Doc No.

25/EACO/G/2/2023

East African Communications Organisation

Communications for all in East Africa

EACO GUIDELINES FOR QUALITY OF SERVICE FOR MOBILE VOICE SERVICE

PART 2: MEASUREMENT AND STATISTICAL METHODOLOGIES

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JUNE 2023

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1. Introduction

The term Quality of Service (QoS) is extensively used today, not just in the telecommunications world in which it has its roots, but increasingly regarding broadband, wireless and multimedia services that are based on the IP protocol. Networks and systems are gradually being designed in consideration of the end-to-end performance required by user applications; however, the term QoS is usually not well-defined, is used loosely or, worst of all, misused. Therefore, guidance is needed on how to understand and apply the term QoS.

The term "Quality of Service" addresses technical as well as non-technical aspects affecting a service. Different concepts and guidance have been developed to cover various interests and viewpoints of all parties of telecommunications service market, i.e. users, service providers, network operators, manufacturers and regulators.

This guideline provides to EACO countries, a guidance for “Quality of Service for Mobile Voice Service”. The guideline is formed by two documents (Part1: Definitions & Thresholds of QoS Parameters and Part2: Measurement and Statistical Methodologies) which is discussed in this document.

2. Scope

This guideline covers the QoS of voice service in Mobile networks. This guideline is formed by two parts (Part 1 and 2) as follows:

- Part 1: focuses on harmonising “*Definitions and Thresholds of QoS Parameters*” *for EACO member states”.*
- Part 2: focuses on harmonisation of “*Measurement and Statistical methodologies for EACO member states”.*

This document covers part 2 only; part 1 is covered separately.

3. References

Recommendation ITU-T E.804: « QoS aspects for popular services in mobile networks”

Recommendation ITU-T P.862.3: "Application guide for objective quality measurement based on Recommendations P.862, P.862.1 and P.862.2".

ETSI EG 202 765-1: « Speech and multimedia Transmission Quality (STQ); QoS and network performance metrics and measurement methods; Part 1: General considerations ».

ETSI TS 102 250-4: « Speech and multimedia Transmission Quality (STQ); QoS aspects for popular services in mobile networks; Part 4: Requirements for Quality-of-Service measurement equipment»

4. Abbreviations and Acronyms

EACO: East African Communication Organisation

NRA: National Regulatory Authorities

ITU: International Telecommunication Union

ITU-T: International Telecommunication Union- Telecommunication Standardization Sector

QoS: Quality of Service

QoE: Quality of Experience

ETSI: European Telecommunications Standards Institute

5. Guideline

5.1 QoS Definition

The International Telecommunication Union (ITU) under its recommendation ITU-T E.800 defines QoS as “Totality of characteristics of a telecommunications service that bear on its ability to satisfy stated and implied needs of the user of the service.”

5.2 Principles of the QoS Measurement Methodology

This guideline considers the different phases of service provision on the mobile networks as defined by ITU-T and ETSI below:

i. Network Availability: Probability that the services are made available to users by a mobile network.
ii. Network Accessibility: Probability that the user can successfully register on the network, which delivers the service.
iii. Service Accessibility: Probability that the user can access the service he wants to use.

iv. Service Integrity: This is the QoS during service provision e.g., speech quality for voice and bit error rate for data among others.
v. Service Retainability: This describes the availability of service provision until termination in accordance with the will of the user. Key Performance Indicators (KPIs) under this phase include call dropped call rate and the data cut-off ratio.

This guideline is based on the following principles:

5.2.1 Impartiality and objectivity

a) The Subscriber Identity Modules (SIMs) to be used must be standard consumer SIMs without any limitations e.g., fair use, amount consumed, promotion limitations to mention but a few.
b) Measurements will be carried out under the same conditions for all concerned licensees.
c) Identical terminal equipment shall be used for all operator networks under test. In the process, SIM rotation shall be implemented to cover for any differences between terminals.
d) To eliminate human error, tests will be carried out automatically as much as feasibly possible.

5.2.2 Representativeness

a) The parameters selected shall reflect the most common KPIs that directly affect consumer experience.
b) The measurement schedule shall take into consideration traffic variations over the hours of a day, and the days of the week.
c) Population distribution across the country shall be taken into consideration when deciding on the sample areas.

5.2.3 Consistency and accuracy

a) The selected sample size shall be statistically representative and accurately portray the quality of service.
b) The Test equipment, including sim cards, used shall not have any technical obstacle considering the available technologies or KPIs to be measured.
c) A common test platform shall be used in making observations and collecting field data.

5.3 Data Sources

Data under this Guideline shall be collected from the following sources:

i. Data collected through administrative reporting
ii. Data collected within networks measurements
iii. Data collected through drive / walk tests

5.4 Quality of Service Key Performance Indicators (KPIs)

The QoS indicators/KPIs will be as per the approved EACO Guidelines namely:

a) EACO Guidelines for Quality of Service for Mobile Voice Service (Part1: Definitions & Thresholds of QoS Parameters)

b) EACO Guidelines for Quality of Service for Fixed Voice Service

c) EACO Guidelines for Quality of Service of Data Services in Mobile Networks

5.5 Measurement Considerations

The following shall be taken into account when undertaking QoS monitoring.

5.5.1 Number of observations

The sample size should be representative and big enough to obtain an acceptable accuracy level.

5.5.2 Day and time when measurements are done

Monitoring should consider traffic fluctuations during the time of day and day of the week. Observations should however be avoided at night-time, public holidays, weekends, and other peculiar event times. This consideration will not however influence the coverage KPI.

5.5.3 Location

Samples should be collected where feasible in different locations including indoor, outdoor and ‘in-car’ for both rural and urban centres based on the population density.

5.5.4 Position in the rooftop box

The Terminal equipment shall be positioned vertically on a stable and adapted base to provide the best possible transceiver radio conditions. The antennas shall be fixed in a way that complies with recommendations given in ETSI TS 102 250-4 V2.2.1 section 5.5.

5.5.5 Charging profile

The most popular sim cards (pre-paid or post-paid) shall be used depending on the country.

5.5.6 Speed while driving

During measurements, speed shall be limited to 60 Km/h. The drive test speeds should never exceed the specified road speed limits for particular roads. Consideration should also be made on the path terrain and condition of the road.

5.5.7 Electrical supply

Electrical supply of the test equipment must be guaranteed by use of a back-up battery to ensure autonomy of the device and optimal radio conditions.

5.5.8 Calls and timers:

The following values, based on ETSI TS 102 250-5 section 4.2.1.1, apply:

- Call duration: 120s
- Call window: 180s (means: call duration + 30s (for the setup and release phases) + 30s for the minimum pause interval)
- Call set up time out: 20s
- Call set up time testing: 10s

5.6 Periodic reporting and publication

The following principles will apply:

a) Data shall be collected at least twice a year covering the whole country.
b) Log files shall be verified as soon as they are received from the field to detect errors and propose corrective actions and ensure completeness and consistency of the measurements.
c) Results shall be presented to licensees for comments before publication.
d) Publication shall be done on the NRA website, in at least two popular media newspaper outlets and any online platform which is deemed appropriate.