QUALITY OF SERVICE MEASUREMENT AND MONITORING FRAMEWORK

1. Introduction
This framework is proposed in fulfilment of the mandate of Uganda Communications Commission (UCC) under the Uganda Communications Act, Cap 106, laws of Uganda including (m) to promote the interests of consumers and operators as regards the quality of communications services and equipment.

The framework is premised on the following interpretation

Quality of Service (QoS) - “Totality of characteristics of a telecommunications service that bear on its ability to satisfy stated and implied needs of the user of the service.” (Ref. ITU-T E.800)

Network performance (NP) - “The ability of a network or network portion to provide the functions related to communications between users.” (Ref. ITU-T E.800)

Busy Hour (BH) – “The continuous 1-hour period lying wholly in the time interval concerned for which the traffic or the number of call attempts is greatest”. (Ref. ITU-T E.800)

In this context therefore, the QoS parameters and associated framework have been developed to reflect a primary focus on consumer perspectives.

2. Components of the framework
The QoS measurement and monitoring framework shall consist of the following:

- Periodic reporting by the licensees on the respective QoS indicators and critical outage reports as outlined by UCC.
- Provision of explanations by service providers of their performance where the performance is below the standard as well as associated remedial plans;
- Assessment by UCC of trends in performance for each service provider to identify persistent performance problems versus one-off events
- Independent performance evaluation done by UCC or other body. Such evaluation may include benchmarking studies, audits of QoS performance, and surveys on consumer satisfaction and consumer awareness.
- Analysis of the other UCC quality of service-related data or information (e.g. consumer complaints and dispute resolution);
- Comparative publishing of QoS performance of the service providers. The publishing or provision of information to consumers shall be based on parameters that are relevant, meaningful and accessible to consumers to ensure usefulness to the consumers.
3. QoS measurements and reporting by licensees

The licensee shall every quarter provide UCC with reports on the results of measurements done against the UCC QoS indicators.

This reporting shall be done using only the standard reporting templates provided by UCC for this purpose. These shall, in all cases, be accompanied with a declaration letter signed by a duly authorized officer of the Licensee, stating that the report is true and accurate in all respects.

The reports so submitted shall contain results for the respective quarter aggregated on a monthly basis starting on 1\textsuperscript{st} January of the respective calendar year. Such report shall be submitted to UCC by the 15\textsuperscript{th} day of the following quarter.

Measurement methods, formulas and calculation shall be in accordance with those specified for the associated QoS indicators\textsuperscript{1}. All supported data used to produce the required report shall be kept by the Licensee for a minimum of Twelve (12) months and shall be availed to representatives of the UCC on request.

For each quality of service indicator that the licensee is required to report against, the licensee shall conduct periodic tests and surveys at intervals or as requested by UCC.

Accordingly, the licensee shall establish and administer measurement systems consistent with this QoS Framework and conduct the specified measurements in a way that will provide all required data.

The measurements, recording and presentation of results for the purpose of the above reports shall be based on regions as designated by the Uganda Bureau of Statistics.\textsuperscript{2} For this purpose however, Kampala shall be designated as a separate region and leaving the remaining districts to constitute the central region. The reporting areas as such shall be constituted as Kampala, Central, Eastern, Western and Northern regions. These regions shall constitute the reporting areas. The consideration and reporting of the regions shall each be done separately unless prior written approval has been provided by UCC.

4. Critical Outage Reports

\textsuperscript{1} The measurement system and associated set of network element counters to be used for real traffic reports shall be agreed upon jointly by UCC and all the respective licensees

\textsuperscript{2} Refer to 2012 Statistical Abstract – Uganda Bureau of Statistics
The Licensee shall inform UCC about all critical\(^3\) network disruptions or outages affecting its entire network, core network or impacting a portion of its network traffic.

This shall be done using the standard template provided by UCC for this type of reporting and shall be sent electronically to the email address ucc@ucc.co.ug or by fax to 0414 348 832.

Such reporting shall be done within twelve (12) hours from time of the occurrence of the outage or incidence in case of unplanned outages, and five (5) working days or (3) hours before planned and confirmed outages.

5. **UCC monitoring and audits**

   UCC shall conduct inspections, surveys or performance audits of the quality of service of the licensee from time to time to establish the performance of the licensees and adherence to the UCC quality of service standard or requirements.

   Measurements for this shall be done using modes of collection of data that include but are not limited to:
   
   i. Impromptu and routine drive tests,
   
   ii. Mobile test probes (making calls over the air interface)
   
   iii. Consumer survey, and
   
   iv. Statistical data and documents from operators

   UCC reserves the right to use its own personnel, employ the services of specialist personnel and/or an independent third party to conduct any QoS audits deemed necessary. In cases of emergency requirement for onsite audits, the licensee shall arrange for UCC personnel/representatives to be granted access to their network installations as and when this access is required.

   The licensee shall fully co-operate with and provide all assistance to such inspectors as well as with all UCC requests for information and all UCC verification and audit activities.

6. **Publication of QoS results**

   UCC may publish its survey results, audit results and/or rating of the QoS performance of licences for the general public in any form or manner as may be deemed appropriate by UCC.

7. **Contravention**

   A licensee shall have committed a contravention if:
   
   a) It fails to perform the measurement, reporting and record keeping tasks set out in this document;

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\(^3\) A Critical Outage is when a service critical network element is down or severely degraded hindering normal service provision to a significant portion of the customer base.
b) It fails to achieve a target for a UCC QoS parameter for a reporting period;

c) It fails to submit reports during the time period specified by UCC;

d) It submits or publishes false or misleading information about its quality of service; or

e) It obstructs or prevents UCC conducting a QoS investigation, inspection, audit or measurement.

8. **Exemption from compliance**

A licensee shall be excused from compliance with the QoS standard or provisions of this document to the extent it is unable to comply due to Force Majeure conditions.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Computation</th>
<th>Target</th>
<th>Operator Measurement</th>
<th>Audit &amp; benchmarking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Service Activation/provisioning time</td>
<td>Time taken to provide service from time when the customer completes all due obligations for provision of the service</td>
<td>Time of provision of service – Time of completion of fulfilment of requirements to provide service.</td>
<td>5 working days from time of completion of request for fixed services</td>
<td>A daily record of service provision/activation times aggregated over a month</td>
<td>Review logs of customer records management system and any related complaints as received by UCC</td>
</tr>
<tr>
<td>Service restoration time</td>
<td>The time taken to restore the service from the time the fault is reported by a customer to the time of restoration (The time interval during which an item is in a down state due to a failure)</td>
<td></td>
<td>80% of all service restoration should be fulfilled within 24 hrs</td>
<td>A daily record of service failure related customer complaints/subscriber complaints aggregated over one month.</td>
<td>Review customer complaint management records as submitted by the operator and review complaints received from subscribers by UCC</td>
</tr>
<tr>
<td>Network Availability</td>
<td>Measure of degree to which the network is usable; and or time that network resources are available to the customer. Excludes time for planned maintenance.</td>
<td>Mean accumulated downtime per reporting area. e.g.</td>
<td>&gt;99% availability for core network elements</td>
<td>A daily record of the down time of each network element for core and access network elements, based on Operations and Maintenance centre (OMC) generated data aggregated</td>
<td>Review of OMC records for all network elements</td>
</tr>
</tbody>
</table>

4 Access network: An implementation comprising those entities which provide the required transport bearer capabilities for the provision of telecommunications services between a Service Node Interface (SNI) and each of the associated User-Network Interfaces (UNIs) – ITU G.902
<table>
<thead>
<tr>
<th><strong>Blocked call rate</strong></th>
<th>Probability that a call attempt is unsuccessful due to the lack of network resources</th>
<th>[\frac{\text{Number of blocked calls}}{\text{total call attempts}}]</th>
<th>&lt;2%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Call setup time</strong></td>
<td>the time interval from the instant the user initiates a connection request until the complete message indicating call disposition is received by the calling terminal</td>
<td>(Time of alerting signal – time of sending address signal)</td>
<td>≤12s for on-net calls</td>
</tr>
<tr>
<td><strong>Dropped Call rate</strong></td>
<td>Proportion of calls, which once they have been correctly established and therefore have an assigned traffic channel, are dropped or interrupted prior to their normal completion by the user, the cause of the early termination being with the operator’s network.</td>
<td>[\frac{\text{No. of dropped calls}}{\text{total number of successful call attempts}}]</td>
<td>&lt;2%</td>
</tr>
<tr>
<td><strong>Call audio quality</strong></td>
<td>Voice Call Audio Quality is the perceptibility of the conversation during a call – Listening quality</td>
<td>PESQ Scale (1 – Bad to 4.5 - Excellent)</td>
<td>&gt;3.1</td>
</tr>
<tr>
<td><strong>SMS Completion</strong></td>
<td>Successfully received SMS between two</td>
<td>98% of Messages sent should be successfully delivered</td>
<td></td>
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<tr>
<td><strong>rate</strong></td>
<td>terminal equipments that are active and within coverage area.</td>
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<tr>
<td><strong>SMS End to end delivery time</strong></td>
<td>The maximum delivery time from when an SMS is sent from one terminal (MO) to when it is received on another terminal (MT), both terminals being active and within coverage area. (Time when MT receives the message - time the MO sends the message)</td>
<td>≤2 min for (ON-NET)</td>
<td></td>
</tr>
<tr>
<td><strong>Point of Interconnect blocking</strong></td>
<td>Proportion of unsuccessful interconnect call attempts due to insufficient interconnect capacity</td>
<td>&lt;1.5%</td>
<td></td>
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