REPUBLIKA E SHQIPËRISË

**ELECTRONIC AND POSTAL COMMUNICATIONS AUTHORITY**

# REGULATION ON QUALITY OF SERVICE INDICATORS

**November 2026,**

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## Article 1
## Legal basis

This regulation has been drafted in implementation of Article 143 of Law no. 54/2024 "On Electronic Communications in the Republic of Albania."

## Article 2
## Purpose

1. This Regulation establishes the methodology for monitoring the quality of interpersonal communications services and internet access services, the quality indicators for these services, the measurement methods, and the content, format and manner of publication of information for end-users.
2. The indicators and measurement methods are based on the documents specified in the annexes to this Regulation, including standards developed by ETSI (European Telecommunications Standards Institute) and 3GPP (3rd Generation Partnership Project), ITU recommendations, IETF technical documents and BEREC Guidelines.

## Article 3
## Definitions

For the purposes of this Regulation, the following terms shall have the following meanings:

1. **"Internet Access Service" (IAS):** is a publicly available electronic communications service that provides access to the internet and thereby connectivity to virtually all end points of the internet irrespective of the network technology and terminal equipment used.
2. **"Interpersonal Communications Service":** is a service normally provided for remuneration that enables direct interpersonal and interactive exchange of information via electronic communications networks between a finite number of persons, whereby the persons initiating or participating in the communication determine its recipient(s). This service does not include services which enable interpersonal and interactive communication merely as a minor ancillary feature that is intrinsically linked to another service.
3. **"Number-Based Interpersonal Communications Service" (NB-ICS):** is an interpersonal communications service which connects with publicly assigned numbering resources, namely, a number or numbers in national or international numbering plans, or which enables communication with a number or numbers in national or international numbering plans.
4. **"Voice Communications Service":** is a publicly available electronic communications service for originating and receiving, directly or indirectly, national or national and international calls through a number or numbers in a national or international telephone numbering plan.

## Article 4
## Quality of Service Indicators

1. For the purposes of measurement, monitoring and publication, AKEP monitors and measures quality of service indicators for the following services:
    a) Interpersonal communications services;
    b) Internet access services;
    c) Performance of public mobile networks;
    d) Customer/end-user services.
2. Any amendment, supplementation or updating of the indicators, measurement methods and annexes shall be made by decision of the AKEP Steering Council, based on a reasoned assessment of necessity, proportionality, impact on competition and implementation costs, and following public consultation in accordance with Article 44 of Law No. 54/2024.
3. The indicators, measurement methods, calculation methods, accessibility measures and reporting forms are specified in Annexes I to VII, which form an integral part of this Regulation.

## Article 5
## Procedures for Monitoring and Verification of Quality of Service Indicators

1. Compliance with quality of service (QoS) indicators for fixed and mobile electronic communications networks and services shall be assessed on the basis of measurements carried out by AKEP through its mobile QoS monitoring center, inspections conducted by the Authority, as well as periodic reporting by undertakings through self-declaration.
2. For mobile electronic communications networks, quality of service monitoring shall be carried out through field measurements using “Drive Test”, “Walk Test” or other internationally recognized methodologies. For fixed electronic communications networks, monitoring shall be carried out through active and/or passive measurements of internet access service quality indicators, using the quality-of-service measurement system administered by AKEP, in accordance with ETSI standards, ITU-T recommendations and BEREC Guidelines.
3. Monitoring by AKEP shall be carried out in accordance with the Annual Plan approved by the Head of the Authority, based on objective risk and representativeness criteria, or outside the Plan in response to complaints, incidents, indications of infringements or other supervisory needs.
4. In addition to the monitoring carried out by AKEP, electronic communications undertakings shall be required to report quality of service indicators periodically through a self-declaration procedure, in accordance with the format and deadlines specified in this Regulation.
5. Providers shall ensure the necessary access and cooperation for AKEP to exercise its statutory powers and shall be responsible for the completeness, traceability and accuracy of the reported data. Before publishing an individual result with adverse consequences or imposing an administrative measure, AKEP shall communicate the material findings and the methodology used to the provider and allow a reasonable period for submitting observations or correcting factual errors, without prejudice to its inspection powers and the urgent measures provided for by law.

## Article 6
## Rules for Measuring Quality of Service Indicators

1. Measurement shall cover the offers and quality levels actually available on the market. Where offers with different quality levels exist, the results shall be disaggregated according to comparable categories of service and technology and, where necessary, geographical area. No offer shall be excluded solely on the basis of its tariff, commercial name or additional charge.
2. The use by undertakings of additional quality of service indicators other than those specified in this Regulation shall not exempt them from the obligation to measure, monitor, report and publish the quality of service indicators specified in this Regulation.
3. Unless otherwise specified in this Regulation or its annexes, the data collection period shall be the calendar quarter, while reporting to AKEP shall be carried out every six months in accordance with Article 13.
4. The provisions of this Regulation shall be without prejudice to the application of specific requirements laid down in the legislation in force or in AKEP regulatory acts for particular categories of electronic communications networks or services, including universal service, concerning quality of service indicators and levels.

## Article 7
## Obligations of Electronic Communications Undertakings

1. Undertakings providing public electronic communications networks or services shall be required to measure, monitor, report and publish quality of service indicators in accordance with the requirements laid down in this Regulation.
2. For the purposes of fulfilling the obligations set out in paragraph 1 of this Article, undertakings shall:

   a) establish and implement appropriate procedures, information systems and mechanisms for measuring, monitoring, recording and managing quality of service indicators, and ensure that these mechanisms enable AKEP or an entity authorised by AKEP to verify and inspect the measurement processes and reported results;
   b) publish and make available to end-users and AKEP information on quality of service indicators, in accordance with this Regulation and the legislation in force.

3. Undertakings shall be responsible for measuring and reporting quality of service indicators only in respect of the network elements and services that they directly manage or control, or for which they are responsible under a Service Level Agreement (SLA).
4. Where quality of service is affected by factors beyond the provider's control, the provider shall identify those factors, provide supporting evidence and, where technically feasible, assess their impact on quality of service.
5. Undertakings that decide to measure and publish additional quality of service indicators beyond those specified in this Regulation shall notify AKEP within 30 (thirty) days of commencing the measurements. The notification shall contain information on the methodology, procedures and systems used to measure and assess these indicators.

6. The implementation of measures to ensure and monitor quality of service shall be carried out in accordance with the legislation in force on the open internet and other applicable acts.

## Article 8

## Information Systems and Procedures Used by Electronic Communications Undertakings for Measuring Quality of Service Indicators

1. Within 6 (six) months following the expiry of the deadline specified in point 1 of Article 18 of this Regulation for the commencement of measurements, providers shall prepare, approve and maintain a methodology manual, which shall include at least:

    a) complete documentation of the operational processes relating to the measurement, monitoring, processing and reporting of quality of service indicators;
    b) technical documentation of the information systems used for measuring and managing the indicators, including a description of the data structure, how the data are used and the relevant functions;
    c) the methodology, formulas and algorithms used to calculate each quality of service indicator, clearly specifying the data sources and the rules for their processing, in accordance with the technical documentation referred to in point (b) of this paragraph.

2. Undertakings shall be responsible for continuously updating the manual referred to in point 1 of this Article. At AKEP's request, they shall submit, in electronic format, the current version of the manual, its previous versions and the relevant supporting documentation.
3. In the event of changes to the procedures, systems or methodologies used to measure quality of service indicators, or where requested by AKEP, undertakings shall update the manual referred to in point 1 of this Article within 30 (thirty) days of the implementation of the relevant changes or receipt of AKEP's request.

## Article 9

## AKEP Information System for Measuring the Quality of Internet Access Services over Fixed Networks

1. AKEP shall make available to end-users a measurement system that is independent of service providers and has a published methodology, for the main quality of service indicators of internet access services, including:
    a) data download and upload speeds;
    b) latency;
    c) variation in latency (jitter);
    d) packet loss ratio.
2. In accordance with the technical capabilities of the system and developments in international standards, AKEP may expand the list of measurement parameters and system functionalities, taking into account ETSI standards, ITU-T recommendations, BEREC

Guidelines and European best practices, including service quality tests and net neutrality monitoring.

3. The system aims to increase transparency regarding the quality of internet access services and enables the monitoring of service performance, the identification of changes or degradation in quality, and the publication of results in aggregated form, where appropriate.
4. The system may consist of applications, software components, measurement servers or other appropriate technical solutions deployed at different points in the network, including Internet Exchange Points (IXPs), data centers, operators' networks or the premises of volunteer end-users, depending on the architecture of the measurement system.
5. The system may perform quality of service measurements both within the service provider's network (on-net) and towards other networks (off-net), depending on the system architecture and the location of the measurement servers.
6. AKEP shall ensure the administration, technical integrity, maintenance and periodic verification of the system, with a view to guaranteeing the accuracy, reliability and reproducibility of measurement results.

## Article 10

## Ensuring Access and Non-Interference with Internet Quality of Service Measurements over Fixed Networks

1. Undertakings providing direct connectivity or international capacity for internet access shall be required to cooperate with AKEP and ensure the necessary technical conditions for the installation and operation of the measurement system modules, including technical infrastructure, power supply, the necessary network connectivity and appropriate measures for the security and protection of the equipment.
2. Undertakings providing internet access through other domestic operators shall be required to ensure that their subscribers have access to the measurement system and that the adequate network connectivity and capacity with this system is available through the connections used to provide the internet access service.
3. Undertakings shall not, through any other technical mechanism, influence measurement results by prioritizing, restricting or blocking traffic generated by the quality measurement system.
4. Quality parameters affected by elements beyond the undertaking's direct control shall not be attributed to that undertaking for the purposes of assessing quality of service, except where such effects result from actions taken or restrictions imposed by the undertaking.

## Article 11
## Measurement of Quality of Service Indicators for Public Electronic Communications Services over Mobile Networks

1. The quality of service indicators specified in this Regulation shall apply to all undertakings providing public electronic communications services over mobile networks and holding one or more Mobile Network Codes (MNCs). Where an undertaking holds more than one Mobile Network Code (MNC), AKEP may carry out separate measurements, analyses and

reporting for each MNC where these codes are used to provide distinct networks or services.

2. In the event of a dispute initiated by a subscriber or end-user concerning quality of service, the assessment of quality of service indicators shall be carried out in respect of the undertaking with which the subscriber has signed the contract for the provision of the service, regardless of whether that undertaking operates its own mobile communications network or provides the service through the network of another undertaking.

**Article 12**
**Quality of service indicators for mobile networks measured by AKEP**

**Quality of Service Indicators for Mobile Networks Measured by AKEP**

1. AKEP shall measure the quality of service indicators for public electronic communications services provided over mobile communications networks, in accordance with the methodology specified in Annex IV, which forms an integral part of this Regulation.

   The measurements shall include, inter alia, the following indicators:

   a) **Technology-dependent indicators:** measured signal level, measured separately for each radio access technology.
   b) **Service-dependent indicators:**

   **Voice services:**

   - Network availability;
   - Service accessibility (percentage of failed calls);
   - Service retainability (percentage of dropped calls);
   - Call setup time;
   - Voice quality.

   **Data services:**

   - Service Access Failure Ratio (SAFR) (%);
   - Service Session Failure Rate (SSFR) (%);
   - Data transmission speed over the radio communications network (GPRS/EDGE, UMTS (3G), LTE (4G) and 5G NR);
   - Percentage of time during which the measured terminal equipment operated on the respective radio access technologies (GSM, UMTS, LTE and 5G NR);
   - Latency;
   - Jitter;
   - Packet Loss Ratio.

2. The undertaking shall be required to provide AKEP, free of charge, with the necessary technical facilities for measuring the quality of service indicators of public electronic communications services, including:

    - SIM cards with no restrictions on voice and data services;
    - IVR system voice numbers;
    - FTP/HTTP data servers.

    The undertaking shall not apply differentiated treatment, prioritization, optimization or traffic restrictions to the SIM cards, International Mobile Equipment Identity (IMEI) numbers of terminal equipment, or traffic generated by the equipment used by AKEP for quality of service measurement purposes.

3. The undertaking shall be required, at AKEP's request, to enable AKEP to carry out data transmission speed measurements using the undertaking's servers, by allowing the uploading and downloading of test files of different sizes. The undertaking shall ensure access to its servers for the period necessary to carry out the measurements, which shall not exceed 7 days from the date of AKEP's request.
4. The undertaking shall be required to ensure the uninterrupted operation and maintenance of the servers used for measurements, so that their performance does not affect the measurement results. The servers shall have sufficient technical capacity and network connectivity to ensure that the server infrastructure does not constitute a limiting factor during data transmission speed measurements.

## Article 13
## Information to Be Submitted to AKEP by Undertakings

1. The indicators shall be measured, recorded and calculated for each calendar quarter, namely 1 January–31 March, 1 April–30 June, 1 July–30 September and 1 October–31 December, unless expressly provided otherwise in the annexes.
2. Undertakings shall submit to AKEP, no later than the last working day of the month following each calendar six-month period, a report containing the recorded values of the quality of service indicators for each quarter of that six-month period and for each of the indicators specified in the annexes to this Regulation.
3. Where the commencement of the measurement of quality of service indicators does not coincide with the beginning of a calendar quarter, the first report submitted to AKEP shall cover only the period during which measurements were carried out.
4. AKEP shall periodically publish comparative information on quality of service indicators based on the reports submitted by undertakings in accordance with this Regulation.

## Article 14
## Information Provided to End-Users on Quality of Service

1. Before signing any contract, undertakings shall make available to end-users clear, accurate, comparable and up-to-date information on the quality of service indicators for the services they provide.

2. In order to fulfil the obligation set out in point 1 of this Article, undertakings shall publish annually:

   a) no later than the last working day of January, the quality of service indicators recorded during the preceding calendar year, for each of the indicators specified in the annexes to this Regulation;
   b) no later than the last working day of January, the quality of service levels they undertake to provide during the following calendar year, for each of the indicators specified in the annexes to this Regulation;
   c) where the quality of service levels published pursuant to point (b) of this paragraph change during the year, they shall update the publicly available information without delay and notify end-users of such changes.

3. Where the measurement of quality of service indicators does not commence at the beginning of the calendar year, the information published pursuant to this Article shall cover only the period during which measurements were carried out, clearly indicating the period to which the data relate.
4. The information referred to in point 2 of this Article shall be made available to end-users, in written or electronic form, at all points of sale and customer service centers.
5. In the case of internet access services, the information referred to in point 2(b) of this Article concerning the minimum quality of service levels that the undertaking undertakes to guarantee to end-users, in accordance with the indicators specified in Annex II, shall form part of the pre-contractual information and shall be made available to the end-user before signing the contract.

**Article 15**
**Publication and reporting of information on service quality**

1. Undertakings shall publish easily accessible and up-to-date information for end-users on the quality of the services they provide. They shall also publish, in the same manner, information on the measures ensuring equal access for end-users with disabilities.
2. The information shall be published in accordance with the format, content and deadlines specified in this Regulation and its annexes.
3. Undertakings shall report data on quality of service indicators to AKEP in accordance with the reporting periods and procedures specified in this Regulation.
4. AKEP may request additional information or the publication of other quality of service indicators where necessary to protect end-users, ensure transparency or enforce the legislation in force.

**Article 16**
**Measures to Ensure Equal Access for End-Users with Disabilities**

1. Undertakings providing internet access services and interpersonal communications services shall publish the measures ensuring equal access for end-users with disabilities. For interpersonal communications services, the information shall include at least:

- Bandwidth for voice transmission;
- Characteristics of the Real-Time Text service, including:
  - Visually distinguishable display;
  - Configurable text direction;
  - Interoperability;
  - Real-Time Text response time;
- Characteristics of video transmission, including:
  - Resolution;
  - Frame rate;
  - Synchronization.

2. Undertakings providing publicly available interpersonal communications services shall publish whether they offer the measures specified in Annex VI.

**Article 17**
**Emergency situations and cases of force majeure**

In exceptional circumstances, including natural disasters, states of emergency or other cases of force majeure affecting the quality of electronic communications services, the undertaking shall be required to:

a) document and report the circumstances of the exceptional situation or case of force majeure, describing their impact on the provision of the service;
b) publish and make available to AKEP information on quality of service indicators, clearly distinguishing the values recorded during the period affected by the exceptional circumstances or force majeure from those recorded under normal operating conditions, and accompany this information with a reasoned explanation of the deviations identified.

**Article 18**
**Final provisions**

1. The measurement of quality of service indicators, in accordance with the requirements of this Regulation or any amendments thereto, shall commence within 3 (three) months from the date of entry into force of the Regulation or the relevant amendments, unless otherwise specified therein.
2. Where an undertaking commences the provision of a service after the entry into force of this Regulation or any amendments thereto, the 3 (three)-month period provided for in point 1 of this Article shall be calculated from the date on which the provision of the service commences.
3. The first report on quality of service indicators shall be submitted to AKEP no later than the last working day of the month following the calendar six-month period during which the measurements commenced, in accordance with the requirements of this Regulation.
4. The information on quality of service levels included in contracts with end-users, in accordance with point 2 of Article 14 of this Regulation, shall be consistent with the information published pursuant to point 3 of this Article and shall reflect the quality of service levels that the undertaking undertakes to provide.

5. Failure to comply with the obligations arising from this Regulation shall constitute an administrative offence and shall be subject to the sanctions provided for in Article 184 of Law No. 54/2024, "On Electronic Communications in the Republic of Albania".

**Article 19**
**Entry into force**

1. Regulation No. 16, dated 16 April 2010, "On Quality of Service Indicators", is hereby repealed.
2. This Regulation shall enter into force on the date of its approval by the AKEP Steering Council and shall be published on AKEP's official website.

**ANNEX I: BASIC QUALITY OF SERVICE (QoS) INDICATORS FOR THE PROVISION OF INTERPERSONAL COMMUNICATIONS SERVICES OVER FIXED AND MOBILE ACCESS NETWORKS**

| Quality of Service Indicators | |
|---|---|
| Time for Initial Connection | |
| Definition | Measurement Method |
| ETSI ES 202 057-1 (Clause 5.1)<br><br>The period of time from the moment a service provider receives a valid request for the provision of a service until the moment the service is activated and becomes operational for the user. Cancelled requests shall be excluded from the calculation of this indicator. This indicator applies to fixed and mobile services. | ETSI ES 202 057-1 (Clause 5.1.3)<br><br>This indicator shall be measured by:<br>a) the time within which 50%, 95% and 99% of requests for service provision are fulfilled, starting with the requests fulfilled in the shortest time;<br>b) the percentage of requests fulfilled within the timeframe agreed with the end-user. Where this percentage is below 80%, the average number of days by which the agreed timeframe was exceeded shall also be reported, considering only requests fulfilled late.<br><br>Statistics shall be reported separately for fixed and mobile access networks. |
| Fault Repair Time | |
| ETSI ES 202 057-1 (Clause 5.5)<br><br>The period of time from the moment a fault is reported until the service element or the service itself is restored to normal operation.<br><br>This indicator applies only to fixed services. | ETSI ES 202 057-1 (Clause 5.5.3)<br><br>This indicator shall be measured by:<br>a) the time within which 80% and 95% of valid reported faults on access lines are repaired, starting with the faults repaired in the shortest time. The time shall be expressed in calendar hours;<br>b) the percentage of faults repaired within the |

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| | target timeframe established by the undertaking;<br>c) the publication of information on the hours during which users may report faults.<br><br>Statistics shall be reported for all fixed access networks. |
| Call Setup Time | |
| ETSI EG 202 057-2 (Clause 5.2)<br><br>The period of time commencing when the network receives the addressing information necessary to establish a call and ending when the calling party receives a busy signal, ringing signal or answer signal from the called party. Where overlap signalling is used, measurement shall commence when the network has received sufficient addressing information to initiate call routing. This indicator applies to calls over both fixed and mobile networks. | ETSI EG 202 057-2 (Clause 5.2.3)<br><br>This indicator shall be measured by:<br>a) the average call setup time for national calls, expressed in seconds;<br>b) the time, expressed in seconds, within which the fastest 95% of national calls are established;<br>c) the average call setup time for international calls, expressed in seconds;<br>d) the time, expressed in seconds, within which the fastest 95% of international calls are established;<br>e) the number of measurements carried out for national and international calls.<br><br>Statistics shall be reported for voice services over both fixed and mobile networks. |
| 3GPP TS 32.454 (Clause 5.1.2)<br><br>Session setup time: the average time required to establish an IMS (VoLTE) session, from the initiation of the session setup procedure until its successful completion. | 3GPP TS 32.454 (Clause 5.1.2)<br><br>This indicator shall be measured by the average session setup time, expressed in seconds. |
| Complaints about Billing Accuracy | |
| ETSI ES 202 057-1 (Clause 5.11)<br><br>The percentage of invoices that have resulted in a complaint from an end-user concerning the accuracy of the invoice for a particular service.<br><br>This indicator applies to both fixed and mobile services. | ETSI ES 202 057-1 (Clause 5.11.3)<br><br>This indicator shall be measured as a percentage (%). |
| Speech Connection Quality | |
| ETSI EG 202 057-2 (Clause 5.3)<br><br>ETSI TR 102 506 | ETSI EG 202 057-2 (Clause 5.3.2)<br><br>Statistics shall be reported for: |

<table>
<tr><td rowspan="4">Assessment of the quality of voice communication for each call.<br><br>Voice quality as perceived by the end-user.<br><br>This indicator applies to voice services over fixed and mobile networks.</td><td>Statistics shall be reported separately for:<br>• fixed-to-fixed network calls;<br>• fixed-to-mobile network calls;<br>• mobile-to-fixed network calls;<br>• mobile-to-mobile network calls.</td></tr>
<tr><td>ITU-T G.1020: Performance parameter definitions for quality of speech and other voiceband applications utilising IP networks.</td></tr>
<tr><td>ITU-T G.1028: End-to-end quality of service for voice services over 4G mobile networks (VoLTE).</td></tr>
<tr><td>ITU-T P.863: Perceptual objective listening quality prediction.</td></tr>
<tr><td colspan="2">Dropped Call Rate</td></tr>
<tr><td>ETSI EG 202 057-3 (Clause 6.4.2)<br><br>The percentage of incoming and outgoing calls which, after being successfully established and assigned a traffic channel, are disconnected before their normal termination by the user due to causes related to the operator’s network. This indicator applies to mobile networks.</td><td>ETSI EG 202 057-3 (Clause 6.4.2.2)<br><br>Where measurements are performed using network element counters, the percentage of dropped calls shall be reported, calculated on the basis of all calls made during the measurement period.<br><br>Where measurements are performed using test calls, the following shall be reported:<br>• the percentage of dropped calls;<br>• the number of measurements (observations) used; and<br>• the absolute accuracy limits at a confidence level of 95%, calculated on the basis of the number of measurements performed.</td></tr>
<tr><td>3GPP TS 32.454 (Clause 5.2.1)<br><br>The percentage of dropped IMS sessions applies to IMS (VoLTE KPI). It is the percentage of dropped IMS sessions, calculated as the ratio between the number of dropped IMS sessions and the number of successfully established IMS sessions. This indicator applies to IMS (VoLTE KPI).</td><td>3GPP TS 32.454 (Clause 5.2.1)<br><br>This indicator shall be measured as a percentage (%).</td></tr>
<tr><td colspan="2">Unsuccessful Call Ratio</td></tr>
<tr><td>ETSI EG 202 057-2 (Clause 5.1)<br><br>The percentage of unsuccessful calls, calculated as the ratio between the number of unsuccessful calls and the total number of</td><td>ETSI EG 202 057-2 (Clause 5.1.3)<br><br>This indicator shall be measured by:<br>a) the percentage of unsuccessful national calls;</td></tr>
</table>

| | |
|---|---|
| call setup attempts during a specified period. This indicator applies to fixed and mobile networks. | b) the percentage of unsuccessful international calls;<br>c) the number of measurements used for national and international calls, together with the absolute accuracy limits. |
| Call Setup Failure Probability | |
| ETSI TS 102 024-9 (Clause 4.1.1)<br><br>The ratio between the total number of call setup attempts resulting in call setup failure and the total number of call setup attempts within a given population.<br><br>This indicator applies to both fixed and mobile networks. | ETSI TS 102 024-9 (Clause 4.1.1) |
| Call Signalling Delays | |
| ETSI TS 102 024-9 (Clause 4.2)<br><br>This indicator comprises three different scenarios: call setup delay, call answer signal delay and call release delay.<br><br>Call Setup Delay (CSD) is the time between the moment the calling terminal provides sufficient addressing information to establish the call and the moment the calling party receives confirmation from the called terminal that the called party is being alerted.<br><br>Call Answer Signal Delay (CASD) is the time between the moment the called terminal indicates that it is ready to initiate the call and the moment this indication is received by the calling terminal.<br><br>Call Release Delay (CRD) is the time between the moment the terminal terminating the call initiates the release procedure and the moment it receives confirmation of the release from the other terminal.<br><br>This indicator applies to calls over both fixed and mobile networks. | ETSI TS 102 024-9 (Clause 4.2) |

## ANNEX II: BASIC QoS INDICATORS FOR INTERNET ACCESS SERVICES (IAS)

<table>
<tr><td colspan="2">Quality of Service Indicators</td></tr>
<tr><td colspan="2">Data Transmission Speed</td></tr>
<tr><td>Definition</td><td>Measurement Method</td></tr>
<tr><td>Data transmission speed is defined as the speed achieved in transmitting data during each process of uploading test files between a remote website and the user’s computer.</td><td>A test call measuring:<br>a) The maximum data transmission speed achieved, in kbit/s;<br>b) The minimum data transmission speed achieved, in kbit/s;<br>c) The mean value and standard deviation of the data transmission speed, in kbit/s.</td></tr>
<tr><td colspan="2">Latency</td></tr>
<tr><td>The time between the moment the first bit of a packet from the source enters the network, passes through the network and reaches the destination, which immediately sends a bit back towards the source, and the moment the last bit of the packet arrives back at the source through the network (round-trip delay).</td><td>Reference: IETF RFC 2681; BEREC Regulatory Assessment Methodology for Net Neutrality, in the applicable version in force.</td></tr>
<tr><td colspan="2">Jitter</td></tr>
<tr><td>Reference: IETF RFC 3393<br>The difference between the delays of selected packets.</td><td>Reference: BEREC Regulatory Assessment Methodology for Net Neutrality, in the applicable version in force.</td></tr>
<tr><td colspan="2">Packet Loss Ratio</td></tr>
<tr><td>Reference: ITU-T Y.2617<br>The total number of packets that fail to be delivered through the network, divided by the total number of packets transmitted.</td><td>Reference: BEREC Regulatory Assessment Methodology for Net Neutrality, in the applicable version in force.</td></tr>
<tr><td>Reference: ITU-T Y.1540<br>The ratio of the total number of lost IP packet outcomes to the total number of IP packets transmitted in a given population.</td><td></td></tr>
</table>

## ANNEX III: BASIC QoS INDICATORS FOR CUSTOMER CARE

| Quality of Service Indicators | |
|---|---|
| Operator Response Time (Customer Care Services – Assistance Service) | |
| Definition | Measurement Method |
| ETSI ES 202 057-1 (Clause 5.6.1)<br><br>The time interval from completion of dialing until a human operator answers the calling user to provide the requested service. Applicable to fixed and mobile services. | ETSI ES 202 057-1 (Clause 5.6.3)<br>Measured by: a) the average response time; b) the percentage of calls answered within 20 seconds. The number of valid calls and abandoned calls shall also be reported in accordance with the method specified in the standard. |
| Customer Complaint Resolution Time | |
| ETSI ES 202 057-1 (Clause 5.10.1)<br><br>The time interval from the moment a customer complaint is submitted to the service provider's published point of contact and assessed as valid until the cause of the complaint has been eliminated. Applicable to fixed and mobile services. | ETSI ES 202 057-1 (Clause 5.10.3)<br><br>Measured by:<br>a) the time required to resolve the fastest 80% and 95% of complaints (expressed in calendar hours);<br>b) the percentage of complaints resolved within the timeframe declared as a target by the service provider. |
| Number of Customer Complaints During the Data Collection Period | |
| ETSI ES 202 057-1 (Clause 5.9.1)<br><br>The number of complaints recorded per customer during the data collection period. | ETSI ES 202 057-1 (Clause 5.9.4)<br><br>The number of complaints recorded per customer during the data collection period shall be provided. Statistics shall include all complaints received during the data collection period, irrespective of the validity or subject matter of the complaint. |
| Data Transmission Speed (Upload and Download) | |
| The definitions in accordance with Article 4(1)(d) of the Open Internet Regulation are set out in BoR (22) 81, paragraphs 140–157. | Guidance on measuring Internet Access Service (IAS) speeds is provided in Section 3.1 of the BEREC document "Net Neutrality Regulatory Assessment Methodology", BoR (22) 72. |

## ANNEX IV: MOBILE (CELLULAR) NETWORK COVERAGE BY SIGNAL STRENGTH

Mobile network coverage is classified according to the signal strength measured at the terminal equipment, based on the relevant parameters for each technology. This classification is used to assess service availability.

Technical characteristics
Received signal level (colour coding):

### GSM

Very good signal
(RxLev > -75 dBm, dark green)
Good signal
(-85 dBm < RxLev ≤ -75 dBm, light green);
Acceptable signal
(-95 dBm < RxLev ≤ -85 dBm, yellow);
Weak signal
(-103 dBm < RxLev ≤ -95 dBm, orange);
Unacceptable signal
(RxLev ≤ -103 dBm, red).

Determination of network coverage (threshold value for the existence of network coverage):
RxLev > -95 dBm.

### UMTS

Very good signal
(CPICH RSCP > -75 dBm, dark green)
Good signal
(-95 dBm < CPICH RSCP ≤ -75 dBm, light green);
Acceptable signal
(-105 dBm < CPICH RSCP ≤ -95 dBm, yellow);
Weak signal
(-115 dBm < CPICH RSCP ≤ -105 dBm, orange);
Unacceptable signal
(CPICH RSCP ≤ -115 dBm, red).

Determination of network coverage (threshold value for the existence of network coverage):
CPICH RSCP > -105 dBm; and
EcNo > -12 dB.

**LTE**

Very good signal
(RSRP > -80 dBm, dark green);
Good signal
(-100 < RSRP ≤ -80 dBm, light green);
Acceptable signal
(-110 dBm < RSRP ≤ -100 dBm, yellow);
Weak signal
(-115 dBm < RSRP ≤ -110 dBm, orange);
Unacceptable signal
(RSRP ≤ -115 dBm, red).

Determination of network coverage (threshold value at which network coverage is deemed to exist):
RSRP > -110 dBm.

5G NR (New Radio)

In 5G NR networks, signal-level threshold values vary depending on the frequency band used. This is related to the physical characteristics of radio-wave propagation: lower-frequency bands offer better penetration and coverage over longer distances, whereas higher-frequency bands experience greater propagation losses and require a higher density of base stations to ensure the same service level.

For this reason, the classification of 5G NR coverage quality must take into account the frequency band used. The signal-level values specified for each band are used to categorise coverage quality as very good, good, acceptable, weak and unacceptable/no coverage, based on the technical parameter for received signal level (NR-RSRP/SS-RSRP).

The following categorisation aims to ensure a uniform and transparent assessment of 5G NR network coverage, reflecting the technical differences between the frequency bands used.

| Coverage classification | Description | < 1 GHz | 1.8 GHz & 2.1 GHz | 2.6 GHz | 3.5 GHz |
|---|---|---|---|---|---|
| Very good | Strong signal level with maximum data transmission speeds | ≥ -82.8 dBm | ≥ -91.7 dBm | ≥ -93.3 dBm | ≥ -97.4 dBm |
| Good | Strong signal level with good data transmission speeds | ≥ -92.8 dBm | ≥ -101.7 dBm | ≥ -103.3 dBm | ≥ -107.4 dBm |
| Acceptable | Fast and stable data speeds can | ≥ -102.8 dBm | ≥ -111.7 dBm | ≥ -113.3 dBm | ≥ -117.4 dBm |

| | | | | | |
|---|---|---|---|---|---|
| | be achieved, but at weaker signal levels limited speeds and interruptions in data transmission may occur | | | | |
| Weak | Limited or poor data speeds, with a high likelihood of data connection interruptions | ≥ -112.8 dBm | ≥ -121.7 dBm | ≥ -123.3 dBm | ≥ -127.4 dBm |
| Unacceptable | Signal level at which no coverage is provided to users | < -112.8 dBm | < -121.7 dBm | < -123.3 dBm | < -127.4 dBm |

## ANNEX V: MEASUREMENT METHODOLOGY

Methodology for measuring quality of service indicators for public electronic communications services over mobile networks.

The methodologies for measuring public electronic communications services over mobile networks shall comply with the specifications set out in ETSI TS 102 250.

The same measuring equipment and measurement terminals shall be used for all undertakings. Measurements shall be carried out using the so-called measurement window methodology.

The measurement window may include:

only the voice service measurement methodology;

only the voice quality measurement methodology;

only the data transmission methodology;

or a combination thereof.

**Quality of service measurement methodology – voice transmission**

**a) Comparative measurements (Benchmarking)**

All undertakings shall be measured simultaneously.

The measurement window shall meet the following conditions:

For making a call:

Call setup time: 30 seconds;

Call duration:

Scenario 1: 90 seconds;

Scenario 2: 120 seconds;

Pause between calls: 10 seconds.

Duration of the measurement window:

30 seconds + 120 seconds + 10 seconds.

**b) Disputes initiated by subscribers or end-users**

The OUTDOOR methodology shall be used.

Measurements shall be carried out in the vicinity of the address specified in the contract of the subscriber or end-user who submitted the complaint.

The measurement window shall meet the following conditions:

Call setup time: 30 seconds;

Call duration: 90 seconds;

Pause between calls: 10 seconds;

Only Mobile Originated Calls (MOC) shall be made;

The measurement duration shall not be less than 120 minutes.

Duration of the measurement window:

30 seconds + 90 seconds + 10 seconds.

**Quality of service measurement methodology – data transmission**

Methodology for measuring data transmission speeds in public mobile communications networks (GSM, UMTS, LTE, 5G NR) using the FTP/HTTP protocol.

**a) Comparative measurements (Benchmarking)**

All undertakings shall be measured simultaneously.

Data transmission speed shall be measured during the downloading and uploading of test files between the undertaking's network and the user's terminal equipment.

Connection setup time: 30 seconds.

Pause between two consecutive data transmission sessions: 15 seconds.

Transmission speed over the radio network shall be measured in the downlink (download/downlink) and uplink (upload/uplink) directions at the application layer, using the FTP/HTTP protocol and test files hosted on an FTP/HTTP server.

Test file size:

5 MB for measurements in populated areas;

1 MB for test routes.

A pause of 5 seconds shall be inserted between each test file transfer within a session.

The measurement time window consists of:

connection establishment time;

standard file download time.

Duration of the measurement window: 90 seconds.

**b) Complaints from subscribers or end-users**

Only the undertaking against which the complaint has been submitted shall be measured.

Data transmission speed shall be measured during the downloading of test files between the undertaking's network and the terminal equipment.

Connection setup time: 30 seconds.

Pause between transmission sessions: 15 seconds.

Measurements shall be carried out in the downlink (download/downlink) and uplink (upload/uplink) directions at the application layer, using the FTP/HTTP protocol.

Test file:

1 MB for test routes.

Between each test file transfer:

a pause of 5 seconds.

Time window:

connection establishment time + standard file download time;

duration: 90 seconds.

The number of measured sessions shall not be less than 50.

**Voice quality measurement methodology (Voice Quality)**

MOS (Mean Opinion Score) is defined by the ITU as a rating on a defined scale whereby an individual assesses transmission performance through a telephone system, both when speaking and when listening to audio material.

The system used by the Authority to measure MOS is based on the POLQA (Perceptual Objective Listening Quality Assessment) algorithm, in accordance with ITU-T Recommendation P.863, to obtain the MOS-LQO score.

MOS-LQO is an objective assessment of voice quality, obtained by generating calls and recording MOS-LQO values.

Calls are generated using the voice quality measurement application employing the POLQA algorithm.

The scenario specified in the voice transmission quality measurement methodology shall be used to generate calls, including:

2 terminal devices;

the voice communications application;

the capability for two-way communication to record and reproduce MOS-LQO values.

Voice quality shall be measured in the following directions:

mobile device → server (outgoing call);

mobile device → mobile device.

For the following calls:

mobile–fixed;

mobile–mobile;

MOS-LQO values shall be recorded in both directions. Voice quality shall be assessed from the user's side on the mobile device (outgoing call), using the MOS-LQO score generated by the POLQA algorithm in accordance with ITU-T Recommendation P.863, through the measurement equipment and systems used by AKEP.

**ANNEX VI: MEASURES TO ENSURE EQUAL ACCESS FOR END-USERS WITH DISABILITIES**

| Service | Quality parameter | Definition |
|---|---|---|
| Voice service | Bandwidth for voice transmission | Information and Communication Technology (ICT) enabling two-way voice communication shall support speech encoding/decoding with an upper frequency limit of at least 7 kHz. (Yes/No). (Recommended standard: ETSI EN 301 549 v3.2.1, Clause 6.1). |
| Real-Time Text (RTT) | Visually distinguishable display | ICT equipment shall enable the sending and receiving of Real-Time Text (RTT), with sent text visually distinguishable and separate from received text. (Yes/No). (ETSI EN 301 549 v3.2.1, Clause 6.2.2.1). |
| | Programmatically configurable send and receive direction | ICT equipment shall enable the sending and receiving of RTT, with the direction of sent and received text programmatically configurable, except where RTT is implemented as a closed functionality. (Yes/No). (ETSI EN 301 549 v3.2.1, Clause 6.2.2.2). |
| | Interoperability | ICT equipment supporting RTT functionality shall support interoperable mechanisms. (Yes/No). (ETSI |

| | | |
|---|---|---|
| | | EN 301 549 v3.2.1, Clause 6.2.3). |
| | RTT response time | Input text shall be transmitted to the ICT network or platform within 500 ms of the smallest reliably transmittable unit of text becoming available. (Yes/No). (ETSI EN 301 549 v3.2.1, Clause 6.2.4). |
| Video | Resolution | ICT equipment providing two-way voice communication and real-time video shall: a) support at least QVGA resolution (Yes/No); b) preferably support at least VGA resolution (Yes/No). (ETSI EN 301 549 v3.2.1, Clause 6.5.2). |
| | Frame rate | ICT equipment providing two-way voice communication and real-time video shall: a) support at least 20 frames per second (FPS) (Yes/No); b) support at least 30 FPS, with or without sign language in the video transmission (Yes/No). (ETSI EN 301 549 v3.2.1, Clause 6.5.3). |
| | Audio/video (A/V) synchronisation | ICT equipment providing two-way voice communication and real-time video shall be capable of presenting audio and video with a maximum difference of 100 ms. (Yes/No). (ETSI |

| | | |
|---|---|---|
| | | EN 301 549 v3.2.1, Clause 6.5.4). |

**ANNEX VII: REPORTING FORMS**

**Form 1: Reporting on the values of quality of service indicators for public electronic communications services over a fixed network – voice communications service**

Operator name:_____
Reporting period: from _____ to_____

| No. | QoS Indicator | Measurement Standard | Number of Tests | Confidence Level of Results | Confidence Interval of Results | Measurement | Statistics |
|---|---|---|---|---|---|---|---|
| 1.1 | Time for Initial Connection | ETSI ES 202 057-1 | | | | for 95% of services activated during the observation period | (calendar days and hours) |
| | | | | | | for 99% of services activated during the observation period | (calendar days and hours) |
| | | | | | | % of services activated within the agreed timeframe | % |
| 1.2 | Fault Repair Time | ETSI ES 202 057-1 | | | | for 80% of access line faults reported during the observation period | (hours and minutes) |
| | | | | | | for 95% of access line faults reported during | (hours and minutes) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | the observation period | |
| | | | | | | Percentage of faults repaired within the target timeframe set by the operator | % |
| | | | | | | Operating hours of the fault reporting service | From ____ to _____ (weekdays)<br>From _____ to _____ (Saturday)<br>From _____ to _____ (Sunday)<br>From ____ to _____ (weekdays)<br>From _____ to _____ (Saturday)<br>From _____ to _____ (Sunday)<br>From ____ to _____ (weekdays)<br>From _____ to _____ (Saturday)<br>From _____ to _____ (Sunday) |
| 1.3 | Call Setup Time | ETSI EG 202 057-2 | | | | Average setup time for all national calls | (seconds) |
| | | | | | | Time within which 95% of all national calls are established | (seconds) |
| | | | | | | Average setup time for international calls | (seconds) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | Time within which 95% of international calls are established | (seconds) |
| 1.4 | Complaints about Billing Accuracy | ETSI ES 202 057-1 | | | | % during the observation period | % |
| 1.5 | Operator Response Time (Customer Care Services – Assistance Service) | ETSI ES 202 057-1 | | | | Average response time during the observation period | (seconds) |
| | | | | | | Answered within 20 seconds | % |
| 1.6 | Customer Complaint Resolution Time | ETSI ES 202 057-1 | | | | Time within which the fastest 80% of complaints were resolved | (hours and minutes) |
| | | | | | | Time within which the fastest 95% of complaints were resolved | (hours and minutes) |
| | | | | | | Percentage of complaints resolved within the timeframe previously set as a target by the operator | % |
| 1.7 | Percentage of Problems Encountered During the Number | ETSI ES 202 057-1 | | | | % during the measurement period | % |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Portability Procedure | | | | | | |
| 1.8 | Unsuccessful Call Ratio | ETSI EG 202 057-2 | | | | % during the measurement period | % |
| 1.9 | Call Setup Failure Probability | ETSI TS 102 024-9 | | | | % during the measurement period | % |
| 1.10 | Call Signalling Delays | ETSI TS 102 024-9 | | | | Call Setup Delay | (seconds) |
| | | | | | | Call Answer Signal Delay | (seconds) |
| | | | | | | Call Release Delay | (seconds) |

By signing this form, we assume full responsibility for the truthfulness and accuracy of the data.

Date:_____
Signature of the responsible person:_____

**Form 2: Reporting on the values of quality of service indicators for public electronic communications services over a mobile network – voice communications service**

Operator name:_____
Reporting period: from _____ to_____

| No. | QoS Indicator | Measurement Standard | Number of Tests | Confidence Level of Results | Confidence Interval of Results | Measurement | Statistics |
|---|---|---|---|---|---|---|---|
| 2.1 | Time for Initial Connection | ETSI ES 202 057-1 | | | | for 95% of services activated during the observation period | (calendar days and hours) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | for 99% of services activated during the observation period | (calendar days and hours) |
| | | | | | | % of services activated within the agreed timeframe | % |
| 2.2 | Call Setup Time | ETSI EG 202 057-2 | | | | Average setup time for all national calls | (seconds) |
| | | | | | | Time within which 95% of all national calls are established | (seconds) |
| | | | | | | Average setup time for international calls | (seconds) |
| | | | | | | Time within which 95% of international calls are established | (seconds) |
| 2.3 | Operator Response Time (Customer Care Services – Assistance Service) | ETSI ES 202 057-1 | | | | Average response time during the observation period | (seconds) |
| | | | | | | Answered within 20 seconds | % |
| 2.4 | Customer Complaint | ETSI ES 202 057-1 | | | | Time within which the fastest 80% of | (hours and minutes) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Resolution Time | | | | | complaints were resolved | |
| | | | | | | Time within which the fastest 95% of complaints were resolved | (hours and minutes) |
| | | | | | | Percentage of complaints resolved within the timeframe previously set as a target by the operator | % |
| 2.5 | Session Setup Time (IMS-VoLTE KPI) | 3GPP TS 32.454 | | | | Average session setup time during the observation period. | (seconds) |
| 2.6 | Percentage of VoLTE Calls Dropped by the Operator's IMS Network | 3GPP TS 32.454 | | | | % during the observation period | % |
| 2.7 | SMS Message Transmission Time | ETSI EG 202 057-2 | | | | Average message transmission time during the observation period | (seconds) |
| 2.8 | Unsuccessful Message Ratio | ETSI EG 202 057-2 | | | | % during the observation period | % |
| 2.9 | Complaints about Billing Accuracy | ETSI ES 202 057-1 | | | | % during the observation period | % |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2.10 | Complaints about Billing Accuracy for Prepaid Users | ETSI ES 202 057-1 | | | | % during the observation period | % |
| 2.11 | Percentage of Problems Encountered During the Number Portability Procedure | ETSI ES 202 057-1 | | | | % during the measurement period | % |
| 2.12 | Dropped Call Rate | ETSI EG 202 057-3 | | | | % during the observation period | % |
| 2.13 | Unsuccessful Call Ratio | ETSI EG 202 057-2 | | | | % during the measurement period | % |
| 2.14 | Call Setup Failure Probability | ETSI TS 102 024-9 | | | | % during the measurement period | % |
| 2.15 | Call Signalling Delays | ETSI TS 102 024-9 | | | | Call Setup Delay | (seconds) |
| | | | | | | Call Answer Signal Delay | (seconds) |
| | | | | | | Call Release Delay | (seconds) |

By signing this form, we assume full responsibility for the truthfulness and accuracy of the data.

Date:_____
Signature of the responsible person:_____

**Form 3: Reporting on the values of quality quality of service indicators for broadband internet access services over a fixed electronic communications network.**

Operator name:_____
Reporting period: from _____ to_____

| No. | QoS Indicator | Measurement Standard | Number of Tests | Confidence Level of Results | Confidence Interval of Results | Measurement | Statistics |
|---|---|---|---|---|---|---|---|
| 3.1 | Time for Initial Connection | ETSI ES 202 057-1 | | | | for 95% of services activated during the observation period | (calendar days and hours) |
| | | | | | | for 99% of services activated during the observation period | (calendar days and hours) |
| | | | | | | % of services activated within the agreed timeframe | % |
| 3.2 | Access Line Fault Rate | ETSI ES 202 057-1 | | | | Ratio of the number of faults to the average number of access lines during the measurement period | % |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 3.3 | Fault Repair Time for Access Lines | ETSI ES 202 057-1 | | | | for 80% of access line faults reported during the observation period | (hours and minutes) |
| | | | | | | for 95% of access line faults reported during the observation period | (hours and minutes) |
| | | | | | | Percentage of faults repaired within the target timeframe set by the operator | % |
| | | | | | | Operating hours of the fault reporting service | From ____ to _____ (weekdays)<br>From _____ to _____ (Saturday)<br>From _____ to _____ (Sunday)<br>From ____ to _____ (weekdays)<br>From _____ to _____ (Saturday)<br>From _____ to _____ (Sunday)<br>From ____ to _____ (weekdays) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | | | From _____ to _____ (Saturday) From _____ to _____ (Sunday) |
| 3.4 | Operator Response Time (Customer Care Services – Assistance Service) | ETSI ES 202 057-1 | | | | Average response time during the observation period | (seconds) |
| | | | | | | Answered within 20 seconds | % |
| 3.5 | Complaints about Billing Accuracy | ETSI ES 202 057-1 | | | | % during the observation period | % |
| 3.6 | Customer Complaint Resolution Time | ETSI ES 202 057-1 | | | | Time within which the fastest 80% of complaints were resolved | (hours and minutes) |
| | | | | | | Time within which the fastest 95% of complaints were resolved | (hours and minutes) |
| | | | | | | Percentage of complaints resolved within the timeframe previously set as a target by the operator | % |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 3.7 | Data Transmission Speed towards the User (download) | ETSI EG 202 057-4 | | | | 95th percentile* (download) | kbit/s or Mbit/s |
| | | | | | | 5th percentile* (download) | kbit/s or Mbit/s |
| | | | | | | Mean value and standard deviation in the downstream direction (download) | kbit/s or Mbit/s |
| 3.8 | Data Transmission Speed towards the Service Provider (upload) | ETSI EG 202 057-4 | | | | 95th percentile* (upload) | kbit/s or Mbit/s |
| | | | | | | 5th percentile* (upload) | kbit/s or Mbit/s |
| | | | | | | Mean value and standard deviation in the upstream direction (upload) | kbit/s or Mbit/s |
| 3.9 | Latency | BEREC (22) 72 | | | | Standard deviation | ms |
| | | | | | | Mean deviation | ms |
| 3.10 | Jitter | BEREC (22) 72 | | | | Standard deviation | ms |
| | | | | | | Mean deviation | ms |
| 3.11 | Packet Loss Ratio | BEREC (22) 72 | | | | % of lost packets relative to the total number of transmitted packets | % |

***Percentile:**

- *The 95th percentile means that 95% of the measured speeds have a value less than or equal to the speed value shown in the table (expressed in kbit/s or Mbit/s).*

- *The 5th percentile means that 5% of the measured speeds have a value less than or equal to the speed value shown in the table (expressed in kbit/s or Mbit/s).*

By signing this form, we assume full responsibility for the truthfulness and accuracy of the data.

Date:_____

Signature of the responsible person:_____

**Form 4: Reporting on the values of quality of service indicators for broadband internet access services over a mobile electronic communications network.**

Operator name:_____
Reporting period: from _____ to_____

| No. | QoS Indicator | Measurement Standard | Number of Tests | Confidence Level of Results | Confidence Interval of Results | Measurement | Statistics |
|---|---|---|---|---|---|---|---|
| 4.1 | Data Transmission Speed towards the User (download) | ETSI TS 102 250-2 | | | | 95th percentile* (download) | kbit/s or Mbit/s |
| | | | | | | 5th percentile* (download) | kbit/s or Mbit/s |
| | | | | | | Mean value and standard deviation in the downstream direction (download) | kbit/s or Mbit/s |
| 4.2 | Data Transmission Speed towards the Service Provider (upload) | ETSI TS 102 250-2 | | | | 95th percentile* (upload) | kbit/s or Mbit/s |
| | | | | | | 5th percentile* (upload) | kbit/s or Mbit/s |
| | | | | | | Mean value and standard deviation in the upstream direction (upload) | kbit/s or Mbit/s |
| 4.3 | Latency | BEREC (22) 72 | | | | Standard deviation | ms |
| | | | | | | Mean deviation | ms |
| 4.4 | Jitter | BEREC (22) 72 | | | | Standard deviation | ms |
| | | | | | | Mean deviation | ms |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4.5 | Packet Loss Ratio | BEREC (22) 72 | | | | % of lost packets relative to the total number of transmitted packets | % |

*Percentile:

- *The 95th percentile means that 95% of the measured speeds have a value less than or equal to the speed value shown in the table (expressed in kbit/s or Mbit/s).*
- *The 5th percentile means that 5% of the measured speeds have a value less than or equal to the speed value shown in the table (expressed in kbit/s or Mbit/s).*

By signing this form, we assume full responsibility for the truthfulness and accuracy of the data.

Date:_____

Signature of the responsible person:_____