Government of
The Republic
of Vanuatu

TRR
Telecommunication &
Radiocommunication
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A Consultation Paper on
Quality of Service Parameters and Measurement

Inviting public comment and input
29/06/2018

TABLE OF CONTENTS

1 INTRODUCTION 2
2 CONSULTATION FEEDBACK INFORMATION 2
3 BACKGROUND 4
4 PURPOSE 5
5 REGULATORY IMPACT ASSESSMENT 6
6 PROPOSED QUALITY OF SERVICE PARAMETERS 7
7 PROPOSED METHODOLOGY 9
8 CONSULTATION QUESTIONS 10
9 ANNEX 11

1 INTRODUCTION

1.1 As the national regulatory agency responsible to facilitate the development of the telecommunications sector, and in line with its functions on the facilitation of Universal access it is critical for Telecommunications and Radiocommunications Regulator (TRR) to establish a baseline and regularly monitor the performance of service provider networks to ensure that subscribers obtain a quality service.

1.2 The Government Universal Access Policy stipulates the TRR to prescribe the Quality of Telecommunications Services with the minimum standards, and in consultation with Service Providers.

1.3 The Quality of Service benchmarking will be beneficial to both consumers and operators. End consumers may then make informed choices regarding the services provided. On the other hand, operators can identify areas where they can improve the quality of service that they offer in the presence or absence of competition

1.4 This consultation document is in relation to the proposed undertaking of a Quality of Service (QOS) benchmark exercise and considers the parameters and measurement techniques that would be used in such an exercise for the purpose of assessing and monitoring the performance of the service providers' telecommunications networks.

1.5 The consultation will also consider potential additional information collection mechanisms for other types of data from the industry and the possible form and approach such mechanisms would take.

1.6 The outcome of the benchmark exercise will be beneficial to both consumers and operators. Consumers may then make informed choices regarding the services provided based on the performance information of the networks. Operators can identify areas where they can improve the quality of service that they offer in the presence or absence of competition.

2 CONSULTATION FEEDBACK INFORMATION

2.1 TRR welcomes and invites comments and feedback to this consultation document from all interested parties;

2.2 We would appreciate your provision of information to be cleared by quoting the corresponding section or paragraphs of this document when providing your comments;

2.3 In the interests of transparency, TRR may make public all or parts of any submissions made in response to this Consultation Document, unless there is a specific request to treat all or part of a response in confidence. Respondents are required to clearly mark any information included in their

submission that they consider confidential and include reasons why that information should be treated as such;

2.4 TRR will evaluate requests for confidentiality according to relevant legal principles, if a request for confidentiality appears to be without merit, and relates to information which is not confidential, or results in the substance of the submission being obscured, TRR maintains its discretion to determine whether the information claimed to be confidential is to be treated as such. Where information claimed to be confidential is included in a submission, respondents are requested to provide both a confidential and a non-confidential version of their submission. TRR however may consult with respondents in the event of uncertainty as to the confidentiality of the information provided;

2.5 TRR will accept comments in English, French or Bislama;

2.6 If comments are submitted in printed format, they should be submitted on A4 paper accompanied, wherever possible, by a USB memory stick containing the comments, in electronic format;

2.7 Comments on this consultation document should be provided to TRR via the following means:

- Via email to consultation@trr.vu
- Faxed to (678) 24470
- Posted or hand delivered to:

  Public Input – Quality of Service Parameters and Measurement
  Telecommunications and Radiocommunications Regulator
  P O Box 3547, Port Vila, Vanuatu

2.8 The deadline for public comments is **4pm, Friday 29th of June 2018.**

2.9 A general forum will be held to discuss this consultation on **Wednesday 20th of June 2018**, at TRR's Office.

2.10 For any phone enquiries regarding this Consultation document, please call the following numbers:

- (678) 27621 or (678) 27487 and speak with staff responsible.

2.11 For more information about TRR's Consultation Guidelines, please visit the following website www.trr.vu**.**

2.12 You are welcome to visit our website http://www.trr.vu for more details on the latest developments in the telecommunication services industry and other related matters.

3 BACKGROUND

3.1 The performance of telecommunications networks is becoming a focal point for the general consumer and as such, network providers must be able to supply and maintain a network that the consumer has confidence in a call being successfully completed, that is simplistically network access, ring tone, answer, conversation, termination and network clear down.

3.2 The TRR has to ensure that the services being provided are of expected standard, and in line with the International Telecommunications Union standard and that the public can rely on these services. Quality of Service (QoS) is the general measure of this standard[1] internationally and therefore the TRR now seeks to measure, improve and monitor the QoS of the operators.

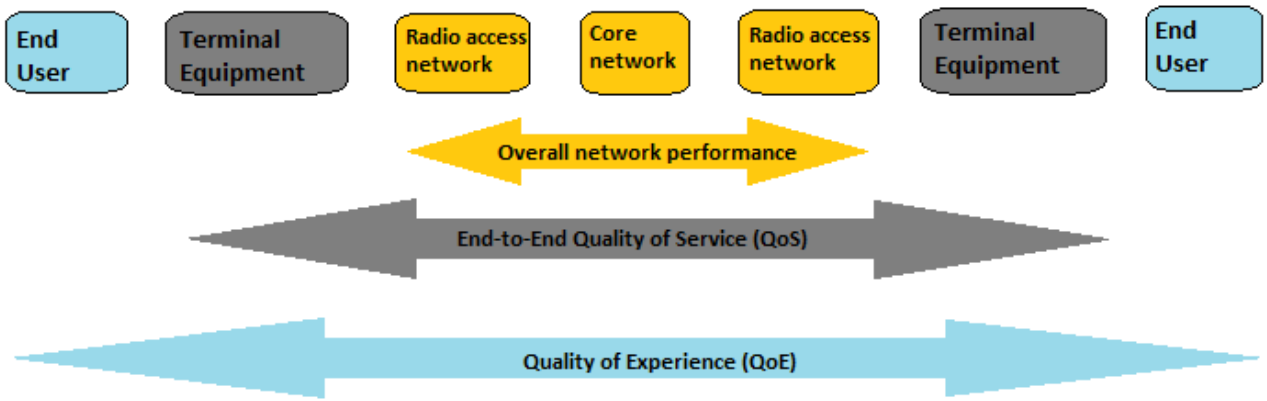
3.3 QoS benchmarking will be beneficial to both consumers and operators. End consumers may then make informed choices regarding the services provided. On the other hand, operators can identify areas where they can improve the quality of service that they offer in the presence or absence of competition.

3.4 This will be of relevance as accurate and timely information will be collected and this can be provided to the government for input into the national policies on both telecommunications sector and the wider economy.

3.5 The assessment will focus mainly on the end-to-end quality of service. This is determined by undertaking assessment of the overall transmission chain within a network from a user's perspective. This takes into account the complete transmission chain including the end-user devices from a user's perspective while excluding the end-users' subjective elements such as personal experience and expectation.

[1] ITU, ISO, ETSI, GSMA, IETF

3.6 The diagram below illustrates the three main components that establishes the quality of Mobile Services.



3.13 Overall Network Performance caters for the quality of the network infrastructure. The End-to-End (QoS) component is the QoS for network infrastructure working with the end user device. This is the component that we want to investigate. Quality of Experience (QoE) covers both previously mentioned components including the customer's perception.

4 PURPOSE

4.1 TRR intends to implement a Quality of Service (QoS) benchmark measurement activity on a regular basis to measure and report on the performance of service provider networks.

4.2 The main objectives of QoS benchmark measurement activity are:

i. To ensure the service provided meets the standards of internationally recognized institutions and that a benchmark is set to locate areas of improvement for Service providers;

ii. To inform the public in the simplest way possible on some key indicators of QoS for Mobile Services and so in doing affected consumers can make informed choices and understand the telecommunications market better;

iii. To ensure that TRR continues to have access to timely, relevant and accurate information regarding the QoS to enable it to appropriately perform its role, and to effectively and efficiently monitor the activities of the telecommunications sector in Vanuatu and ensure and protect sustainable and effective competition;

iv. To assist and enable TRR and Government of Vanuatu policies to be evidenced-based and informed by current and appropriate measurable facts and trends within the telecommunications market of Vanuatu; and

v. To continue to maintain Vanuatu's active participation and contribution in international telecommunications and regulatory matters by providing accurate and timely information to our international ICT partners and affiliated member associations, and by meeting expected international standards.

5 REGULATORY IMPACT ASSESSMENT

5.1 TRR, in 2012, published guidelines for QoS[2] following consultation with service providers with the requirement of service providers to report to the TRR on the parameters agreed on a regular basis.

5.2 To date there has been no reporting by service providers on the QoS parameters agreed nor any other actions required by service providers under these guidelines.

5.3 TRR has subsequently reviewed these guidelines and has determined that they do not meet the current market structure nor do they adequately represent the services provided by service providers in the market today.

5.4 It is likely that this is a contributing factor to the non-conformance of the service operators in providing this information to the TRR.

5.5 Nevertheless, QoS is an important factor and has an impact on the subscriber on the perceived ability to make and receive mobile calls, send and receive SMS and to make use of the internet and other data services.

5.6 TRR does not intend to develop a regulation to enforce QoS, but would like to see QoS measurements done on a yearly basis and with sufficient information available to the consumer on the service provider's network performance, allowing the consumer to make an educated decision on the best network for their purposes. TRR would also like to see that this information is able to be utilised by the service providers to improve the performance of their network on an ongoing basis.

5.7 Given that the new QoS measurement regime is expected to be substantially less imposing than the existing guideline obligations, TRR does not foresee or expect that the proposed changes should impose any significant additional incremental costs on service providers.

[2] Quality of Service Guideline 2012

5.8 TRR however notes that the proposed QoS measurement activity may lead to additional costs to service providers in the long run with respect to network performance upgrades as and if required.

5.9 TRR requests, and hopes, that service providers engage appropriately and cooperatively in this consultation.

5.10 With regards to such considerations TRR has provided a three (3) week period for comment on this consultation, in order to provide sufficient time to service providers to appropriately consider the proposed QoS parameters and methodology and to provide their views.

5.11 TRR also proposes to allocate time within this consultation period for face-to-face discussions with service providers, either individually or as a group, in order to ensure that the proposed parameters and methodology is appropriately understood and that they adequately reflect the activities undertaken by service providers.

6 PROPOSED QUALITY OF SERVICE PARAMETERS

6.1 QoS in the telecommunications world is based on standards[3] and licence conditions. However, QoS will not exist just by having the mandatory standards or licences included, it has to be maintained. To do so, we need to define a set of keys performance indicators, which are important to the end-user and for users (as consumers) to be made aware of them; then we need to perform measurements of such KPIs.

6.2 QoS Parameters characterized the quality of the service being offered and the level of customer satisfaction. QoS parameters represent subjective and abstract user perception of quality in terms of numeric (quantified) values.

6.3 TRR has previously documented a QoS guideline. This guideline establishes a framework for the provision of information to assist end users with their selection of services and to assist in the maintenance and the improvement of the QoS provided by service providers.

6.4 The guideline has set down some parameters for QoS. These have been reviewed and decided to have it scaled down. The ultimate reason being some of the parameters are no longer relevant (eg: installation of fixed lines timeframe, fault repairs).

6.5 Some important definitions of the parameters that are used are outlined below:

i. **Call drop rate** means the rate of incoming and outgoing 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 end user.

[3] ITU, ISO, ETSI, GSMA, IETF

ii. **Call set up time** means the period starting when the address information required for setting up a call is received by the network and finishes when the called party busy tone, or ringing tone or answer signal is received by calling party.

iii. **Calls successfully connected** means the ratio of successfully connected calls over the total number of calls that were initiated by end users.

iv. **Download/Upload Speed** means the performance of an internet connection based on the number of bytes per second that data travels from the user's device (upload) and from the internet (download).

v. **Handover Success rate** means the rate of successfully transferring an ongoing call or data session from one channel to another in a cellular network.

vi. **Packet Loss** means the measurement in percentage of the packets loss with respect to total packet sent.

vii. **Rx Signal level** means the signal strength of the transmitted signal from the closest tower that is received by the terminal equipment.

viii. **SMS (Short Message Service) End-to-End Delivery** time means the time it takes for an SMS to be successfully delivered to the other end user.

ix. **SMS (Short Message Service) Establishment Rate** means the ratio of being able to send an SMS successfully. It is measured in percentage.

x. **Start time** means the time it takes for a YouTube video to start playing. This is measured in seconds (s).

6.6 The defined parameters are tabled in Annex 8.1.

7 PROPOSED METHODOLOGY

7.1 TRR had previously developed guidelines for the measurement of QoS. These guidelines required the operators to provide statistical information on a quarterly basis on various parameters, some of which may no longer be relevant, others may be required. However it was found that no information had been provided by the operators on this matter.

7.2 In undertaking this exercise there are a number of options that can be considered, these being;

i. Retain the existing QoS guidelines, update the parameters and enforce compliance with respect to reporting.
ii. Agree QoS parameters and TRR develop its own methodology to measure and report on QoS.
iii. Agree on QoS parameters and TRR, in concert with operators, engage a third party to undertake the QoS benchmarking exercise to ensure a standardised and recognised approach is taken which provides a neutral and independent result.

7.3 Option (i) is already in place and is not adhered to. The issue here is that the operators see this as a burden to undertake the measurement. TRR can see that there may be differences in the approach to measurement which will lead to difficulties in comparison between the two operators which will make it difficult for subscribers to understand which operator may provide a better service.

7.4 Option (ii) is the future state for the TRR, whereby appropriate staff are trained with appropriate tools purchased to undertake measurements on an independent and neutral basis that compares both operators simultaneously. At present TRR does not have the infrastructure nor the skillsets to progress this option. This is a five (5) year time horizon depending on current technical staff learning capability.

7.5 Option (iii) is considered to be most appropriate in the short to medium term, whereby TRR engage, in concert with the industry, an independent body to undertake the QoS measurement and benchmarking. This will ensure that all industry parties are in agreement with the parameters and the approach to the QoS benchmarking and that the results will be a truly independent and standardised comparison of QoS between the operators. This option also removes any burden from the operators and allows TRR staff to commence capacity building on this activity on a functional level.

7.6 TRR considers Option (iii) to be the most appropriate option at this time.

8 CONSULTATION QUESTIONS

The below questions seek the views of interested parties on TRR's proposed QoS parameters and measurement approach. TRR will consider any suggested changes or amendments to the QoS parameters and measurement approach that support the stated purpose of this consultation, and particularly that encourage the following:

A. Reduces the burden or complexity of QoS measurement and reporting for service providers;
B. Reduces the burden or complexity of interpreting the QoS results by the TRR;
C. Enables the timely reporting of QoS benchmark information that is accurate and relevant with regards to mobile voice and data telecommunications services in Vanuatu residents.

Questions

Q1. Do you have any objections with the TRR undertaking a QoS Assessment?

Q2. Do you have any objections with the QoS parameters identified?

Q3. Are there any other relevant QoS parameters that should be considered?

Q4. Do you have any objections with the approach of utilizing an independent body to undertake the QoS measurements and reporting?

9 ANNEX

9.1 PARAMETERS

MOBILE VOICE PARAMETERS		
PARAMETER	**THRESHOLD/STANDARD**	**COMMENTS/REFERENCE**
AVAILABILITY		
Network Availability		Network Availability throughout duration at the area of the assessment
Rx Signal Level	≥-95dBm	To check for received signal strength at the area of assessment Reference: Framework for the Assessment of Service Quality of Telecommunications Systems and Service,CA,2017
ACCESSIBILITY		
Call Set up time	< 10s	Time it takes to initiate a call Reference: ITU-T Recommendation E.807
Call successfully connected	>98%	Rate of successfully connected calls over the total calls initiated Reference: Framework for the Assessment of Service Quality of Telecommunications Systems and Service, CA, 2017
SMS Establishment Rate	>95%	Rate of successfully sending an SMS References: ETSI EG 202 009-2 V1.3.1 ETSI EG 202 057-2 V1.3.2 (5.6.2) ETSI TS 102 250-2 V2.3.1 (7.4.4 – completion failure ratio) ETSI TS 102 250-5 V2.4.1
RETAINABILITY		
Call Drop Rate	≤2%	Rate of calls forcibly dropped over total number of calls made Reference: ESTI ES 202 765-2(7.4)

Handover Success Rate	≥96%	Rate of calls successfully transferred either soft or hard handover Reference: Framework for the Assessment of Service Quality of Telecommunications Systems and Service,CA,2017
INTERGRITY		
Call Set up time	<10 s	Time it takes to initiate a call Reference: ITU-T Recommendation E.807
SMS End-to-End Delivery time	>95% in less than 30s	Rate of successfully sending an SMS within 20s over total number of SMS sent References: ETSI EG 202 009-2 V1.3.1 ETSI EG 202 057-2 V1.3.2 (5.6.3) ETSI TS 102 250-2 V2.3.1 ETSI TS 102 250-5 V2.4.1
MOBILE DATA PARAMETERS		
PARAMETER	**THRESHOLD/STANDARD**	**COMMENTS**
AVAILABILITY		
Network Availability		Network Availability throughout duration at the area of the assessment
Rx Signal Level	>-95dBm	To check for received signal strength at the area of assessment Reference: Framework for the Assessment of Service Quality of Telecommunications Systems and Service,CA,2017
Web-page Download		
Data Establishment Rate	95% within 20 seconds	Set up success rate for the page to completely load Reference: Framework for the Assessment of Service Quality of Telecommunications Systems and Service, CA, 2017
Packet loss Ratio	<2%	

DL/UL Speed	>25Mbps/15Mbps	Average LTE speed given that the test device will be set to Auto connect mode with LTE being the priority
File Download/Upload		*No specific file size but the same should be used throughout test
Data Establishment Rate	>95%	Set up success rate for the page to completely load Reference: Framework for the Assessment of Service Quality of Telecommunications Systems and Service,CA,2017
DL/UL Speed	>25Mbps/15Mbps	Average LTE speed given that the test device will be set to Auto connect mode with LTE being the priority
Youtube Video		
Data Establishment Rate	>98%	Set up success rate for the page to completely load Reference: Framework for the Assessment of Service Quality of Telecommunications Systems and Service,CA,2017
Start time	<5s	Duration for when video actually starts to play