

**THE NATIONAL COMMUNICATIONS AUTHORITY  
- QUALITY OF SERVICE REGULATIONS, 2019**

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*Regulation*

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## NATIONAL COMMUNICATIONS AUTHORITY - QUALITY OF SERVICE REGULATIONS, 2019

### PART I PRELIMINARY PROVISIONS

IN exercise of the powers conferred on the Minister responsible for Communications by section 97 of the Electronic Communications Act, 2008 (Act 775) these Regulations are made this ... of..., 2019.

#### Citation

1. These Regulations may be cited as the National Communications Authority (Quality of Service) Regulations, 2019.

#### Application

2. These regulations shall apply to the Service Provider classes defined under section 101 of the Electronic Communications Act, 2008 (Act 775)

#### Interpretation

3. In these Regulations, unless the context requires otherwise-

“**Act**” means the National Communications Authority Act 2008, Act 769;

“**Authority**” means the National Communications Authority established by the National Communications Authority Act 2008, Act 769;

“**Basic Telephone Service**” covers collection, carriage, transmission and delivery of voice messages over licensee’s Public Switched Telephone Network in licensed service area and includes provision of all types of services except those requiring a separate licence;

“**Peak Hour**” means the hour in a day where the traffic for a licensed service is highest on the network.

“**Call Connection Success Rate**” means the number of successfully connected calls to the number of call attempts;

“**Call Drop Rate**” means the percentage of calls, which, once they have been successfully established and therefore have an assigned traffic channel, are interrupted prior to their normal completion by the user; the cause of the early termination being attributable to the service provider’s network;

“**Mobile Cellular Services**” means services derived from a Public Land Mobile Network;

“**Closed User Group Service**” means electronic communications service, used by a closed user group, operated without interconnection to a public electronic communications network enabling electronic communications to persons other than the members of that group;

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**“Downtime”** means the duration for which part of a network or service cannot be accessed;

**“Electronic Communications”** means any communication through the use of wire, radio optical or electronic transmission emission or receiving system or any part of these;

**“Electronic Communications Network”** means any wire, radio, optical or electromagnetic transmission, emission or receiving system, or any part of these, used for the provision of electronic communications service

**“Electronic Communications Service”** includes a service providing electronic communications, a closed user group service, a private electronic communications service, a public electronic communications service, a radio communications service and a Value Added Service:

**“Fault”** means a state where a network does not meet the service specifications and some repair action is required;

**“Force Majeure”** means fire, strikes, or other labour action or dispute, acts of God, or any circumstances beyond the reasonable control of the licensee;

**“Locality”** means the part of the licensed area that is served by a licensed network resource. The licensed network resource may be the switching or radio equipment that serves the User

**“Mean Opinion Score”** means a numerical indication of the perceived quality of received media after compression and/or transmission. The MOS is expressed, as a single number in the range 1 to 5, where 1 is lowest perceived quality, and 5 is the highest perceived quality;

**“TTR”** means Time to Restore/Repair;

**“NMS”** means Network Management System of the Service Provider;

**“OSS”** means Operations Support Systems of the Service Provider;

**“Private Electronic Communications Service”** means electronic communications services used within one enterprise or any body corporate with which it is affiliate, to satisfy its internal needs and operated without interconnection to a public electronic communications network that enables electronic communications to persons other than within the enterprise or the body corporate;

**“Public Electronic Communications Service”** include electronic communications service, a public telephone service offered to members of the general public which permits one user to communicate with another user regardless of the technology used to provide the service, but does not include a service that modifies a communication, restructures, adds or supplies, or permit user interaction with information unless the service is offering a public telephone service;

“**Public Switched Telephone Network**” means a network set up and operated by basic service providers for the specified purpose of providing fixed communication services between subscribers using telephone sets or accessories;

“**Public Land Mobile Network**” means a network set up and operated by a licensed operator, for the purpose of providing land based mobile communication services to the public and which provides communication facilities to subscribers using mobile user equipment;

“**Sanction**” means a fine or compensation requirement imposed on the Electronic Communications Service Provider for defaulting in its QoS obligation.

“**Service Provider**” means a person licensed under the Electronic Communications Act, 2008 (Act 775) to provide Electronic Communication Services;

“**Service Level Agreement**” means a contract between the Service Provider and the customer that defines the level of service expected from the service provider.

## **PART II**

### **OBJECTIVES AND METHODOLOGY**

#### **Objectives of the Regulations**

4. These regulations are intended to:
  - (a) create conditions for customer satisfaction by making known the quality of service obligations that the service provider is required to meet.
  - (b) measure the quality of service provided by the Service Provider from time to time in line with the service parameters stated in these regulations in order to assess the levels of performance.
  - (c) improve the operation and performance of interconnected networks; and
  - (d) implement a Quality of Service framework, which allows the quality of service delivered by Service Providers to be measured, reported and published based on defined parameters and measurement methodologies as provided in these Regulations.

#### **Measurement Mechanisms**

5. The measurement of quality of service parameters shall be based on the measurement mechanisms as follows:
  - a) The Service Provider shall submit to the Authority on hourly basis the raw data from their NMS and OSS, which shall be used to calculate level of performance of Service Providers based on the parameters stated in these Regulations,
  - b) The parameters referred to in Regulations 5(a) may be reviewed by the Authority in accordance with international best practice.
  - c) The Service Provider shall allow the Authority to access its trouble ticketing system for customer service provisioning and complaints.
  - d) Test calls measurement shall be made using drive-tests or other test units as determined by the Authority.
  - e) The Authority shall conduct audits on all parameters, network interfaces and elements it deems appropriate.

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OBLIGATIONS OF ELECTRONIC COMMUNICATIONS SERVICE PROVIDERS****Performance Obligations**

6. (a) The Service Provider shall ensure that performance of electronic communications services meets levels of performance as set forth in these regulations.
- (b) Notwithstanding the foregoing, the Services Provider may exceed the performance of electronic communications services levels of performance set forth in these regulations.

**Measurement Systems**

7. (a) The Service Provider shall establish measurement systems consistent with these Regulations.
- (b) For the purposes of monitoring compliance of the QoS parameters the Authority shall be guided by the measurement mechanisms in Schedules I to IX of the Regulations.

**Services to be provided on payment**

8. The Service Provider shall provide services to a person who applies and is capable of paying the appropriate charges for the provision of services.

**Provision of Service**

9. In the event of planned disruption of service, the Service Provider shall inform its customers of such incidence not later than three (3) days prior to the occurrence.

**Duty of Service Provider to Customers**

10. In executing its obligations to customers, the Service Provider shall:-
  - a) establish and maintain efficient information services to assist a customer with queries relating to the services and products, including installation, customer assistance and public directory assistance;
  - b) provide to customers in respect of each category of the licensed service, equal access to service in the licensed area at the same quality of service and at the same tariff;
  - c) comply with relevant provisions under L.I 1991 on duties of the service provider;
  - d) submit to the Authority within one (1) month of commencement of service for approval a Service Level Agreement containing the minimum quality of service standards to which customers are entitled, and the remedies and compensation available when service fall below such standards.
  - e) The Authority on receipt of the Service Level Agreement shall review and where the Authority determines that the Service Level Agreement does not meet the requirement set by the Authority, the Authority shall direct the Service Provider to amend the Service Level Agreements to be in line with the requirements set by the Authority.
  - f) notify all customers of the terms and conditions of the Service Level Agreement and shall thereafter provide licensed services based upon the agreement.
  - g) All modifications made to existing Service Level Agreement shall be submitted to the Authority by the Service Provider for approval.
  - h) The Service Provider shall notify the customer of the modified Service Level Agreement following the approval granted by the Authority.

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### **PART IV** **QUALITY OF SERVICES**

#### **Quality of Service for Electronic Communication Services**

11. The Service Provider shall provide services in accordance with the quality of service parameters specified in the Schedules of these Regulations.

#### **Review of Quality of Service Parameters**

12. The Authority may review the quality of services parameters and measurement mechanisms anytime the Authority deems it fit, but not more than once in a financial year.

#### **Public Emergencies**

13 (a) In the event of Force Majeure, the Authority may require the Service Provider to provide the necessary services to the Government giving priority to the support activities required to overcome the emergency.

(b) The Service Provider shall submit to the Authority every six (6) months its plan for the procedures and operations which the licensee shall follow in the event of any such emergency and shall update the said plan upon request by the Authority.

(c) In the event that the emergency or crisis is related to matters concerning national security, the licensee shall co-ordinate with the relevant authority indicated by the Authority and shall implement the emergency plan as far as reasonably practicable in accordance with the instructions as may be given by the Authority.

#### **Procedures for rectifying violation of QoS requirement**

14. (a) In case of a violation, a formal notice will be sent to the Service Provider to rectify the problem within fourteen (14) days.

(b) In the event that a joint team of the Authority and Service Provider determines that the violation cannot be resolved within 14 days, the Service Provider shall be required to submit a plan to address same.

(c) Any such plan submitted shall be subject to review and approval by the Authority.

(d) The Authority shall apply the appropriate sanctions on a Service Provider for failure to rectify a violation in accordance with the action plan approved pursuant to Regulations 14 (c).

#### **Notification of Service Degradation and Outages**

15. (a) The Service Provider shall notify the Authority and affected customers in any locality within an hour (1) of any service degradations or outages, which may extend beyond an hour.

(b) The Authority shall be notified via the email address [serviceissues@nca.org.gh](mailto:serviceissues@nca.org.gh)

(c) The channels for communication to customers may include the following:

- Newspaper (at least one state-owned)
- Social Media (Facebook, Twitter, Instagram)
- SMS
- Local Radio stations in the affected locality (including GBC Radio stations)
- Television (including GBC TV Stations).

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- (d) The Service Provider shall include the following information to its customers during events of service degradation and outages:
- Affected Service
  - Period of disruption
  - Reason(s) of disruption
  - Areas of disruption
  - Possible effect(s) on Consumers
  - Estimated time for Service Restoration

**Application of Sanctions**

16. The Authority will apply the appropriate sanctions in accordance with Schedule VI of these Regulations.

**Compensations**

17. (a) The Service Provider shall provide for the fair redress and compensation of customers in the event of wrongful treatment by the Service Provider.
- (b) In addition to the sanctions to be imposed by the Authority as per Schedule VI, affected customers shall be compensated by the Service Provider as may be prescribed by the Authority except in the case of force majeure.

**Publication of Quality of Service Results**

18. The Authority shall publish results of service quality measurements for every district on monthly basis in order to ensure customers are provided with information that will enable them make informed decisions.

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**SCHEDULE I**

**QUALITY OF SERVICE (QoS) PARAMETERS FOR INTERCONNECTION**

Every Service Provider required per its licence to interconnect with other communications networks shall meet the following Quality of Service benchmarks for any interconnected service in respect of each specified parameter measured by real traffic on any interconnected route.

The Service Provider shall submit a monthly report based on peak hour conditions.

<b>Parameter</b>	<b>Definition</b>	<b>Formula</b>	<b>Measurement Mechanism</b>	<b>Measurement Tool</b>	<b>Target</b>
Interconnection Route Utilization	The percentage of provisioned interconnection route that is carrying traffic	(Capacity in use / Capacity Provisioned)* 100%	Real Traffic	Performance Management system	Not more than 70% of capacity
Time To Repair (TTR) Interconnection Route	The duration from a reported interconnection fault to service restoration	Time of Total Service Restoration - Time of Occurrence of Fault	Real Traffic	Performance Management system	Not more than One Hour
Network Effectiveness Ratio (NER)	The ability of the network to deliver calls to far-end terminals  (Reference: ITU-T E.425 Rec.)	(Seizure delivered to far-end Connecting Entity) / (Total Seizure requests from Connecting Entity) x 100	Real Traffic	Performance Management system	Not less than 95%

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## SCHEDULE II

## QUALITY OF SERVICE (QoS) PARAMETERS FOR MOBILE VOICE SERVICE

A Service Provider required per its licence to provide mobile voice services shall meet the following Quality of Service benchmarks in respect of each specified parameter measured by test traffic in any locality or Performance Management System based on daily or peak hour conditions; where appropriate.

Parameter	Definition	Formula	Measurement Mechanism	Measurement Tool	Target
Service Coverage	The transmitter output power as received by a reference antenna at a distance from the transmitting antenna	Field Strength measurements	Field Strength measurements	Test Stations or Drive Test System	>-75dBm for indoors >-85dBm for in-vehicles >-95dBm for outdoor in city
Call Connection Success Rate	The percentage of attempted calls that are connected to the intended recipients	$(\text{Number of Calls connected to intended recipients} / \text{Number of Calls attempted}) * 100\%$	Real Traffic from OSS and/or Test Traffic	Performance Monitoring System/ Test Stations or Drive Test System	> 95% <i>(90% of cells should record measurement values &gt; 95% for real traffic)</i>
Call Drop Rate	The percentage of calls connected to intended recipients that ended or released without the intervention of any of the users	$(\text{Number of Calls disconnected without intervention by any user} / \text{Number of Calls connected to intended recipients}) * 100\%$	Real Traffic from OSS and/or Test Traffic	Performance Monitoring System/ Test Stations or Drive Test System	<1% <i>(90 % of cells should record measurement values &lt; 1% for real traffic)</i>

Call Setup Time	The duration from when a call is made to the time of receiving a ring back tone	Time Call Alerting-Time Dial	Test Traffic	Test Stations or Drive Test System	<10seconds at 95 <sup>th</sup> percentile of all cases
Voice Quality	Numerical indication Of the perceived quality of received media after compression and /or transmission	Mean Opinion Score (MOS) (Reference- ITU-T P.863)	Test Traffic	Test Stations or Drive Test System	> 3.5 for 95% of all cases

### SCHEDULE III

#### QUALITY OF SERVICE (QoS) PARAMETERS FOR MOBILE MESSAGING SERVICE

A Service Provider required per its licence to offer mobile messaging service shall meet the following Quality of Service benchmarks for any messaging service in respect of each specified parameter measured by test traffic.

Parameter	Definition	Formula	Measurement Mechanism	Measurement Tool	Target
Delivery Success Rate	The percentage of sent messages that are received by the intended recipients	(Number of SMS received by intended recipients/ Number of SMS sent) *100%	Test Traffic	Test Stations or Drive Test System	≥ 98%
Delivery Success Time	The duration from when an SMS is sent to the time of receiving the SMS by the intended recipient	Time SMS received-Time SMS sent	Test Traffic	Test Stations or Drive Test System	All SMS less than 5 seconds

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**SCHEDULE IV**

**QUALITY OF SERVICE (QoS) PARAMETERS FOR BASIC TELEPHONY SERVICE**

A Service Provider of basic telephony service shall meet the following Quality of Service benchmarks in respect of each specified parameter measured in any locality.

The Service Provider shall submit a monthly report based on daily and/or peak hour conditions.

<b>Parameter</b>	<b>Definition</b>	<b>Formula</b>	<b>Measurement Mechanism</b>	<b>Measurement Tool</b>	<b>Target</b>
Service Provision Time	The duration for a service to be operational after payment for the service has been made	Time Service Operational- Time Payment of Service	Complaints	Trouble ticket system	< 5 Calendar Days
Time to Repair (TTR)	The duration from a reported fault to service restoration	Time Service Restored- Time Reported	Complaints	Trouble ticket system	≤ 48 hours
Call Connection Success Rate	Percentage of successfully connected calls	(Number of successfully connected call attempts) / (Total number of attempts) x100	Real Traffic from OSS or Test traffic	Performance Monitoring system or Test Stations	> 99%

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## SCHEDULE V

## QUALITY OF SERVICE (QoS) PARAMETERS FOR DATA SERVICE

A Service Provider that provide data services shall meet the following Quality of Service benchmarks in respect of each specified parameter measured in any locality and shall submit monthly report based on peak hour and/or daily conditions.

## HTTP (Web Browsing) Service

Parameter	Definition	Formula	Measurement Mechanism	Measurement Tool	Target
HTTP set-up time	The time it takes for a standard web page to start loading. The time period needed to access the service successfully, from starting the dial-up connection to the point of time when the content is sent/received. (Ref: ITU-T E.804)	Time Content Received- Time Content requested	Real Traffic from OSS and or Test traffic	Performance Monitoring System/ Test Stations or Drive Test System	< Five (5) seconds at 95 <sup>th</sup> percentile
HTTP Drop Rate	The percentage of incomplete data transfers that were started successfully	(Number of incomplete data transfers/ Number of transfers started successfully) *100%	Real Traffic from OSS and or Test traffic	Performance Monitoring System/ Test Stations or Drive Test System	< 1%
HTTP Mean Bit Rate	The average data transfer rate measured throughout the entire session of the service	Average HTTP Throughput	Real Traffic from OSS and or Test traffic	Performance Monitoring System/ Test Stations or Drive Test System	≥ 1Mb/s

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Parameter	Definition	Formula	Measurement Mechanism	Measurement Tool	Target
Latency	The time it takes for a data packet to be transmitted and returned back to the source. The total time for round trip	Average round trip time	Test Traffic (ping test)	Test Stations or Drive Test System	≤80ms (for Broadband Wireless services) <100ms (other mobile cellular Services)

## FTP (FILE TRANSFER PROTOCOL) Service

Parameter	Definition	Formula	Measurement Mechanism	Measurement Tool	Target Preferred
FTP {download  upload} set-up time [s]	The duration to access the service successfully; starting from service request to the point of time when the content starts download /upload	Time Service Access Successful -Time Service Access Start	Real Traffic from OSS and or Test traffic	Performance Monitoring System/ Test Stations or Drive Test System	< Five (5) seconds at 95 <sup>th</sup> percentile
FTP Drop Rate	The percentage of incomplete data transfers that were started successfully	(Number of incomplete data transfers/ Number of transfers started successfully) *100%	Real Traffic from OSS and or Test traffic	Performance Monitoring System/ Test Stations or Drive Test System	<1%
FTP {download  upload} mean data rate [Mb/s]	The average data transfer rate measured throughout the entire session of the service	Average FTP Throughput	Test traffic	Test Stations or Drive Test System	≥ 10 Mb/s (for Broadband Wireless services) <2 Mb/s (other mobile cellular Services)

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## Web Streaming Service

Parameter	Definition	Formula	Measurement Mechanism	Measurement Tool	Target
The web radio tune-in Success Rate	The percentage that a subscriber can obtain the tune-in information for a web radio streaming server successfully	$(\text{Number of Successful tune-in} / \text{Total attempts}) * 100\%$	Test Traffic	Test Stations or Drive Test System	>98%
The web radio tune-in Success Time	The duration needed to obtain the tune-in information for a web radio streaming server successfully	$\text{Time Tune-in} - \text{Time Successful Tune-in}$	Test Traffic	Test Stations or Drive Test System	< 2 sec
Web radio reproduction cut-off Ratio	The percentage that a subscriber cannot successfully complete stream reproduction from a given web radio station for a given period of time	$(\text{Number of Unsuccessful listening attempts} / \text{Total attempts}) * 100\%$	Test Traffic	Test Stations or Drive Test System	< 2%

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## Over the Top (OTT) Voice Service

Parameter	Definition	Formula	Measurement Mechanism	Measurement Tool	Target
Call Success Rate	The percentage of attempted calls that are connected to the intended recipients	(Number of Calls connected to intended recipients/ Number of Calls attempted) *100%	Test traffic	Test Stations or Drive Test System	≥ 98%
Call Setup Time	The duration from when a call is made to the time of receiving a ring back tone	Time Call Alerting- Time Dial	Test Traffic	Test Stations or Drive Test System	All calls less than 10 seconds
Call Drop Rate	The percentage of calls connected to intended recipients that ended without the intervention of any of the users	(Number of Calls disconnected without intervention by any user/ Number of Calls connected to intended recipients) *100%	Test traffic	Test Stations or Drive Test System	< 2%
Call Clarity	According to ITU-T P.863	Mean Opinion Score	Test Traffic	Test Stations or Drive Test System	all calls better than 3.5 MOS

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**Over the Top (OTT) Messaging Service**

<b>Parameter</b>	<b>Definition</b>	<b>Formula</b>	<b>Measurement Mechanism</b>	<b>Measurement Tool</b>	<b>Target</b>
Delivery Success Rate	The percentage of sent messages that are received by the intended recipients	$(\text{Number of SMS received by intended recipients} / \text{Number of SMS sent}) * 100\%$	Test Traffic	Test Stations or Drive Test System	$\geq 98\%$
Delivery Success Time	The duration from when an SMS is sent to the time of receiving the SMS by the intended recipient	$\text{Time SMS received} - \text{Time SMS sent}$	Test Traffic	Test Stations or Drive Test System	All SMS less than 5 seconds

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**SCHEDULE VI**

**QUALITY OF SERVICE (QoS) PARAMETERS FOR DIGITAL FINANCIAL SERVICE (DFS)**

A Service Provider who offers digital financial service (i.e. mobile money) shall meet the following Quality of Service benchmarks in respect of each specified parameter measured by test traffic.

<b>Parameter</b>	<b>Definition</b>	<b>Formula</b>	<b>Measurement Mechanism</b>	<b>Measurement Tool</b>	<b>Target</b>
Money Transfer Success Rate	The percentage of money transfers that are received by the intended recipients	$(\text{Number of Money Transfers received by intended recipients} / \text{Number of Money Transfers sent}) * 100\%$	Test Traffic	Test Stations or Drive Test System	Equal to 100%
Money Transfer Success Time	The duration from when a Mobile Money is sent to the time of receiving the Mobile Money by the intended recipient	Time Mobile Money received- Time Mobile Money sent	Test Traffic	Test Stations or Drive Test System	All Mobile Money Transfers less than 5 seconds
Money Transfer Failed Transaction Resolution Time	The duration from when a deducted Mobile Money Wallet is credited after reporting failed transaction.	Time Mobile Money Credited - Time Mobile Money Failed transaction reported	Test Traffic	Test Stations or Drive Test System	< 6 hours

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**SCHEDULE VII**

**QUALITY OF SERVICE (QoS) PARAMETERS FOR INFRASTRUCTURE**

A Service Provider required per its licence to offer infrastructure service shall meet the following benchmarks for service/infrastructure availability.

<b>Parameter</b>	<b>Definition</b>	<b>Formula</b>	<b>Measurement Mechanism</b>	<b>Measurement Tool</b>	<b>Target</b>
Coverage Signal Strength	The transmitter power output as received by a reference antenna at a distance from the transmitting antenna	Field Strength Measurements		Test Stations or Drive Test System	>-75dBm for Indoors >-85dBm for In-vehicles >-95dBm for outdoor in city
Time To Restore Service (TTR)	The duration from a reported outage to service restoration	Time Service Restored- Time Reported	Real Traffic	Performance Management system	Less than 6 hours for a Cell ; less than 1 hour for core network

**SCHEDULE VIII**

**BILLING, CUSTOMER SERVICE & SATISFACTION MEASURES**

A Service Provider required per its licence to offer any mobile service shall meet the following benchmarks for billing, customer service and customer satisfaction in respect of each specified parameter.

<b>Parameter</b>	<b>Definition</b>	<b>Formula</b>	<b>Measurement Mechanism</b>	<b>Measurement Tool</b>	<b>Target</b>
Billing Accuracy-Voice Calls	Same duration in seconds used for a call used should be used for charging	Per second charging	Real or Test Traffic	Billing Assurance Systems	Accurate charging

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Billing Accuracy-Messaging		Message Length of 160 characters	Real or Test Traffic	Billing Assurance Systems	Accurate charging
Billing Accuracy-Internet Services		Volume charging Time charging	Real or Test Traffic	Billing Assurance Systems	Accurate charging
Provision and installation of Internet equipment (modem and related accessories) on premise after payment	Number of days from Service request to Service operations	Time of Service provision – Time of Service request	Complaints	Trouble ticket system	≤ Five (5) Days
Interactive Voice Response (IVR)	Duration of announcement of the entire IVR options before a customer can make a choice.	Time IVR Option to Operator to speak to an agent - Time IVR started	Test traffic	Test Stations	< Fifteen (15) Seconds
Call Centre Operator Response	Duration of waiting after the option to a Customer Care Assistant has been chosen	Time Operator Assistance Pick up- Time Making Operator request	Test traffic	Test Stations	< Thirty (30) Seconds
Customer satisfaction on overall quality of service		<u>Number of answers as good Quality/</u> Number of customers interviewed	Complaints	Trouble ticket system or Survey	>95%
Customer Service Point Delay	The duration for queuing at a Customer Service Point before queries or complaints can be rendered	Time Customer Service Assistance -Time of issued queue number	Complaints	Trouble ticket system	<15 minutes
Complaint Resolution Time	The duration from a reported fault to service restoration	Time Service Restored- Time Reported	Complaints	Trouble ticket system	< 5 days

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### SCHEDULE IX

#### CUSTOMER SATISFACTION ATTRIBUTES

A Service Provider in respect of the following Quality of Service benchmarks 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 Authority.

<b>Parameter Name</b>	<b>Target</b>
% of customers satisfied with the service availability.	>90%
% of customers satisfied with the service accessibility.	>90%
% of customers satisfied with the reliability.	>90%
% of customers satisfied with billing performance.	>90%
% of customers satisfied with the help/ enquiry services.	>90%

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## SCHEDULE X

## SANCTIONS ON DEFAULT ON QUALITY OF SERVICE OBLIGATIONS

## Sanctions for Interconnection

Parameter	Definition	Measurement Tool	Target	Sanction	Penalty Points
Interconnection Route Utilization	The percentage of provisioned interconnection route that is carrying traffic	Performance Management System	Not more than 70% of capacity	Directives to expand; fines to Authority from Route Owner	4200 per route for more than 70%
Time To Repair (TTR) Interconnection Route	The duration from a reported interconnection fault to service restoration	Performance Management System	Not more than One Hour	Compensation to Partner; fines to Authority	4200 per hour to be paid by defaulting operator
Network Effectiveness Ratio	According to ITU-T E.425 Rec.)	Performance Management System	Not less than 95%	Fines to the Authority	4200 per route

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## Sanctions for Mobile Voice Service

Parameter	Definition	Measurement Tool	Target	Sanction	Penalty Points
Service Coverage	The transmitter power output as received by a reference antenna at a distance from the transmitting antenna	Test Stations or Drive Test System	>-75dBm for indoors >-85dBm for in-vehicles >-95dBm for outdoor in city	Fine to be paid by defaulting operator to Authority	17,000 per locality/ district
Call Connection Success Rate	The percentage of attempted calls that are connected to the intended recipients	Performance Monitoring System/ Test Stations or Drive Test System	> 95%	Fine to be paid by defaulting operator to Authority	17,000 per locality/ district
Call Drop Rate	The percentage of calls connected to intended recipients that ended or released without the intervention of any of the users	Performance Monitoring System/ Test Stations or Drive Test System	<1%	Fine to be paid by defaulting operator to Authority	17,000 per locality/ district
Call Setup Time	The duration from when a call is made to the time of receiving a ring back tone	Test Stations or Drive Test System	<10seconds at 95 <sup>th</sup> percentile of all cases	Fine to be paid by defaulting operator to Authority	17,000 per locality/ district
Voice Quality	According to ITU-T P.863	Test Stations or Drive Test System	> 3.5 for 95% of all cases	Fine to be paid by defaulting operator to Authority	17,000 per locality/ district

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**Sanctions for Mobile Messaging Service**

<b>Parameter</b>	<b>Definition</b>	<b>Measurement Tool</b>	<b>Target</b>	<b>Sanction</b>	<b>Penalty Points</b>
Delivery Success Rate	The percentage of sent messages that are received by the intended recipients	Test Stations or Drive Test System	$\geq 98\%$	Compensation to Customers; Fines to be paid to the Authority	Twice the amount charged for undelivered service; 4200 for every default
Delivery Success Time	The duration from when an SMS is sent to the time of receiving the SMS by the intended recipient	Test Stations or Drive Test System	All SMS less than 5 seconds	Fine to be paid by defaulting Operator	4200 for every destination in default

**Sanctions for Basic Telephony Service**

<b>Parameter</b>	<b>Definition</b>	<b>Measurement Tool</b>	<b>Target</b>	<b>Sanction</b>	<b>Penalty Points</b>
Service Provision Time	The duration for a service to be operational after payment for the service has been made	Trouble ticket system	< 5 Calendar Days	Compensation to Customer	Twice the amount paid for the Service
Time to Repair (TTR)	The duration from a reported fault to service restoration	Trouble ticket system	$\leq 48$ hours	Compensation to Customer	90 per day or pro-rated after every hour after 48 hours.
Call Connection Success Rate	Percentage of successfully connected calls	Performance Monitoring system or Test Stations	> 99%	Fine to be paid by defaulting Operator	4200 for every destination in default

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## Sanctions for Data Service

## HTTP (Web Browsing) Service

Parameter	Definition	Measurement Tool	Target	Sanction	Penalty Points
HTTP Set-up time	The time it takes for a standard web page to start loading. The time period needed to access the service successfully, from starting the dial-up connection to the point of time when the content is sent/received. (Ref: ITU-T E.804)	Performance Monitoring System/ Test Stations or Drive Test System	< Five (5) seconds at 95 <sup>th</sup> percentile	Fine to be paid by defaulting Operator	4200 per locality or district
HTTP Drop Rate	The percentage of incomplete data transfers that were started successfully	Performance Monitoring System/ Test Stations or Drive Test System	< 1%	Fine to be paid by defaulting Operator	4200 per locality or district
HTTP Mean Bit Rate	The average data transfer rate measured throughout the entire session of the service	Performance Monitoring System/ Test Stations or Drive Test System	≥ 1Mb/s	Fine to be paid by defaulting Operator	4200 per locality or district
Latency	The time it takes for a data packet to be transmitted and returned back to the source. The total time for round trip	Test Stations or Drive Test System	≤80ms (for Broadband Wireless services) <100ms (other mobile cellular Services)	Fine to be paid by defaulting Operator	4200 per locality or district

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## FTP (FILE TRANSFER PROTOCOL) Service

Parameter	Definition	Measurement Tool	Target	Sanction	Penalty Points
FTP {download  upload} set-up time [s]	The duration to access the service successfully; starting from service request to the point of time when the content starts download /upload	Performance Monitoring System/ Test Stations or Drive Test System	< Five (5) seconds at 95 <sup>th</sup> percentile	Fine to be paid by defaulting Operator	4200 per locality or district
FTP Drop Rate	The percentage of incomplete data transfers that were started successfully	Performance Monitoring System/ Test Stations or Drive Test System	<1%	Fine to be paid by defaulting Operator	4200 per locality or district
FTP {download  upload} mean data rate [Mb/s]	The average data transfer rate measured throughout the entire session of the service	Test Stations or Drive Test System	≥ 10 Mb/s (for Broadband Wireless services) <2 Mb/s (other mobile cellular Services)	Compensation to Customers; Fines to be paid to the Authority	170 per day to customers; or a fine of 4200 per locality or district

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## Web Streaming Service

Parameter	Definition	Measurement Tool	Target	Sanction	Penalty Points
The web radio tune-in Success Rate	The percentage that a subscriber can obtain the tune-in information for a web radio streaming server successfully	Test Stations or Drive Test System	>98%	Fine to be paid by defaulting Operator	4200 per locality or district
The web radio tune-in Success Time	The duration needed to obtain the tune-in information for a web radio streaming server successfully	Test Stations or Drive Test System	< 2 sec	Fine to be paid by defaulting Operator	4200 per locality or district
Web radio reproduction cut-off Ratio	The percentage that a subscriber cannot successfully complete stream reproduction from a given web radio station for a given period	Test Stations or Drive Test System	< 2%	Fine to be paid by defaulting Operator	4200 per locality or district

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## Over the Top (OTT) Voice Service

Parameter	Definition	Measurement Tool	Target	Sanction	Penalty Points
Call Success Rate	The percentage of attempted calls that are connected to the intended recipients	Test Stations or Drive Test System	$\geq 98\%$	Fine to be paid by defaulting Operator	4200 per day
Call Setup Time	The duration from when a call is made to the time of receiving a ring back tone	Test Stations or Drive Test System	All calls less than 10 seconds	Fine to be paid by defaulting Operator	4200 per day
Call Drop Rate	The percentage of calls connected to intended recipients that ended without the intervention of any of the users	Test Stations or Drive Test System	$< 2\%$	Fine to be paid by defaulting Operator	4200 per day
Call Clarity	According to ITU-T P.863	Test Stations or Drive Test System	all calls better than 3.5 MOS	Fine to be paid by defaulting Operator	4200 per day

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**Over the Top (OTT) Messaging Service**

<b>Parameter</b>	<b>Definition</b>	<b>Measurement Tool</b>	<b>Target</b>	<b>Sanction</b>	<b>Penalty Points</b>
Delivery Success Rate	The percentage of sent messages that are received by the intended recipients	Test Stations or Drive Test System	$\geq 98\%$	Fine to be paid by defaulting Operator	4200 per day
Delivery Success Time	The duration from when an SMS is sent to the time of receiving the SMS by the intended recipient	Test Stations or Drive Test System	All SMS less than 5 seconds	Fine to be paid by defaulting Operator	4200 per day

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### Sanctions for Digital Financial Service (DFS)

Parameter	Definition	Measurement Tool	Target	Sanction	Penalty Points
Money Transfer Success Rate	The percentage of money transfers that are received by the intended recipients	Test Stations or Drive Test System	Equal to 100%	Fine to be paid by defaulting Operator	4200 for every default
Money Transfer Success Time	The duration from when a Mobile Money is sent to the time of receiving the Mobile Money by the intended recipient	Test Stations or Drive Test System	All Mobile Money Transfers less than 5 seconds	Fine to be paid by defaulting Operator	4200 per hour
Money Transfer Failed Transaction Resolution Time	The duration from when a deducted Mobile Money Wallet is credited after reporting failed transaction.	Test Stations or Drive Test System	< 6 hours	Compensation	4200 per hour after 6 hours

### Sanctions for Infrastructure

Parameter	Definition	Measurement Tool	Target	Sanction	Penalty Points
Coverage Signal Strength	The transmitter power output as received by a reference antenna at a distance from the transmitting antenna	Test Stations or Drive Test System	>-75dBm for Indoors >-85dBm for In-vehicles >-95dBm for outdoor in city	Fine to be paid by defaulting Operator	4200 per locality or district
Time To Restore Service (TTR)	The duration from a reported outage to service restoration	Performance Management system	Less than 6 hours for a Cell; Less than 1 hour for core network	Fine to be paid by defaulting Operator	4200 per hour after 6 hours for a Cell; 9000 per hour for core network

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**Sanctions for Billing, Customer Service and Satisfaction Measures**

<b>Parameter</b>	<b>Definition</b>	<b>Measurement Tool</b>	<b>Target</b>	<b>Sanction</b>	<b>Penalty Points</b>
Billing Accuracy	Same duration in seconds used for a call used should be used for charging	Billing Assurance Systems	Accurate charging	Compensation to customers;  Fine to be paid by defaulting Operator	Twice amount overcharge;  4200 for every destination in default
Provision and installation of Internet equipment (modem and related accessories) on premise after payment	Number of days from Service request to Service operations	Trouble ticket system	≤ Five (5) Days	Compensation to customers	Cost of service charged per day after 5 days
Interactive Voice Response (IVR)	Duration of announcement of the entire IVR options before a customer can make a choice	Test Stations	< Fifteen (15) Seconds	Fine	4200 per destination
Call Centre Operator Response	Duration of waiting after the option to a Customer Care Assistant has been chosen	Test Stations	< Thirty (30) Seconds	Fine	4200per destination
Customer Service Point Delay	The duration for queuing at a Customer Service Point before queries or complaints can be rendered	Trouble ticket system	> Fifteen (15) minutes	Compensation	9.0 per hour after 15 minutes
Complaint Resolution Time	The duration from a reported fault to service restoration	Trouble ticket system	< Five (5) Days	Compensation	4200 per day after 5 days

