

The Gazette  **of Pakistan**

**EXTRAORDINARY
PUBLISHED BY AUTHORITY**

ISLAMABAD, THURSDAY, SEPTEMBER 09, 2021

PART II

Statutory Notifications (S.R.O.)

**GOVERNMENT OF PAKISTAN
PAKISTAN TELECOMMUNICATION AUTHORITY**

NOTIFICATION

Islamabad, the 14th June, 2021

S. R. O. 1130(I)/2021.—In exercise of powers conferred under clause (o) of sub-section (2) of section 5 of the Pakistan Telecommunication (Re-organization) Act, 1996 the Authority hereby makes the following regulations, namely:—

PART-I

PRELIMINARY

1. SHORT TITLE AND COMMENCEMENT

- (1). These Regulations shall be called the Cellular Mobile Network Quality of Service (QoS) Regulations, 2021.
- (2). These regulations shall come into force from the date of gazette notification.

(1365)

Price: Rs. 20.00

- (3). With the gazette notification of these Regulations, earlier GPRS/EDGE Service (QoS) Standards Regulations, 2010, Cellular Mobile Network Quality of Service Regulations 2011 and Cellular Mobile Network Quality of Service (Amendments) Regulations 2012 shall stand repealed.

2. SCOPE AND APPLICABILITY

- (1). These regulations shall apply to all Cellular Mobile Communication Service and Next Generation Mobile Service Licensees for the purpose of identifying the minimum quality of service standards and associated measurement, reporting and record keeping of Mobile Network Coverage, Voice, SMS and Mobile Broadband Service.

3. DEFINITIONS

- (1). In these regulations, unless the context otherwise requires:
 - (a). **'Act'** means the Pakistan Telecommunication (Re-organization) Act, 1996;
 - (b). **'Authority'** means the Pakistan Telecommunication Authority established under subsection (1) of section 3 of the Act;
 - (c). **'Circuit Switched Fall Back (CSFB)'** is a technology whereby voice and SMS services are delivered to 4G devices through the use of 2G or 3G circuit-switched network.
 - (d). **'License'** means an authorization granted by the Authority for the establishment, operation or maintenance of any telecommunication system or provision of any telecommunication service;
 - (e). **'Licensee'** means the grantee or holder of a mobile communication service and Next Generation Mobile Service licenses to which these regulations apply;
 - (f). **'Mobile Broadband Service'** means an access to the open Internet that provide download speeds of at least 1 Mbit/s (i.e. applicable after two years from the date of gazette notification of these Regulations) through technologies standardized for 3G (e.g. WCDMA, HSPA+ etc.), 4G and advanced generation(s) (e.g. LTE and LTE-Advanced etc.),

and excludes lower-speed technologies (such as GPRS; EDGE and CDMA 1xRTT etc.)

- (g). **'Mobile Communication Service'** means a wireless based telecommunications service where the terminal equipment may be connected to the telecommunications system by wireless means and used while in motion;
 - (h). **'Next Generation Mobile Service'** means the Mobile Communication Services offered through technologies standardized for 3G, 4G and advanced generation(s).
 - (1). **'Quality of Service'** means the main indicator of the performance of a Mobile Communications Service and Next Generation Mobile Service Licensees and of the degree to which the performance conforms with the standards of such quality of service as specified in these regulations and the license for the specified parameters; and
 - (j). **'Regulations'** means all or any regulations issued from time to time by the Authority;
 - (k). **'Voice over LTE'** or **'VoLTE'** means voice calls established, maintained and released using Internet Protocol (IP) Multi-Media Sub-System (IMS).
- (2). Words and expressions used but not defined in these regulations shall have the meanings respectively assigned to them in the Act or the rules or the regulations, as the case may be.

PART-II

MEASUREMENT, REPORTING AND RECORD KEEPING

4. QUALITY OF SERVICE PARAMETERS

- (1). Compliance Reports are required to be submitted in respect of Quality of Service Parameters defined in these Regulations.
- (2). Every Mobile Communications Service and Next Generation Mobile Service licensee shall at all times meet or exceed the minimum requirements of quality of service specified in their respective Licenses and in these regulations, as follows:
 - (a). **Voice Calls**

(i). *Network Accessibility & Network Downtime*

Network Accessibility. The probability that mobile services are available to an end customer by display of the network indicator on the mobile test equipment throughout the entire duration of the samples”

Benchmark

Network Accessibility should be $\geq 99\%$

Measurement

Network Accessibility (%) = [1 - Percentage of time mobile device is reporting “No Service” or “Emergency” as served technology during the drive test duration].

- (1). “No Service” or “Emergency” is the period mobile services are neither available to an end customer nor display of the network indicator on the mobile equipment.

Network Downtime “The probability that mobile services are not available to end customer”:

Benchmark

Network Down-time should be $\leq 1\%$

Measurement

Network downtime (%) = (Total Time Network is Unavailable / Total Time of Network Measurement) * 100

- (1). Network downtime shall be measured from Network Management System (NMS) of the operator as average of one month either across all the outdoor sites deployed by the operator throughout the country or any other area i.e. District, Tehsil or surveyed area etc., provided by the Authority.
- (2). It shall be reported separately for 2G, 3G and 4G sites.

(ii). *Call Setup Success Rate*

Call Setup Success Rate “The probability that the end customer successfully access the mobile service when requested if it is

offered by display of the network indicator on the mobile equipment”

Benchmark

Call Setup Success Rate should be $\geq 98\%$

Measurement

Call Setup Success Rate (%) = (Number of Successfully Established Calls / Total Number of Call Attempts) x 100%

(1). *Successfully Established Calls shall include Completed Calls and Established but Dropped Calls.*

(2). *Attempts include Completed, Dropped and Failed Calls.*

(iii). **Call Setup Time**

“The time between sending of complete call initiation information by the caller (A-party) and in return receipt of call setup notification”

Benchmark

Call Setup Time should be < 7.5 Seconds, (including Circuit Switched Fall Back (CSFB) time)

Measurement

Call Setup Time = $t_2 - t_1$ whereas, t_2 = point of time where connect is established (B-party) (e.g. alerting or subscriber busy is detected by test equipment) and t_1 = point of time when send button on mobile equipment (A-party) is pressed.

(1). *Time duration shall be measured as per following:*

(i). *GSM: From Timestamp of “Channel Request” message to Timestamp of “Alerting” message*

(ii). *UMTS: From Timestamp of “RRC Connection Request” message to Timestamp of “Alerting” message*

(iii). *LTE CSFB: From Timestamp of “LTE-RRC Connection Request” and if not available then (EMM Extended Service Request) to Timestamp of “Alerting” message*

- (2). *In case of VoLTE service, Time duration should be measured between Timestamp of SIP "INVITE" to Timestamp of SIP "200 OK (INVITE)" message.*

(iv). Call Completion Ratio & Call Drop Rate

Call Completion Ratio *"The probability that a service, once obtained, will continue to be provided under given conditions for a given time duration or until deliberately terminated by either A-party or B-party":*

Benchmark

Call Completion Ratio should be > 98%

Measurement

Call Completion Ratio (%) = $(\text{Total No. of End User Intentionally Terminated Calls} / \text{Total Number of Successfully Established Calls}) \times 100$

- (1). *Successfully Established Calls shall include Completed Calls and Established but Dropped Calls*

Call Drop Rate *"The probability that a service, once obtained, will neither continue for a given time duration nor deliberately terminated by either A-party or B-party":*

Benchmark

Call Drop Rate < 2%

Measurement

Call Drop Rate (%) = $(\text{Total Number of Dropped Calls} / \text{Total Number of Successfully Established Calls}) \times 100\%$

- (1). *Successfully Established Calls shall include Completed Calls and Established but Dropped Calls*

(v). End-to-End Speech Quality

"The degree of speech quality that a listener perceives at the terminal with a talker at the other end":

Benchmark

Mean Opinion Score (MOS) should be > 3

- (1). *Measurement will be based on Perceptual Objective Listening Quality Analysis (POLQA) Algorithm (ITU-T P863) or ITU MOS standards as adopted by the Authority.*
 - (2). *Measurement will be based on the POLQA Version 2.4/Super Wideband or latest version of ITU-T P.863 to achieve the correct relative service quality between VoLTE, HD Voice and legacy narrowband telephony.*
 - (3). *Average MOS values shall be considered for each direction of communication for the duration of the testing for each designated area under testing.*
- (b). **Short Messaging Service (SMS)**
- (i). **SMS Success Rate - Mobile Originated**

“Probability that the short message service is delivered successfully, end-to end when requested and display of the relevant information on the mobile equipment”.

Benchmark

SMS Success Rate should be \geq 99%.

Measurement

SMS Success Rate (%) = $(\text{Total Number of Successful SMS} / \text{Total Number of SMS Attempts}) \times 100\%$

- (ii). **End-to-End SMS Delivery Time**

“The time between sending a short message from a mobile terminal (A-Party) and receiving the very same short message at intended mobile terminal (B-Party)”.

Benchmark

End-to-End SMS Delivery Time should be \leq 12 seconds

- (c). **Next Generation Mobile Service / Mobile Broadband Service**

(i). Download User Data Throughput

“Download User Data Throughput is measure of the average data rates in the downlink on the test mobile equipment during the testing session.”

Benchmark

Technology	Download User Data Throughput	Applicability Pakistan	Applicability AJ&K and GB
4G	>2Mbps	Existing	After One (01) year from the effective date of these Regulations
	> 3Mbps	After One (01) year from the effective date of these Regulations	After two (02) years from the effective date of these Regulations
	> 4Mbps	After Two (02) years from the effective date of these Regulations	After four (04) years from the effective date of these Regulations
3G	> 512 Kbps	After One (01) year from the effective date of these Regulations	After One (01) year from the effective date of these Regulations
	> 1Mbps	After Two (02) years from the effective date of these Regulations	After Three (03) years from the effective date of these Regulations

(ii). Upload User Data Throughput

“Upload User Data Throughput is measure of the average data rates in the Uplink on the test mobile equipment during the testing session.”

Benchmark

Technology	Upload User Data Throughput	Applicability Pakistan	Applicability AJ & K and GB
4G	> 768 Kbps	After One (01) year from the effective date of these Regulations	After two (02) years from the effective date of these Regulations
	> 1 Mbps	After Two (02) years from the effective date of these Regulations	After four (04) years from the effective date of these Regulations
3G	> 128 Kbps	After One (01) year from the effective date of these Regulations	After One (01) year from the effective date of these Regulations
	> 256 Kbps	After Two (02) years from the effective date of these Regulations	After Three (03) years from the effective date of these Regulations

(iii). **Latency**

"Latency is the round trip time for data packets from mobile handset to any local/global/international server decided by the Authority and back to the sending endpoint"

Benchmark

- (1). Latency < 75 milliseconds (4G)
- (2). Latency < 150 milliseconds (3G)

(iv). **Webpage Loading Time**

"Time required for loading a website is known as Webpage Loading Time."

Benchmark

Webpage Loading Time should be < 5 Seconds

Measurement

- (1). *Measured by loading different webpages and recording the amount of time that this page takes to load.*

(d). **Mobile Network Coverage**

(i). **Signal Strength**

"Signal reception is the signal strength received by a mobile phone from a cellular network that shows level of network coverage at any particular location (i.e. Excellent, Good or Poor Coverage)".

Benchmark

- (1). *In 4G network a minimum outdoor signal strength i.e. Reference Signal Receive Power (RSRP) of -100 dBm must be achievable with 90% confidence.*
- (2). *In 3G network a minimum outdoor signal strength i.e. Received Signal Code Power (RSCP) of -100 dBm must be achievable with 90% confidence.*
- (3). *In 2G network a minimum outdoor signal strength i.e. Received Signal Level (RXLEV) of - 90 dBm must be achievable with 90% confidence.*

5. MEASUREMENT, REPORTING AND RECORD KEEPING TASKS

(1). For each quality of service standard that is reportable for a service, and for each reporting period, Licensee shall perform the following measurement, reporting and record keeping:

(a). *To monitor the quality of telecommunication service being provided by the Licensee and adherence to the criteria laid down in the License and Regulations, each Licensee shall conduct end-to-end drive tests and surveys at intervals as required by the Authority. The Licensee shall procure the test instruments and equipment as and when required for the purpose.*

(b). *The tests and surveys shall be so designed as to give the overall as well as the detailed picture of the network, of the Quality of Service provided by the Licensee with fifteen (15) days prior intimation to the Authority.*

(c). *The Authority may specify the nature and procedure of quality tests and surveys, and may issue directions in this respect, to which the Licensee shall comply. The Licensee shall, furnish the results of the quality tests and surveys to the Authority, for each quarter in such form and manner as the Authority may specify:*

Provided that the information for the applicable quarter shall be submitted by the Licensee within thirty (30) days after the close of the reporting quarter.

(d). *The Authority may call for such special quality tests and surveys and reports thereon, as it may deem appropriate, and the Licensee shall comply with the directives of the Authority in this regard.*

(e). *The Authority may if deemed necessary, depute its own representative(s) to be present at the quality tests and surveys carried out by the Licensee.*

(f). *The Licensee shall maintain record of the said quality tests and surveys, in such form and manner as the Authority may specify. This record shall at all times be open to inspection and audit by the Authority or officer of the Authority, with or without notice to the Licensee. Such record shall be retained for a period of three years.*

(g). *Unless otherwise stated in these regulations, the reporting periods, which are periods of time over which measurements are taken and recorded shall be one month starting on 1st January of the applicable calendar year or as the Authority may from time to time specify. The Licensee shall consolidate and maintain the reports for each month and submit the record on a quarterly basis.*

Part-III

MONITORING BY THE AUTHORITY

6. INSPECTIONS AND PERFORMANCE AUDIT FOR QUALITY OF SERVICE

- (1). The Authority shall conduct inspections, surveys, tests or carry out surprise checks as specified in Annex-A through its designated officers or conduct performance audit for Quality of Service of the Licensee from time to time to ensure that users of telecommunication services get such Quality of Service standards as laid down in these Regulations and the License.
- (2). The inspections may be carried out with or without the representative of the Licensee.
- (3). The Licensee shall extend full co-operation and provide all assistance to the inspecting officer (s) in carrying out the tests and surveys, including provision of test instruments, technical support, unhindered access to the Licensee's premises, and make available network management system and records, i.e. electronic or manual or both, whenever required by such officer.
- (4). The Authority may engage, if circumstances so require, third party/consultants to conduct quality of service audit.
- (5). The inspecting officer shall prepare an inspection report of the quality of service inspection, also comprising the shortfalls, if any, observed during such inspection.
- (6). This report shall be provided to the Licensee in the format as specified in these regulations as Annex-B.
- (7). The Licensee shall immediately carryout Root Cause Analysis, take all remedial measures to remove the shortfalls identified in the inspection report and submit compliance report within thirty (30) days of the issuance of the inspection report in confirmation that all stated short falls have been removed.
- (8). The compliance report shall consist of following:
 - (a). *Detailed Root Cause Analysis of the degraded QoS KPIs, consisting of investigation of each abnormal event and patch wise examination where QoS KPI found degraded.*
 - (b). *Details of the problematic cells or area impacting the QoS KPI along with the steps taken to resolve the issue.*

- (c). *The Confirmatory Testing to be performed on the identified Cells/Areas. Multiple tests will be performed to confirm the resolution of the identified issues only.*
- (i). A new testing in overall city, without resolution of the identified issue at particular location will not be considered as compliance.
 - (ii). Compliance Report to include the log files and/or any other supporting evidences/OSS KPIs.
- (9). The Authority shall provide the opportunity to remove the shortfalls identified in the inspection report for any particular city, against/ on account of only one test carried out in a calendar year and not thereafter.
- (10). The Authority shall measure the performance of the Licensees using modes for collection of data or documents, including but not limited to surprise drive tests etc. The main aspects of the methodology for taking measurements through drive tests shall be as specified in **Annex-A** to these regulations. The Authority may review or define new thresholds as and when required.

PART-IV

MISCELLANEOUS

7. NETWORK PERFORMANCE SCORE

- (1). The Authority may engage, or direct Licensees to jointly engage, if circumstances so require, third party/ consultants, to conduct quality of service audit as per ETSI TR 103 559 recommendations and submit Network Performance Score (NPS) Report.
- (2). The Report shall be published for the information of general public as well as shared with Licensees to take corrective measures and improve its overall network ranking.

8. PUBLICATION OF QUALITY OF SERVICE REPORTS

- (1). Without prejudice to anything contained or any action required under these regulations, the Authority may publish such survey results, service audit results, and/ or rating of Licensees for information of general public with or without additional notes or comments on its website and / or in any other form or manner, as it consider appropriate.
- (2). For each parameter that is reportable for a service, for each reporting area and for each reporting period, measurements as published by the Authority under this regulation shall be set out in the format comprising the following information for each Licensee:

- (a) *The name of service;*
- (b) *An identification of the reporting area for which the measurements were taken;*
- (c) *The measurements submitted by the Licensee or measured by the Authority;*
- (d) *An indication of any target for the parameter and service that has not been reached by the Licensee;*
- (e) *In case of joint testing with representative of Licensee, any explanatory remarks by the Licensee, if accepted by the Authority, including but limited to remarks about changes in operational conditions that could not have reasonably been foreseen by the Licensee; and*
- (f) *Any other information or comparison of service quality that the Authority determines to be appropriate possibly including information to help consumers to assess the performance of Licensees.*

9. PROVISION OF INFORMATION

- (1). All Licensees shall ensure the provision of complete information to the authority regarding any aspect of any provision under these regulations as and when required by the Authority.

Annex-A

DRIVE TEST/SURVEY MEASUREMENT METHDODOLOGY

1. VOICE CALLS, SMS & NEXT GENRATION MOBILE SERVICE

- (a). Cities
 - i. Karachi
 - ii. Tier -1 (Federal and Provincial Capital Cities except Karachi)
 - iii. Tier -2 (All Divisional HQs Cities)
 - iv. Tier -3 (All Other Cities)
- (b). Towns
- (c). Roads
 - i. Motorways
 - ii. National & Provincial Highways
 - iii. Inter City Roads

2. PERCENTAGE OF ON-NET & OFF-NET CALLS/SMS

- (a). All ON-NET, or
- (b). Percentage of ON-NET & OFF- NET

3. A AND B PARTY

- (a). A-Party (Originating Number) - Moving continuously during Drive Test
- (b). B-Party (Terminating Number) - Moving or Static

4. CALL/SMS WINDOW

- (a). Call/SMS Window
- (b). Pause between Calls

5. CONDUCT OF SURVEY

- (a). PTA will carry out survey independent of Cellular Mobile Service Licensees.

- (b). The testing shall be carried using different scenarios. Any combination of ON-NET, OFF-NET Calls, SMS and Mobile Broadband Data Testing shall be used.

6. CITY COVERAGE

- (a). Licensee shall be required to share the coverage maps in both Mapinfo and Google Earth format or any other format as desired by the Authority.
- (b). Drive test/ survey shall be carried out in such a way that it highlights coverage differences in the results. Any Licensee shall get benefit for better coverage in any particular area in comparison to other Licensee which do not have presence or weak coverage for the said area.

Annex-B

**CELLULAR MOBILE SERVICE LICENSEES QUALITY OF SERVICE SURVEY
INSPECTION REPORT**

Name of Operator: _____

Part-A		General Information		
City/Town/Road				
Date				
Survey Timing				
Number of Samples	Voice Calls	SMS	Data Tests	
			3G	4G

Part-B		Drive Test / Survey Results	
Key Performance Indicator		Minimum Target	Results
Network Accessibility (Network Downtime)		≥ 99% (≤ 1%)	
Call Setup Success Rate		≥ 98%	
Call Setup Time		< 7.5 Seconds	
Call Drop Rate (Call Completion Ratio)		< 2% (> 98%)	
Mean Opinion Score (Average A2B, Average B2A)		> 3	
SMS Success Rate		≥ 99%	
End-to-End SMS Delivery Time		≤ 12 Seconds	
Download User Data Throughput		≥ 2Mbps, ≥ 3Mbps or 4Mbps (4G) (as applicable) ≥ 512 Kbps or 1Mbps (3G) (as applicable)	
Upload User Data Throughput		≥ 768 Kbps or 1Mbps (4G) (as applicable) ≥ 128 Kbps or 256 Kbps (3G) (as applicable)	
Latency		< 75 milliseconds (4G) < 150 milliseconds (3G)	
Webpage Loading Time		< 5 Seconds	
Signal Strength		RSRP	-100dBm with 90% Confidence
		RSCP	-100dBm with 90% Confidence
		RxLev	-90dBm with 90% Confidence

ERUM LITIF.
Director (Law & Regulations),