



**INFORMATION &
COMMUNICATION TECHNOLOGY
QUALITY OF SERVICE AND
QUALITY OF EXPERIENCE
GUIDELINES**

MAY 2019

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PART I

PRELIMINARY PROVISIONS

The Authority means Botswana Communications Regulatory Authority (BOCRA).

In these Guidelines, unless the context requires otherwise, the Act means the Communications Regulatory Authority Act (CRA Act) of 2012.

These Guidelines maybe referred to as the revised Information and Communications Technology Quality of Service (ICT QoS) Guidelines of 2019 and development of Quality of Experience (QoE) Guidelines.

These Guidelines shall apply to all Licensees offering Public Switched Telephone Networks (PSTN), Mobile and Internet services in Botswana.

PART II

DEFINITIONS

A. TECHNICAL PARAMETERS

Public Switched Telephone Networks (Fixed Services)

Call Connection Failure Rate	Percentage of unsuccessful calls.
Call Setup Time (CST)	The duration from when a call is made to the time of receiving a ring back tone.
Drop Call Ratio	The percentage of calls connected to intended recipients that ended without the intervention of any of the users.
Network Availability	The degree to which the network is operable and not in a state of failure or outage at any point in time. It measures the total uptime of the network.

Mobile Services

Mean Opinion Score (MOS)	A numerical value that measures user experience and the factors that influence voice quality. MOS is expressed in one number, from 1 to 5, 1 being the worst and 5 the best. <i>ITU-T Recommendation P.863.</i>
Call Setup Time (CST)	The time interval from the instant when the calling party initiate a connection request to the time when the calling party received a ring back tone (called party busy tone/ringing tone/answer signal).

Call Set-up Success Rate	The ratio of total number of successful calls to the total number of all call attempts made on the network during a specified period.
Drop Call Ratio	The percentage of calls connected to intended recipients that ended without the intervention of any of the users.
Handover Success Rate	The ratio of successful handover calls to the total number of handover call attempts made. Handover is the process by which a mobile telephone call is transferred from one base station to another as the subscriber passes the boundary of a cell. <i>ITU-T Recommendation Q.1005.</i>
Mobile Coverage Strength	The transmitter power output as received by a reference antenna at a distance from the transmitting antenna.
Network Availability	The degree to which the network is operable and not in a state of failure or outage at any point in time. It measures the total uptime of the network.
SMS Delivery Success Rate	The percentage of sent messages that are received by the intended recipients.
SMS End to End Delivery Time	The duration from when an SMS is sent to the time of receiving the SMS by the intended recipient.
SMS Service Accessibility	Probability that a user can access SMS centre for sending SMS.

Fixed Internet Services

DNS Resolution Success Rate	Likelihood for a host name to host address translation of a DNS resolver successfully.
DNS Resolution Time	The time taken for a host name to host address translation. Time taken for a DNS host name to translate website names into IP Addresses.
Data transmission Rate	The speed of data travelling from user to the network and back.
Access Network Utilization	Measures the total traffic between access node to aggregation node.
Throughput	Measures the speed of uploading and downloading data in Megabits per second between end user and test equipment.
Latency	Measures the round-trip time taken by standard packet to travel across network from end user to the test equipment and back to the user.
Packet loss	Measures the percentage of data packets transmitted from source that fail to arrive at their destinations.

Mobile Internet Services

FTP Drop Rate	The percentage of incomplete data transfers that were started successfully.
FTP Mean Data Rate [Kbit/s]	The average data transfers rate measured through the entire connect time to the service.

FTP Set-up Time The duration to access the service successfully, from starting the dial-up connection to the point of time when the content is sent or received.

HTTP Drop Rate The percentage of incomplete data transfers that were started successfully.

HTTP Mean Data Rate The average data transfer rate measured through the entire connect time to the service.

HTTP Set-up Time The duration between the instant when the request of the web page is sent to the instant when the beginning of the web page is received.

Web Radio Streaming Service

Web Radio Tune-in Success Rate The percentage that a subscriber can obtain the tune-in information for a web radio streaming server successfully.

Web Radio Tune-in Success Time The duration needed to obtain the tune-in information for a web radio streaming server successfully.

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.

Voice Over Long Term Evolution (VoLTE) Service

Drop Call Rate Proportion of calls that are terminated prior to the user initiated a disconnect.

Network Efficiency Ratio The ability of the network to deliver calls to the far terminal. It expresses the relationship between the number of seizures and the sum of number of seizures resulting in either an answer message, or a user busy or a no answer ring. **[ITU-T Recommendation E.425].**

Post Dialing Delay (PDD) Time interval in seconds between the end of dialing by the caller and the reception of the network response. Equivalent to Call Setup Time, as defined in *ITU-T Recommendation E.800*.

Registration Success Rate The ratio of the number of successful established terminating session to the number of attempted established terminating session. (*ETSI TR 103 219*).

Service Availability The percentage of the time a system stays operational over a period of time.

Interconnection Services

Interconnection Route Utilization The percentage of provisioned interconnection route that is carrying traffic.

Mean Time To Repair (MTTR) The duration from a reported interconnection fault to service restoration.

Point of Interconnection Congestion Percentage of congestion at point of interconnection.

B. NON-TECHNICAL PARAMETERS

Service Availability The percentage of time the network shall be available to the subscribers. Service should always be available.

Provision of Service The time taken to provide service to a location where it is required. It is the maximum waiting time for connection of service.

Call Centre Operator Response	The duration from sending request to speak with Operator to the time that Operator response is heard.
Mean Time To Repair (MTTR)	The duration from a reported fault to service restoration.
Billing Complaint Rate	The percentage of billing related complaints to the number of customers per the reporting period.
Billing Accuracy	Same duration in seconds used for a call should be used for charging.
Complaint Resolution Time	The time taken for a service provider to resolve a complaint.

PART III

COMMUNICATION SERVICE LICENSEE OBLIGATIONS

OBJECTIVES

These Guidelines are intended to:

- (a) Ensure service providers provide good quality of service to users and ensure objective quality information is provided to users to assist them in choosing communication services;
- (b) create conditions for customer satisfaction by making known the quality of service which the Service Provider is required to provide and the user expecting to receive;
- (c) measure quality of service provided by the Service Provider from time to time and to compare them with best international practice so as to assess the level of performance; and
- (d) protect the interest of consumers of ICT services.

LICENSEES OBLIGATIONS

The Service Providers shall:

- (a) ensure performance of communications services that meets quality of service parameters as set forth by these Guidelines; and
- (b) perform measurements on quality of services from time to time, keep records of the results of the measurements, and report the same to the Authority.

PART IV

PARAMETERS

Services

The QoS and QoE parameters for the following services related to the CRA Act of 2012 are prescribed under these Guidelines: -

- (a) PSTN services;
- (b) Mobile telephone services;
- (c) Fixed Internet services;
- (d) Mobile Internet services
- (e) VoLTE services;
- (f) Interconnection services; and
- (g) Non -Technical services.

Quality of service

The licensee providing services above shall be required to meet targets on quality of services parameters as specified in **Schedule 1** to **Schedule 7** of these Guidelines.

PART V

COMPLIANCE

Compliance

In order to comply with the CRA Act of 2012 section 6(1)(a)(c), the Services Providers shall:

- (a) establish measurement systems consistent with the Guidelines proposed by the Authority in consultation with the stakeholders;
- (b) provide measurement results for all services and the network coverage to the Authority;
- (c) meet targets as set forth in these Guidelines;
- (d) produce and submit the data required by the Authority as when required;
- (e) provide information to consumers to make informed decisions about their services;
- (f) provide consumers equal access to the same quality of service in accordance with the tariffs and QoS standards; and inform consumers of any significant outage that affect service provision.

Service Level Agreements

There shall be a well outlined Service Level Agreement (SLA) between the Service Provider and the consumer to ensure end to end QoS. In general, the SLA should state amongst others the following:

- Level of performance: The minimum level of performance offered to the customer, not the average level to be achieved for all customers;
- The compensation payment: if the minimum level is not achieved with the sum at least proportional to the degree of failure; and

- The mechanism for claiming compensation: this should be done automatically without requiring the customer to make a claim.

Investigation

The Authority shall:

- (a) investigate at any time the quality of service measurement, reporting and recording procedures of a licensee; and
- (b) direct its officers or agents (third party) to carry out investigation on quality of service measurements.

Inspection

The Authority or any person authorized in writing by the Authority, may at any reasonable time enter upon the premise of the licensee for purposes of ascertaining the compliance with these Guidelines.

PART VI

REPORTING

Reporting

The Licensee shall submit quality of service report as may be required by the Authority from time to time. Service Providers shall:

- (a) Be required to provide the network coverage and overall network performance on a monthly basis to the Authority based on data from their network operations and maintenance facilities;
- (b) Avail raw data from the network to the Authority on a monthly basis; and
- (c) Analyse the raw data and send reports to the Authority in an agreed format, specifying the manner in which the sampling was done with sufficient detail to enable the Authority to verify the accuracy of the report.

Record Keeping

All Service Providers covered by the CRA Act of 2012 shall maintain:

- (a) documented processes of data collection for each QoS parameter contained in the Guidelines and submit to the Authority as required;
- (b) complete and accurate records of its compliance of each QoS parameter specified in such a manner and in such a format, as may be prescribed by the Authority from time to time;
- (c) The Authority may, from time to time, either by order or by direction, specify uniform record keeping procedures and formats including guidelines on measurement methodology for various QoS parameters; and

The Authority may, if it considers it expedient so to do, at any time, direct any of its officers or employees or an agency appointed by the Authority to inspect the records or to get such records audited.

Auditing

The Authority shall:

- (a) undertake QoS audits from time to time to verify QoS experienced by customers and compare the results from audit exercises against license obligations and Guidelines;
- (b) audit some or all the quality of service data;
- (c) vary the frequency of the audits, reporting areas and reporting periods that require auditing;
- (d) use a third party to perform audits on behalf of the Authority; and

Publication

The Authority shall publish on print media or Authority's website, the Quality of Service Report as may be decided by the Authority as follows:

- (a) QoS measurements and performance shall be published by the Authority to help consumers carry out comparisons between Service Providers
- (b) the compliance reports of each Quality of Service parameter reported to it by the service providers under these Guidelines
- (c) the results of the audit and assessment of the Quality of Service undertaken by the Authority or its authorised agent shall be published;
- (d) Licensees will be required to publish information on their websites and send the information to subscribers periodically; and

- (e) Operators shall publish on their websites a Coverage Map showing their network coverage and services availability. The Map will assist consumers to easily understand service availability and make informed choices of the preferred Service Provider.

PART VII

SERVICE INTERRUPTIONS

Planned Service Interruptions

Licensees shall:

- (a) issue the public advanced notice of planned interruption of services by publishing a notice in the widely read electronic media or print media at least 48 hours before the planned interruption of services;
- (b) send the notice through the Short Messaging System (SMS);
- (c) issue public notices stating the number and type of subscribers that will be affected by the planned interruptions; and
- (d) provide the information for such service interruptions to the Authority at least 48 hours before the planned interruptions of service.

Unplanned Service Interruptions

In the event of any unplanned service interruption a licensee shall:

- (a) within an hour of the event, notify the Authority via email of the occurrence of the event, including details on areas affected and numbers of end users affected where possible;
- (b) continue to provide updates to the authority via email every one-hour detailing progress in resolving the issue; and
- (c) within 24 hours of resolution of the issue, provide to the Authority a formal report detailing the circumstances attributing to the interruptions of the service, and the action taken to remedy the situation.

PART VIII

REVIEW

The Authority may review the Quality of Service and Quality of Experience targets and parameters under these Guidelines from time to time.

PART IX

PENALTIES

Any licensee who:

(a) fails to comply with the requirements of these Guidelines is liable to a fine of not less than **BWP 50,000.00**;

(b) fails to meet and maintain targets for each Quality of Service parameters as specified in the Schedule 1 – Schedule 7, shall be liable to a fine of not less than **BWP 50,000.00** for each act of contravention and **BWP 50,000.00** for each day that the contravention continues to occur;

(c) fails to submit quarterly quality of service reports within ten working days after the end of a given quarter, shall be liable to a fine of not less than **BWP 50,000.00**;

(d) submits or publishes false or misleading information about quality of service, shall be liable to a fine of not less **BWP50,000.00** for each act of contravention and **BWP50,000.00** for each day that the contravention continues to occur; and

(e) obstructs or prevents an investigation or audit being carried out by the Authority or its agents in respect of the quality of service measurements, reporting, data collection and record keeping procedures, shall be liable to a fine of not less than **BWP50,000.00** for each act of contravention and **BWP50,000.00** for each day that the contravention continues to occur.

PART X

ENFORCEMENT

The Authority shall take appropriate measures to enforce the license conditions in conjunction with these Guidelines. Licensees who fail to comply shall face financial penalties as outlined in Part IX above.

PART XI

IMPLEMENTATION

These Guidelines will come into force with effect from **01June 2019**. Operators are expected to have met the requirements of the Guidelines within six (6) months after coming into effect.

SCHEDULES

---- SCHEDULE 1----

QUALITY OF SERVICE PUBLIC SWITCHED TELEPHONE SERVICES

Every Public Telephone Service Provider shall meet the following Quality of Service standards for fixed in respect of each specified parameter measured by test calls in any locality and shall submit a monthly report based on peak hour conditions.

TABLE 1: QUALITY OF SERVICE PUBLIC SWITCHED TELEPHONE SERVICES

Parameter Name	Formula	Measurement Mechanism (standards)	Measurement Tool	Target
Network Availability	$Network\ Availability = [(Total\ Operational\ minutes - Total\ minutes\ of\ service\ downtime) / Total\ operational\ minutes] \times 100$	Test traffic. ETSI EG 202 057-3	Test Stations or Drive Test System	>99%
Call Set-up Time	$Call\ Set-up\ Time = Time\ of\ Call\ Alerting - Time\ of\ receiving\ Dial\ tone$	Test traffic	Test Stations or Drive Test System	<3sec (local call) <5sec (Toll)
Call Connection Failure Rate	$Call\ Connection\ Failure\ Rate = Probability\ of\ end-to-end\ blocking\ (ITU-T\ Rec.\ E.721);$	Test Traffic ETSI EG 201 769-1	Test Stations or Drive Test System	<2%
Drop Call Ratio	$Drop\ Call\ Ratio = (Number\ of\ Calls\ disconnected\ without\ intervention\ by\ any\ user / Number\ of\ Calls\ connected\ to\ intended\ recipient) * 100\%$	Real Traffic from OSS and or Test traffic. ETSI ES 202 765-2, clause 7.4	Performance Monitoring System/ Test Stations or Drive Test System	≤ 2%

-- SCHEDULE 2--

QUALITY OF SERVICE PARAMETR FOR CELLULAR MOBILE SERVICES

Every cellular mobile Service Provider shall meet the following Quality of Service standards for cellular mobile service in respect of each specified parameter measured by test traffic in any locality and shall submit a monthly report based on daily peak hour conditions.

TABLE 2: QUALITY OF SERVICE PARAMETR FOR MOBILE SERVICES

Parameter Name	Formula	Measurement Mechanism	Measurement Tool	Target
Network Availability	<i>Network Availability</i> = [(Total Operational minutes - Total minutes of service downtime) / Total operational minutes] x 100	Test traffic.	Test Stations or Drive Test System	>99%
Call Set-up Time	<i>Call Set-up Time</i> = Time of Call Alerting - Time of receiving Dial tone	Test traffic	Test Stations or Drive Test System	<5Sec (intra network normal traffic) <8Sec (fixed to mobile normal traffic)
Drop Call Rate	<i>Drop Call Ratio</i> = (Number of Calls disconnected without intervention by any user / Number of Calls connected to intended recipient) *100%	Real Traffic from OSS and or Test traffic.	Test Stations or Drive Test System	≤ 2%
Call Set-up Success Rate	<i>Call Set-up Success Rate</i> = (Total number of successfully	Real Traffic from OSS and or Test traffic.	Test Stations or Drive Test System	≥98% for all calls

	connected calls / Total number of attempts) *100			
Handover Successful Rate	Handover Successful Rate = (Total number of Successful handovers / Total number of handover requests) *100	from OSS and or Test traffic	Test Stations or Drive Test System	≥96%
Mobile Service Coverage Signal Strength	Mobile Service Coverage signal strength = Field strength measurements	Field strength measurements	Test Stations or Drive Test System	≥ -85dBm ((in- vehicles) ≥ -95dBm (outdoors)
SMS Delivery Success Rate	SMS Delivery Success Rate = (Number of SMS received by intended recipients/ number of SMS sent) *100	Real Traffic from OSS and or Test Traffic	Performance Monitoring System/ Test Stations or Drive Test System	All SMS 99%
SMS End to End Delivery Time	SMS End to End Delivery Time = Time SMS received – time SMS sent	Test traffic	Test Stations or Drive Test System	All SMS should be delivered in less than <5 seconds
SMS Service Accessibility	SMS Service Accessibility = (Success access to SMS centre /over total Number of SMS attempts) * 100.	Test traffic	Test Stations or Drive Test System	≥ 98%
Mean Opinion Score (MOS)	Mean Opinion Score is expressed in one number from 1-5, 1 being the	Test traffic	Test Stations or Drive Test System	≥3.5

	worst and 5 being the best.			
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---SCHEDULE 3---

QUALITY OF SERVICE PARAMETERS FOR FIXED INTERNET SERVICES

Every Internet Service Provider shall meet the following Quality of Service standards for Internet service in respect of each specified parameter measured by test calls in any locality and shall submit a monthly report based on peak hour conditions.

TABLE 3: QUALITY OF SERVICE PARAMETERS FOR FIXED INTERNET SERVICES

Parameter Name	Formula	Measurement Mechanism	Measurement Tool	Target
DNS Host Name Resolution Time	<i>DNS Host Name Resolution Time</i> = Time for standard query response received – time standard query sent. [ETSI TS 102 250-2 & ITU-T Y.1540]	Real Traffic from OSS and or Test traffic	Performance Monitoring System/ Test Stations or Drive Test System	< 10 ms
DNS Host Name Resolution Success Rate	<i>DNS Host Name Resolution Success Rate</i> = (Successful DNS host Name resolution requests/ Total DNS Host name resolution requests) *100 [ETSI TS 102 250-2]	Real Traffic from OSS and or Test traffic	Performance Monitoring System/ Test Stations or Drive Test System	< 99%
<i>Data transmission Rate</i>	Data transmission rate = Size of test file/ The transmission time required for a complete and error free transmission	Test Traffic	Test station	At least 75% of the advertised speed during peak time

Access Network Utilization	<i>Access Network Utilization</i> = Total traffic between access node / aggregation of traffic at the node	Test Traffic	Test Stations	uplink utilization must not be more than 75% of uplink bandwidth provided
Throughput	Throughput = Number of test samples greater than or equals QoS throughput) / Total number of test samples)) *100	Test Traffic	Test Stations	Throughput must not be less than: a) 75% of subscribed level of bandwidth for 90% of the time for ADSL b) 95% of the subscribed bandwidth for 100 % of the time for dedicated services
Latency	Latency = (Number of test samples less than or equal to 85 ms / Total number of test samples) *100	Test Traffic	Test Stations	≤ 85 ms 95% of the time
Packet Loss	<i>Packet Loss</i> = (Total no of packet lost / Total no of packets sent) *100	Test Traffic	Test Stations	≤ 1%

-----SCHEDULE 4-----

QUALITY OF SERVICE PARAMETERS FOR MOBILE INTERNET SERVICES

TABLE 4: QUALITY OF SERVICE PARAMETERS FOR MOBILE INTERNET SERVICES

Parameter Name	Formula	Measurement Mechanism	Measurement Tool	Target
HTTP Set-up Time	$HTTP\ Set-up\ Time = \frac{Time\ Content\ Received - Time\ Content\ requested}{}$	Real Traffic from OSS and or Test traffic	Performance Monitoring System/ Test Stations or Drive Test System	95% within 5 seconds
HTTP Drop Rate	$HTTP\ Drop\ Rate = \frac{Number\ of\ incomplete\ data\ transfers}{Number\ of\ transfers\ started\ successfully} * 100\%$	Real Traffic from OSS and or Test traffic	Performance Monitoring System/ Test Stations or Drive Test System	< 1%
HTTP Mean data Rate	$HTTP\ Mean\ data\ Rate = \frac{User\ data\ transferred\ (Kbit)}{(Time\ Data\ transfer\ Complete - Time\ Data\ Transfer\ Start)}$	Real Traffic from OSS and or Test traffic= user data transferred [Kbits]/ Time data transfer is completed-time data transfer start	Performance Monitoring System/ Test Stations or Drive Test System	1Mbps
FTP {download upload} Set-up Time	$FTP\ \{download\ upload\}\ Set-up\ Time = \frac{Time\ Service\ Access\ Successful}{Time\ Service\ Access\ Start}$	Real Traffic from OSS and or Test traffic	Performance Monitoring System/ Test Stations or Drive Test System	< 2 seconds
FTP Drop Rate	$FTP\ Drop\ Rate = \frac{Number\ of\ incomplete\ data\ transfers}{Number\ of\ transfers\ started\ successfully} * 100\%$	Real Traffic from OSS and or Test traffic	Performance Monitoring System/ Test Stations or Drive Test System	< 1%

	transfers started successfully) *100%			
FTP {download upload} Mean Data Rate [Kbit/s]	<i>FTP {download upload} Mean Data Rate [Kbit/s] = User data transferred (Kbits) /(Time Data transfer Complete- Time Data Transfer Start)</i>	Real Traffic from OSS and or Test traffic	Performance Monitoring System/ Test Stations or Drive Test System	2Mbps
FTP {download upload} data transfer success ratio [%]	<i>FTP {download upload} data transfer success ratio [%] = (completed data transfers /successfully started data transfers) *100</i>	Real Traffic from OSS and or Test traffic	Performance Monitoring System/ Test Stations or Drive Test System	80%
Web Radio Tune-in Success Rate	<i>Web Radio Tune-in Success Rate = (Number of Successful tune-in/ Total attempts) * 100%</i>	Test traffic	Test Stations or Drive Test System	>98%
Web Radio Tune-in Success Time	<i>Web Radio Tune-in Success Time = Time attempt Tune-in - Time Successful Tune-in</i>	Test Traffic	Test Stations or Drive Test System	< 2 seconds
Web Radio Reproduction Cut-off Ratio	<i>Web Radio Reproduction Cut-off Ratio = (Number of Unsuccessful listening attempts/ Total attempts) * 100%</i>	Test Traffic	Test Stations or Drive Test System	< 2%

---SCHEDULE 5---

QUALITY OF SERVICE FOR VoLTE SERVICES

Every Service Provider shall meet the following Quality of Service standards for VoLTE service in respect of each specified parameter measured by test calls in any locality and shall submit a monthly report based on peak hour conditions.

TABLE 5: QUALITY OF SERVICE FOR VoLTE SERVICES

Parameter Name	Formula	Measurement Mechanism	Measurement Tool	Target
Registration Success Rate	$\text{Registration success rate} = \frac{\text{Successful Registration attempts}}{\text{Total number of Registration attempts}} * 100$ (ETSI TR 103 219)	Test traffic	Performance Monitoring System/ Test Stations or Drive Test System	≤ 98%
Service Availability	$\text{Service Availability} = \frac{[(\text{Total Operational minutes} - \text{Total minutes of service downtime}) / \text{Total operational minutes}] \times 100}{100}$	Test traffic	Performance Monitoring System/ Test Stations or Drive Test System	≥ 98%
Post Dialing Delay (PDD)	$\text{Post Dialing Delay (PDD)} = \text{Time of ringing tone} - \text{time of dialing.}$	Test traffic	Performance Monitoring System/ Test Stations or Drive Test System	≤ 4s
Drop Call Rate	$\text{Drop Call Rate} = \frac{\text{Total number of calls terminated unwillingly}}{\text{total number of successfully}} * 100$	Test traffic	Performance Monitoring System/ Test Stations or Drive Test System	≤ 2%

	established calls) *100 ITU-T Recommendation E.804 (Section7.3.6.5(
Network Efficiency Ratio	Network Efficiency Ratio = Number of seizures resulting in answer message, user busy, no answer / Total number of seizures attempt) *100	Test traffic	Performance Monitoring System/ Test Stations or Drive Test System	≥ 95%

---SCHEDULE 6---

QUALITY OF SERVICE FOR INTERCONNECTION

Every Service Provider shall meet the following Quality of Service standards for any interconnected service in respect of each specified parameter measured by real calls on any interconnected route and shall submit a monthly report based on daily peak hour conditions.

TABLE 6: QUALITY OF SERVICE FOR INTERCONNECTION

Parameter Name	Formula	Measurement Mechanism	Measurement Tool	Target
Interconnection Route Utilization	<i>Interconnection Route Utilization = Capacity in use / Capacity Provisioned) *100%</i>	Real Traffic	Performance Management system	< 80%
Mean Time To Repair (MTTR) Interconnection Route	<i>Mean Time To Repair (MTTR) Interconnection Route = Time Service Restored- Time Reported</i>	Real Traffic	Performance Management system	< 2 hours
Point of interconnection Congestion	<i>Point of interconnection Congestion = (Number of blocked call attempts /total number of call attempts) * 100</i>	Real traffic from OSS and or test Traffic (ITU-T Recommendation E.847-201703)	Performance Monitoring system test stations or Drive test	<0.5%

---SCHEDULE 7-----

QUALITY OF EXPERIENCE (NON-TECHNICAL PARAMETERS)

TABLE 7: QUALITY OF EXPERIENCE (NON-TECHNICAL PARAMETERS)

Parameter Name	Formula	Measurement Mechanism	Measurement Tool	Target
Service Availability	<i>Service Availability</i> = percentage of the time the service was available to the percentage the service was available + the down time	Report from systems	Test tools	>99%
Provision of Service	Provision of Service = the time the customer pays for service to the time the customer is provided with service	Complaints	Trouble ticket system	5 Calendar Days
Call Centre Operator Response	<i>Call Centre Operator Response</i> = Time Operator Assistance Pick up - Time Making Operator request.	Test traffic	Test Stations	< 30 seconds
<i>Mean Time To Repair (MTTR)</i>	Mean Time To Repair (MTTR) = Time Service Restored- Time Reported	Complaints	Trouble ticket system	< 8 hours
<i>Billing Accuracy</i>	Billing Accuracy = (Time Service used - Time Service charged) *100	Test traffic	Billing Assurance Systems	Not more than 0.1% issued should be disputed
<i>Complaint Resolution Time</i>	Complaint Resolution Time = (number of valid complaint resolved/total number of complaints received) *100%	Test Traffic	Trouble ticket system	99% of complaints resolved within 1 week
Billing Complaint Rate	Billing Complaint Rate = (Total number of billing complaint received at the end of the reporting period / Total number of active customer base at the end of the period) *100	Complaints	Trouble Tickets	≥1%

**Signed by the Chief Executive
Mr Martin Mokgware**

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