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## LEGAL NOTICE NO. 100 OF 2016

**Lesotho Communications Authority (Quality of Service) Rules, 2016**

Pursuant to Section 4 of the Communications Act 2012<sup>1</sup>,

**LESOTHO COMMUNICATIONS AUTHORITY**

makes the following Rules -

**Citation and commencement**

1. These Rules may be cited as Lesotho Communications Authority (Quality of Service) Rules, 2016 and shall come into operation on the date of publication in the Gazette.

**Scope and Application of the Rules**

2. These Rules prescribe quality of service standards applicable to communications service.

**Definitions**

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

“Authority” means the Lesotho Communications Authority;

“consumer” means a natural person who is or may in future be a user of communications services;

“customer” means a retail end user of communications services;

“communications network” means an integrated system of facilities used to provide one or more communications service;

“communications service” means a broadcasting, postal or telecommunications service;

“investigation” means any action undertaken by the Authority to establish whether a licensee is committing or has committed a contravention;

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

“inquiry” means a formal hearing held by the Authority;

“licensee” means a person who has been granted a licence by the Authority for the provision of a communication service;

“measurement” means a numerical value that is obtained by using a measurement method;

“measurement method” means the method of measuring a parameter that is identified in the schedule of measurements in these regulations;

“network termination point” means a point at which a customer has physical access through terminal devices or other customer premises equipment to a network of a licensee;

“parameter” means a measurable characterization of the quality of an aspect of a service;

“quality of service” means the collective effect of service performances, which determines the degree of meeting set standards;

“reporting area” means the geographic area for which measurements are taken and recorded;

“reporting period” means the period of time over which measurements are taken and recorded when a licensee or the Authority performs quality of service measurements; and it shall be prescribed by the Authority;

“service level agreement (SLA)” means a part of a service contract where service is formally defined;

“service provider” means a licensed provider of communications service; and

“the Act” means Communications Act 2012.

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**Quality of service parameters**

4. (1) The licensee providing fixed, mobile or internet services shall be required to meet the target set out in the quality of service parameters as specified in the Schedule.

(2) The Authority shall inspect or investigate matters relating to quality of service of a licensee to ensure compliance.

(3) The Authority may review quality of service parameters and targets.

**Licensee obligations**

5. The service provider shall -

- (a) ensure that communications services are provided at or exceed the set targets, in the case of data services, ensure that advertised offerings include minimum guaranteed speed;
- (b) ensure that customers are provided with information regarding the quality of services they purchase in order for them to make informed decisions;
- (c) establish measurement systems consistent with the framework proposed by the Authority;
- (d) keep a customer referenced log of faults or complaints reported in relations to any parameter in Schedule;
- (e) ensure that service level agreements (SLAs) entered into with customers stipulate targets that are the same or better than those set in these Rules; and
- (f) provide to the Authority, reports of measurement results for the quality of service parameters as requested by the Authority.



**Provision of information**

6. (1) The Authority may require a licensee to provide information so as to enable the Authority to monitor and enforce quality of service.

(2) Where the Authority requests information under subrule (1), the Authority shall provide among other things, detailed specifications of its information request, and applicable response times.

**Investigations and inquiry**

7. (1) The Authority may conduct investigations and inquiries to determine whether a Licensee has complied with these Rules.

(2) The Authority shall afford the licensee an opportunity to make representations during the process in order to enable the Authority to make an informed decision.

(3) Where an inquiry is held in public, appropriate arrangements shall be made to allow reasonable access to the inquiry.

**Contravention**

8. (1) A licensee contravenes these rules if it fails to meet any of the targets set out in the quality of service parameters as specified in the Schedule.

(2) The Authority may publish findings of an investigation or inquiry and the applicable sanctions in the local media.

**Sanctions**

9. Where the Authority determines upon that there has been a contravention, the Authority may -

- (a) direct the licensee to take corrective measures against the contravention within a specified period.
- (b) apply on or more of the following sanctions -
  - (i) name and shame;

- (ii) direct a service provider to issue a public apology;
  - (iii) direct a service provider to make compensation;
  - (iv) direct a service provider to refund affected customers;
  - (v) impose a fine not exceeding M2,000,000.00.
- (c) in the case where the Authority determines that the licensee is unable to meet the targets set out in the quality of service parameters as specified in the Schedule, the Authority may;
- (i) reduce the licence term; or
  - (ii) suspend or revoke the licence.

#### **Determination of sanctions**

10. In determining the applicable sanctions, the Authority shall consider the following factors -

- (a) the nature and seriousness of the contravention, including -
  - (i) duration and frequency of the contravention;
  - (ii) undue gains from the contravention;
  - (iii) extent to which the quality of service delivered by licensee departs from the set targets;
  - (iv) the impact of the contravention on consumers;
  - (v) the loss or risk of loss caused to consumers.
- (b) the conduct of the licensee after the contravention, including -
  - (i) the degree of co-operation with the Authority provided during the investigations of the contravention; and
  - (ii) remedial steps taken since the contravention was identified;

- (c) previous record of the licensee, particularly -
  - (i) whether the licensee has previously been requested to take remedial action; and
  - (ii) general compliance history of the licensee.

**Individual complaints**

11. These Rules shall not oust the right of individual customer to have their complaints dealt with and obtaining redress where appropriate. Such complaints shall be dealt with in accordance with the complaints procedures as prescribed by the Authority.

**Reconsideration**

12. (1) A licensee may request reconsideration by the Authority of any decision that makes a determination or imposes a sanction in terms of this Rules.

(2) The request shall be in writing and be made within 10 days of such decision.

(3) The Authority shall, within 30 days of the request, make a final decision to grant or deny such request either in part or in whole and state reasons for its final decision.

**TŠELISO 'MOKELA**  
**CHIEF EXECUTIVE OFFICER**

**NOTE**

1. Act No. 4 of 2012

## SCHEDULE

## Quality of Service Parameters, targets and sanctions

*Part 1 General Parameters*

Parameters	Target	Sanction-applicable rule
<b>1. Account/Bill Complaint Rate</b> The proportion of bills or prepaid accounts resulting in a customer complaint about the correctness of a given bill or prepaid credit. An account/bill correctness complaint is an expression of dissatisfaction with a prepaid account credit or bill received by a customer.	1.1 No more than 2% of customers	1.1.1 9(b)(i)
<b>2. Account/Bill Complaint Resolution Time</b> Time taken to resolve an account/bill complaint. This is measured as the elapsed time from when the complaint is received by an operator to when the complaint has been resolved.	2.1 95% of complaints should be resolved within 5 working days  2.2 All complaints resolved within 20 days	2.1.1 9(b)(iv)  2.2.1 9(b)(v) M1,200.00 per each unresolved complaint after 20 days
<b>3. Disconnection Complaint Rate</b> The percentage number of complaints about disconnections received by an operator per reporting period.	3.1 Not more than 2% of disconnected customers	3.1.1 9(b)(i)
<b>4. Disconnection Complaint Resolution Time</b> Time taken to resolve a disconnection complaint, measured from when the complaint is received by an operator to when the complaint has been resolved.	4.1 95% of complaints should be resolved within 2 working days	4.1.1 9(b)(i)



4.2 All complaints resolved within 20 days 4.2.1 9(b)(v)  
M1,200.00  
per each  
unresolved com-  
plaint  
after 20 days

**5. Order Completion Time**  
The time taken to provide a service  
in locations where the service is offered.

5.1 95% of  
orders completed  
with 7 working  
days for Fixed  
Services and  
wired Internet

5.1.1 9(b)(i)

5.2 95% of orders  
completed within 1  
working day for Mobile  
Services and wireless  
Internet

5.2.1 9(b)(i)

5.3 All orders should be  
completed within 20  
days per each order  
not met within 20  
days

5.3.1 9(b)(v)  
M1,000.00

**Part 2 Fixed Services Parameters**

**Parameters**

**Target**

**Sanction-applica-  
ble rule**

**6. Call Drop Ratio**

A proportion of calls that  
after being successfully  
established are dropped before  
they can be ended normally  
by a user.

6.1 Not more than 1%  
of successful calls

6.1.1 9(b)(i)  
up to 1.5%

6.1.2 9(b)(v)  
M20,000.00  
per each 0.5% in  
excess of 1.5%

**7. Customer Reported Faults**

The proportion of valid fault  
reports received by an operator per  
customer per reporting period.

7.1 Not more than 2%  
of customers

7.1.1 9(b)(i)

<b>8. Fault Repair Time.</b> Amount of time taken to resolve a fault from time a customer reports the fault.	8.1 95% of faults should be cleared within 5 working days	8.1.1 9(b)(iii)
	8.2 100% in 20 days	8.2.1 9(b)(v) Each fault not resolved within 20 days shall warrant a fine of M2,000.00
<b>9. Call Set-up Time</b> The period starting when the address information required for setting up a call is received by the network and finishing when the called party busy tone or answer signal is received by the calling party.	9.1 Not more than 3 seconds for intra-network	9.1.1 9(b)(i) up to 3 and 9 seconds respectively
	9.2 Not more than 8 seconds for fixed to mobile	9.2.1 9(b)(v) M20,000.00 per each additional second beyond 3 and 9 seconds, respectively.
<b>10. Unsuccessful Call Ratio</b> The ratio of unsuccessful calls to the total number of call attempts in a reporting period.	10.1 Not more than 2% of attempted calls	10.1.1 9(b)(i) up to 3%
		10.1.2 9(b)(v) M10,000.00 for each 0.5% above 3%
<b>11. Listening Voice Quality</b> The quality of received speech signal in relation to the original speech signal.	11.1 Mean not less than 3 on a POLQA scale	11.1.1 9(b)(i)

### ***Part 3 Mobile Services Parameters***

<b>Parameters</b>	<b>Target</b>	<b>Sanction-applicable rule</b>
<b>12. Call Drop Ratio</b> Percentage of calls that are dropped or interrupted by the operator's network prior to their completion by the user.	12.1 Not more than 2%	12.1.1 9(b)(i) up to 2.5%
		12.1.2 9(b)(v) M20,000.00 per each 0.5% in excess of 2.5%

<b>13. Call Set-up Time</b> The period starting when the address information required for setting up a call is received by the network and finishing when the called party busy tone or answer signal is received by the calling.	13.1 Not more than 8.0 seconds.	13.1.1 9(b)(i) up to 9 seconds  13.1.2 9(b)(v) M20,000.00 per each additional second beyond 9 seconds
<b>14. Unsuccessful Call Ratio</b> The ratio of unsuccessful calls to the total number of call attempts in a reporting period.	14.1 Not more than 2% of call attempts	14.1.1 9(b)(i) up to 3%  14.1.2 9(b)(v) M20,000.00 per each 0.5% above 3%
<b>15. Call Release Delay</b> Time interval from the instant the DISCONNECT message is passed by the user terminal which terminated the call to the access signalling system, until the RELEASE message is received by the same terminal (indicating that the terminals can initiate/receive a new call).	15.1 Not more than 1.0 second for calling and called parties	15.1.1 9(b)(i) up to 2 seconds  15.1.2 9(b)(v) M20,000.00 per each additional second beyond 2 seconds
<b>16. Completion Rate SMS</b> The ratio of delivered SMSs to the destination party, (excluding duplicated and corrupted SMSs) to the total number of SMSs successfully sent to SMSC.	16.1 Not less than 99%	16.1.1 9(b)(i) up to 98%  16.1.2 9(b)(v) M20,000.00 per each 0.5% below 98%
<b>17. End-to-end Delivery Time for SMS</b> The period starting when sending an SMS from a terminal equipment to SMS centre and finishing when receiving the very same SMS on another terminal equipment (provided the receiving equipment is within coverage area).	17.1 Less than 5.0 seconds	17.1.1 9(b)(i) up to 6 seconds  17.1.2 9(b)(v) M10,000.00 per each additional second beyond 6 seconds
<b>18. Network Availability</b> Time that the network resources are available to the consumer (including the base transceiver station (BTS) and the mobile switching centres (MSC)).	18.1 Not less than 99.99% for MSC	18.1.1 9(b)(i) up to 99.9%  18.1.2 9(b)(v) M20,000.00 for each 0.01% below 99.9%

	18.2 Not less than 95% for BTS	18.2.1 9(b)(i) up to 94.5%
		18.2.2 9(b)(v) M10,000.00 per each 0.5% below 94.5%
<b>19. Network Coverage</b> The ratio of the geographical land area where there is coverage to the total (country) land area.	19.1 Outdoor signal level with a minimum signal strength of -96dBm	19.1.1 9(b)(i)
<b>20. Listening Voice Quality</b> The quality of received speech signal with respect to the original speech signal.	20.1 Mean not less than 3 on the POLQA scale	20.1.1 9(b)(i)

#### ***Part 4 Internet Services Parameters***

<b>Parameters</b>	<b>Target</b>	<b>Sanction</b>
<b>21. Data Transmission Speed Achieved</b> Data transmission rate that is achieved separately for downloading and uploading specified test files between service provider's network and a user's PC.	21.1 More than 90% of advertised speed should be attained	21.1.1 9(b)(i)
<b>22. Dropped Internet Session Ratio</b> The proportion of successfully established Internet sessions that end before they would be ended normally by users (excluding sessions dropped due to insufficient credit).	22.1 Not more than 1%.	22.1.1 9(b)(i)

#### ***Part 5 Call Centre Services Parameters***

<b>Parameters</b>	<b>Target</b>	<b>Sanction</b>
<b>23. Interactive Voice Response Time</b> The duration of the announcement of the entire IVR options before a customer can make a choice.	23.1 Not more than 30 seconds	23.1.1 9(b)(i)



<b>24. Customer Assistance Operator Access Time</b> The duration of waiting after the option to a Customer Care Assistant has been chosen by the Customer.	24.1 Not more than 3 minutes	24.1.1 9(b)(i)
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### **Part 6 Interconnection Parameters**

<b>Parameters</b>	<b>Target</b>	<b>Sanction-applicable rule</b>
<b>25. Mean Time-To-Repair (MTTR) Interconnection Link</b> Duration of the instant a fault has been notified by a service provider to the published point of contact of the other service provider to the instant where the service has been restored to the normal working order.	25.1 Not more than 2 hours	25.1.1 9(b)(iii) Twice the value of the busy hour traffic per second beyond 2hrs
<b>26. Interconnection Link Utilisation</b> The amount of transmission capacity utilised with respect to the total transmission capacity provided for interconnection.	26.1 Not more than 80%	26.1.1 9(a)

## **EXPLANATORY MEMORANDUM TO THE SCHEDULE**

### **1. Account/Bill Complaint Rate**

#### **1.1 Description**

An account/bill complaint is an expression of dissatisfaction with a pre-paid account credit/post-paid bill received by a customer. An inaccuracy occurs when, for example, in correct call data are used, calls are charged at an incorrect rate, services are billed incorrectly, credits or debts are handled incorrectly, or the total charge including VAT is calculated incorrectly.

#### **1.2 Measurement Method**

The number of prepaid account and bill complaints received during the reporting period should be divided by the average number of prepaid accounts and bills issued (i.e. average number of customers) during the same period. The averaging is necessary because the number of prepaid accounts/bills may vary during the data collection period.



### **1.3 Target**

Not more than 2% of customers for the service in the reporting period.

## **2. Account/Bill Complaint Resolution Time**

### **2.1 Description**

Time taken to resolve account/bill complaints.

### **2.2 Measurement Method**

- (i) Time from when the complaint is received by an operator to when the complaint has been resolved. Resolution shall be deemed to mean to the customer's satisfaction, such that no further communication on the issue is made between the parties.
- (ii) The mean, standard deviation and 95th percentile of the distribution of times to resolve complaints, and the number of account/bill complaints resolved, should be provided as measurements. The measurements should include all account complaints resolved during the reporting period, regardless of the validity of the complaint, the extent to which the complaint repeats an earlier one, and the dates of calls or any other occurrences that are the subject of the complaint.

### **2.3 Target**

- (i) 95% of complaints to be resolved within five (5) working days.
- (ii) 100% of registered complaints resolved within 20 days.

## **3. Disconnection Complaint Rate**

### **3.1 Description**

A disconnection is any way of preventing a customer from using a service; it may not require physical unplugging of connections. A disconnection complaint is a statement by the customer querying an unjustified disconnection. This occurs when, for instance, calls to or from the telephone number of a customer are made unsuccessful by deliberate

acts of the operator. A disconnection complaint should not be confused with a request for suspension, disconnection or transfer or with a fault report.

### **3.2 Measurement Method**

The number of disconnection complaints received during the reporting period should be divided by the average number of customers for the operator during the same period. The averaging is necessary because the number of customers may vary during the data collection period. The measurements should include all disconnection complaints received during the exporting period regardless of the extent to which the complaint repeats an earlier one, and the dates of disconnections or any other occurrences that are the subject of the complaint

### **3.3 Target**

Not more than 2% of customers per reporting period.

## **4. Disconnection Complaint Resolution Time**

### **4.1 Description**

Time taken to resolve a disconnection complaint; measured from when the complaint is received by an operator to when the complaint has been resolved.

### **4.2 Measurement Method**

The mean, Target deviation and 95th percentile of the distribution of times to resolve disconnection complaints, and the number of disconnection complaints resolved, should be provided as measurements. The measurements should include all disconnection complaints resolved during the reporting period, regardless of the extent to which the complaint repeats an earlier one, and the dates of disconnections or any other occurrences that are the subject of the complaint.

### **4.3 Target**

- (i) 95% complaints to be resolved within two working days.

- (ii) 100% of registered complaints should be resolved within 20 days.

## 5. Order Completion Time

### 5.1 Description

Time taken to provide a service in locations where the service is offered.

### 5.2 Measurement Method

- (i) The order completion/service supply time should be measured as the elapsed time (not the working time) from when a service request is accepted by an operator to when a service is provided. Service requests that are unable to be fulfilled because the operator does not offer that particular service in the requested location are excluded.
- (ii) If the operator and the customer agree that more than one service will be provided at a location or that a service will be provided at more than one location, the provision of each service at each location should be counted as a separate service request. Otherwise, service requests concerning single physical connections should be counted as a single service request, regardless of the number of channels activated or affected; multiple lines sharing the same physical path to a customer should be regarded as a single physical connection. The installation of supplementary services is excluded from the measurement.
- (iii) The mean, standard deviation and 95th percentile of the distribution of service supply times, the number of orders received and the number of services completed, should be provided as measurements. The measurements should include all service requests fulfilled during the reporting period.

### 5.3 Target

- (i) Fixed services & ISP: 95% to be completed within seven working days.



- (ii) Mobile services: 95% to be completed within one working day.
- (iii) All orders completed within 20 days.

## **6. Call Drop Ratio (Fixed Services)**

### **6.1 Description**

The proportion of successfully established voice calls that are dropped by the network before they can be ended normally by users.

### **6.2 Measurement Method**

- (i) The number of dropped calls should be divided by the number of successfully established calls. The statistics should be calculated from:
  - (a) Measurements on all real traffic; or
  - (b) Measurements on real traffic for outgoing calls in a representative populations of local exchanges to a representative set of destinations; or
  - (c) Test calls in a representative population of local exchanges or Network Termination Points to a representative set of destinations.
- (ii) The following category statistics should be provided separately:
  - (a) When using real traffic, the percentage of dropped calls for local calls/on-net, together with the number of successfully established calls
  - (b) When using test calls, percentage of dropped calls, together with the number of observations used and the absolute accuracy limits for 95% confidence calculated from the number of observations used

### **6.3 Target**

Not more than 1% of successfully setup calls for fixed networks.

## **7. Customer Reported Faults**

### **7.1 Description**

The number of valid fault reports received by an operator per customer per reporting period. A fault report is a report of disrupted or degraded service that a customer submits to the point of contact of the service provider and is attributable to the fixed access line; and that is not found to be invalid. A fault report may be submitted by telephone or by personal contact at a customer service centre. Faults in any equipment on the customer side of the network termination point and faults that are attributable to the core network or other networks are excluded. Faults reported for a single physical connection should be counted as a single fault, regardless of the number of channels activated or affected; multiple lines sharing the same physical path to a customer should also be regarded as a single physical connection

### **7.2 Measurement Method**

The number of valid fault reports received during the reporting period should be divided by the average number of customers for the service during the same period. The averaging is necessary because the number of access lines may vary during the data collection period. The result should be provided as a percentage.

### **7.3 Target**

Not more than 2% of customers per reporting period.

## **8. Fault Repair Time**

### **8.1 Description**

The time taken to restore a service after receiving valid fault reports. This measure applies only to services that offer the "Target repair" times to customers. The "standard repair" times are the times stated in



the terms and conditions of the service provider. Cases where the service provider does not offer a "standard repair" time or where the service provider agrees with the customer to provide faster repair for payment of higher maintenance fees are excluded, as are cases where lower fees are charged in return for a lower level of repair service.

### **8.2 Measurement Method**

The mean, standard deviation and 95th percentile of the distribution of fault repair times, and the number of faults cleared, should be provided as measurements. The measurements should include all faults cleared during the reporting period. The statistics should be based on faults cleared in the data collection period, irrespective of when they are reported.

### **8.3 Target**

- (i) 95% in five working days.
- (ii) 100% in 20 days.

## **9. Call Set-up time**

### **9.1 Description**

The call set up time is the time interval from the instant when the calling party (user) initiates a connection request to when the address information required for setting up a call is received by the network and finishing when the call disposition (called party busy tone or ringing tone or answer signal) is received by the calling party/user.

### **9.2 Measurement Method**

- (i) The measurement should reflect time in seconds. The statistics should be calculated from:
  - (a) Measurements on real traffic for outgoing calls; or
  - (b) Measurements on real traffic for outgoing calls in a representative population exchange to a representative set of destinations; or

- (c) Test calls in a representative population of local exchanges or NTPs to a representative set of destinations
- (ii) The following statistics should be provided separately:
  - (a) The mean value in seconds for national or net-net calls;
  - (b) The time in seconds within which the fastest 95% of national or on-net calls are set-up;
  - (c) The mean value in seconds for fixed to mobile calls;
  - (d) The time in seconds within which the fastest 95% of fixed to mobile calls are set-up.

### **9.3 Target**

- (i) FIXED SERVICES:
  - (a) Intra-network – Not more than 3 seconds at normal load;
  - (b) Fixed to Mobile – 8 seconds at normal load
- (ii) MOBILE SERVICES:

Not more than 8 seconds.

## **10. Unsuccessful Call Ratio (Fixed Services)**

### **10.1 Description**

Unsuccessful call ratio is defined as the ratio of unsuccessful calls to the total number of call attempts in the reporting period. An unsuccessful call is a call attempt to a valid number, properly dialled following dial tone, where neither called party busy tone, nor ringing tone, nor answer signal, is recognised at the access of the calling user within 30 seconds from the instant when the last digit of the destination subscriber is received by the network.

### **10.2 Measurement Method**

- (i) The number of successful call attempts should be divided by the total number of call attempts. The statistics should be calculated from:
  - (a) Measurement on all real traffic; or
  - (b) Measurement on real traffic for outgoing calls in a representative population of local exchanges to a representative set of destinations; or
  - (c) Test calls in a representative population of local exchanges or NTPs to a representative set of destinations.
- (ii) The following category statistics should be provided separately:
  - (a) The percentage of unsuccessful calls for local calls/on-net, together with the number of observations used and the absolute accuracy limits for 95% confidence from this number

### **10.3 Target**

For Fixed Services: Not more than 2% of attempted calls

## **11. Listening Voice quality**

### **11.1 Description**

The quality of received speech signal with respect to the original speech signal.

### **11.2 Measurement Method**

The test speech sample should be transmitted over the network under test and compared with the received sample

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MOS	Voice Quality
5	Best
4	High
3	Medium
2	Low
1	Poor

### **11.3 Target**

99% of the test speech samples should not be less than 3 on the POLQA scale.

## **12. Call Drop Ratio (Mobile Services)**

### **12.1 Description**

Percentage number of calls that are dropped by the operator's network prior to their completion by the user excluding calls dropped due to insufficient credit.

### **12.2 Measurement Method**

- (i) The number of dropped calls should be divided by the number of successfully established calls. The statistics should be calculated from:
  - (a) Measurements based on real traffic; or
  - (b) Measurements based on test calls
- (ii) The following category statistics should be provided separately:
  - (a) The percentage of dropped calls, together with the number of all calls in the reporting period
  - (b) The percentage of dropped calls, together with the number of observations used and the absolute accuracy limits for 95% confidence calculated from the number of observations used.

**12.3 Target**

Not more than 2% of successfully established calls

**13. Call Set-up time (Mobile Services)**

Refer to item 9 above

**14. Unsuccessful Call Ratio (Mobile Services)****14.1 Description**

Unsuccessful call ratio is defined as the ratio of unsuccessful calls to the total number of call attempts in a reporting period. An unsuccessful call is a call attempt to a valid number, while in a coverage area, where neither the call is answered nor called party busy tone nor ringing tone is recognised at the access of the calling user within 40 seconds from the instant the last digit of the destination subscriber number is received by the network.

**14.2 Measurement Method**

- (i) The statistics should be calculated from:
  - (a) Real traffic, or
  - (b) Test calls.
- (ii) The following statistics should be provided:
  - (a) The percentage of unsuccessful calls, calculated from all call attempts in the reporting.
  - (b) The percentage of unsuccessful calls, together with the number of observations used and the absolute accuracy limits for 95% confidence calculated from this number.

**14.3 Target**

Not more than 2% of attempted calls



## **15. Call Release Delay**

### **15.1 Description**

Time interval from the instant the DISCONNECT message is passed by the user terminal which terminated the call to the access signalling system until the RELEASE message is received by the same terminal.

### **15.2 Measurement Method**

Measurements are made by tests survey in real traffic load in a Mobile or Fixed network. The statistics should be calculated from measurement averages obtained from the drive tests during the reporting time.

### **15.3 Target**

Less than 1.0 second for the calling and called parties.

## **16. Completion Rate SMS**

### **16.1 Description**

Completion Rate for SMS is the ratio of delivered SMSs to the destination party, (excluding duplicated and corrupted SMSs) to the total number of all SMSs successfully sent. A corrupted SMS message refers to the SMS message that is received with a different file size than the original file that is sent.

### **16.2 Measurement Method**

- (i) Successfully received SMSs, excluding all duplicated and/or corrupted SMSs should be divided by the number of all successfully sent SMSs. The statistics should be calculated from:
  - (a) Measurements on real traffic for short messages; or
  - (b) Measurements on real traffic for short messages in a representative population of NTPs/SAPs; or
  - (c) Test calls in a representative population of NTPs/SAPs

- (ii) The following statistics should be provided:
  - (a) The ratio of successfully sent and received short messages, together with the number of observations used and the absolute accuracy limits for 95% confidence calculated from this number.

### **16.3 Target**

Not less than 99% SMS completion rate.

## **17. End to End Delivery Time for SMS**

### **17.1 Description**

The period starting when sending an SMS from terminal equipment to SMS centre and finishing when receiving the same SMS on another terminal equipment.

### **17.2 Measurement method**

- (i) The statistics should be calculated from:
  - (a) Measurements on real traffic for short messages; or
  - (b) Measurements on real traffic for short messages in a representative population of NTPs/SAPs; or
  - (c) Test calls in a representative population of NTPs/SAPs.
- (ii) The following statistics should be provided:
  - (a) The mean value in seconds for sending and receiving short messages.
  - (b) The time in seconds within which the fastest 95% of short messages are sent and received;
  - (c) The number of measurements performed

### **17.3 Target**

Mean time delivery time should be less than 5 seconds.

## **18. Network Availability**

### **18.1 Description**

Time that the network resources are available to the consumer (including the base transceiver station (BTS) and the mobile switching centres (MSC))

### **18.2 Measurements Method**

- (i) The measurement must be made via an automatic data collection system, based on the fault management system of the network that register the appropriate information (alarms and events with time stamps when a cell is out of service and when it becomes operative again).
- (ii) The statistic should be calculated from the following:

$$\text{Network Availability \%} = [1 - (T_i/T_t)] * 100$$

Where:

$T_i$  = total time for all inoperative cells (counted cell by cell) in hours  
 $T_t$  = total time for reporting period in hours (including weekends and public holidays) multiplied by total number of cells.

### **18.3 Target**

- (i) Not less than 95% per reporting period for BTS
- (ii) Not less than 99.99% per reporting period for MSC

## **19. Network Coverage**

### **19.1 Description**

The ratio of the geographical land area where there is coverage to the total (country) land area. The coverage area is the area where there is

outdoor signal level (at street level) more than -96 dBm from the control channels to give access to the network.

### **19.2 Measurements Method**

Coverage area shall be calculated with radio measuring tools of base stations and radio parameters such as power, antenna height, and topography information. The calculated results shall be verified by mobile test tools with antenna configuration and radio sensitivity representative of mobile terminals placed in the market.

### **19.3 Target**

Outdoor signal level with minimum signal strength of -96 dBm

## **20. Listening Voice Quality**

### **20.1 Description**

The quality of received speech signal with respect to the original speech signal.

### **20.2 Measurement Method**

The test speech sample should be transmitted over the network under test and compared with the received sample

<b>MOS</b>	<b>Voice Quality</b>
5	Best
4	High
3	Medium
2	Low
1	Poor



### **20.3 Target**

Not less than 3 on the POLQA scale

## **21. Data Transmission Speed Achieved**

### **21.1 Description**

Data transmission rate that is achieved separately for downloading and uploading specified test files between service provider's network and a user's PC.

### **21.2 Measurement Method**

- (i) The data transmission rate is calculated by dividing the size of the test file by the transmission time required for a complete and error-free transmission.

The calculation of this indicator shall be done according to the following formula: -

***Data Transmission Speed Achieved*** = size of the test file/the transmission time required for a complete and error-free transmission

The transmission time is the time period starting when the access network has received the necessary information to start the transmission and ending when the last bit of the test file has been received.

- (ii) The following statistics should be provided separately for down load and upload direction:
  - (a) The highest data transmission rate in kbit/s achieved.
  - (b) The lowest data transmission rate in kbit/s achieved.
  - (c) The mean value of the data transmission rate in kbit/s.



**21.3 Target**

More than 90% of advertised speed should be achieved.

**22. Dropped Internet Session Ratio****22.1 Description**

The proportion of successfully established Internet sessions that end before they would be ended normally by users. This excludes session dropped to insufficient credit on customer accounts.

**22.2 Measurement Method**

The number of dropped Internet sessions should be divided by the number of successfully established sessions. The result, and the number of successfully established sessions, should be provided as measurements. The measurements should be obtained from end-to-end test sessions. A test session is regarded as dropped if it is not kept for up to 120 seconds after being successfully established.

**22.3 Target**

Not more than 1% of sessions should be dropped after being successfully established.

**23. Interactive Voice Response Time****23.1 Description**

The duration of the announcement of the entire IVR options before a customer can make a choice.

The customer makes a voice enquiry call to a call centre. The operator IVR then gives options to select a series of options to be selected. The point of measurement is the time taken to get the first option selected as prompted by the IVR from the time of making the call to the call centre.

There should be a queuing system for all operator attended calls i.e., no

call should receive a busy signal; rather each call is queued and calls should be answered within 30 seconds maximum.

### **23.2 Measurement Method**

The "response time" is measured with test calls using a stop clock by the verifying officer. The measurement commences when the customer first receives a ringing tone to the time last IVR prompt ends.

Since the event is fixed, the samples taken should be samples to give confidence of consistency in stop-clock timing action.

### **23.3 Target**

Not more than 30 seconds.

## **24. Customer Assistance Operator Access Time**

### **24.1 Description**

The duration of waiting after the option to a customer care assistant has been chosen by the Customer.

The customer makes a call into the operator call centre with the aim of receiving assistance from a live customer care officer and not IVR.

The point of interest is the time it takes between the customer care centre ringing and the time the customer gets a voice response from the customer care agent.

There should be a queuing system for all operator attended calls i.e., no call should receive a busy signal; rather each call is queued and maximum calls should be answered within 3 minutes.

### **24.2 Measurement Method**

The duration is measured by test calls using a stop clock by the verifying officer. Measurement commences when the customer care number rings until receiving customer care officer response.

Since the event is fixed, the samples taken should be samples to give confidence of consistency in stop-clock timing action and call initiation.

#### **24.3 Target**

Not more than 3 minutes.

### **25 Mean Time-To-Repair (MTTR) Interconnection Link**

#### **25.1 Description**

Duration of the instant a fault has been notified by the operator to the published point of contact of the service provider to the instant where the service has been restored to normal working order.

#### **25.2 Measurement Method**

Interconnected service providers to provide the data on the down-times in their monthly reports and or when required to do so by the Authority.

#### **25.3 Target**

Not more than 2 hours per incidence.

### **26. Interconnection Link Utilisation**

#### **26.1 Description**

The amount of transmission capacity utilised with respect to the total transmission capacity provided for interconnection.

#### **26.2 Measurement Method**

Each one of the Interconnected service providers to provide the interconnection link capacity utilisation in their monthly reports or when required to do so by the Authority.

#### **26.3 Target**

Not more than 80% of each of provisioned link utilisation.

## 27. Measurement Method for QoS Parameters Based on Traffic

### 27.1 Real Traffic

When using real traffic, the measurements must be made via an automatic data collection system, based on the network counters which register real traffic of the network. The network counters collect information 24 hours a day, every day of the year.

### 27.2 Test Traffic

When using test calls, the samples must be calculated using the following equation [Cochran (1963)] to determine a representative sample:

$$n_0 = \frac{Z^2 pq}{e^2}$$

Where  $n_0$  is the sample size

$z^2$  represents the desired confidence level & the value of is found in Statistical tables.

$e$  is the desired level of precision.

$p$  is the estimated proportion of the attribute that is present in the population

$q$  is  $1-p$

**Note** that  $pq$  = degree of variability and maximum variability (i.e. 0.5) must always be assumed.

### 27.3 Distribution of Measurements for Test Traffic

Where test calls are used, measurements must be scheduled so as to reflect accurately traffic variations over hours of a day, days of a week and months of a year.



#### **27.4 Precision and Reliability**

Where test calls or samples from real traffic are used, measurements must provide a relative accuracy of greater than or equal to 10% with a level of reliability of 95%.

#### **28. Acronyms**

MOS	Mean Opinion Score
SMS	Short Message Services
BTS	Base Transceiver Station
MSC	Mobile Switching Centre
IAP	Internet Access Point
PC	Personal Computer
ISP	Internet Service Provider
QoS	Quality of Service
ICMP	Internet Control Message Protocol
NTPs	Network Termination Points
POLQA	Perceptual Objective Listening Quality