 16A, 17 and 18 provide for financial disincentives in respect of specified instances of non-compliance, such as failure to meet prescribed benchmarks, failure to submit compliance reports, failure to submit correct compliance report, and failure to remit the financial disincentive within the stipulated time. However, presently,

the Regulations have no provision for imposition of financial disincentive for non-compliance with respect to other provisions of the regulations.

- c) In order to strengthen regulatory compliance and to ensure uniform enforceability of all provisions prescribed under the Regulations, the Authority is of the view to introduce new regulation 16B in principal regulations.
- d) Further, QoS parameters mentioned under regulation 7(1) are to be monitored by service providers and reported to the Authority but excluded from the provision of regulation 16, therefore regulation 7(1) is proposed to be excluded from the provision of proposed new regulation 16B.

(iii). Proposed Provision

Following regulation is proposed to be inserted as Regulation 16B:

“16B. Consequences for the failure of service providers to comply with any other provisions of the regulations.- (1) If a service provider fails to comply with any of the provisions of the regulations excluding provision mentioned in sub-regulation (1) of regulation (7), it shall, without prejudice to the terms and conditions of its license, or the Act or rules or regulations or orders made, or directions issued, thereunder, be liable to pay an amount, by way of financial disincentive, not exceeding rupees five lakh per instance of such non-compliance as the Authority may, by order, direct:

Provided that if the service provider fails to comply the same provision of the regulations consecutively in two or more subsequent months or quarters, as applicable, he shall be liable to pay, by way of financial disincentives, an amount not exceeding rupees eight lakhs for the second consecutive contravention and not exceeding rupees ten lakhs for each consecutive contravention occurring thereafter:

Provided that this regulation shall not be applicable if any non-compliance attracts the provision of regulation 16 or regulation 16A or regulation 17 or regulation 18 .”

2.25. Amendment in Regulation 17

(i). Existing Provision

“(1). If a service provider contravenes the provisions of regulation 13, it shall, without prejudice to the terms and conditions of its license or authorization, or the provisions of the Act or rules or regulations or orders made, or, directions issued, thereunder, be liable to pay an amount, by way of financial disincentive, not exceeding rupees five thousand per report for every day during which the default continues, subject to the maximum amount of rupees ten lakhs, as the Authority may, by order, direct:

Provided that no order for payment of any amount by way of financial disincentive shall be made by the Authority unless the service provider has been given a reasonable opportunity of representing against the contravention of the regulation observed by the Authority.”

(2) 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.”

(ii). Explanatory note for the proposed amendment

- a) Regulation 17 prescribes consequences for failure of the service providers to submit compliance reports by prescribing financial disincentive for every day of delay in submission of compliance report.
- b) It is observed that sometime service provider does not submit the compliance report. In such cases, it becomes difficult to decide the applicable amount of financial disincentives in absence of specific provision of non-submission of compliance report.
- c) Therefore, regulation is proposed to be amended to include specific provision for non-submission of compliance report. As per amended

provision, financial disincentive, not exceeding rupees ten lakhs per report shall be payable in case compliance report is not submitted within a period of three (3) months from due date. However, in case, compliance report is submitted within three months then financial disincentive, not exceeding rupees five thousand per report for every day during which the default continues, shall be payable.

(iii). Proposed Provision

“(1). If a service provider contravenes the provisions of regulation 13, it shall, without prejudice to the terms and conditions of its license or authorization, or the provisions of the Act or rules or regulations or orders made, or, directions issued, thereunder, be liable to pay an amount, by way of financial disincentive, not exceeding rupees five thousand per report for every day during which the default continues, as the Authority may, by order, direct:

Provided that if service provider fails to submit the compliance report within a period of three (3) months from due date then be liable to pay an amount, by way of financial disincentive, not exceeding rupees ten lakhs per report.”

2.26. Addition of Regulation 17A

(i). Existing Provision

The principal regulations do not provide for a separate Regulation 17A.

(ii). Explanatory note for the proposed amendment

- a) It is observed that the provisions relating to providing reasonable opportunity of representing against the contravention of the regulation observed by the Authority and remittance of the amount payable by way of financial disincentive to the specified head of account, are common to Regulations 16 and 17 and would also be applicable to the proposed Regulations 16A and 16B.
- b) Therefore, in order to avoid repetition of same provisions across multiple regulations and improving the readability and consistency

of the Regulations, it is proposed to delete related provisions from Regulation 16 and Regulation 17 and introduce a separate Regulation 17A containing these common provisions of financial disincentive.

(iii). Proposed Provision

*“17A. **Common provisions for financial disincentives.**- (1) No order for payment of any amount by way of financial disincentive, under regulation 16 or regulation 16A or regulation 16B or regulation 17, shall be made by the Authority unless the service provider has been given a reasonable opportunity of representing against the contravention of the regulation observed by the Authority.*

(2) The amount payable by way of financial disincentive under regulation 16 or regulation 16A or regulation 16B or regulation 17 shall be remitted to such head of account as may be specified by the Authority.”

2.27. Amendment in Regulation 18

(i). Existing Provision

“(1) If a service provider fails to make payment of financial disincentive under regulation 16 or regulation 17 within a period of twenty one days from the date of issue of order for payment of financial disincentive or as stipulated in the order for payment of financial disincentive, it shall be liable to pay interest at a rate which will be 2% above the one year Marginal Cost of Lending Rate (MCLR) of State Bank of India existing as on the beginning of the Financial Year (namely 1st April) in which last day of the stipulated period falls and such interest shall be compounded annually.”

(ii). Explanatory note for the proposed amendment

a) Regulation 18 presently provides for payment of interest in case a service provider fails to make payment of financial disincentive within prescribed timeline where the financial disincentive imposed under regulation 16 or regulation 17.

- b) Since the proposed amendments mentioned above introduce new regulations 16A and 16B, providing for imposition of financial disincentive, it is considered necessary to suitably amend Regulation 18 so that the provision relating to payment of interest applies uniformly to all provisions (Regulation 16, 16A, 16B and 17) relating to imposition of financial disincentives.

(iii). Proposed Provision

*“(1) If a service provider fails to make payment of financial disincentive under regulation 16 **or regulation 16A or regulation 16B** or regulation 17 within a period of twenty one days from the date of issue of order for payment of financial disincentive or as stipulated in the order for payment of financial disincentive, it shall be liable to pay interest at a rate which will be 2% above the one year Marginal Cost of Lending Rate (MCLR) of State Bank of India existing as on the beginning of the Financial Year (namely 1st April) in which last day of the stipulated period falls and such interest shall be compounded annually.”*

2.28. Amendment in the Schedule-I

2.28.1. Amendment in the para 1.1

(i). Existing Provision

*“**1.1. Cell Bouncing Busy Hour (CBBH):** CBBH for a quarter shall be decided on the basis of analysis of hourly traffic data of each cell for each day of preceding quarter. The hour during which the cell experience maximum average traffic during preceding quarter shall be CBBH of the respective cell. Different cells may have different CBBH based on the actual traffic experienced by the respective cell. Thus, the CBBH for a cell will remain the same for a quarter irrespective of the assessment period for the purpose of reporting the performance against QoS parameters.”*

(ii). Explanatory note for the proposed amendment

- a) Subsequent to notification of QoS Regulations, service providers submitted that system is automatically calculating CBBH based on

the hour during which cell experiences maximum traffic in a day. Calculating busy hour based on past 90 days performance and configuring the same in system for each quarter will require lot of manual efforts without any gain.

- b) The definition of CBBH was prescribed in the QoS regulations with the understanding that each service provider should follow the same practice and the CBBH can also be verified during audit.
- c) Considering that it is feasible for service providers to provide the details of CBBH of each cell for each day of the assessment period separately, modified definition of CBBH was agreed by the authority vide Direction dated 19th September 2024¹⁸ and 3rd January 2025¹⁹.
- d) Accordingly, vide proposed amendment, the clarification issued vide above mentioned Directions is being incorporated in the regulations.

(iii). Proposed provision

“1.1. Cell Bouncing Busy Hour (CBBH): *CBBH should be system generated one-hour period in a day during which the cell experiences the maximum traffic.”*

2.28.2. Insertion of new sub-para (vi) under para 3.2.2

(i). Existing Provision

In the principal regulations, there is no such sub-para in existing para 3.2.2. of Schedule-I.

(ii). Explanatory note for the proposed amendment

- a) It is observed that in case services of a service provider remain disturbed in any particular area then they intimate the same to the affected customers through SMS or other means. However, in such cases they do not allow customers to book the fault on the pretext that their team is already working to resolve the issue.

¹⁸ https://traf.gov.in/sites/default/files/2024-11/Direction_19092024.pdf

¹⁹ https://traf.gov.in/sites/default/files/2025-01/Direction_03012025.pdf

- b) Such practice is not in the interest of customer due to following reasons:
- Service providers keep on changing the timeline for rectification of faults.
 - By not allowing booking of fault by customer amounts to artificially improving the performance of service provider with respect to fault rectification related QoS parameter.
 - Regulation has the provision for providing rebate to the customer due to delay in rectification of fault. By not allowing booking of fault, the customer is deprived from availing the rent rebate or validity extension as the case may be.
- c) In view of above, the Authority is of the view that service provider should not stop customer from booking of fault in any situation. With this intention, the proposed sub-para has been inserted in schedule-I.

(iii). Proposed Provision

Following new sub-para is proposed to be added under para 3.2.2 of Schedule-I:

“(vi). Service providers shall ensure that complaint registration facilities remain accessible to subscribers at all times, including during network-wide or localized service disruptions. In case of such disruptions, all affected subscribers shall be either enabled to register complaints or be automatically mapped to system-generated fault tickets. Such instances shall be duly recorded and included in Quality of Service reporting metrics.”

2.28.3. Amendment in sub-para (ii) of para 4.3.1

(i). Existing Provision

“(ii) ... DCR is a radio KPI and will be captured and reported through the relevant counters in radio access network. DCR value of each cell shall be computed up to two decimal places. In VoLTE scenario, the performance against this parameter is calculated on QCI=5 bearers

dropped abnormally in eNodeB. The corresponding parameter for VoNR i.e QCI flow indicator is captured in gNodeB in 5G Stand Alone (SA) mode.”

(ii). Explanatory note for the proposed amendment

- a) In VoLTE, QCI = 5 is used for bearer carrying IMS signalling. It is a non-GBR (non-guaranteed bit rate) bearer with the highest priority (Priority 1), ensuring that voice call setup, registration, and tear-down messages are prioritized over standard data traffic to guarantee fast call connectivity.
- b) Whereas conversational voice payload in VoLTE is carried on a dedicated GBR bearer with QCI = 1, which is defined in 3GPP TS 23.203 as the standardized QCI for conversational speech with strict delay and priority requirements.
- c) Accordingly, performance of dropped call rate in VoLTE is measured on QCI=1 bearers dropped abnormally in eNodeB. In sub-para (ii) of para 4.3.1 of schedule-I, erroneously, “QCI=1” was written as “QCI=5”.
- d) Similarly, performance of dropped call rate in VoNR is measured on 5QI=1 bearers dropped abnormally in gNodeB.
- e) Therefore, proposed amendment is being issued to rectify the above-mentioned error with respect to VoLTE and to add provision with respect to VoNR.

(iii). Proposed Provision

*“(ii). ...DCR is a radio KPI and will be captured and reported through the relevant counters in radio access network. DCR value of each cell shall be computed up to two decimal places. In VoLTE scenario, the performance against this parameter is calculated on **QCI=1** bearers dropped abnormally in eNodeB. **Similarly, in VoNR scenario, the performance against this parameter is calculated on 5QI=1 bearers dropped abnormally in gNodeB.***

2.28.4. Amendment in table under sub-para (iv) of para 4.3.1

(i). Existing Provision

Table under sub-para (iv) of para 4.3.1 of schedule-I presently specifies four DCR codes namely, 'DNE', 'NOP', 'NAV' and 'NDM', to be used by service providers while reporting performance of cells for assessment of QoS parameters.

(ii). Explanatory note for the proposed amendment

- a) During the discussion on draft API document, some of the service providers intimated that they are offering only data service through 5G RAN, and no voice service is being offered. They further intimated that performance of such 5G cells with respect to voice related parameters like dropped call rate (DCR), uplink and downlink packet dropped rate are not available.
- b) Accordingly, API document dated 8th January 2025, prescribing detailed specification for submission of PMR of access service (wireless) through API, conveyed that in such scenario service provider may use 'NVS' code.
- c) Further, it was observed that sometime service provider excludes the performance of certain cells while submitting the performance of the LSA citing force majeure event. It was also observed that some time the event mentioned by service providers do not fall in the category of force majeure as per the provision of the QoS regulation dated 02.08.2024. In absence of specific information, such details could not be verified during audit also.
- d) To address this issue, vide API document dated 3rd February 2026, it was conveyed that while submitting the CGI wise details in DCR(CS-PS), PDR(DL), PDR(UL) and Downtime API, code "FCM" must be used for such cells whose performance is excluded for computation of performance of the whole LSA.
- e) Accordingly, vide proposed amendment, the additional codes conveyed vide API document dated 8th January 2025 and 3rd February 2026 is being incorporated in the regulations.

(iii). Proposed Provision

Two more 'DCR Code' namely 'NVS' and 'FCM' are proposed to be inserted in the table under sub-para (iv) of para 4.3.1 of Schedule-I.

<i>DCR Code</i>	<i>Stands for</i>	<i>Reason or purpose</i>
<i>NVS</i>	<i>No Voice Service is being provided on 5G Cell</i>	<i>In case, only data service is being offered, and no voice service is being offered through 5G RAN.</i>
<i>FCM</i>	<i>Performance of cell excluded due to force majeure</i>	<i>In case performance of certain cells is excluded for certain days due to force majeure, as per provisions of the regulations.</i>

2.28.5. Amendment in sub-para (ii) of para 5.3

(i). Existing Provision

“(ii). The quality of voice in cellular mobile telecom services (GSM), is measured on a scale from 0 to 7 in GSM technology. As the quality deteriorates, this value increases. The quality of the voice is good, if this value remains between 0 and 4.”

(ii). Explanatory note for the proposed amendment

- a) Subsequent to notification of QoS Regulations, service providers pointed out that 2G Rx quality should be kept at 0-5 as Frequency Hopping is being used in the network similar to the provision available in old QoS regulation.
- b) After examination of the matter, clarification was issued vide TRAI letter dated 21st April 2025 (Copy enclosed as **Annexure-III**).

- c) Accordingly, vide proposed amendment, the clarification issued vide letter dated 21st April 2025 is being incorporated in the regulations.

(iii). Proposed Provision

*“(ii). The quality of voice in cellular mobile telecom services (GSM), is measured on a scale from 0 to 7 in GSM technology. As the quality deteriorates, this value increases. The quality of the voice is good, if this value remains between 0 and 4. **However, in cases where frequency hopping phenomenon is used in GSM network, GSM voice samples with Rx Qual between 0 to 5 may be considered as good voice quality, while maintaining supporting evidence.**”*

2.28.6. Amendment in sub-para (ii) of para 7.1.7

(i). Existing Provision

In the principal regulations, formula for calculating the performance, against the parameter “Refund of deposits within 45 days of closure of service or non-provisioning of service”, is given as follows:

$$= \left\{ 1 - \frac{\left(\begin{array}{c} \text{Number of deposits not} \\ \text{refunded within} \\ \text{45 days of closure} \end{array} \right)}{\left(\begin{array}{c} \text{Total number of closure} \\ \text{of service which requires} \\ \text{refund of deposits} \end{array} \right)} \right\} \times 100$$

(ii). Explanatory note for the proposed amendment

- a) The parameter monitors the performance of service providers with respect to refund of deposits within 45 days after either closure of service or non-provisioning of service.
- b) As deposits may require to be refunded in case of non-provisioning of service also apart from closure of service. Existing formula was not including the instances where refund of deposits is required due to non-provisioning of service. Therefore, amendment has been

proposed to include such instances while calculating the performance against the parameter

(iii). Proposed Provision

Formula for calculating the performance, against the parameter “Refund of deposits within 45 days of closure of service or non-provisioning of service”, is proposed to be amended as follows:

$$= \left\{ 1 - \left(\frac{\text{Number of deposits not refunded within 45 days}}{\text{Total number of *instances* which requires refund of deposits}} \right) \right\} \times 100$$

2.29. Addition of Schedule-III

(i). Existing Provision

There is no such Schedule in principal regulations.

(ii). Explanatory note for the proposed amendment

- a) One of the key issues identified during the implementation of the QoS Regulations, 2024 relates to the framework for publication of service-wise geospatial coverage maps by service providers. With the increasing dependence on mobile connectivity for communication, digital services, governance, and economic activities, access to reliable and transparent information on network coverage has become essential. Without adequate network coverage, the delivery of good Quality of Service (QoS) cannot be ensured, as services cannot be accessed in areas where coverage is not available, which is commonly interpreted by consumers as deficient QoS. Therefore, the availability of reliable and transparent information on network coverage becomes a fundamental prerequisite for assessing service quality.

- b) Considering the significance, TRAI, through Regulation 15(3) of QoS Regulations, 2024, mandated service providers providing access service (wireless) to publish service-wise geospatial coverage maps on their websites for the benefit of consumers. This was the first step towards transparency and consumer empowerment. In this regard, TRAI also issued a Direction²⁰ dated 22nd November 2024, prescribing detailed guidelines for publication of coverage maps with effective from 1st April 2025.
- c) In compliance with the regulatory mandate, the service providers have published mobile network coverage maps on their respective website, and TRAI has also facilitated centralized access to these coverage maps through its website²¹ for ease of consumer access.
- d) Salient points of existing framework for publication of mobile network coverage maps are as follows:
- It mandates publication of technology-wise (2G/3G/4G/5G) geospatial coverage maps on service providers' websites for all geographical areas where wireless voice or broadband services are available for subscription.
 - Uniform guidelines have been prescribed for preparation of coverage maps using actual field measurements, network analytics, or industry-standard prediction models, with validation against measured signal strength to ensure maps closely reflect actual user experience.
 - Minimum signal strength thresholds have been specified for each technology (2G, 3G, 4G and 5G) to ensure consistency in determining coverage boundaries across service providers.
 - Standardised requirements have been laid down for display of coverage maps, including technology-specific colour coding,

²⁰ [TRAI's direction dated 22.11.2024](#)

²¹ <https://tra.gov.in/consumer-info/mobile-coverage-map/service-providers>

unified coverage view, map legends, search functionality, navigation tools and user-friendly interface.

- Service providers are required to update coverage maps promptly following network expansion, optimisation or decommissioning, with all changes reflected within three months, maintain update logs for audit purposes, and display the date of the latest update.
 - Prominent placement of the Coverage Map on the service provider's website to facilitate easy public access.
 - A consumer feedback mechanism is to be provided, enabling users to report discrepancies in displayed coverage, which may be utilised by service providers for network optimisation.
 - Service providers are required to make available secure APIs or standard GIS data exchange mechanisms to enable TRAI to develop a unified pan-India geospatial mobile coverage platform, as and when required.
 - It also prescribes inclusion of a Help section explaining the methodology, limitations and usage of the coverage map, while encouraging additional consumer-friendly features such as mobile app access and downloadable maps.
- e) The publication of coverage maps marks a significant step towards transparency and improved consumer experience, however the current approach to publish coverage maps requires further improvement in terms of accuracy, granularity, and usability due to certain challenges and gaps observed in the existing framework, as mentioned below:
- The existing coverage maps, as published by service providers, predominantly adopt a binary representation, indicating only whether coverage is available or not available in a particular geographic area based on the outdoor signal strength threshold prescribed by the Authority for various technologies. While this approach provides a basic indication of service availability, it does

not adequately capture the quality of service that users can expect. Users may experience significant variation in call quality, data speeds, latency, and overall reliability even within areas marked as “covered”. Therefore, a binary representation is insufficient for conveying meaningful information about user experience.

- It has been observed that there are variations between the coverage depicted in the maps published by service providers and the actual coverage observed during field measurements by TRAI through Independent Drive Tests (IDT) or feedback collected through crowdsource via MySpeed App. The IDT reports are available on TRAI website²².
- There is a lack of standardized validation mechanisms for verifying the accuracy of coverage maps across different service providers. Given the dynamic nature of telecom networks, there is a need to ensure that coverage maps are periodically validated and updated to reflect current network conditions and maintain their relevance.
- Therefore, the existing framework may require enhancement to improve the usability and interpretability of coverage maps. This includes incorporation of features such as graded colour schemes based on signal strength or quality levels, improved visualization of service availability, and other user-centric functionalities.
- Internationally, telecom regulators and service providers have progressively enhanced the quality, design and functionality of coverage maps to make them more informative, transparent, accurate and user-friendly. Aligning the framework with global

²² [IDT Reports](#)

best practices will not only improve consumer experience but also promote healthy competition among service providers.

- Service providers have also acknowledged receiving consumer feedback highlighting discrepancies between indicated and actual coverage, instances of poor or no signal despite coverage being shown, indoor coverage limitations, mismatch in 4G/5G availability, and inconsistent data performance. These issues raise concerns regarding the accuracy and reliability of coverage maps.
- f) Addressing the above-mentioned issues would enhance the effectiveness of coverage maps both as a tool for informed consumer decision-making and as a mechanism for ensuring transparency in the telecom ecosystem. Accordingly, a need has been felt for an amendment in the guideline for publication of coverage maps by service providers to address these gaps and to align the framework with the global practices.
- g) Accordingly, best practices adopted by various global regulators were studied and detailed in **Annexure I**. Salient points of practices adopted by various global regulators regarding publication of mobile network coverage maps are as follows:
- Most of the regulators have moved beyond binary representation (coverage or no coverage) of coverage and adopted graded coverage classifications linked to expected service quality and user experience.
 - Signal strength thresholds continue to be widely used as the primary basis for determining and displaying network coverage levels for different technologies.
 - Some regulators have established a clear correlation between signal strength levels and achievable service performance.

- Grid-based coverage representation with high spatial granularity, generally ranging from 50m × 50m to 100m × 100m resolution, has emerged as a widely accepted practice.
 - Several regulators have incorporated validation mechanisms such as drive tests, crowdsourced measurements, independent surveys to verify the accuracy of published coverage maps.
 - Consumer feedback and crowdsourced data are increasingly being used to improve reliability and transparency of coverage information.
 - Many regulators mandated periodic updating of coverage maps to reflect network changes and ensure that consumers have access to reliable information.
- h) In view of the issues identified in the existing framework and the insights derived from global practices, broad guideline for publication of service wise geo-spatial coverage map by service providers have been proposed to be incorporated in Schedule-III. Key points of broad guideline are as follows:
- Telecom service providers are required to publish clear, accurate, and technology-wise (2G/3G/4G/5G) geospatial coverage maps on their websites, in accordance with the Quality of Service Regulations 2024.
 - These maps must be based on actual measurements or standard prediction models and prepared using prescribed technical parameters, grid resolutions, and signal-strength thresholds to classify coverage as Excellent, Good, Fair, or No Coverage.
 - Service providers may adjust displayed coverage levels to reflect real-world service performance where signal strength alone does not ensure expected quality.
 - Maps must be easily accessible through a dedicated “Service Quality → Coverage Map” section on service providers’ website, use distinct colours and gradients, default to a combined coverage view prioritizing higher-generation technologies, and be

updated promptly after any significant network change, maintain coverage map update logs for audit purposes, and display the date of the latest update.

- The Schedule also emphasizes transparency, accountability, and consumer participation.
- Coverage maps are subject to independent validation by TRAI using drive tests and crowdsourced data, with defined accuracy calculations and financial disincentives for non-compliance.
- Service providers must include a user feedback mechanism to report discrepancies, visibly flag areas where coverage is overstated until corrected, and consider such feedback in network optimization.
- Additionally, service providers are required to share coverage data with TRAI through secure APIs in approved GIS formats to support a unified, pan-India coverage map, with further operational details to be specified by the Authority from time to time.

i) Criteria for display of graded coverage levels:

- As described earlier, graded coverage levels are required to enable consumers to make informed assessment of expected service quality in different scenarios, therefore, standardized signal strength thresholds are necessary to ensure consistency across service providers. As discussed in Annexure-I, studies conducted by FCC and Ofcom have shown clear correlation between signal strength and data service performance.
- The proposed thresholds for various services for 'No coverage' have been aligned with the signal strength level benchmarks prescribed by the DoT in the Test Schedule and Test Procedure (TSTP) for testing of rollout obligations. As per TSTP, following threshold are prescribed for checking the coverage requirement as per rollout obligation:

S. No.	Technology	Threshold signal strength (in dBm)
1	3G ²³	RSCP $\geq$ -99 dBm and Ec/No $\geq$ -14 dBm
2	4G and 5G ²⁴	RSRP $\geq$ -110 dBm

- Accordingly, TRAI in its direction dated 22.11.2024²⁵ for coverage map, has also prescribed the same thresholds for distinguishing coverage and no-coverage areas.
- Further, the thresholds prescribed for different coverage levels in proposed amendment are broadly consistent with international practices as detailed in Annexure-I, wherein various telecom regulators have also adopted graded classifications of coverage levels based on signal strength benchmarks and have prescribed comparable and in some cases more stringent signal strength levels.

(iii). Proposed Provision

Schedule-III containing broad guideline for publication of service wise geo-spatial coverage map by service providers is proposed to be incorporated after Schedule-II in principal regulations.

²³ [Test Schedule Test Procedure \(TSTP\) for roll out obligation for 3G technology](#)

²⁴ [TSTP for Roll out Obligation testing for LTE/LTE-A / 5G \(TDD/ FDD\) in 600MHz to 2500 MHz Frequency Bands.](#)

²⁵ [TRAI's direction 22.11.2024](#)

ANNEXURES

Global Best Practices for Publication of Coverage Map

1. Ofcom, United Kingdom

In the United Kingdom, the communications regulator Ofcom has developed a consumer-oriented framework for publishing mobile network coverage through its “Map Your Mobile” coverage checker²⁶.

a) Signal strength thresholds²⁷: Ofcom’s approach is based on modelled signal strength data submitted by Mobile Network Operators (MNOs). These predictions are used to determine whether coverage is likely to be available at a given location. Ofcom applies defined signal strength thresholds to estimate the likelihood of achieving different levels of service. The four thresholds – two in-home and two outdoor – are used to form contours on their Map Your Mobile coverage map. Table 1 below shows the signal strength thresholds in dBm for both 4G and 5G technologies.

Table 1: Thresholds for predicted signal strength for both 4G and 5G (dBm)

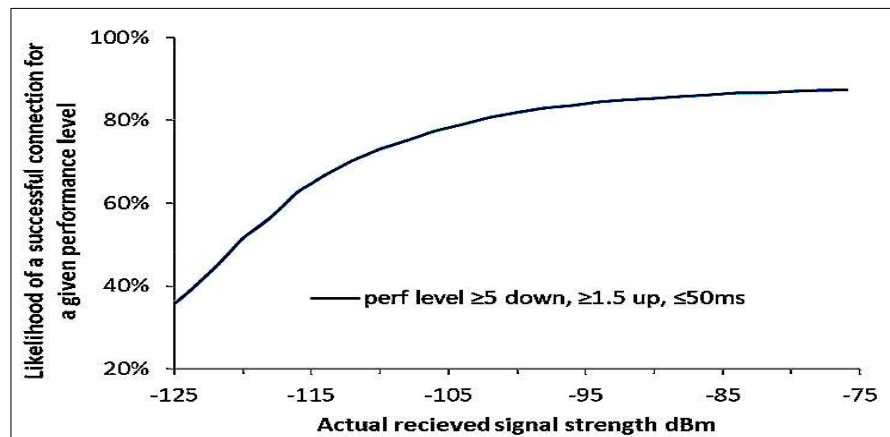
Connectivity Description	Thresholds used for the boundaries of this area (dBm)
Poor to none (outdoor only)	< -105
Variable (outdoor only)	≥ -105 up to -95
Good (outdoor only)	≥ -95 up to -82
Variable in-home, good outdoor	≥ -82 up to -74
Good in-home and outdoor	≥ -74

²⁶ <https://www.ofcom.org.uk/mobile-coverage-checker>

²⁷ [Map Your Mobile coverage checker: methodology – August 2025](#)

- b) Grid Resolution:** MNOs to provide updated predictions on a quarterly basis for each 50m x 50m pixel.
- c) Prediction error:** MNOs to provide predictions that have an average prediction error of between ± 3 dB and with the standard deviation of the prediction error of less than 8dB when compared to drive survey measurements in the corresponding 100m x 100m pixel.
- d) Crowdsourced data:** Ofcom analysed crowdsourced data collected nationwide from both indoor and outdoor environments, across urban and rural areas, and at different times of the day to reflect variations in network load, to assess the likelihood of achieving defined performance levels (≥ 5 Mbit/s download and ≥ 1.5 Mbit/s upload and ≤ 50 ms latency) under varying signal strength conditions. The analysis shows that the successful service performance is improving as signal strength increases as shown in following figure 1.

Figure 1: Crowdsourced data – likelihood of achieving the given performance level

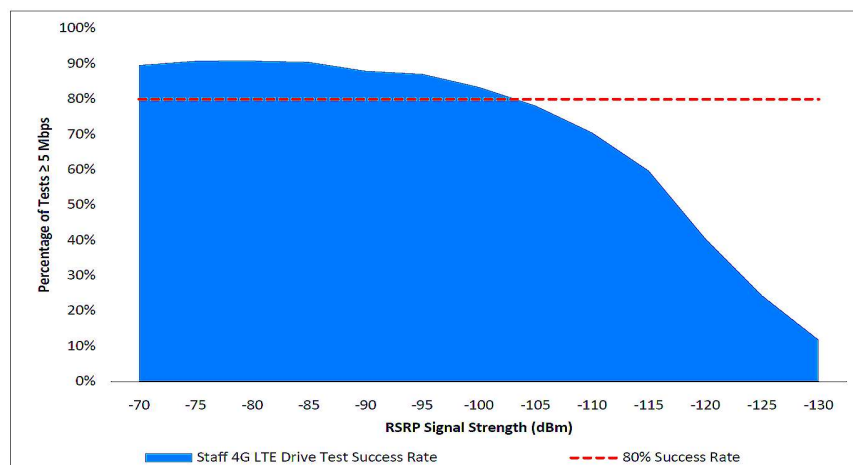


- e) Data Analysis and Verification:** To verify the data, Ofcom carries out several tests in the real-world using dedicated measurement hardware across a sample set of different locations in the UK.

2. FCC, USA

- a) The Federal Communications Commission (FCC) conducted an extensive investigation into the accuracy of mobile broadband coverage maps submitted by service providers under the Mobility Fund Phase II programme. The primary objective of the investigation was to assess whether the coverage data submitted by operators reliably reflected actual on-ground network performance.
- b) FCC²⁸ found a strong positive relationship between recorded RSRP signal strength and the percentage of 4G LTE speed tests achieving a download speed of at least 5 Mbps. Analysis of drive test data indicated that when RSRP values were -80 dBm or higher, the success rate was at least 90%, while an 80% or higher success rate was observed at RSRP values of -105 dBm or higher. However, performance drops sharply below -105 dBm, indicating that weaker signal strength significantly reduces service reliability as shown in Figure 2. These findings highlight that signal strength is a key determinant of user experience and should be considered in coverage assessment.

Figure 2: Percentage of Successful 4G LTE Staff Drive Tests by RSRP



²⁸ [Mobility fund phase II coverage maps investigation](#)

c) National broadband map: The Broadband DATA Act (S.1822)²⁹ requires mobile broadband coverage data to be reported along with fixed broadband coverage data. The Act aims to improve broadband mapping by collecting detailed coverage and signal strength information at individual addresses or locations. It also includes verification and challenge processes to reduce incorrect or overstated coverage claims. Based on data submitted by service providers through the Broadband Data Collection (BDC) process, the FCC maintains a national broadband map³⁰ showing the availability of mobile and fixed broadband services across the United States.

d) Threshold for Mobile Broadband Availability Coverage Maps³¹:

Mobile broadband service providers are required to submit separate coverage maps based on the following propagation model parameters:

- For 3G coverage, a minimum 90% cell edge probability of a download speed of at least 200 kbps and an upload speed of at least 50 kbps, with a minimum 50% cell loading factor.
- For 4G LTE coverage, a minimum 90% cell edge probability of a download speed of at least 5 Mbps and an upload speed of at least 1 Mbps, with a minimum 50% cell loading factor.
- For 5G-NR coverage, two sets of parameters should be modelled for two sets of maps:
 - 1) a minimum 90% cell edge probability of a download speed of at least 7 Mbps and an upload speed of at least 1 Mbps, with a minimum 50% cell loading factor; and

²⁹ <https://www.congress.gov/bill/116th-congress/senate-bill/1822>

³⁰ <https://broadbandmap.fcc.gov/home>

³¹ <https://us-fcc.app.box.com/v/bdc-availability-spec>

- 2) a minimum 90% cell edge probability of a download speed of at least 35 Mbps and an upload speed of at least 3 Mbps, with a minimum 50% cell loading factor.

Service providers must submit broadband coverage polygons for both outdoor stationary and in-vehicle mobile conditions, ensuring that in-vehicle coverage is fully contained within outdoor coverage and clearly distinguishing areas with only outdoor coverage from those supporting both scenarios.

e) Format and Data Submission: The FCC publishes a detailed specification for filers submitting responses. Spatial (GIS) data is submitted as polygon data in one of the following formats:

- ESRI Shapefile;
- ESRI File Geodatabase;
- GeoJSON;
- Geopackage.

Files must be submitted in the common (global) EPSG: 4326 / WGS84 coordinate system. In addition to the spatial coverage data, Service Providers must submit a significant amount of supporting information on how the coverage data was produced.

f) Grid Resolution: The resolution used for their mobile propagation model must not be greater than 100m.

g) Validation: At the point of data submission using the BDC system, several automated data checks are undertaken before the submission is accepted. This includes geometry validation and repair.

The FCC also rely on public or third-party challenges to the published data to improve the mapping and to correctly identify unserved locations. Individual and bulk challenges³² to the mobile broadband

³² <https://help.bdc.fcc.gov/hc/en-us/sections/19845302880027-Submit-a-Mobile-Availability-Challenge>

service data are accepted, with Service Providers required to respond or concede to each challenge. To assist challenge, the FCC has released its own Mobile Speed Test App³³. This will also support the evaluation of mobile network performance. Challenge Speed Tests are submitted to the FCC and are used to challenge coverage data submitted to the National Broadband Map.

- h) Publication:** The FCC publishes the results of its data collection in the National Broadband map which is updated twice a year.

3. Bundesnetzagentur, Germany

The Bundesnetzagentur, Germany, through its Broadband Atlas (Breitbandatlas, BBA) and associated methodology report³⁴, has established a standardized framework for assessing mobile network coverage across the country. This framework supports the provision of transparent and comparable information on mobile network availability across different regions.

- a) Signal threshold:** Under this methodology, mobile network coverage is evaluated based on predefined minimum signal strength thresholds and associated technical parameters as detailed in Table-2 below:

Table 2: Parameter Specification for 2G, 4G and 5G

Parameter	For 2G and 4G		For 5G	
	Frequency <3 GHz	Frequency > 3 GHz	Frequency < 3 GHz	Frequency > 3 GHz
Signal level threshold [dBm]	-103	-109	-109	-109
Probability at cell edge (signal calculation)	75%	75%	75%	75%

³³ <https://www.fcc.gov/BroadbandData/speed-test-app>

³⁴ [Gigabit-Grundbuch Methodenbericht zum Breitbandatlas November 2025](#)

Antenna height [m]	1.5	1.5	1.5	1.5
Minimum data rate at cell edge	Not specified	2 Mbit/s (DL) 512 kbit/s (UL)	2 Mbit/s (DL) 512 kbit/s (UL)	5 Mbit/s (DL) 1 Mbit/s (UL)
Probability of achieving the data rate at cell edge	Not specified	90%	90%	90%
Cell load	Not specified	50%	50%	50%
Signal threshold for LTE anchor band [dBm]	-	-	-120	-

b) Grid Resolution: The coverage assessment is conducted on a grid-based approach, with each grid cell representing an area of 100×100 meters. The predicted coverage values correspond exclusively to outdoor conditions.

4. TRAFICOM, Finland

Traficom sets out that mobile network coverage³⁵ must be reported by telecom operators as geographic coverage areas for each mobile technology, such as GSM, LTE, and 5G, along with corresponding speed categories. Operators are required to estimate these coverage areas themselves using predefined parameters so that the reported coverage reflects actual network conditions as closely as possible.

³⁵ [Mobile network coverage](#)

a) Signal strength thresholds³⁶

- Signal strength for basic coverage refers to a coverage area within which signal strength limits are met: -90 dBm in the GSM network, -100 dBm (RSCP) in the UMTS network, -110 dBm (RSRP) in the LTE network and -120 dBm (RSRP) in the 5G network.
- **Speed Categories:** Traficom has defined spectrum-specific and speed category-specific signal strength thresholds (in dBm) for reported coverage areas, as detailed in Tables 3 and 4.

Table 3: Signal strength limits (dBm) for reporting LTE coverage by speed category and spectrum

Speed Category (DL)	700 MHz	800 MHz	1800 MHz	2100 MHz	2600 MHz
30 Mbit/s	-85	-85	-100	-100	-100
100 Mbit/s	-	-	-85	-85	-85
300 Mbit/s*	-	-	-60	-60	-60

*Requires MIMO solution / wider than usual spectrum blocs

Table 4: Signal strength limits (dBm) for reporting 5G coverage by speed category and spectrum

Speed Category	700 MHz	800 MHz	1800 MHz	2100 MHz	2600 MHz	3500 MHz
Basic Coverage	-	-	-	-120	-	-
30 Mbit/s (DL)	-85	-	-	-	-	-
100 Mbit/s (DL)	-	-	-	-	-	-110

³⁶ [Definitions for communications services and networks used in TRAFICOM'S statistics and requests for information](#)

300 Mbit/s (DL)	-	-	-	-	-	-100
1000 Mbit/s (DL)	-	-	-	-	-	-65

b) Data Collection: Mobile network coverage areas are submitted as polygon Shape (SHP) files. The Shapes must depict the coverage area within which the service indicated by the specified technology and speed category is available. A separate layer or map image must be provided of each technology and speed category pair when reporting coverage areas. A SHP typically contains four different files, the extensions of which are SHP (Shape File), SHX (Shape Inde File), DBF (Database File) and PRJ (Projection File).

c) Grid Resolution: Network availability is calculated on the basis of coverage area maps using population grid data provided by Statistics Finland. The grid data consists of 250x250 metre geographical cells. A single map file must not contain more than 5,000 individual map objects representing a geometric area. If the geometric areas are marked on the basis of a square-shaped grid, the recommended minimum size of each grid cell is 50x50 metres.

d) Traficom also published a report namely “Utilisation of commercial mobile networks in the deployment of C-ITS (Cooperative Intelligent Transport Systems) services”³⁷. It defines threshold ranges (e.g., below -110 dBm indicating poor or unreliable coverage, and above -90 dBm indicating strong coverage) to categorize network performance levels. The report establishes threshold values linking signal strength to achievable throughput, showing that higher data rates require stronger signal levels.

³⁷ https://www.traficom.fi/files/media/file/C-ITS-mobiili-loppuraportti_11_2024.pdf

Table 5: Coverage requirement (LTE RSRP and 5G SS-RSRP) thresholds estimated for different minimum throughput requirements values in dBm

Mbit/s DL	Sub-GHz (10 MHz) RSRP	Mid-band (20 MHz) RSRP	Sub-GHz with CA RSRP	Mid-band with CA RSRP	5G @ 3500 MHz (100 MHz) SS- RSRP
5	-105	-111	-110	-117	
10	-99	-108	-107	-115	
15	-95	-106	-105	-113	
20	-91	-104	-103	-112	-114
25	-88	-102	-101	-111	
30	-85	-100	-100	-110	
40	-80	-97	-97	-107	-113
50	-76	-95	-95	-105	
100		-85	-85	-95	-110
200		-70		-80	-105
300		-60		-68	-100
500					-90
1000					-65

Table 6: Network coverage and received signal power thresholds to classify network performance

KPI Metric	Unreliable operability	Basic operability	Medium operability	High operability
RSRP / SS- RSRP	LTE < -110 dBm 5G < - 110 dBm	LTE > -110 dBm 5G > - 110 dBm	LTE > -100 dBm 5G > - 100 dBm	LTE > -90 dBm 5G > - 90 dBm

5. ARCEP, France

The Autorité de régulation des communications électroniques, des postes et de la distribution de la presse (ARCEP) provides mobile network coverage information through its interactive platform Mon réseau mobile³⁸, which

³⁸ <https://monreseau mobile.arcep.fr/>

enables users to view and compare the coverage and quality of service of different mobile operators across France. Through this platform, ARCEP publishes coverage maps (based on predictive modelling submitted by operators) along with real-world quality of service measurements, allowing users to assess network performance for services such as voice, SMS, and mobile data at specific locations.

a) Coverage Level³⁹

To improve the information provided to users, and similar to what exists for “Voice and SMS” maps, ARCEP has introduced four “mobile internet” (4G) coverage levels for maps as given in Table-7.

Table 7: Coverage levels for maps described by ARCEP

Coverage Levels	Voice and SMS	Mobile Internet
No Coverage	Unlikely to be able to make calls or send SMS, whether indoors or outdoors.	Unlikely to be able to use mobile data, whether indoors or outdoors.
Limited Coverage	You should be able to make calls and send SMS outdoors in most cases, but probably not indoors.	You should be able to use mobile data outdoors in most cases, but probably not indoors.
Good Coverage	You should be able to make calls and send SMS outdoors in most cases and, in some cases, indoors.	You should be able to use mobile data outdoors in most cases and, in some cases, indoors.
Very Good Coverage	You should be able to make calls and send SMS outdoors and, in most cases, indoors.	You should be able to use mobile data outdoors and, in most cases, indoors.

b) Download speed thresholds⁴⁰: The download speed indicator used by ARCEP includes three thresholds – 3, 8 and 30 Mbit/s – corresponding

³⁹ <https://en.arcep.fr/news/press-releases/view/n/mobile-coverage-020924.html>

⁴⁰ [mobile-quality-of-service](#)

to different levels of requirement depending on usage as shown in Table-8.

Table 8: Download speed indicator used by ARCEP and corresponding usage levels

Speed (Mbit/s)	Description
3 Mbit/s	Speed suitable for the least demanding mobile Internet uses, such as web browsing;
8 Mbit/s	Speed suitable for the most common uses, such as watching videos;
30 Mbit/s	Speed suitable for the most demanding uses, such as using collaborative tools in a professional setting.

The different mobile service quality thresholds reflect the user experience and are broken down by type of area (dense, intermediate, rural).

- c) Format:** Operators submit coverage data in ESRI Shapefile format, separately for each technology (2G, 3G, 4G and 5G) and service (voice and data), in accordance with specified projections and attribute requirements. The submitted data includes coverage maps, base station details, population and geographic coverage percentages, information on sites under maintenance or temporarily unavailable, and planned deployments up to two years in advance. ARCEP is also considering the introduction of a centralised platform for data submission.
- d) Modelling & Thresholds:** Coverage information is primarily based on service-level criteria, such as the ability to make a call or achieve a defined data throughput, rather than solely on signal strength thresholds. ARCEP continues to monitor developments related to 5G coverage reporting, including work undertaken at the European level.
- e) Frequency:** Operators are required to submit updated data on a quarterly basis (every three months), and ARCEP typically takes about one month to process and integrate the submitted data.

f) Validation⁴¹: ARCEP conducts independent drive tests to validate coverage and assess quality of service, including measurements of throughput, video streaming performance, and voice call success. These tests are also carried out by third-party agencies as per ARCEP's specifications, with costs borne by operators in proportion to their market size. Validation exercises are generally targeted and aim for a compliance level of around 98%. Additionally, crowdsourced data is used to supplement quality of service insights and improve coverage visibility in areas not covered by surveys. Public feedback is also collected, with approximately 4,000 feedback reports annually, some of which are further investigated or incorporated into validation activities. The coverage map is reliable if it has a reliability rate greater than or equal to 98% for the area subject to verification.

g) Publication: ARCEP publishes all operator-submitted coverage data as open data in Geopackage format and provides detailed, user-friendly coverage maps through its platform. These maps include coverage predictions by service and technology, site-level information, and coverage obligations (such as along transport corridors). ARCEP also publishes regular reports and enables users to generate customised maps and analyses for specific geographic areas, including trends over time.

6. BEREC

The Body of European Regulators for Electronic Communications (BEREC) published a report '*Common Position on Information to Consumers on Mobile Coverage*⁴²', establishing a Common Position on how European regulatory authorities should monitor and report mobile network coverage to the public. It seeks to harmonize diverse national practices by creating a standardized framework for defining, measuring, and displaying signal information. The primary objective is to increase transparency, empower consumers to make

⁴¹ <https://www.legifrance.gouv.fr/jorf/id/JORFTEXT000050089414>

⁴² [BEREC Common Position on information to consumers on mobile coverage](#)

informed decisions, and promote competition between operators by providing accessible, accurate, and comparable information. The document focuses exclusively on outdoor mobile coverage and outlines four primary strategies for National Regulatory Authorities (NRAs):

a) Technical Specifications for Relevant and Comparable Information

(CP1): BEREC recommends that NRAs define coverage based on service availability—the probability of a successful service reception (e.g., a phone call or data session)—rather than just signal strength.

- **Thresholds:** An area should be declared "in-coverage" if the service meets a pre-specified minimum rate of success, such as 95%.
- **Multi-level Reporting:** Rather than a simple "covered/not covered" binary, BEREC encourages NRAs to provide multi-level coverage information. This could include categories like "High likelihood of service," "Likely to get service," "Intermittent," and "Unlikely".
- **Measurement Metrics:** Standardized metrics for different technologies include RxLev for 2G, RSCP for 3G, and RSRP for 4G. BEREC also recommends using a neutral receiving device for calculations to ensure comparability between different operators.

b) The Use of Signal Predictions for Coverage Estimation (CP2): Since it is often technically or economically impossible to conduct field measurements for 100% of a country, BEREC recognizes signal predictions as a necessary statistical representation of coverage.

- **Methods of Generation:** NRAs may generate these predictions themselves, obtain them from mobile network operators (MNOs), or use a third party.
- **Comprehensive Scope:** Signal prediction is currently the only known methodology that allows for a geographic estimation of coverage over 100% of a country's landmass.
- **Transparency:** Regardless of the source, NRAs must be confident in the accuracy of these predictions and clearly state the parameters used, such as terrain models and propagation software.

c) Ensuring Accuracy via Field Measurements (CP3): To ensure the public can trust published information, NRAs should verify the reliability of coverage data using field measurements, specifically drive-testing.

- **Verification:** Drive-testing offers an effective way to test the accuracy of theoretical signal predictions and verify actual service availability.
- **Standardization:** NRAs are encouraged to ensure statistical robustness in their measurement methodologies and data processing.
- **Benchmarking:** Field measurements can act as an incentive for MNOs to improve their networks by providing a comparable picture of performance across all operators at the same time and location.

d) Availability and Presentation of Information (CP4): The final strategy focuses on making coverage information as accessible and user-friendly as possible.

- **Access Channels:** NRAs should provide information through their own websites, third-party apps, and as open data to encourage widespread reuse by external parties.
- **Map Features:** When publishing coverage maps, BEREC recommends a resolution of 100m or lower. Maps should also allow consumers to select or unselect specific services (e.g., voice vs. data) or technologies (e.g., 4G vs. 3G).
- **Building Confidence:** To build consumer trust, NRAs should explicitly state whether the map data was provided by operators or collected by the NRA, and whether it has been tested for accuracy.

By adopting these four positions, European regulators aim to move beyond fragmented national practices toward a consistent, service-oriented approach that reflects the actual user experience of mobile connectivity.

7. CRTC (Canada)

The Canadian Radio-television and Telecommunications Commission's report *"Recommendations on a New Reporting Standard for Mobile Coverage"*⁴³ (2025), prepared by FarrPoint, provides a comprehensive assessment of mobile coverage reporting practices in Canada and proposes a standardized, evidence-based framework. It emphasizes improved data standardization, validation, and transparency to enhance the accuracy of coverage maps and support informed decision-making by consumers and policymakers.

Some key Recommendations by CRTC are as follows:

- A resolution of no less than **50m** should be specified for operators to use when generating coverage predictions.
- Operators would overlay their coverage predictions onto standard grid to report the predicted signal strength for each pixel.
- An approach needs to be developed to validate coverage submissions, and work with operators to agree on an appropriate model accuracy validation process. This should include commissioning survey work to independently confirm the accuracy of each operator's predictions and quantify any variation between operators
- In addition to the work to directly validate coverage submissions on a signal strength basis, quality of service metrics should be incorporated into the reporting of mobile coverage.
- The maps should be interactive and allow the public to view coverage by operator and service level at any given location, identifying the availability of each service level proposed. The map should also allow the public to provide feedback on the coverage claims where the predictions do not match their real-world experience.

⁴³ [CRTC Recommendations on a new reporting standard for mobile coverage](#)



भारतीय दूरसंचार विनियामक प्राधिकरण
Telecom Regulatory Authority of India
[भारत सरकार / Government of India]



No. RG-17/(3)/2022-QoS

Dated: 20th March 2025

To,

All Service Providers having:

- (i) Unified Access Service License;
- (ii) Unified License with authorization for Access Service;
- (iii) Internet Service Authorization under any License; and
- (iv) Authorization under the Telecommunications Act, 2023 for providing Access or Broadband Service

Subject: Clarification on various QoS parameters of access service (wireline) and broadband (wireline) service prescribed in QoS regulation dated 02.08.2024.

TRAI has notified revised Quality of Service (QoS) Regulations namely "The Standards of Quality of Service of Access (Wireline and Wireless) and Broadband (Wireline and Wireless) Service Regulations, 2024 (06 of 2024)" on 02nd August 2024. The regulations are effective from 1st October 2024. These Regulations are applicable for both access and broadband services provided on wireline as well as wireless media.

2. In accordance to the TRAI's Direction F.No.RG-17/(3)/2022-QoS dated 19.09.2024 and Amendment to Direction issued on 03.01.2025, the service providers are required to submit the performance monitoring report of access service (Wireline) within a period of fifteen (15) days from the end of respective quarter in the prescribed format.

3. In this regard, some of the service provider providing Access Service (Wireline) and Broadband (Wireline) service have raised certain issues/sought clarification in respect of few QoS parameters & benchmark. Accordingly, following clarification/ modifications are issued in this regard:

S. No	Service	QoS parameter/ Regulation	Clarification/ Modification suggested	TRAI's clarification
i	Access Service (Wireline)	Billing and Charging complaints ($\leq 0.1\%$)	Requested to examine and issue clarification as calculation does not give the correct picture as the	There is no change from earlier regulations except that earlier performance was monitored separately for prepaid and postpaid and now combined performance is monitored.

			complaints are being considered for 3 months whereas the number of subscribers are taken for 1 month. As a result of this, the prescribed benchmark of the said parameter is not being complied with.	Further, the statement that 'number of subscribers are taken for 1 month' is not correct as total subscribers at the end of the reporting period are taken to compute the performance. Hence, no modification is required.
ii	Access Service (Wireline) and Broadband (Wireline) service	Fault incidences (No. of faults per 100 subscribers) (≤ 5)	As per the QoS Regulation 2024, the benchmark for this parameter has been revised from <7 per month to <5 per quarter. However, Para 5.2.2 of the EM to the Regulations clearly reflect that whole analysis and conclusions to prescribe this benchmark is based on Monthly assessment period i.e. reduction of benchmark to <5 per month from the earlier prescribed benchmark of <7 per month, in the previous QoS Regulation, 2009. As is clear from the discussions, analysis and conclusions mentioned in the	It is clarified that performance of this parameter for both wireline and broadband service may be calculated using following formula instead of the formula as given in para 3.2.1 of schedule-I of the Regulations: $\frac{\text{Total number of faults reported during the assessment period}}{3} \times 100$ = $\frac{\text{Total number of faults reported during the assessment period}}{\text{Total number of connections at the end of the assessment period}} \times 100$

EM, there was no intention of the Authority to prescribe the overly stringent, unachievable, and misaligned benchmark of <1.67 fault incidences per month (which is < 5 divided by 3 months).

We therefore request the Authority to kindly consider this benchmark, as per the explanation provided in the EM to the Regulations and facilitate accurate reporting i.e. Fault Incidence (No. of faults/100 subscribers /month) as <5 fault incidences per month averaged over a Quarter, to ensure consistency with the intent of the Authority.

Further K Net Solutions has requested to allow up to 70 fault incidences per 100 customers on a

			quarterly basis.	
iii	Access Service (Wireline) and Broadband (Wireline) service	Regulation (10) of the revised QoS Regulations provides that "service provider providing both access service (wireline) and broadband (wireline) service shall meet the benchmarks for both the services on aggregated basis."	-	During the PMR submission of QE Dec 2024, following issues were observed in this provision: • Only Airtel, BSNL, RJIL and Tata have submitted the combined performance of 'Customer Service' related parameters in access (wireline) report. • However, Airtel, BSNL and RJIL submitted the performance of other parameters for Broadband (Wireline) service on 'All India' basis whereas PMR of access service (wireline) was submitted on LSA basis. Therefore, service area wise performance cannot be compared. • Further, some service provider used total subscriber base of access service (wireline) and broadband (wireline) services to compute the performance of 'Customer Service' related parameters. This approach results non-uniform measurement method across the service providers against this parameter. Therefore, service providers are requested to submit the performance of 'Customer Service' related parameters separately for access service (wireline) and broadband (wireline) service in respective PMR from QE March 2025 onwards.

4. This is issued with the approval of competent authority.

Joint Advisor (QoS-I)

Copy to: Advisor, All Regional Offices, TRAI



भारतीय दूरसंचार विनियामक प्राधिकरण
Telecom Regulatory Authority of India
[भारत सरकार / Government of India]



No. RG-17/(3)/2022-QoS

Dated: 21st April 2025

To,

All Service Providers having:

- (i) Unified Access Service License;
- (ii) Unified License with authorization for Access Service;
- (iii) Internet Service Authorization under any License; and
- (iv) Authorization under the Telecommunications Act, 2023 for providing Access or Broadband Service

Subject: Clarification on various QoS parameters of access service (wireless) prescribed in QoS regulation dated 02.08.2024.

TRAI has notified revised Quality of Service (QoS) Regulations namely "The Standards of Quality of Service of Access (Wireline and Wireless) and Broadband (Wireline and Wireless) Service Regulations, 2024 (06 of 2024)" on 02nd August 2024. The regulations are effective from 1st October 2024. These Regulations are applicable for both access and broadband services provided on wireline as well as wireless media.

2. In accordance to the TRAI's Direction F.No.RG-17/(3)/2022-QoS dated 19.09.2024 and Amendment to Direction issued on 03.01.2025, the service providers are required to submit the performance monitoring report of access service (Wireless) within a period of fifteen (15) days from the end of respective quarter in the prescribed format.

3. In this regard, some of the service provider providing Access Service (Wireless) and COAI have raised certain issues and sought clarification in respect of few QoS parameters & benchmark. Accordingly, following clarification are issued in this regard:

S. No	QoS parameter/ Regulation	Clarification/ Modification requested for	TRAI's clarification
1	Downlink Packet Drop Rate for Packet Switched Network (4G/5G and beyond) [DLPDR_QSD (88, 88)] and Uplink Packet Drop Rate for Packet Switched Network (4G/5G and beyond) [ULPDR_QSD (88,	- Low call volume cells with less than 50 Calls in TDD band should be allowed to exclude while calculating the performance. - TSPs should be allowed to exclude interference, ducting, and low call volume in the TDD band for Downlink Packet Drop Rate (DL PDR) and Uplink Packet Drop Rate (UL PDR) parameters, as these do not affect the	- In consultation paper issued on 18.8.2023, percentile value for these two parameters was proposed as (96, 96). - However, after considering the submissions received from TSPs during consultation process, the percentile value effective from 01.10.2024 was revised to (88, 88) which shall be revised to (89, 89) and

	88]] (Benchmark $\leq 2\%$)	Quality of Service (QoS) or Quality of Experience (QoE) observed by the customer. - Current API reporting format should be modified to accommodate the submission of both sets of values, as per the existing QoS Regulations and the proposed benchmarks and exclusions. - Financial Disincentives should not be prescribed for any reported non-compliance for these parameters.	(90, 90) w.e.f. 01.04.2026 and 01.04.2027 respectively. - On analysis of performance reported by TSPs during QE Dec 2024, it is observed all TSPs are meeting the benchmark of DLPDR_QSD (88, 88) in all LSAs except in two LSAs by one TSP. Further, benchmark of ULPDR_QSD (88, 88) is also being met by all TSPs in all LSAs except one LSA by one TSP and 12 LSAs by another TSP. - Further, no direct correlation was observed between performance of these two QoS parameters and % of TDD cells with ≤ 50 calls. - It is further noted that IMT Advance supports both bands i.e. Time Division Duplexing (TDD) and Frequency Division Duplexing (FDD) and both bands support IMT Advance standard of ITU. Therefore, the interference in TDD bands cannot be considered as a limitation in meeting the benchmark. - In view of above, no modification is required. However, TSPs are advised to ensure continuous optimization of their TDD band network to meet the prescribed benchmark.
2	Connections with good voice Quality (Benchmark $\geq 95\%$)	2G Rx quality samples is very stern and should be kept at 0-5 as Frequency Hopping is being used in the network. - The SINR threshold of ≥ -6 dB should be considered acceptable for computing Connections with Good Voice Quality, rather than the current threshold of > 0 dB, which is theoretically and	- Under revised QoS regulations, this parameter does not attract any FD. - Considering the performance reported by TSPs for QE Dec 2024 no modification is required. - The measurement methodology states that <i>"The quality of voice in cellular mobile telecom services (GSM), is measured on a scale from 0 to</i>

		practically not possible.	7 in GSM technology. As the quality deteriorates, this value increases. The quality of the voice is good, if this value remains between 0 and 4.” • However, in cases where frequency hopping phenomenon is used in GSM network, GSM voice samples with Rx Qual between 0 to 5 may be considered as good voice quality, while maintaining supporting evidence, as was the case in previous QoS regulations.
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4. This is issued with the approval of competent authority.

Joint Advisor (QoS-I)

Copy to:

1. Advisor, All Regional Offices, TRAI
2. COAI with respect to letter dated 21.01.25 and 28.03.2025

वर्ल्ड ट्रेड सेंटर, टावर-एफ, नौरोजी नगर, नई दिल्ली-110029
World Trade Centre, Tower-F, Nauroji Nagar New Delhi - 110029

ANNEXURE – IV

**Principal regulations incorporating
proposed amendment for ease of reference.**

**This will however not be a part of final
notification to be issued for amendment.**

(Strikethrough text in **red font** indicates text proposed to
be deleted; while the text in the **blue font** indicates text
proposed to be added)

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

TELECOM REGULATORY AUTHORITY OF INDIA

NOTIFICATION

New Delhi, 2nd August 2024

F. No. RG-17/(3)/2022-QoS—In exercise of the powers conferred upon it under section 36, read with sub-clauses (i) and (v) 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, namely:—

**THE STANDARDS OF QUALITY OF SERVICE OF ACCESS (WIRELINE
AND WIRELESS) AND BROADBAND (WIRELINE AND WIRELESS)
SERVICE REGULATIONS, 2024 (06 of 2024)**

SECTION-I

PRELIMINARY

1. Short title, commencement, and application.— (1) These regulations may be called the Standards of Quality of Service of Access (Wireline and Wireless) and Broadband (Wireline and Wireless) Service Regulations, 2024.

(2) These regulations shall come into force with effect from 1st October 2024.

(3) These regulations shall apply to all service providers, having-

- (i) Unified Access Service License;
- (ii) Unified License with authorization for Access Service;
- (iii) Internet Service Authorization under any License; and
- (iv) Authorization under the Telecommunications Act, 2023 for providing Access or Broadband Service:

Provided that nothing contained in these regulations shall apply to an Internet Service Provider whose total number of subscribers as on last day of

the preceding financial year does not exceed ten thousand or as notified by Authority by an order or direction.

2. Definitions.— (1) In these regulations, unless the context otherwise requires,—

- (a) **“Act”** means the Telecom Regulatory Authority of India Act, 1997 (24 of 1997);
- (b) **“Access Service Authorization”** means authorization in the designated Service Area under the Telecommunications Act, 2023 or authorization thereunder or as defined in Unified License as applicable;
- (c) **“Access Service (Wireless)”** means telecommunication service provided through a wireless telecommunication under access service authorization;
- (d) **“Access Service (Wireline)”** covers collection, carriage, transmission, and delivery of voice or non-voice messages over the Public Switched Telephone Network in a licensed or authorized service area and includes the provision of all types of services except those requiring a separate license or authorization;
- (e) **“Authority”** means the Telecom Regulatory Authority of India established under sub-section (1) of section 3 of the Act;
- (f) **“Authorization”** means the authorization as defined in the Telecommunications Act, 2023;
- (g) **“Broadband”** means a data connection, through wireless or wireline access media, that is able to support interactive services including Internet access and has the capability of delivering the minimum download speed, as specified by licensor from time to time, to an

individual subscriber from the point of presence (POP) of the service provider intending to provide broadband service;

- (h) **“Broadband Service”** means a data service provided using broadband data connection by Internet Service Provider under any license or authorization;
- (i) **“Call Centre”** means a department or a section or a facility established by the service provider for redressal of complaints and for addressing service requests of its consumers;
- (j) **“Cell”** means a radio network object that can be uniquely identified by a user equipment from a (cell) identification that is broadcasted over a geographical area from access (wireless) network;
- (k) **“Cell Bouncing Busy Hour”** or **“CBBH”** means the one-hour period in a day during which a cell in an access service wireless network experiences the maximum traffic and shall be decided as per the methodology specified in Schedule-I;
- (l) **“Cell_Q(t)”** or **“Cell Quality of Service Performance Measure”** means the t^{th} percentile value in the set of performance against a QoS parameter corresponding to a Cell observed during different days of the assessment period;

Explanation: If a Cell was operating for thirty days during an assessment period and computed Drop Call Rate (DCR) values were available for all these thirty days then arranging these thirty DCR values in ascending order and finding 90th percentile DCR value for that Cell would point to 27th DCR value (counted from lowest to highest DCR value);

- (m) **“Consumer”** means a consumer of a service provider falling in sub-regulation (3) of regulation 1 of these regulations and includes its customer and subscriber;
- (n) **“Down Link (DL) Packet Drop Rate”** or **“DL-PDR”** means percentage of voice traffic packets which are dropped by the network or lost in the network while transferring data on the downlink for Quality of Service

(QoS) Class Identifier of voice traffic in packet switched (4G or 5G) radio access networks;

- (o) **“Drop Call Rate”** or **“DCR”** means the percentage of voice calls which once having been established are interrupted prior to their normal completion;
- (p) **“Evolved-Universal Terrestrial Radio Access Network (E-UTRAN) Radio Access Bearer”** or **“E-RAB”** means a user plane connection between User Equipment (UE) and Serving Gateway (SGW) in the LTE based technology;
- (q) **“Jitter”** means measure of the latency variation above and below the mean latency value;
- (r) **“Latency”** means the time taken by a packet to reach the receiving endpoint after being transmitted from the sending point in broadband service;
- (s) **“License”** means a license granted or having effect as if granted under section 4 of the Indian Telegraph Act, 1885 (13 of 1885) or the provisions of the Indian Wireless Telegraphy Act, 1933 (17 of 1933), as amended from time to time;
- (sa) **“Physical Resource Block”** or **“PRB”** is the fundamental unit of radio resource allocation in 4G LTE and 5G New Radio (NR) networks. It represents a defined portion of radio spectrum over a specific time interval and serves as the basic scheduling unit through which a cell allocates radio resources to user equipment (UE) for data transmission and reception.
- (t) **“Point of Interconnection”** or **“POI”** means authorized interconnection point for ingress and egress of traffic among the interconnecting applicable systems of service providers in accordance with TRAI regulations or orders;
- (u) **“Public Land Mobile Network”** means an access service wireless network set up and operated under access service license or access service

authorization, for the purpose of providing land-based access services (wireless) to the public and which provides communication facilities to subscribers using mobile stations;

- (v) **“Public Switched Telephone Network”** means a fixed line public telephone network providing a two-way switched telecommunication services to the general public;
- (w) **“QSD(s,t)”** or **“Quality of Service Spatial Distribution”** means the s^{th} percentile value in the set of Cell_Q(t) values, against a QoS parameter, for all cells in a network during the assessment period;
- (x) **“Quality of Service”** or **“QoS”** means the indicators of the performance of a telecommunication network and the degree to which such network conforms to the standards of quality of service as specified in these regulations for specified parameters and shall be measured as per the methodology provided in **Schedule-I**;
- (y) **“Quarter”** means a period of three consecutive months ending on the 30th June, the 30th September, the 31st December and the 31st March of the financial year;
- (z) **“Radio Access Bearer”** or **“RAB”** means a service provided by the Access Stratum to the Non-Access Stratum for the transfer of user data between the User Equipment and the Core Network;
- (aa) **“Radio Interface”** means the interface between User Equipment and the Radio Access Network access point, which encompasses all the functionality required to maintain such interfaces;
- (bb) **“Radio Resource Control”** or **“RRC”** means a sub layer of radio interface layer 3 existing in the control plane which provides information

- transfer service to the Non-Access Stratum and is responsible for controlling the configuration of radio interface layers 1 and 2;
- (cc) **“Regulations”** means the Standards of Quality of Service of Access and Broadband (Wireline and Wireless) Service Regulations, 2024;
- (dd) **“Service Provider”** means any service provider to which these regulations apply;
- (ee) **“Six Sigma”** means a data driven statistical analysis-based approach for Quality Management System(QMS);
- (ff) **“Stand-alone Dedicated Control Channel”** or **“SDCCH”** means, a GSM control channel for signaling purposes where the majority of call setup occurs, which is used for communication between mobile station, i.e. mobile handset and Cell before such mobile station is assigned a Traffic Channel (TCH);
- (gg) **“Tariff Offerings”** means various tariffs offered by service providers to their subscribers including tariff plans, plan vouchers, special tariff vouchers, combo vouchers, top up vouchers and add-on plans;
- (hh) **“Telecommunication”** means telecommunication as defined in the Telecom Regulatory Authority of India Act, 1997 (24 of 1997);
- (ii) **“Telecommunication service”** means telecommunication service as defined in the Telecommunications Act, 2023;
- (jj) **“Time Consistent Busy Hour”** or **“TCBH”** means the one-hour period starting at the same time each day for which the average traffic of the resource group concerned is greatest over the days under consideration and shall be decided as per the methodology specified in **Schedule-I**;
- (kk) **“Traffic Channel”** or **“TCH”** means a logical channel which carries user information;
- (ll) **“Up Link (UL) Packet Drop Rate”** or **“UL-PDR”** means percentage of voice traffic packets which are dropped by the network or lost in the network while transferring data on the uplink for Quality of Service (QoS)

Class Identifier of voice traffic in packet switched (4G or 5G) radio access networks;

(mm) **“Voice over LTE”** or **“VoLTE”** means voice call established, maintained and released using Internet Protocol (IP) Multi-Media Sub-System (IMS) in LTE or IMT-Advanced network;

(nn) **“Voice over New Radio”** or **“VoNR”** means voice call established, maintained and released using Internet Protocol (IP) Multi-Media Sub-System (IMS) in IMT-2020 network;

(2) Words and expressions used but not defined in these regulations, but defined in the Act or the rules and other regulations made thereunder or in the Telecommunication Act 2023 or the license or the authorization or relevant International Telecommunication Union (ITU) standards or 3rd Generation Partnership Project (3GPP) standards, shall have the same meaning respectively assigned to them in the Act or the rules and the regulations or the Telecommunication Act 2023 or the license or the authorization under relevant Act or relevant ITU or 3GPP standards, as the case may be, in that order.

SECTION II

ADOPTION OF QUALITY MANAGEMENT FRAMEWORK

3. Design, implementation and management of Networks.- (1) Every service provider shall prepare a quality management plan, within six months of issue of these regulations, to adopt Six Sigma quality management practices for QoS management, which shall include quality of service aspects related to network availability, accessibility, retainability and customer services.

(2) The quality management plan shall provide for required redundancies including power, transmission links, equipment, geo-redundancies in the core network and access network as per relevant standards to achieve end-to-end QoS as per the benchmarks specified in these regulations.

- (3) The quality management plan shall cover all technical and non-technical aspects of QoS including designing, implementation and monitoring of networks and customer services to ensure network availability, accessibility, retainability and customer experience.
- (4) Every service provider shall submit to the Authority the performance report of their quality management plan, on yearly basis, covering the implementation of Six Sigma quality management practices and its impact on the Quality-of-Service provided by the service provider in respect of each Quality of Service parameter specified in these regulations.
- (5) The Authority may, from time to time, through audit conducted either by its own officers or employees or through an agency appointed by it, verify and assess the performance of quality management plan.

SECTION III

QUALITY OF SERVICE PARAMETERS FOR ACCESS SERVICE (WIRELIN)

4. Quality of Service Parameters in respect of which compliance reports are to be submitted to the Authority.— (1) Every service provider providing access service (wireline) shall meet the benchmarks, to be measured as per the measurement methodology provided in **Schedule-I**, for each of the following QoS parameters, namely:—

S. No.	Name of Parameter	Benchmark	Assessment period
I. Service Provisioning			
(i)	Provision of a service within 7 working days of payment of demand note by the customer	≥ 98%	Quarterly
II. Fault Repair			
(ii)	Fault incidences (No. of faults per 100 subscribers/month)	≤ 5	Quarterly

(iii)	Fault repair by next working day	$\geq 85\%$	Quarterly
(iv)	Fault repair within three working days	$\geq 99\%$	Quarterly
	Rent rebate/ validity extension in case fault is repaired after three(3) working days: For post-paid subscribers: Proportional rent rebate for actual number of days, during which fault remains pending shall be credited in next bill. For pre-paid subscribers: The validity of subscribed tariff offering shall be increased for actual number of days during which fault remain pending.		
(v)	Mean Time-To-Repair (MTTR)	≤ 10 hours	Quarterly
III. Point of Interconnection			
(vi)	Point of Interconnection (POI) Congestion (90 th percentile value)	$\leq 0.5\%$	Quarterly

5. Duration of time of alert for the called party.- (1) The duration of time of alert for an incoming voice call, which is neither answered nor rejected by the called party, shall be sixty seconds for access service (wireline).

(2) The terminating network shall, on expiry of sixty seconds in case of access service (wireline), release the incoming voice call and transmit the call release message to the originating network:

Provided that the originating network may release an unanswered call after ninety seconds in case the call release message is not received from the terminating network.

SECTION IV

QUALITY OF SERVICE PARAMETERS FOR ACCESS SERVICE (WIRELESS)

6. Quality of Service parameters in respect of which compliance reports are to be submitted to the Authority. – (1) Every service provider providing access service (wireless) shall meet the benchmark, to be measured as per the measurement methodology provided in Schedule-I, for each of the following QoS parameters, namely:-

S. No.	Name of Parameter	Benchmark	Assessment period	Effective date
I. Network Availability				
(i)	Availability of service wise geospatial coverage map on service provider's website for percentage of working cells Accuracy of service wise geospatial coverage map published on service provider's website	$\geq 99\%$ $\geq 98\%$	Monthly	01.04.2025 01.10.2026
(ii)	Cumulative downtime (Cells not available for service)	$\leq 2\%$	Quarterly	01.10.2024
			Monthly	01.04.2025
		$\leq 1.5\%$	Monthly	01.10.2025
		$\leq 1\%$	Monthly	01.10.2026
(iii)	Worst Affected Cells due to downtime	$\leq 2\%$	Quarterly	01.10.2024

			Monthly	01.04.202 5
		≤ 1.5%	Monthly	01.10.202 5
		≤ 1%	Monthly	01.10.202 6
			Quarterly	01.10.202 4
(iv)	Percentage of significant network outage (services not available in a district for more than 4 hours) reported to the Authority within 24 hrs of start of the outage Note: Significant Network Outage is defined as an event where access service (wireless) in a district remains unavailable for a continuous period exceeding four (4) hours, or where more than ten percent (10%) of subscribers in the Licensed Service Area (LSA) experience complete loss of service for a continuous period exceeding four (4) hours. Compensation Rebate to the subscribers for significant	100%	Monthly	01.04.202 5 01.10.202 6

	network outages of more than 24 hrs: • For post-paid subscribers registered in the district or affected post-paid subscribers, as applicable: Proportional rent rebate, as per plan charges, for affected number of days shall be credited in next bill. • For the pre-paid subscribers registered in the district or affected pre-paid subscribers, as applicable: The validity of subscribed tariff offering shall be increased by equal number of affected days.			
II. Voice Connection Establishment (Accessibility)				
(v)	Call Set-up Success Rate: Intra- Service provider (within service provider's network)	≥ 98%	Quarterly	01.10.202 4
			Monthly	01.04.202 5
(vi)	Call Set-up Success Rate: Inter-Service provider (incoming from other service providers' network)	≥ 95%	Quarterly	01.10.202 4
			Monthly	01.04.202 5
(vii)	Point of Interconnection (POI) Congestion (90 th percentile)	≤ 0.5%	Quarterly	01.10.202 4

	value)		Monthly	01.04.2025
III. Voice Connection Maintenance (Retainability)				
(viii)	DCR Spatial Distribution Measure for Circuit Switched (2G/3G) network [CS_QSD (88, 88)]	$\leq 2\%$	Quarterly	01.10.2024
			Monthly	01.04.2025
	DCR Spatial Distribution Measure for Circuit Switched (2G/3G) network [CS_QSD (89, 89)]	$\leq 2\%$	Monthly	01.04.2026
	DCR Spatial Distribution Measure for Circuit Switched (2G/3G) network [CS_QSD (90, 90)]	$\leq 2\%$	Monthly	01.04.2027
(ix)	DCR Spatial Distribution Measure for Packet Switched (4G/5G and beyond) network [PS_QSD (92, 92)]	$\leq 2\%$	Quarterly	01.10.2024
			Monthly	01.04.2025
	DCR Spatial Distribution Measure for Packet Switched (4G/5G and beyond) network [PS_QSD (93, 93)]	$\leq 2\%$	Monthly	01.10.2025
	DCR Spatial Distribution Measure for Packet Switched (4G/5G and beyond) network [PS_QSD (94, 94)]	$\leq 2\%$	Monthly	01.04.2026
	DCR Spatial Distribution Measure for Packet Switched (4G/5G and beyond) network	$\leq 2\%$	Monthly	01.04.2027

	[PS_QSD (95, 95)]			
(x)	Downlink Packet Drop Rate for Packet Switched Network (4G/5G and beyond) [DLPDR_QSD (88, 88)]	$\leq 2\%$	Quarterly	01.10.2024
			Monthly	01.04.2025
	Downlink Packet Drop Rate for Packet Switched Network (4G/5G and beyond) [DLPDR_QSD (89, 89)]	$\leq 2\%$	Monthly	01.04.2026
	Downlink Packet Drop Rate for Packet Switched Network (4G/5G and beyond) [DLPDR_QSD (90, 90)]	$\leq 2\%$	Monthly	01.04.2027
(xi)	Uplink Packet Drop Rate for Packet Switched Network (4G/5G and beyond) [ULPDR_QSD (88, 88)]	$\leq 2\%$	Quarterly	01.10.2024
			Monthly	01.04.2025
	Uplink Packet Drop Rate for Packet Switched Network (4G/5G and beyond) [ULPDR_QSD (89, 89)]	$\leq 2\%$	Monthly	01.04.2026
	Uplink Packet Drop Rate for Packet Switched Network (4G/5G and beyond) [ULPDR_QSD (90, 90)]	$\leq 2\%$	Monthly	01.04.2027
IV. Broadband Service				
(xii)	Latency (in 4G and 5G network)	≤ 75 msec	Quarterly	01.10.2024
			Monthly	01.04.2025

		≤ 50 msec	Monthly	01.04.2026
(xiii)	Packet Drop Rate (in 4G and 5G network)	≤ 3%	Quarterly	01.10.2024
			Monthly	01.04.2025
		≤ 2%	Monthly	01.04.2026
(xiv)	Tariff offerings in which 80 th percentile value of measured test samples for which download and upload speed is ≥ offered typical download and upload speed for 4G/5G technology in tariff offerings	80 th percentile 100%	Quarterly	01.10.2024
			Monthly	01.04.2025 01.10.2026
V. Network Slicing				
(xv)	Cells having daily PRB utilisation > 80% (in 5G network)	≤ 1%	Monthly	01.10.2026

Note: The assessment period and corresponding benchmark for respective QoS parameters shall come into force with effect from specified 'Effective date' and the benchmarks for the QoS parameters specified against the previous assessment period shall stand withdrawn accordingly.

- (2) Every service provider shall, in all its tariff offerings for broadband (wireless) service, indicate the technology wise typical download and upload speed generally available to the ~~consumers~~ subscribers.
- (3) Every service provider, planning to create a new network slice in their 5G network, shall submit the details of proposed and existing network slice parameters, at least twenty one (21) days in advance to the Authority, clearly demonstrating the availability of sufficient capacity in the cell(s) which are part of different slices, in such manner and format as may be directed by the Authority, from time to time.

7. Quality of Service parameter in respect of which compliance is to be monitored by the service provider and reported to the Authority.— (1)

Every service provider providing access service (wireless) shall meet and monitor the benchmarks, to be measured as per the measurement methodology provided in Schedule-I, for each of the following QoS parameters, namely: –

S. No.	Name of Parameter	Benchmark	Assessment period	Effective date
(i)	Maximum Bandwidth utilization between radio and core network during TCBH	$\leq 80\%$	Quarterly	01.10.2024
			Monthly	01.04.2025
(ii)	SDCCH Congestion/ RRC Congestion	$\leq 1\%$	Quarterly	01.10.2024
			Monthly	01.04.2025
(iii)	Traffic Channel congestion i.e. TCH, RAB, E-RAB, EN-DC (E-UTRAN New Radio Dual Connectivity for NSA to access 4G and 5G both networks at same time) or DRB (Data Radio Bearer for SA) Congestion	$\leq 2\%$	Quarterly	01.10.2024
			Monthly	01.04.2025
(iv)	Connections with good voice quality	$\geq 95\%$	Quarterly	01.10.2024
			Monthly	01.04.2025

(v)	Jitter (in 4G and 5G network)	≤ 50 msec	Quarterly	01.10.20 24
			Monthly	01.04.20 25
(vi)	Messaging: Successful SMS delivery within service provider's network	$\geq 95\%$	Quarterly	01.10.20 24
			Monthly	01.04.20 25
(vii)	Silence Call Rate	$\leq 1\%$	Monthly	01.10.20 26

Note: The assessment period and corresponding benchmark for respective QoS parameters shall come into force with effect from specified 'Effective date' and the benchmarks for the QoS parameters specified against the previous assessment period shall stand withdrawn accordingly.

(2) The service provider shall—

- (a) measure the service coverage of the access service (wireless) through drive tests at periodic intervals and take remedial action to address problems related to network coverage, interference, call drop, voice quality and data speed observed during such drive tests;
- (b) maintain and make available such records as per clause (a) in electronic format to the Authority; and
- (c) provide to the Authority or any agency or representative authorized by the Authority, on demand, for verification, the primary data for the records maintained as per clause (b) above.

(3) The Authority may, through drive tests of the access service (wireless) conducted either by its own officers or employees or through an agency appointed by it or through joint drive tests with the service provider, assess

the quality of the service in the coverage area, and the service provider shall facilitate such drive tests.

- (4) The service provider shall, *suo-moto*, take all remedial action to rectify shortcomings or deficiencies, if any, detected during the joint drive tests involving service providers without waiting for any communication from the Authority.
- (5) In respect of drive test conducted by the Authority or joint drive tests under sub-regulation (3), the service provider shall submit to the Authority—
 - (a) its action plan for removal of the shortcomings or deficiencies, within fifteen days of receipt of the communication from the Authority about such shortcomings or deficiencies; and
 - (b) its compliance report, after completing the remedial action, within three months of submission of action plan, and in case, remedial action is not completed within three months of submission of action plan, then a quarterly compliance report shall be submitted till completion of the remedial action.

8. Duration of alert for the called party.—: (1) The duration of time of alert for an incoming voice call, which is neither answered nor rejected by the called party, shall be thirty seconds for access service (wireless).

(2) The terminating network shall, on expiry of thirty seconds in case of access service (wireless), release the incoming voice call and transmit the call release message to the originating network:

Provided that the originating network may release an unanswered call after ninety seconds in case the call release message is not received from the terminating network.

SECTION V

QUALITY OF SERVICE PARAMETERS FOR BROADBAND (WIRELIN) SERVICE

9. Quality of Service Parameters for which compliance reports are to be submitted to the Authority.— (1) Every Service Provider having Internet Service Authorization and providing broadband (wireline) service shall meet the benchmarks, to be measured as per the measurement methodology provided in **Schedule-I**, for each of the following QoS parameters, namely:—

S. No.	Name of the Parameter	Benchmark	Assessment period
I. Service provisioning			
(i)	Provision of a service within seven (7) working days of payment of demand note by the customer	≥ 98%	Quarterly
II. Broadband Service Performance			
(ii)	Latency	≤ 50 msec	Quarterly
(iii)	Packet Drop Rate	≤ 1%	Quarterly
(iv)	Tariff offerings in which 90 th percentile value of measured test samples for which download and upload speed is ≥ offered typical download and upload speed in tariff offerings	90 th percentile 100%	Quarterly
(v)	Maximum Bandwidth utilization of any Customer serving node to ISP Gateway Node [Intra-network] or Internet Exchange Point Link(s)	≤ 80%	Quarterly
(vi)	Jitter	≤ 40ms	Quarterly

	III. Fault Repair		
(vii)	Fault incidences (No. of faults per 100 subscribers/month)	≤ 5	Quarterly
(viii)	Fault repair by next working day	$\geq 85\%$	Quarterly
(ix)	Fault repair within three working days	$\geq 99\%$	Quarterly
	Rent rebate/ validity extension in case fault is repaired after three (3) working days: For post-paid subscribers: Proportional rent rebate for actual number of days, during which fault remain pending, shall be credited in next bill. For pre-paid subscribers: The validity of subscribed tariff offering shall be increased for actual number of days, during which fault remain pending.		
(x)	Mean Time-To-Repair (MTTR)	≤ 10 hours	Quarterly
(xi)	Percentage of significant network outage reported to the Authority within 24 hrs of start of the outage Note: Significant Network Outage is defined as an event where broadband (wireline) service in a district remains unavailable for a continuous period exceeding four (4) hours, or where more than ten percent (10%) of subscribers in the Service Area experience complete loss of service or material degradation in service quality for a continuous period exceeding four (4) hours. Material degradation in service quality shall mean a	100%	Quarterly

	reduction of twenty percent (20%) or more in the download or upload speed experienced by a subscriber vis-à-vis the declared typical download or upload speed. Rebate to the subscribers for significant network outages of more than 24 hrs: • For post-paid subscribers registered in the district or affected post-paid subscribers, as applicable: Proportional rent rebate, as per plan charges, for affected number of days shall be credited in next bill. • For the pre-paid subscribers registered in the district or affected pre-paid subscribers, as applicable: The validity of subscribed tariff offering shall be increased by equal number of affected days.		
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(2) Every service provider shall, in all its tariff offerings for broadband (wireline) service, indicate the typical download and upload speed generally available to the consumers.

Explanation: For the purposes of this regulation, broadband (wireline) service shall include all ~~fixed wireless and~~ wireline medium including copper, fibre, cables etc.

SECTION VI

QUALITY OF SERVICE PARAMETERS RELATED TO CUSTOMER SERVICE

10. Quality of Service Parameters in respect of which compliance reports are to be submitted to the Authority.— (1) Every service provider providing access service (wireline) or access service (wireless) or broadband (wireline)

service, as applicable, shall meet the benchmarks, to be measured as per the measurement methodology provided in **Schedule-I**, for each of the following QoS parameters, namely:—

S. No.	Name of Parameter	Benchmark	Assessment period
II. Customer Service			
(i)	Billing and charging complaints	$\leq 0.1\%$	• Access service (wireline) and broadband (wireline) service – Quarterly • Access service (wireless)- ○ Quarterly w.e.f. 01.10.2024 ○ Monthly w.e.f. 01.04.2025
(ii)	Resolution of billing/ charging complaints within four weeks one week	100%	
(iii)	Application of adjustment to customer's account within one week from the date of resolution of billing and charging complaints or rectification of faults or rectification of significant network outage, as applicable	100%	
(iv)	Accessibility of call centre/ customer care	$\geq 95\%$	
(v)	Percentage of calls answered by the operators (voice to voice) within ninety seconds	$\geq 95\%$	
(vi)	Termination/ closure of service within seven working days of receipt of customer's request	100%	

(vii)	Refund of deposits within 45 days of closure of service or non-provisioning of service	100%	
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~~Provided that the service provider providing both access service (wireline) and broadband (wireline) service shall meet the benchmarks for both the services on aggregated basis.~~

Explanation: For the purposes of this regulation, broadband (wireline) service shall include all ~~fixed wireless and~~ wireline medium including copper, fibre, cables etc.

11. Quality of Service parameters for customers' perception of service.—

- (1) The performance of the service providers providing access service (wireline), access service (wireless) or broadband (wireline) service, as the case may be, shall be subject to periodic assessment by the Authority through customer satisfaction surveys, which may be conducted by the Authority either through its own officers or employees or through any agency appointed by it.
- (2) The customer satisfaction survey shall include questionnaire on various Quality of Service aspects of this regulation from the consumer perspective, as specified by the Authority.
- (3) The service provider shall, take all remedial action to rectify shortcomings or deficiencies, if any, observed in the result of the customer satisfaction survey and submit to the Authority—
 - (a) its action plan for removal of the shortcomings or deficiencies, within fifteen days of receipt of the communication from the Authority about such shortcomings or deficiencies; and
 - (b) its compliance report, after completing the remedial action, within three months of submission of action plan and in case, remedial action is not completed within three months of submission of action plan, then a

quarterly compliance report shall be submitted till completion of remedial action.

SECTION VII

RECORD KEEPING, REPORTING, AUDIT AND PUBLICATION OF QUALITY OF SERVICE PERFORMANCE

12. Record Keeping.— (1) The service provider shall document the process of collection, mapping and processing of data for each QoS parameter specified by the Authority under regulation 4, regulation 6, regulation 7, regulation 9, and regulation 10, as applicable, and submit to the Authority, within sixty days of notification of these regulations, the documented process of collection, mapping and processing of data of each QoS parameter, indicating the correlation with the primary data which are derived from system counters or codes in different network elements or through measurement setup, along with any aggregation, transformation or computations, exclusions, exceptions applied including electronic record keeping procedure.

(2) Every service provider shall maintain complete and accurate records of raw or primary and processed data relating to the compliance of benchmark of each QoS parameters specified in regulations 4, regulation 6, regulation 7, regulation 9 and regulation 10, as applicable, in electronic form in such manner, period and format as may be directed by the Authority, from time to time.

(3) The Authority may, from time to time, either by order or by direction, specify record keeping procedures and formats, including guidelines on measurement methodology, deployment of test probes with related infrastructure and publishing the performance of the service provider on its website for various QoS parameters specified in these regulations, to be followed by the service providers.

(4) Every service provider shall preserve the records, as specified in sub-regulation (2), for at least one year after reporting the performance to the Authority and in case of disputes, all the records under dispute shall be

maintained upto six months beyond the resolution of the dispute, or one year after reporting the performance to the Authority, whichever is later.

13. Reporting.— (1) Every service provider shall create or upgrade their system within six months of notification of these regulations for collection of primary data, its storage, processing, performance report generation and their online submission to the Authority, in respect of each QoS parameters specified under regulation 4, regulation 6, regulation 7, regulation 9 and regulation 10 in such manner and format, at such intervals and within such time limit as may be specified by the Authority, from time to time, by an order or direction.

(2) Every service provider shall establish a system for live monitoring of network availability and report to the Authority in such manner, format and frequency as may be specified by the Authority by an order or direction.

(3) The benchmark of each QoS parameters specified in sub-regulation (1) shall be measured, reported, and complied at license or authorised Service Area level, as may be specified by the Authority, from time to time, by an order or direction:

Provided that the Authority may, from time to time, by an order or direction, specify certain QoS parameters to be measured and reported to the Authority for specific States or Union Territories or districts for a specific purpose and period.

14. Audit.— (1) The Authority may, from time to time, through audit conducted either by its own officers or employees or through an agency appointed by it, verify the performance against the Quality of Service parameters, specified in regulation 4, regulation 6, regulation 7, regulation 9 and regulation 10, as reported to the Authority under regulation 13 by the service provider.

15. Publication.— (1) The Authority may publish, in such manner and in such format, as may be decided by the Authority from time to time—

- (a) the compliance reports of benchmarks of each QoS parameter reported to it by the service providers under regulation 13;

- (b) the results of the customer satisfaction surveys undertaken by the Authority under regulation 11;
- (c) the results of drive tests undertaken by the Authority under sub-regulation (3) of regulation 7;
- (d) the findings of audit undertaken by the Authority under regulation 14;
- (e) Service wise Quality of Experience Score (QoES) of service providers based on various parameters of network performance, consumer service, and consumer perception collected through multiple sources;

through its website or through press releases or through advertisements in the print or electronic media, for the information to the public.

- (2) Every service provider shall publish, for the information of the consumers, its performance with respect to the benchmark of QoS parameters specified in regulation 4, regulation 6, regulation 7, regulation 9 and regulation 10, as applicable, in such manner and format, as may be directed by the Authority from time to time.
- (3) Every service provider providing access service (wireless) shall publish on its website the service wise geospatial coverage maps in such a manner and format, as broadly specified under **Schedule III** and as may be directed by the Authority from time to time, for the geographical areas where wireless voice or wireless broadband service is available for subscription ~~by consumers~~.

SECTION VIII

CONSEQUENCES FOR FAILURE TO COMPLY WITH THE REGULATIONS

16. Consequences for the failure of service providers to meet the benchmark of Quality of Service parameters.- (1) If a service provider fails to meet the benchmark of QoS parameters specified under sub-regulation (1) of regulation 4 or sub-regulation (1) of regulation 6 or sub-regulation (1) of regulation 9 or sub-regulation (1) of regulation 10, it shall, without prejudice to the terms and conditions of its license, or the Act or rules or regulations or

orders made, or directions issued, thereunder, be liable to pay an amount, by way of financial disincentive, not exceeding rupees one lakh per benchmark per compliance report for the first contravention as the Authority may, by order, direct:

Provided that if the service provider fails to meet the benchmark of the same parameter consecutively in two or more subsequent months or quarters, as applicable, he shall be liable to pay, by way of financial disincentives, an amount not exceeding rupees two lakhs for the second consecutive contravention and not exceeding rupees three lakhs for each consecutive contravention occurring thereafter:

~~(2) If the compliance report furnished by the service provider under regulation 13 is found to be false, it shall, without prejudice to the terms and conditions of its license or authorization, or the Act or rules or regulations or orders made, or, directions issued thereunder, be liable to pay an amount, by way of financial disincentive, not exceeding rupees two lakhs per benchmark per compliance report, for which such false report has been furnished, for the first contravention as the Authority may, by order, direct:~~

~~*Provided that* if the compliance report furnished by the service provider under regulation 13 is found to be false for the same parameter consecutively in two or more subsequent months or quarters, as applicable, the service provider shall be liable to pay, by way of financial disincentives, an amount not exceeding rupees five lakhs for the second consecutive false reporting and not exceeding rupees ten lakhs for each consecutive false reporting occurring thereafter.~~

~~(3) No order for payment of any amount by way of financial disincentive shall be made by the Authority unless the service provider has been given a reasonable opportunity of representing against the contravention of the regulation observed by the Authority.~~

~~(4) 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.~~

16A. Consequences for the failure of service providers to submit correct compliance reports. - (1) If the compliance report furnished by the service

provider under regulation 13 is found to be false, it shall, without prejudice to the terms and conditions of its license or authorization, or the Act or rules or regulations or orders made, or, directions issued thereunder, be liable to pay an amount, by way of financial disincentive, not exceeding rupees two lakhs per benchmark per compliance report, for which such false report has been furnished, for the first contravention as the Authority may, by order, direct:

Provided that if the compliance report furnished by the service provider under regulation 13 is found to be false for the same parameter consecutively in two or more months or quarters, as applicable, the service provider shall be liable to pay, by way of financial disincentives, an amount not exceeding rupees five lakhs for the second consecutive false reporting and not exceeding rupees ten lakhs for each consecutive false reporting occurring thereafter.

Explanation: If, upon examination of the information in the compliance report or in any other report pertaining to the performance of QoS parameters furnished by the service provider, the Authority finds that there is a mismatch in the data or value of any parameter reported by the service provider and the performance calculated by the Authority from value or the data given by the service provider in its report or observed during the audit, to the extent that absolute value of difference exceeds 1% of the prescribed benchmark, then such events shall also be considered as false reporting.

16B. Consequences for the failure of service providers to comply with any other provisions of the regulations.- (1) If a service provider fails to

comply with any of the provisions of the regulations excluding provision mentioned in sub-regulation (1) of regulation (7), it shall, without prejudice to the terms and conditions of its license, or the Act or rules or regulations or orders made, or directions issued, thereunder, be liable to pay an amount, by way of financial disincentive, not exceeding rupees five lakh per instance of such non-compliance as the Authority may, by order, direct:

Provided that if the service provider fails to comply the same provision of the regulations consecutively in two or more subsequent months or quarters, as applicable, he shall be liable to pay, by way of financial disincentives, an amount not exceeding rupees eight lakhs for the second consecutive contravention and not exceeding rupees ten lakhs for each consecutive contravention occurring thereafter:

Provided that this regulation shall not be applicable if any non-compliance attracts the provision of regulation 16 or regulation 16A or regulation 17 or regulation 18.

17. Consequences for failure of the service providers to submit compliance reports.-(1) If a service provider contravenes the provisions of regulation 13, it shall, without prejudice to the terms and conditions of its license or authorization, or the provisions of the Act or rules or regulations or orders made, or, directions issued, thereunder, be liable to pay an amount, by way of financial disincentive, not exceeding rupees five thousand per report for every day during which the default continues, ~~subject to the maximum amount of rupees ten lakhs,~~ as the Authority may, by order, direct:

~~*Provided that no order for payment of any amount by way of financial disincentive shall be made by the Authority unless the service provider has been given a reasonable opportunity of representing against the contravention of the regulation observed by the Authority.*~~

Provided that if service provider fails to submit the compliance report within a period of three (3) months from due date then be liable to pay an amount, by way of financial disincentive, not exceeding rupees ten lakhs per report.

~~*(2) 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.*~~

17A. Common provisions for financial disincentives.- (1) No order for payment of any amount by way of financial disincentive, under regulation 16 or regulation 16A or regulation 16B or regulation 17, shall be made by the Authority unless the service provider has been given a reasonable opportunity of representing against the contravention of the regulation observed by the Authority.

(2) The amount payable by way of financial disincentive under regulation 16 or regulation 16A or regulation 16B or regulation 17 shall be remitted to such head of account as may be specified by the Authority.

18. Consequences for the failure of the service providers to pay financial disincentive within the stipulated time.-(1) If a service provider fails to make payment of financial disincentive under regulation 16 or regulation 16A or regulation 16B or regulation 17 within a period of twenty one days from the date of issue of order for payment of financial disincentive or as stipulated in the order for payment of financial disincentive, it shall be liable to pay interest at a rate which will be 2% above the one year Marginal Cost of Lending Rate (MCLR) of State Bank of India existing as on the beginning of the Financial Year (namely 1st April) in which last day of the stipulated period falls and such interest shall be compounded annually.

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

SECTION IX

MISCELLANEOUS

19. Review. —(1) The Authority may, from time to time, review the regulations including the QoS parameters specified in regulation 4, regulation 6, regulation 7, regulation 9 and regulation 10.

(2) The Authority may, on reference from any affected party for good and sufficient reasons, review and modify these regulations.

20.Repeal and Saving.— (1) The Standards of Quality of Service of Basic Telephone Service (Wireline) and Cellular Mobile Telephone Service Regulations, 2009 (7 of 2009), the Standards of Quality of Service for Wireless Data Services Regulations, 2012 (26 of 2012) and the Quality of Service of Broadband Service Regulations 2006 (11 of 2006) and the directions issued thereunder, as listed in **Schedule-II**, are hereby repealed.

(2) Notwithstanding such repeal, relevant provisions of the said regulations and directions issued thereunder shall continue to be applicable for the purposes of compliance with provisions of these regulations up to 30th September 2024.

(3) Notwithstanding such repeal, anything done, or any action taken under the said regulations shall be deemed to have been done or taken under the corresponding provisions of these regulations.

21.Interpretation.— (1) In case of any doubt regarding interpretation of any of the provisions of these regulations, the clarification of the Authority shall be final and binding.

Secretary

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Note. The Explanatory Memorandum explains the analysis of comments and counter-comments received during consultation process for Consultation Paper on ‘Review of Quality-of-Service Standards for Access Services (Wireless and Wireline) and Broadband Services (Wireless and Wireline)’ dated 18th August,2023.

Measurement Methodology

The Schedule provides the methodology for measurement of the performance against QoS parameters specified in regulations 4, regulation 6, regulation 7, regulation 9 and regulation 10 of the Standards of Quality of Service of Access (Wireline and Wireless) and Broadband (Wireline and Wireless) Service Regulations, 2024.

1. Determination of Busy Hour

Measurement of the performance against various QoS parameters is to be done during a busy hour. Further, two types of busy hours are mentioned for the measurement of performance against different QoS parameters. These busy hours are to be determined as follows:

1.1. Cell Bouncing Busy Hour (CBBH): CBBH should be system generated one-hour period in a day during which the cell experiences the maximum traffic. ~~CBBH for a quarter shall be decided on the basis of analysis of hourly traffic data of each cell for each day of preceding quarter. The hour during which the cell experience maximum average traffic during preceding quarter shall be CBBH of the respective cell. Different cells may have different CBBH based on the actual traffic experienced by the respective cell. Thus, the CBBH for a cell will remain the same for a quarter irrespective of the assessment period for the purpose of reporting the performance against QoS parameters.~~

1.2. Time Consistent Busy Hour (TCBH): TCBH for a quarter shall be decided on the basis of analysis of hourly traffic data of the concerned resource group for each day of preceding quarter. The hour during which the concerned resource group experience maximum average traffic during preceding quarter shall be TCBH of the concerned resource group. TCBH so determined shall be same for whole of the resource group. The TCBH for concerned resource group

(like PoI, latency etc.) will remain the same for a quarter irrespective of the assessment period for the purpose of reporting the performance against QoS parameters.

2. Force majeure: For the purpose of measurement methodology provided in Schedule-I, the force majeure incidence shall include reason of war, or hostility, acts of the public enemy, civic commotion, sabotage, Act of State or direction from Statutory Authority, explosion, epidemic, quarantine restriction, strikes and lockouts (as are not limited to the establishments and facilities of the service provider), fire, floods, natural calamities or any act of GOD (hereinafter referred to as EVENT), provided duly documented proof of happenings of any such EVENT is maintained and produced by the service provider while claiming exemption against any QoS benchmark.

3. Measurement Methodology for QoS Parameters under Regulation 4.- Access Service (Wireline)

3.1. Service Provisioning

3.1.1. Provision of a service within 7 working days of payment of demand note by the customer

- (i) Access Service (wireline) must be provisioned by the service provider within 7 working days of the payment of the demand note by the prospective subscriber. As far as possible, the service providers should issue the demand note after ascertaining the technical feasibility to avoid delay in provisioning and inconvenience to prospective subscribers.
- (ii) The performance against this parameter, for the assessment period, shall be measured as per the following formula:

$$= \left\{ 1 - \left(\frac{\text{Total number of connections provisioned after 7 working days of payment of demand note}}{\text{Total number of connections for which demand note paid by the customer}} \right) \right\} \times 100$$

3.2. Fault Repair

3.2.1. Fault incidence (No. of faults per 100 subscribers/month):

The performance against this parameter, for the assessment period, shall be measured as per the following formula:

$$= \frac{\text{Total number of faults reported during the assessment period}}{\text{Total number of connections at the end of the assessment period}} \times 100$$

3.2.2. Fault repair by next working day and Fault repair within three working days

- (i) The performance against the parameter '*Fault repair by next working day*', for the assessment period, shall be measured as per the following formula:

$$= \frac{\text{Number of faults repaired by next working day}}{\text{Total number of faults registered}} \times 100$$

- (ii) The performance against the parameter '*Fault repair within three working days*', for the assessment period, shall be measured as per the following formula:

$$= \left\{ 1 - \left(\frac{\text{Number of faults repaired after three working days}}{\text{Total number of faults registered}} \right) \right\} \times 100$$

- (iii) For calculating the performance against above-mentioned parameters, only those complaints, which were registered till the close of the business hours (i.e., 6 PM) of that day, will be considered. Complaints registered after business hours will be taken as being registered on the next day's business hours.

- (iv) Delay in fault repair due to duly documented force majeure incidences can be excluded for calculating the performance against

above-mentioned parameters. Details of such force majeure conditions shall be maintained by the service provider.

- (v) In case, fault remains pending for more than three working days, then in case of post-paid subscribers, rent rebate proportional to actual number of days, during which fault remained pending, shall be credited to the customer account. Further, in the case of pre-paid subscribers, validity of the subscribed tariff offering shall be increased for the actual number of days, during which fault remained pending. The rent-rebate/ validity extension, as applicable, shall be made within one week from the date of rectification of fault and the rent rebate shall be reflected in the next bill.

- (vi) Service providers shall ensure that complaint registration facilities remain accessible to subscribers at all times, including during network-wide or localized service disruptions. In case of such disruptions, all affected subscribers shall be either enabled to register complaints or be automatically mapped to system-generated fault tickets. Such instances shall be duly recorded and included in Quality of Service reporting metrics.

3.2.3. Mean Time to Repair (MTTR)

- (i) MTTR is a measure of efficient fault resolution and operation management practices. The performance against this parameter, for the assessment period, shall be measured through the following formula:

$$= \frac{\text{Sum of time taken to repair each fault (in hours)}}{\text{Total number of faults cleared}}$$

- (ii) For counting the repair time of each fault, only working hours (i.e., 8 AM to 6 PM) shall be taken into consideration. The duration shall be from the time of lodging of the complaint till the time of repair of

the fault, excluding non-working hours. For example, in case a fault is reported at 3.30 PM on Monday, a working day, and if the fault is rectified at 12.30 PM on Tuesday, the total repair time for the fault will be 7 hours.

3.3. Point of Interconnection

3.3.1. Point of Interconnection (PoI) Congestion (90th percentile value)

- (i) Congestion at the POIs happens due to inadequate interconnection resources commensurate with the outgoing traffic at the Point of Interconnection between two telecom networks.
- (ii) The measurement of this parameter shall be made during Time Consistent Busy Hour. Performance affected due to duly documented force majeure conditions can be excluded for calculating the performance against the parameter. Details of such force majeure, if any, shall be maintained by the service provider.
- (iii) The following formula shall be used for calculation of congestion on each PoI in the LSA over the assessment period:

$$\text{PoI congestion (O/G)} = \frac{\text{Number of failed calls during TCBH on a given PoI}}{\text{Number of call attempts to the PoI during TCBH}} \times 100$$

The value of PoI congestion (O/G), so obtained at each PoI in the LSA, shall be arranged in ascending order. The 90th percentile value of PoI congestion (O/G), after arranging congestion of all POIs in ascending order, shall be the performance against this parameter for the assessment period. The decimal value, if any, to calculate 90th percentile shall be rounded off to nearest integer.

4. Measurement Methodology for QoS Parameters under Regulation 6.- Access Service (Wireless)

This section provides methodology for measurement of the performance against QoS parameters provided under regulation 6. Most of the QoS parameters are technology agnostic and applicable for all generations of the access service (wireless) networks except few parameters against which specific network generation has been specified.

4.1. Network Availability

4.1.1. ~~Availability of service wise geospatial coverage map on service provider's website for percentage of working cells~~ Accuracy of service wise geospatial coverage map published on service provider's website

- (i) Broad guidelines for publication of service wise geospatial coverage map by service providers on their website including methodology for validation of Coverage maps are detailed in Schedule-III.
- (ii) To report the performance against this parameter, service providers shall conduct physical or virtual drive test, as is already required under regulation 7, especially covering the locations where consumer feedback has been received in previous three months, to assess the accuracy of their coverage maps. The supporting data shall be reported to the Authority in the format and manner which may be prescribed from time to time.”
- ~~(i) Under this parameter, the Access Service (Wireless) providers shall provide service wise (2G/ 3G/ 4G/ 5G) geospatial coverage maps on their website. Compliance against this parameter shall be reported to the Authority as per the specified timelines in regulation 6.~~
- ~~(ii) To provide up to date status of mobile coverage to the consumers, coverage maps should be updated by the service providers earliest upon the cells are either commissioned or decommissioned or~~

~~coverage is changed significantly due to any other reason in the Licensed or Authorized Service Area (LSA) network.~~

~~(iii) All the changes in network coverage, due to any action in month 'x', shall be reflected in coverage map within 'x+3' months. For example, the change in network coverage for any technology resulting due to any activity, including cell commissioning, decommissioning, network optimization etc., in month of March of the year should be reflected in the coverage maps latest by the month of June of the concerned year. The log of changes made in coverage map for respective assessed month shall be maintained for the purpose of audit.~~

~~(iv) As cell coverage is dependent upon the cell loading or cell traffic, as against its dimensioned traffic handling capacity, the coverage maps should be presented considering 50% cell traffic against the dimensioned capacity. It is expected that suitable backhaul bandwidth is provisioned to support cell traffic.~~

~~(v) The cell coverage of respective technology shall be presented on the coverage map in prescribed color scheme having minimum prescribed signal strength, in line with license or authorization conditions or relevant standards, at the cell edges with its 50% loading.~~

~~(vi) The link for network coverage map shall be provided in the home or landing page of the service provider's website at a prominent location for single click navigation.~~

~~(vii) The maps shall be interactive as far as possible and shall provide options to at least see the coverage by (a) selecting technology (single, multiple or all) (b) entering latitude or longitude or both to~~

~~see coverage in area of interest and (c) selecting or entering LSA/
State/ UT or district.~~

~~(viii) The Authority may, from time to time, specify functional and
technical requirements for display of service wise geospatial
coverage maps on service provider's website by an order or direction.~~

4.1.2. Cumulative downtime (cells not available for service) and Worst Affected cells due to downtime

- (i) **Cumulative downtime (cells not available for service)** shall measure the downtime of all the cells of all technologies (2G/ 3G/ 4G/ 5G) due to any reason including transmission links/ circuits down, power outage, hardware faults etc. during the assessment period. For measuring the performance against the benchmark for this parameter, the downtime of each cell lasting for more than one hour at a time shall be taken for computation. The downtime shall be counted from start of the occurrence of down alarm till the closure of down alarm. The total duration in hours of all such instances of downtime of all cells shall be calculated. Thereafter, the performance against this parameter for the assessment period shall be measured through the following formula:

$$= \frac{\text{Sum of downtime of all cells (in hours)}}{\{24 \times \text{Number of days in the assessment period} \times \text{Total number of Cells in the network of reported service area at the end of the assessment period}\}} \times 100$$

- (ii) **Worst Affected Cells due to downtime** are those cells whose cumulative downtime during a month exceeds 24 hours. The downtime of each cell lasting for more than one hour at a time, as per (i) above, shall only be taken into consideration. The total number of such worst-affected cells in the month shall be determined. Thereafter, the performance against this parameter for

monthly assessment period shall be measured through the following formula:

$$= \frac{\text{Total number of cells having accumulated downtime of more than 24 hours}}{\text{Total number of Cells in the network of reported service area at the end of the assessment period}} \times 100$$

Note: However, in the case of quarterly assessment in interim period, average of number of worst affected cells during three different months of the quarter will become numerator of the above formula.

- (iii) Performance affected due to duly documented force majeure conditions and planned downtime shall be excluded for calculating the performance against these two parameters. All such exclusions with details of force majeure shall be maintained by the service provider. The planned downtime shall only be excluded from the calculations if the possibly affected subscribers, due to planned downtime, have been informed through SMS/ email/ newspaper/ website at least 7 days in advance from start date of the planned downtime. However, non-service affecting planned downtime shall not be excluded from the calculation and no prior intimation to the subscriber is required in such cases.
- (iv) Further, the Authority, based on inputs from service providers and/or independent assessment, may consider allowing specific exclusions for prescribed duration in identified areas in case the downtime is affected due to conditions which are not under the control of the service providers like major law-and-order situation or major natural calamities affecting network maintenance or network restoration significantly.

4.1.3. Percentage of significant network outage ~~(Services not available in a district for more than 4 hours)~~ reported to the Authority within 24 hrs of start of the outage

- (i) ~~Significant Network Outage (SNO) is a scenario when access (wireless) service is not available in any district for more than 4 hours due to any reason~~ Significant Network Outage is defined as an event where access service (wireless) in a district remains unavailable for a continuous period exceeding four (4) hours, or where more than ten percent (10%) of subscribers in the Licensed Service Area (LSA) experience complete loss of service for a continuous period exceeding four (4) hours due to any reason. All 'cells' physically located in the district shall be considered for deciding SNO.
- (ii) All such SNOs shall be reported to the Authority within 24 Hrs. from the start of any such outage. After restoration of the outage, the service provider shall report the summary of root cause along with details of action taken.
- (iii) If any such significant network outage continues for more than 24 hours, the service provider shall provide proportional rent rebate, as per subscribed tariff offering, for actual number of days of service outage to postpaid subscribers registered in the affected district(s) or affected post-paid subscribers, as applicable in next billing cycle. In the case of pre-paid subscribers registered in the affected district(s) or affected pre-paid subscribers, as applicable the validity of their applicable active tariff offering, at the time of the start of the SNO, shall be increased by the equal number of days for which service outage continues.

- (iv) The outage duration of more than 12 hours in a calendar day shall be considered equal to one full day for the calculation of rent rebate or extension of validity.
- (v) However, recorded and reported force majeure incidences can be excluded for the calculation of rent rebate or extension of validity.

4.2. Voice Connection Establishment (Accessibility)

4.2.1. Call Set-up Success Rate (CSSR)

- (i) Call Set-up Success Rate (CSSR) is a technology agnostic parameter which is applicable to voice call establishment in Circuit Switched network and Packet Switched network using Voice over LTE (VoLTE) in 4G technology or Voice Over New Radio (VoNR) in 5G technology.
- (ii) Call Setup Success Rate is defined as the ratio of Established Calls to Call Attempts. 'Established Calls' mean the following events have happened in call setup:
 - (a) Call attempt is made;
 - (b) The signaling channel is allocated;
 - (c) The call is routed to the outwards path of the terminating network;
 - (d) An alert signal is received by caller in the form of ring back tone, busy tone, or an announcement.
- (iii) The CSSR shall be measured during time consistent busy hour of the monitored network. The call attempts for two different parameters of CSSR shall include as follows:
 - Call Set-up Success Rate: Intra-Service provider (Within service provider's network)- (a) all call attempts originated and terminated in the LSA network of the service provider and (b) all incoming call attempts from other LSA networks of the service provider.

- Call Set-up Success Rate: Inter- Service provider (Incoming from other service providers' network)- all incoming call attempts from all LSA networks of all other service providers.

(iv) The performance against both the parameters as mentioned in para (iii) above, for the assessment period, shall be measured through the following formula :

$$= \frac{\text{Total number of established calls during TCBH}}{\text{Total number of call attempts during TCBH}} \times 100$$

The relevant counter(s) from different technology networks shall be added for arriving at the values of numerator and denominator. However, the breakup of separate counters shall be maintained by the service provider for the purpose of audit. Calls failed due to network issues in LSA network segment shall be treated as failed calls or not 'Established Calls'. Calls that failed due to user behavior such as Busy, not reachable etc. will be counted as established calls for the purpose of CSSR calculation.

4.2.2. Point of Interconnection (PoI) Congestion (90th percentile value)

- (i) This parameter signifies the ease by which a customer of one network would be able to communicate with the customer of another network. This parameter also reflects as how effective is the interconnection between two networks. Congestion at the PoIs is due to inadequate interconnection commensurate with the outgoing traffic at the Point of Interconnection between two telecom networks.
- (ii) The PoI interconnection between IP networks (4G/5G) shall be on IP interface, as far as possible, to avoid conversion and reversion of IP data in TDM and vice versa which affects the call setup time, call quality and overall consumer experience.

- (iii) The Service Providers should ensure that the voice calls get the required end-to-end priority in IP based network interconnection for LTE and 5G network in both intra service provider and inter-service provider scenarios.
- (iv) The measurement of this parameter shall be made during Time Consistent Busy Hour. Performance affected due to duly documented force majeure conditions can be excluded for calculating the performance against the parameter. Details of force majeure shall be maintained by the service provider.
- (v) The following formula shall be used for calculation of congestion on each PoI in the LSA over the assessment period:

$$\text{PoI congestion (O/G)} = \frac{\text{Number of failed calls during TCBH on a given PoI}}{\text{Number of call attempts to the PoI during TCBH}} \times 100$$

- (vi) Value of PoI congestion outgoing (O/G) so obtained at each PoI in the LSA, shall be arranged in ascending order. The 90th percentile value of PoI congestion (O/G) arranged in ascending order shall be the performance against this parameter. The decimal value, if any, to calculate 90th percentile shall be rounded off to nearest integer.

4.3. Voice Connection Maintenance (Retainability)

4.3.1. Dropped Call Rate (DCR)

- (i) Call drop represents the service provider network's ability to maintain a call once it has been successfully established. This parameter shall include both incoming calls and outgoing calls which, once they have been established and have an assigned traffic channel/ bearer, are dropped, or interrupted before their normal completion by the user, the cause of the early termination being within the service provider's network.

- (ii) The measurement of dropped call rate (DCR) of individual cells shall be taken during Cell Bouncing Busy Hour (CBBH) for each day of the assessment period through the following formula:

$$= \frac{\text{Total number of interrupted (dropped) calls}}{\text{Total number of calls successfully established}} \times 100$$

DCR is a radio KPI and will be captured and reported through the relevant counters in radio access network. DCR value of each cell shall be computed up to two decimal places. In VoLTE scenario, the performance against this parameter is calculated on ~~QCI=5~~ QCI=1 bearers dropped abnormally in eNodeB. Similarly, in VoNR scenario, the performance against this parameter is calculated on 5QI=1 bearers dropped abnormally in gNodeB. ~~The corresponding parameter for VoNR i.e QCI flow indicator is captured in gNodeB in 5G Stand Alone (SA) mode.~~

- (iii) **Organizing the DCR data for measurement of CS_QSD(s, t) and PS_QSD(s, t)**

- (a) Performance of DCR shall be monitored and reported separately for different technologies:
- Voice call in Circuit Switched (CS) network [2G and 3G] through '**DCR Spatial Distribution Measure for Circuit Switched (2G/3G) network [CS_QSD (s, t)]**' parameter; and
 - Voice call in Packet Switched (PS) network [4G, 5G and beyond] through '**DCR Spatial Distribution Measure for Packet Switched (4G/5G and beyond) network [PS_QSD (s, t)]**' parameter.

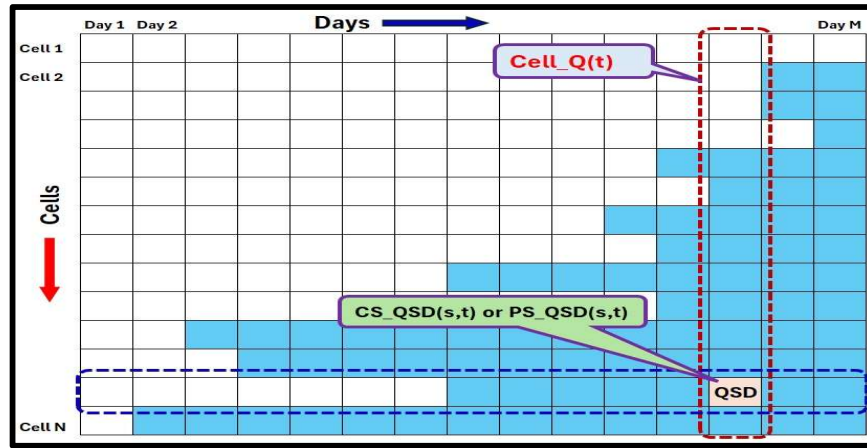
Where **s** and **t** are % of cells and % of days respectively. Applicable values for **s** and **t** are as mentioned in regulation 6.

- (b) In order to calculate the performance against both the DCR related parameters, first step is to organize the DCR data in matrix form separately for Circuit Switched (CS) and Packet Switched (PS) network, where each row represents the DCR values for individual cells over the days arranged in chronological order as columns i.e. the daily DCR values for the assessment period. The day wise DCR performance shall be arranged for all cells in the LSA.
- (c) Now, DCR values for all days of the assessment period for each cell will be arranged in ascending order. Thus, the worst DCR values of a cell irrespective of date will slide to the rightmost part of the DCR matrix. 't' percentile of the daily time-series of DCR values of each cell, may be considered as representative DCR for that cell during the period of assessment. This representative DCR value of each cell may be called $\text{Cell_Q}(t)$.
- (d) The rows, previously sorted over time, are next sorted in ascending order of their representative $\text{Cell_Q}(t)$ DCR values identified in the previous step. The 's' percentile DCR value is extracted from the resulting vector of ordered, representative $\text{Cell_Q}(t)$ DCR values of each cell. Unlike the previous step, we will obtain a single value, which we may refer to as $\text{QSD}(s, t)$.
- (e) The $\text{QSD}(s, t)$ so derived using the DCR matrix of cells of Circuit Switched (CS) network will be the performance against parameter 'DCR Spatial Distribution Measure for Circuit Switched (2G/3G) network [$\text{CS_QSD}(s, t)$]'. Similarly $\text{QSD}(s, t)$ derived using the DCR matrix of cells of Packet Switched (PS) network will be the performance against parameter 'DCR Spatial Distribution Measure for Packet Switched (4G/5G and beyond) network [$\text{PS_QSD}(s, t)$]'.

(f) DCR value $QSD(s, t)$ in a LSA will be considered as meeting the benchmark, when value $QSD(s, t) \leq \text{Benchmark } QSD$ for respective networks.

(g) In case $t\%$ of total number of days or $s\%$ of total number of cells is not an integer and includes fractional value then the DCR value shall be rounded to the nearest integer value and the same is to be considered for computation of the network's performance assessment.

Figure 1: Terminology for DCR Matrix



(iv) There may, however, be situations when DCR data for a few cells may not be available for some of the days of the assessment period. For example, this could happen in a case when the cell was installed and commissioned in the middle of the assessment period; or if a particular cell is shutdown for certain legitimate reasons; or if there was a genuine technical difficulty in acquiring data for a few days. There may also be cases where the net voice traffic handled by a cell on a particular day was zero or DCR value on that day non-determinable or irrelevant. For the treatment of such special cases, 'DCR Codes', as listed in the table below, may be used when a special observation is made corresponding to a Cell on a particular day. Similar codes shall also apply for the DLPDR_QSD and ULPDR_QSD parameters for the percentile-based performance reporting.

DCR Code	Stands for	Reason or purpose
DNE	Does Not Exist	The cell was either not commissioned or de-commissioned in between the assessment period and was not part of the network to serve the users in the network.
NOP	Not Operational	The cell was not operational because of planned shutdown or taken out of operation due to technical problem and thus not able to serve the users in the network.
NAV	Counter values Not Available	If the requisite counter values for computation of DCR or DLPDR or ULPDR, as applicable, for a Cell on a particular day could not be captured due to technical glitch although the cell was operational.
NDM	Computation Not Determinable or irrelevant	In case, computation of DCR or DLPDR or ULPDR, as applicable, it is observed that mathematically DCR or DLPDR or ULPDR values could not be computed being not in a determinate form or computed value is irrelevant for the purpose of assessment.
NVS	No Voice Service is being provided on 5G Cell	In case, only data service is being offered, and no voice service is being offered through 5G RAN.

FCM	Performance of cell excluded due to force majeure	In case performance of certain cells is excluded for certain days due to force majeure, as per provisions of the regulations.
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- (v) All DCR values for the assessment period shall be considered for Percentile value computation for the parameter DCR spatial measurement excluding the cases enumerated in the table above.

4.3.2. Downlink Packet Drop Rate for Packet Switched Network (4G/5G and beyond) [DLPDR_QSD (s, t)] and Uplink Packet Drop Rate for Packet Switched Network (4G/5G and beyond) [ULPDR_QSD (s, t)]

- (i) The performance against Downlink Packet Drop Rate and Uplink Packet Drop Rate of individual cell shall be computed during Cell Bouncing Busy Hour (CBBH) for each day of the assessment period through the following formula:

$$\text{Packet Drop Rate} = \frac{A}{B} \times 100$$

Where, A and B are as follows:

(a) For Downlink Packet Drop Rate:

A = Total number of voice traffic packets dropped or lost (not successfully transmitted) in the downlink.

B = Total number of voice traffic packets of bearer entered for transmission

The number of voice traffic packets dropped or lost includes the packets dropped due to congestion, traffic management etc., and packets lost in the downlink transmission between the eNodeB/ gNodeB and UE and between the eNodeB/ gNodeB and relay nodes.

(b) **For Uplink Packet Drop Rate:**

A = Total Number of missing voice traffic packets that are not delivered to higher layers (packets lost) of a data radio bearer.

B = Total number of voice traffic packets that are to be delivered to higher layers of a data radio bearer.

The number of missing voice traffic packets includes the packets lost in the uplink transmission between the UE to eNodeB/gNodeB and between the eNodeB/gNodeB and relay nodes.

(ii) The measurement can be made via an automatic data collection system, based on the network counters which register the real traffic of the network. The counter is available on eNodeB / gNodeB and is recorded for complete duration of 24 hours though period of counter dumps may vary for different equipment manufacturers.

(iii) The daily values of ULPDR and DLPDR, as collected during CBBH shall be arranged similar to DCR matrix, as provided in para 4.3.1 above, to calculate **DLPDR_QSD (s, t)** and **DLPDR_QSD (s, t) which shall be $\leq$** prescribed benchmark for both of these parameters.

4.4. Broadband Service

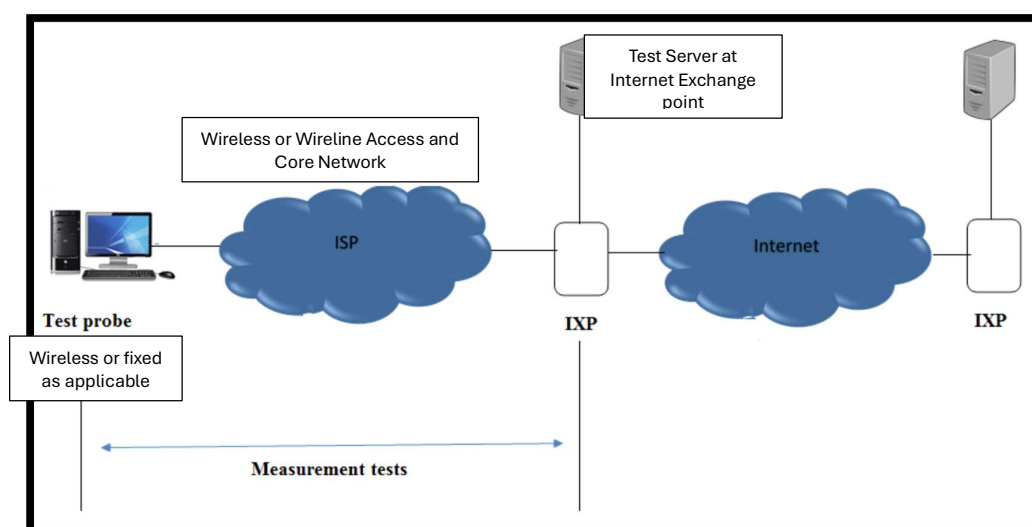
4.4.1. Measurement setup: The performance against broadband related QoS parameters are to be computed by making test calls using the measurement setup as explained below:

(i) Measurement setup to be used to conduct test calls for measuring latency, packet drop rate, 'Percentile value of measured test samples for which download and upload speed is $\geq$ offered typical download and upload speed in tariff offerings' and jitter is given in **Figure 2**.

(ii) The basic measurement set-up consists of a Test-probe and a Test-Server with required software and hardware.

- (iii) Test server(s) shall be located at the internet exchange point(s) or Internet Exchange Points (IXPs) where the traffic of the LSA is exchanged with networks of other service providers as per ITU-T recommendation Y.1545.1.
- (iv) Test calls must be established between the Test-probe and Test-Server and measurements must be made for the respective QoS parameters. These parameters shall be measured in stationary mode.

Figure 2: Measurement set-up for Broadband Services



(v) Requirements for the Test-Server:

- (a) For all tests, a dedicated test server should be used as a well-defined reference. The test server may be located centrally for all the licensed service areas (LSA) or for multiple LSAs or in each LSA (not more than one test server in each LSA). Under no circumstances a commercial server should be used, since the test conditions for such a server may change over time.
- (b) The test server should be identified by an IP address and not by its Fully Qualified Domain Name (FQDN) to avoid issues with

Domain Name Server (DNS) lookup including the DNS caching strategies of the used operating system in the measurement.

(vi) **Test File:** As per ITU-T recommendation⁴⁴ Y.1545.1, the test file should consist of incompressible data i.e. a data file that is already compressed, e.g. like a zip or jpg file. The test file should have at least twice the size (in Mbit) of the theoretically maximum data transmission rate per second (in Mbit/s) supported by respective technology (4G/5G).

(vii) **Representativeness or Number of test calls:**

(a) The choice of adequate test calls, i.e. geographical locations of origin is a crucial point for comparison and validation of the statistics to be calculated for the measured parameters. For each parameter, it is to be ensured that the test samples are collected over all type of areas for fairness in reflecting the QoS perceived by the subscribers in different areas and the statistics shall be preserved to substantiate the same.

(b) The measurements for the QoS parameters should be evenly distributed over the month as far as possible and should be taken during Time Consistent Busy Hour (TCBH). To guarantee the spatial representation of the measurements, the service providers should deploy test probes depending on the number of active customers in each city/town/region, which should consider the market size and demographics in the license service area concerned. These test calls must be spread over the service area covering all the geographical areas (cities/towns) in proportion of the total number of active customers and shall be further

⁴⁴ <https://www.itu.int/rec/T-REC-Y.1545.1/en>

proportioned to cover all the tariff plans working in the service area if applicable.

- (c) To capture realistic users' experience of wireless broadband service, test calls should be distributed across different mix of eNodeBs or gNodeBs cells comprising of city, rural, highway and rail routes.

(d) **For Wireless Broadband:**

- (1) Test calls shall be made from at least 1067 distinct cell coverage areas in a service area having more than one lakh cells, 600 in case of service areas having less than 1 lakh cells.
- (2) Maximum five test calls per cell coverage area can be made preferably from the cell edges as far as possible.
- (3) In each assessment period, cells in different physical locations shall be covered until all distinct cell have been covered in previous 24 months.

- (e) The test calls shall be distributed within TCBH.

- (f) The electronic logs of test calls shall be maintained by the service providers and presented to the Authority, or the auditors. The geolocations of each test call shall be recorded with the test results.

- (g) Any other technical requirement, not covered above, shall be applicable as prescribed in relevant ITU-T Recommendation G.1051 or Y.1545 or Y.1545.1 as applicable.

4.4.2. Latency (in 4G and 5G network)

- (i) Latency is the amount of time taken by a packet to reach the receiving endpoint after being transmitted from the sending point. This time is termed the "end-to-end delay" occurring along the transmission path. Latency generally refers to network conditions, such as network congestion, that may affect the overall time required for transit.
- (ii) Latency, in cellular mobile network, is affected due to several reasons like cell loading i.e. number of users, number of handovers during a given period, routing configuration, congestion in the transport network etc. Service providers shall take remedial action in case high latency, beyond the benchmark, is observed during the measurements.
- (iii) Latency shall be measured through measurement setup and methodology as provided in para 4.4.1 above.
- (iv) As per ITU-T Recommendation G.1051, the 50th percentile value of the latency measurements, after arranging the one way latency captured through a series of randomly transmitted User Datagram Protocol (UDP) packets during the test calls in ascending order, shall be considered the latency for that LSA during the assessment period.

4.4.3. Packet drop rate (in 4G and 5G network):

- (i) The packet drops, or packet loss rate is total number of packets failing to deliver through the network divided by the total number of transmitted packets within a specific time window. If a packet is not received back within a prescribed Round Trip Time (RTT), it is considered as lost for the purpose of packet loss measurements. The lower and upper threshold for RTT is 30ms and 90ms respectively

as per ITU-T recommendation Y.1540. The most common causes of packet loss are congestion leading to buffer overflows or active queue management along the network path. Alternatively, high latency might lead to a packet being counted as lost if it does not arrive within a specified time window.

(ii) Packet drop rate shall be measured through measurement setup and methodology as provided in para 4.4.1 above.

(iii) To measure the performance against this parameter a large number of IP packets (at least 1000) are to be sent. Delay and packet loss measurements are to be performed over TCBH period to allow for the time varying nature of network performance in packet-switched networks as per ITU-T Recommendation⁴⁵ G.1051. The measurement should include all major types of packets i.e., TCP, UDP and RTP in their representative ratios during TCBH traffic. The packet drop rate shall be calculated from the test measurement through the following formula:

$$\text{Packet Drop Rate} = \frac{\text{Total number of Packets received at destination as sent during test window}}{\text{Total number of packets transmitted during test window}} \times 100$$

(iv) The 90th percentile value of the packet drop measurements, after arranging the results in ascending order captured during the test calls, shall be considered the packet drop rate for the LSA during the assessment period.

4.4.4. Tariff offerings in which 80th percentile value of measured test samples for which download and upload speed is $\geq$ offered typical download and upload speed for 4G/5G technology in tariff offerings

⁴⁵ <https://www.itu.int/rec/T-REC-G.1051-202303-I>

- (i) The download speed is defined as the data transmission rate that is achieved for downloading a test file from a test server to a test device. Similarly, the upload speed is the data transmission rate that is achieved for uploading a test file from a test device to a test server.
- (ii) In a mobile network the download or upload speed varies depending on the number of users in a particular location as against the deployed network capacity in radio, fronthaul and backhaul segments. Therefore, service providers need to constantly upgrade their network to maintain consistent performance against these parameters.
- (iii) Hence, based on the deployed network capacity as against the subscriber base, the service providers have been mandated to disclose the **technology wise typical download and upload speeds offered to the subscribers for each tariff offering** in respective service area. The compliance against this parameter shall be measured through the test calls based on measurement setup and methodology as provided in para 4.4.1 above.
- (iv) Typical download or upload speed is the download or upload speed which will be available to the users in the LSA during TCBH in normal network conditions except unusually high traffic spikes
- (v) The **measured typical** download and upload speed should be calculated from test calls made according to the measurement setup as provided in para 4.4.1 above. Test calls are to be made to weigh the results according to the patterns of real traffic during the TCBH.
- (vi) The download and upload speed test measurements shall be conducted utilizing at least three concurrent TCP connections. The measurement, as per prescribed measurement setup and process,

shall be conducted for 4G/5G technology in each plan offered by the service provider in the LSA. In case the typical download or upload speeds are not linked to any plan and applicable for all tariff offerings in the LSA, common test calls shall be made for measurement of the performance against this parameter for 4G/5G technology.

- (vii) ~~Typical~~ Measured download or upload speed shall be the ~~10th~~ 80th percentile of respective download and upload speeds obtained after arranging the results of test calls in ~~ascending~~ descending order for each technology in each tariff offering.
- (viii) The service provider will maintain the declared typical download or upload speed for the committed plan period. If measured ~~typical~~ download or upload speed, in any technology of any plan, ~~offered in any plan to the consumers~~, is found to be lower than the declared typical download or upload speed ~~value~~ during assessment period, then the service provider shall notify the same to the affected customers and take corrective action, before submission of next compliance reports, to meet ~~also declare revised~~ typical download and upload speed.
- (ix) Customer may verify declared typical download and upload speed through TRAI MySpeed app in the coverage area with location access enabled. The service provider shall analyse the reason and take corrective action if any significant deviation is observed in consumer test results from TRAI MySpeed app.
- (x) Service provider shall include all tariff offerings for reporting the performance against the parameter. However, if some of the selected tariff offerings are having same offered typical download and upload speed, then such tariff offerings may be considered a part of a group for the purpose of measurement and reporting of performance

against this parameter. In that case, selection of subscribers from different tariff offerings of a group shall be in proportion to the subscriber base of each tariff offering.

- (xi) However, in case of more than one network slices in the 5G network, each eMBB network slice shall be considered a part of separate tariff offering. Further, compliance to this QoS parameter is to be ensured separately for each network slice.
- (xii) A tariff offering shall be considered 'Non-compliant' if, for at least one technology, the 80th percentile value of the measured download speed is lower than the offered typical download speed, or the 80th percentile value of the measured upload speed is lower than the offered typical upload speed, or both are lower than their respective offered typical speeds.
- (xiii) The performance against the parameter, for the assessment period, shall be measured through the following formula:

$$= \left(1 - \frac{\text{Number of 'Non – compliant' tariff offerings}}{\text{Total number of tariff offerings}}\right) \times 100$$

4.5. Network Slicing

4.5.1 Cells having daily PRB utilisation >80% (in 5G network)

- (i) A Physical Resource Block (PRB) is the fundamental unit of radio resource allocation in 4G LTE and 5G New Radio (NR) networks. It represents a defined portion of radio spectrum over a specific time interval and serves as the basic scheduling unit through which a base station allocates radio resources to user equipment (UE) for data transmission and reception. The higher level of PRB utilization

for number of days, either continuously or periodically, indicates network congestion.

(ii) PRB Utilization in 5G NR is a measure of how fully the physical resource blocks are being used in the network. Ideally, it should be managed to avoid congestion while utilizing available capacity efficiently.

(iii) The performance against this parameter shall be measured through the following formula:

$$= \frac{\sum_{\text{First day of assessment period}}^{\text{Last day of assessment period}} \text{Total number of 5G cells whose Downlink or Uplink or Combined PRB utilisation exceeds 80\% during CBDH}}{\sum_{\text{First day of assessment period}}^{\text{Last day of assessment period}} \text{Total number of 5G cells in the LSA}} \times 100$$

Where CBDH is an hour during which total data download and upload is maximum in 24 hours of the day.

Note: - The measurement of Physical Resource Block (PRB) utilization is standardized by 3GPP and adopted by TEC in its document⁴⁶ ‘*Management and orchestration: 5G performance measurements*’.”

(iv) Performance of all Cells including those cells which are part of Carrier Aggregation (CA) are to be included while calculating the performance using above mentioned formula.

(v) Whenever PRB utilisation exceeds 80% for any five days in a month, service provider must take necessary action to augment the capacity

⁴⁶ https://tec.gov.in/pdf/3gpp/TSDSI_Doc_1657/rel17/TS-28.552%20V1.8.0.pdf

in timely manner so that PRB utilisation reduces below 80%. However, in case PRB utilisation cannot be reduced below 80% even after a period of month then such cells must be removed from network slicing. In other words, service provider will ensure that the same cells reported in PMR of a month with more than 80% PRB utilization for more than five days are not repeated beyond two consecutive months.

- (vi) In addition, before launch of any new network slice, service provider must ensure that sufficient capacity is available in the network and shall submit the details, as per the format and manner prescribed by the Authority, before launch of such network slicing.”

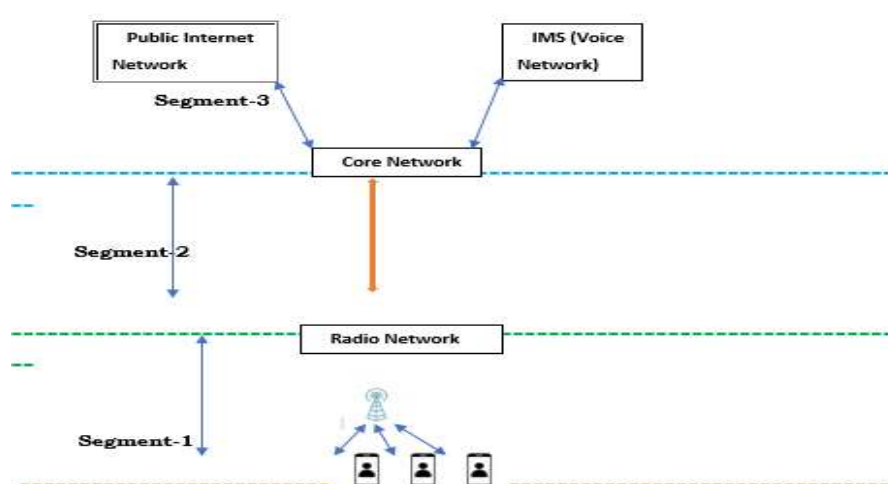
5. Measurement Methodology for QoS Parameters under Regulation 7.- Access Service (Wireless)

5.1. Maximum Bandwidth utilization between radio and core network during TCBH

- (i) While radio level network congestion is reflected in different eNodeB/gNodeB performance matrices like drop call rate or DCR, uplink packet drop rate or downlink packet drop rate, the fronthaul and backhaul segments also affects the voice and broadband performance including call muting, latency, packet drop rate etc. The high level network segments are depicted in **Figure 3**.
- (ii) The performance of segment-1 is already captured under call setup success rate, DCR Spatial distribution, UL/DL packet drop rate etc, the performance of segment-2 is to be measured under this parameter during TCBH. Service providers shall record the maximum bandwidth utilization in segment-2 of LSA network during TCBH for each eNodeB/gNodeB in the network.
- (iii) The service provider shall record the maximum bandwidth utilization of all the RAN to Core network link on any consecutive 4

days of the assessment period during TCBH. The highest bandwidth utilization, recorded during any of four days of each link shall be arranged in an ascending order. The 80th percentile value of such arranged observations shall be considered the performance against the benchmark specified in the regulation. In case there is any aggregation point between Radio and Core Network, the bandwidth utilization for such link shall be measured.

Figure-3-High level network segments in 4G/5G network



5.2. SDCCH Congestion/ RRC Congestion and Traffic Channel congestion i.e. TCH, RAB, E-RAB, EN-DC (E-UTRAN New Radio Dual Connectivity for NSA to access 4G and 5G both networks at same time) or DRB (Data Radio Bearer for SA) Congestion

- (i) The congestion in the network leads to non-establishment of the call. The congestion can be in the signaling channel known as a Standalone Dedicated Control Channel (SDCCH) (in respect of GSM network) or Radio Resource Control (RRC) in 4G and 5G New Radio.
- (ii) Traffic channel or TCH is a logical channel that carries either encoded speech or user data. If there is no free TCH, the call is not

connected because there is no free channel in RAN of a service provider to serve a call attempt.

(iii) The numbers of blocked calls are those call attempts by subscribers where there is no free channel available to serve a call attempt. Hence connection establishment (accessibility) represents congestion in the radio access network. The congestion may be at SDCCCH level or TCH level.

(iv) These parameters shall be measured using network-generated data in Time Consistent Busy Hour (TCBH) over the assessment period. The following general formula shall be used to measure the performance against these two parameters. The respective radio network counters, for respective technology, shall be used for calculation of the performance.

$$\text{Signalling or traffic channel congestion} = \frac{\text{Number of blocked calls due to signal or traffic channel non-availability}}{\text{Number of originating call attempts}} \times 100$$

5.3. Connections with good voice quality

(i) The performance against this parameter shall be computed based on system generated measurement during TCBH of the LSA.

(ii) The quality of voice in cellular mobile telecom services (GSM), is measured on a scale from 0 to 7 in GSM technology. As the quality deteriorates, this value increases. The quality of the voice is good, if this value remains between 0 and 4. However, in cases where frequency hopping phenomenon is used in GSM network, GSM voice samples with Rx Qual between 0 to 5 may be considered as good voice quality, while maintaining supporting evidence.

(iii) In respect of 4G/5G networks, connection with uplink SINR ≥ 0 dB provides assurance of good voice quality.

(iv) Accordingly, the performance against the parameter for the assessment shall be calculated during TCBH through the following formula:

$$= \frac{[(\text{GSM voice connection with Rx Qual} \leq 4) + (\text{4G/5G voice connection with SINR} \geq 0)]}{[\text{Total number of GSM voice connection} + \text{Total number of 4G/5G voice connections}]} \times 100$$

5.4. Jitter (in 4G and 5G network)

(i) Jitter provides a measure of variation in time in arrival of packets from a source to destination. A high value of jitter adversely affects the user experience especially in real time interactive applications.

(ii) ITU-T Recommendation⁴⁷ Y.1540 defines network parameters that may be used in specifying and assessing IP network performance. IP packet delay variation or IPDV or jitter is defined as the differences between the one-way delay of IP packet and reference IP packet transfer delay (e.g. average IPTD as a reference delay).

(iii) The inter arrival jitter is the difference in the relative transit time for two packets. The relative transit time is the difference between a packet's Real-time Transport Protocol (RTP) timestamp and the receiver's clock at the time of arrival, measured in the same units. If S_i is the RTP timestamp from packet i , and R_i is the time of arrival in RTP timestamps units for packet i , then for two packets i and j the inter-arrival jitter D can be expressed as:

$$D(i,j) = (R_j - R_i) - (S_j - S_i)$$

⁴⁷ <https://www.itu.int/rec/T-REC-Y.1540/en>

- (iv) The Jitter measurements should be conducted as per the test setup for each technology separately for RTP and UDP. The test calls for Jitter shall be made during TCBH.
- (v) The IPDV (jitter) shall be calculated as mean deviation based on the samples collected for the delay measurement as per the setup used for measurement of latency as per ITU-T Recommendation G.1051.

5.5. Messaging: Successful SMS delivery within service provider's network

- (i) This QoS parameter with benchmark specifies that successful SMS delivery should be completed in the service provider's network.
- (ii) This performance against the benchmark shall be calculated through the following formula.

% of successfully delivered SMS =

$$\frac{\text{No. of generated and successfully delivered SMS in service provider's network}}{\text{Total number of SMS generated within service provider's network}} \times 100$$

Note: The SMS delivery failure due to subscriber handset's memory full, subscriber unreachable and handset switched off shall not be considered as SMS delivery failure for the purpose of above calculation.

5.6. Drive Tests by the Service Provider

- (i) The service providers are expected to conduct drive tests on a regular and on-going basis to address the network issues and subscriber complaints.
- (ii) The physical drive tests are commonly used to capture (a) network performance (b) actual user experience or for addressing network

issues. However, the availability of large compute power and storage at affordable cost has enabled evolution of analytics models which may be used to predict user experience based on network log, spatial network data analytics and correlation. The prediction of network performance and user experience through network logs and data analytics are sometime referred as ‘virtual drive test’ by the service providers.

- (iii) The main objective of the service provider conducting drive tests is to identify and address network issues on an ongoing basis to maintain the QoS. Therefore, the Authority is of the opinion that service providers are free to use either physical drive test tool or virtual drive test tool to achieve the same objective as achieved through physical drive test. However, the use of ‘virtual drive test tools’ is subject to their precise calibration and correlation by an independent third party while all other conditions and criteria shall be applicable for virtual drive tests. The certification by the independent third party, having proven expertise in the drive test domain, along with the results of calibration and correlation with physical drive tests shall be submitted to the Authority before the use of any ‘virtual drive test’ tool by the service provider.
- (iv) At least one drive test shall be conducted by the service provider in each LSA in each month.
- (v) The key criteria for planning the cell areas to be covered during drive tests shall include (a) call drop rate of more than benchmark for more than 5 days in previous month or (b) packet drop rate in downlink or uplink of more than benchmark for more than 5 days in previous month (c) network related user complaints for low data speed, call drop, call muting and network coverage, etc.
- (vi) The monthly drive tests shall be planned and conducted to cover at least the top 10% of the worst performing cells as listed at para (v) above.

- (vii) The electronic records for all such drive tests, including list of cells, results, remedial action and outcomes, shall be maintained by the service providers and presented to the Authority or to the Auditor, whenever asked.
- (viii) ITU-T Recommendation⁴⁸ E.806 on 'Measurement campaigns, monitoring systems and sampling methodologies to monitor the quality of service in mobile networks' may be referred for further reference and residual matters for conducting the drive tests.

5.7. Silence Call Rate

- (i) A call which has any instance of continuous RTP gap ≥ 4 sec is considered as a 'Silence Call'.
- (ii) The performance against the parameter shall be calculated through the following formula:

$$\text{Silence call rate} = \frac{\text{Count of silence call instances during TCBH}}{\text{Total calls established during TCBH}} \times 100$$

- (iii) A call may have multiple instances of RTP gap of ≥ 4 sec. Each of such instance, within a call, will be added to calculate total instances for all calls during the TCBH to calculate the numerator value.

6. Measurement Methodology for QoS Parameters under Regulation 9.- Broadband (Wireline) Service

6.1. Service Provisioning

6.1.1. Provision of a service within 7 working days of payment of demand note by the customer

Same as provided in para 3.1.1 above.

⁴⁸ <https://www.itu.int/rec/T-REC-E.806/en>

6.2. Broadband Service Performance

6.2.1. Measurement Setup: Measurement setup and methodology provided in para 4.4.1 above, as per ITU-T recommendation Y.1545.1, shall apply for Broadband (Wireline) Service except those specific to wireless broadband service. The minimum number of subscribers to be covered shall be at least 1067 for service areas having subscriber base of more than 1 lakh and 600 for subscriber base of less than one lakh or 5% of the subscriber base of each tariff offering, whichever is lower. Maximum five test calls can be made from per subscriber location which shall be distributed throughout TCBH. The subscribers selected for making test calls shall be distinct and shall not be repeated in at least in last 24 months

6.2.2. Latency

- (i) Latency is the amount of time taken by a packet to reach the receiving endpoint after being transmitted from the sending point. This time is termed the "end-to-end delay" occurring along the transmission path. Latency generally refers to network conditions, such as network congestion, that may affect the overall time required for transit.
- (ii) Latency is affected due to congestion in the uplink or access network. Service providers shall take remedial action in case high latency, beyond the benchmark, is observed during the measurements.
- (iii) Latency shall be measured through measurement setup and methodology as provided in para 4.4.1 above.
- (iv) As per ITU-T Recommendation G.1051, the 50th percentile value of the latency measurements, after arranging the one way latency captured through a series of randomly transmitted User Datagram

Protocol (UDP) packets during the test calls in ascending order, shall be considered the latency for that service area during the assessment period.

6.2.3. Packet drop rate

- (i) The packet drops, or packet loss rate is total number of packets failing to deliver through the network divided by the total number of transmitted packets within a specific time window. If a packet is not received back within a prescribed Round Trip Time (RTT), it is considered as lost for the purpose of packet loss measurements. The most common causes of packet loss are congestion leading to buffer overflows or active queue management along the network path. Alternatively, high latency might lead to a packet being counted as lost if it does not arrive within a specified time window.
- (ii) Packet drop rate shall be measured through measurement setup and methodology as provided in para 4.4.1 above.
- (iii) To measure the performance against this parameter a large number of IP packets (at least 1000) are to be sent. Delay and packet loss measurements are to be performed over a longer period to allow for the time varying nature of network performance in packet-switched networks as per ITU-T Recommendation G.1051. The measurement should include all major types of packets i.e., TCP, UDP and RTP in their representative ratios during TCBH traffic. The packet drop rate shall be calculated from the test measurement through the following formula:

$$= \frac{\text{Total number of Packets received at destination as sent during test window}}{\text{Total number of packets transmitted during test window}} \times 100$$

- (iv) The 90th percentile value of the packet drop measurements, after arranging the results in ascending order captured during the test calls, shall be considered the packet drop rate for the service area during the assessment period.

6.2.4. Tariff offerings in which 90th percentile value of measured ~~test samples for which~~ download and upload speed is $\geq$ offered typical download and upload speed ~~in tariff offerings~~

- (i) The download speed is defined as the data transmission rate that is achieved for downloading a test file from a test server to a test device. Similarly, the upload speed is the data transmission rate that is achieved for uploading a test file from a test device to a test server.
- (ii) The service providers have been mandated to disclose the **typical download and upload speeds offered to the subscribers** in respective service area. The compliance against this parameter shall be measured through the test calls based on measurement setup and methodology as provided in para 4.4.1 above.
- (iii) Typical download or upload speed is the download or upload speed which will be available to the users in the service area during TCBH in normal network conditions except during unusually high traffic spikes.
- (iv) The download and upload speed test measurements shall be conducted utilizing at least three concurrent TCP connections. The measurement, as per prescribed measurement setup and process, shall be conducted for each plan offered by the service provider in the service area. In case the typical download or upload speeds are not linked to any plan and applicable for all tariff offerings in the service area, common test calls shall be made for measurement of the performance against this parameter.

- (v) ~~Typical~~ Measured download or upload speed shall be the ~~10th~~ 90th percentile of respective download and upload speeds obtained after arranging the results of test calls in ~~ascending~~ descending order for each tariff offering.
- (vi) The service provider will maintain the declared typical download or upload speed for the committed plan period. If measured ~~typical~~ download or upload speed, offered in any plan to the consumers, is found to be lower than the declared typical download or upload speed ~~value~~ during assessment period, then the service provider shall notify the same to the affected customers and take corrective action, before submission of next compliance reports, to meet ~~also~~ ~~declare-revised~~ typical download and upload speed.
- (vii) Customer may verify declared typical download and upload speed through TRAI MySpeed app with location access enabled. The service provider shall analyse the reason and take corrective action if any significant deviation is observed in consumer test results from TRAI MySpeed app.
- (viii) Service provider shall include all tariff offerings for reporting the performance against the parameter. However, if some of the selected tariff offerings are having same offered typical download and upload speed, then such tariff offerings may be considered a part of a group for the purpose of measurement and reporting of performance against this parameter. In that case, selection of subscribers from different tariff offerings of a group shall be in proportion to the subscriber base of each tariff offering.
- (ix) A tariff offering shall be considered 'Non-compliant', if 90th percentile value of the measured download speed is lower than the offered typical download speed, or the 90th percentile value of the measured

upload speed is lower than the offered typical upload speed, or both are lower than their respective offered typical speeds.

- (x) The performance against the parameter, for the assessment period, shall be measured through the following formula:

$$= \left(1 - \frac{\text{Number of 'Non – compliant' tariff offerings}}{\text{Total number of tariff offerings}} \right) \times 100$$

6.2.5. Maximum Bandwidth utilization of any Customer serving node to ISP Gateway Node [Intra-network] or Internet Exchange Point Link(s)

- (i) The Internet Service Provider (ISP) can offer a good QoS to the customers only if there is enough bandwidth in the access segment, long distance segment and overseas segment of Internet bandwidths.
- (ii) The access segment is entirely managed and operated by the internet service provider. The broadband service can be provided through different access technologies like fibre, cable, DSL etc. The national long-distance segment is usually taken on lease from National Long Distance (NLD) Service providers and the overseas nearest access point segment is generally provided by the International Long Distance (ILD) service providers in the form of International Private Leased Circuit (IPLC) or Internet Leased Line (ILL). Therefore, enough bandwidth should be available in all the applicable segments to ensure good QoS.
- (iii) The service providers are required to monitor the bandwidth utilization during Time Consistent Busy Hours (TCBH) for each network link(s)/route.

(iv) Average utilization of bandwidth in a route means utilization of bandwidth capacity on all the links of the route. For example, if there are 3 links consisting of one link of 100 Mbps, two links of 1Gbps each, in a route from ISP gateway to International Gateway or IXP then the total bandwidth available in the route is 2.1 Gbps (0.1Gbps +1Gbps+1 Gbps) and 90% of loading means bandwidth utilization of 1.89 Gbps.

6.2.6. Jitter

(i) Jitter provides a measure of variation in time in arrival of packets from a source to destination. High value of jitter adversely affects the user experience especially in real time interactive applications.

(ii) ITU-T Rec. Y.1540 defines network parameters that may be used in specifying and assessing IP network performance. IP packet delay variation or IPDV or jitter is defined as the differences between the one-way delay of IP packet and reference IP packet transfer delay (e.g. average IPTD as a reference delay).

(iii) The inter arrival jitter is the difference in the relative transit time for two packets. The relative transit time is the difference between a packet's Real-time Transport Protocol (RTP) timestamp and the receiver's clock at the time of arrival, measured in the same units. If S_i is the RTP timestamp from packet i , and R_i is the time of arrival in RTP timestamps units for packet i , then for two packets i and j the inter-arrival jitter D can be expressed as :

$$D(i,j) = (R_j - R_i) - (S_j - S_i)$$

(iv) The Jitter measurements should be conducted as per the test setup as prescribed in para 4.4.1 above for each technology separately for RTP and UDP. The test calls for Jitter shall be made during TCBH.

- (v) The IPDV (jitter) shall be calculated as mean deviation based on the samples collected for the delay measurement as per the setup used for measurement of latency as per ITU-T Recommendation G.1051.

6.3. Fault Repair

6.3.1. Fault incidences (No. of faults per 100 subscribers/month)

Same as provided in para 3.2.1 above.

6.3.2. Fault repair by next working day and Fault repair within three working days

Same as provided in para 3.2.2 above.

6.3.3. Mean Time-To-Repair (MTTR)

Same as provided in para 3.2.3 above

6.3.4. Percentage of significant network outage reported to the Authority within 24 hrs of start of the outage

- (i) Significant Network Outage is defined as an event where broadband (wireline) service in a district remains unavailable for a continuous period exceeding four (4) hours, or where more than ten percent (10%) of subscribers in the Service Area experience complete loss of service or material degradation in service quality for a continuous period exceeding four (4) hours. Material degradation in service quality shall mean a reduction of twenty percent (20%) or more in the download or upload speed experienced by a subscriber vis-à-vis the declared typical download or upload speed.
- (ii) All such SNOs shall be reported to the Authority within 24 Hrs. from the start of any such outage including material degradation. After restoration of the outage, the service provider shall report the summary of root cause along with details of action taken.

- (iii) If any such significant network outage continues for more than 24 hours, the service provider shall provide proportional rent rebate, as per subscribed tariff offering, for actual number of days of service outage to postpaid subscribers registered in the affected district(s) or affected post-paid subscribers, as applicable in next billing cycle. In the case of pre-paid subscribers registered in the affected district(s) or affected pre-paid subscribers, as applicable, the validity of their applicable active tariff offering, at the time of the start of the SNO, shall be increased by the equal number of days for which service outage continues.
- (iv) The outage duration of more than 12 hours in a calendar day shall be considered equal to one full day for the calculation of rent rebate or extension of validity.
- (v) However, recorded and reported force majeure incidences can be excluded for the calculation of rent rebate or extension of validity.

7. Measurement Methodology for QoS Parameters under Regulation 10.- Customer Service

7.1. Customer Service

7.1.1. Billing and charging complaints

- (i) Billing and the charging complaints for post-paid or pre-paid subscribers shall include, but not limited to, the following:
 - (a) payment made and not credited.
 - (b) payment made on time, but late payment charges levied wrongly.
 - (c) double charges.
 - (d) charging for toll free services.
 - (e) local call charges billed as STD/ISD or vice versa.
 - (f) calls or messages charged are disputed by the subscriber.

- (g) wrong roaming charges.
 - (h) credit agreed to be given in resolution of billing/ charging complaints but not accounted in the bill.
 - (i) charging for services provided without consent.
 - (j) charging not as per tariff plan.
 - (k) overcharging or undercharging
- (ii) In addition to the above, any billing/ charging complaint which leads to billing/ charging error, waiver, refund, credit, or any adjustment shall also be included as billing/charging complaint for calculating the number of disputed bills.
- (iii) The performance against the parameter “Billing and charging complaints”, for the assessment period, shall be measured as per the following formula:

$$= \frac{\text{Total number of billing or charging complaints reported}}{\text{Total number of postpaid and prepaid subscribers at the end of the assessment period}} \times 100$$

7.1.2. Resolution of billing/ charging complaints within ~~four weeks~~ one week

This parameter is intended to facilitate resolution of billing or charging complaints in a timely manner. The billing or charging related complaints shall include all types of complaints received from postpaid or pre-paid subscribers which involves any monetary aspect or validity period. Some of the examples of billing or charging related complaints are mentioned in para 7.1.1 above. The performance against this parameter for the assessment period shall be measured through the following formula:

$$= \left\{ 1 - \left(\frac{\text{Number of billing or charging complaints NOT resolved within **four weeks one week**}}{\text{Total number of billing or charging complaints registered}} \right) \right\} \times 100$$

7.1.3. Application of adjustment to customer's account within one week from the date of resolution of billing and charging complaints or rectification of faults or rectification of significant network outage, as applicable

- (i) A billing or charging complaint must be resolved within the time period prescribed in the respective regulation and any credit/ waiver/ adjustment arising out of resolution of that complaint must be made to the customer's account **within one week** of resolution of the complaint and intimation thereto the customer, post-paid/ pre-paid. Further, in the case of postpaid customers, the same shall also be reflected in the next bill to be issued.
- (ii) Similarly, rent rebate to postpaid customer or validity extension to prepaid customer, due delay in rectification of faults or due to significant network outage of more than 24 hours, as applicable, shall be made within one week of rectification of significant network outage.
- (iii) The performance against this parameter for the assessment period shall be measured through the following formula:

$$= \left\{ 1 - \left(\frac{\begin{array}{l} \text{(Number of customers to whom credit or waiver or adjustment} \\ \text{has NOT been made within one week from the date of} \\ \text{resolution of billing or charging complaints)} + \text{(Number of} \\ \text{customers to whom rent rebate due to delay in rectification of fault} \\ \text{has NOT been made within one week of rectification of fault)} \end{array}}{\begin{array}{l} \text{(Total number of billing or charging complaints, resolution} \\ \text{of which have resulted into credit or waiver or adjustment)} + \\ \text{(Total number of faults rectified after 7 days)} \end{array}} \right) \right\} \times 100$$

7.1.4. Accessibility of call centre/ customer care

- (i) Accessibility of Call Centre/ customer care number basically means percentage of calls got connected and answered by the call centre agent or Interactive Voice Response system as applicable.
- (ii) The performance against this parameter for the assessment period shall be measured through the following formula:

$$= \frac{\text{Number of calls connected to call center}}{\text{Total number of call attempts on call center number}} \times 100$$

7.1.5. Percentage of calls answered by the operators (voice to voice) within ninety seconds

- (i) The computation of the performance against the parameter 'Percentage of calls answered by operators (voice to voice) within ninety seconds' i.e. the time taken for connecting to the operator shall be calculated from the time the customer has keyed the relevant number in the IVR option menu or direct operator access, as applicable, for speaking to the customer care executive/operator.
- (ii) The menu for speaking to the customer care executive/ operator shall be given preference in the menu options and this menu shall not be below the second layer, the first layer being the choice of language and the second layer the service menu. Further, there should not be unnecessary pause(s) before extending the option to the subscriber for speaking to the customer care executive/operator.
- (iii) The performance against this parameter for the assessment period shall be measured through the following formula:

$$= \frac{\text{Number of calls answered by the operator within 90 seconds}}{\text{Total number of subscribers requested to connect to the operator}} \times 100$$

7.1.6. Termination/ closure of service within seven working days of receipt of customer's request

- (i) Time for termination/ closure of service shall not be more than 7 working days from the date of receipt of request for termination/ closure of any service.
- (ii) The performance against this parameter for the assessment period is to be measured through the following formula:

$$= \left\{ 1 - \left(\frac{\text{Number of termination or closure of service requests executed after 7 working days}}{\text{Total number of termination or closure of service requests received}} \right) \right\} \times 100$$

- (iii) Termination/ closure of service should not be withheld on account of pending dues or any other reason. It is further clarified that no billing or charging should be done beyond seven working days of receipt of customer's request.

7.1.7. Refund of deposits within 45 days of closure of service or non-provisioning of service

- (i) The refund of deposits shall be completed within 45 days after closure of service or non-provisioning of service. Any delay in the refund of deposits shall attract interest @10% per annum for actual delay beyond 45 days and payable to the customer. Here the deposit includes a security deposit and any other refundable deposit taken from the customer. The same benchmark shall also be followed for payment of any other dues payable to the customer after closure/ termination of the service. It is further to clarify that the fact that interest is paid to the customer for the delay in the payment of dues does not absolve the service provider from the responsibility of meeting the prescribed benchmark. Any detail required from subscriber for successful refund may be collected at the time of closure request, if required.

- (ii) The performance against this parameter, for the assessment period, is to be measured through the following formula:

$$= \left\{ 1 - \left(\frac{\text{Number of deposits not refunded within 45 days of closure}}{\text{Total number of instances closure of service which requires refund of deposits}} \right) \right\} \times 100$$

8. Modification in the Schedule

In view of technological advancement, the details mentioned in the schedule can be modified by the Authority through direction or order.

Schedule-II

Schedule-II as mentioned in principal regulations remain unchanged.

Schedule-III

Kindly refer Schedule-III attached with draft notification.

List of Acronyms

S. No.	Acronym	Description
1.	3GPP	3rd Generation Partnership Project
2.	5QI	5G QoS Identifier
3.	API	Application Programmable Interface
4.	ARCEP	Autorité de Régulation des Communications Électroniques, des Postes et de la Distribution de la Presse
5.	ARP	Allocation and Retention Priority
6.	BEREC	Body of European Regulators for Electronic Communications
7.	CA	Carrier Aggregation
8.	CBBH	Cell Bouncing Busy Hour
9.	CBDH	Cell Busy Day Hour
10.	CGI	Cell Global Identity
11.	CRS	Coordinate Reference System
12.	CRTC	Canadian Radio-television and Telecommunications Commission
13.	CS	Circuit Switched
14.	DCR	Dropped Call Rate
15.	DL	Downlink
16.	DoT	Department of Telecommunications
17.	Ec/No	Energy per Chip to Noise Density Ratio
18.	eMBB	enhanced Mobile Broadband

S. No.	Acronym	Description
19.	EPSG	European Petroleum Survey Group
20.	ESRI	Environmental Systems Research Institute
21.	FCC	Federal Communications Commission
22.	FWA	Fixed Wireless Access
23.	GBR	Guaranteed Bit Rate
24.	GIS	Geographic Information System
25.	GSM	Global System for Mobile Communications
26.	IDT	Independent Drive Test
27.	IMS	IP Multimedia Subsystem
28.	IMT	International Mobile Telecommunications
29.	ITU	International Telecommunication Union
30.	JSON	JavaScript Object Notation
31.	KPI	Key Performance Indicator
32.	LSA	Licensed Service Area
33.	LTE	Long Term Evolution (4G)
34.	MCLR	Marginal Cost of Lending Rate
35.	MIMO	Multiple Input Multiple Output
36.	mMTC	massive Machine Type Communications
37.	MNO	Mobile Network Operator
38.	MTTR	Mean Time To Repair
39.	NR	New Radio (5G)
40.	NRA	National Regulatory Authority
41.	Ofcom	Office of Communications
42.	OGC	Open Geospatial Consortium

S. No.	Acronym	Description
43.	PDR	Packet Drop Rate
44.	PMR	Performance Monitoring Report
45.	PRB	Physical Resource Block
46.	PRJ	Projection File
47.	PS	Packet Switched
48.	QCI	QoS Class Identifier
49.	QoS	Quality of Service
50.	RAN	Radio Access Network
51.	RSCP	Received Signal Code Power
52.	RSRP	Reference Signals Received Power
53.	RSSI	Received Signal Strength Indicator
54.	RTP	Real-time Transport Protocol
55.	SA	Standalone
56.	SHP	Shape File
57.	SHX	Shape Inde File
58.	SLA	Service Level Agreement
59.	SMS	Short Message Service
60.	SNO	Significant Network Outage
61.	SS-RSRP	Synchronisation Signal Reference Signal Received Power
62.	TCBH	Time Consistent Busy Hour
63.	TCP	Transmission Control Protocol
64.	TEC	Telecommunication Engineering Centre
65.	TRAI	Telecom Regulatory Authority of India

S. No.	Acronym	Description
66.	TSP	Telecom Service Provider
67.	TSTP	Test Schedule and Test Procedure
68.	UE	User Equipment
69.	UL	Uplink
70.	UMTS	Universal Mobile Telecommunications System
71.	URL	Uniform Resource Locator
72.	URLLC	Ultra-Reliable Low Latency Communications
73.	UT	Union Territory
74.	VoLTE	Voice over Long Term Evolution
75.	VoNR	Voice over New Radio
76.	WGS-84	World Geodetic System 1984
