Consultation Paper
On
Review of network related Quality of Service standards for Cellular Mobile Telephone Service

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1. References

1) “Consultation Paper on Review of network related Quality of Service for Cellular Mobile Telephone Service”

2. Document scope

This document has been prepared in response to the TRAI’s- “Consultation Paper on Review of network related Quality of Service for Cellular Mobile Telephone Service” 1).

The purpose of the document is to provide the TRAI with our recommendations for measuring customer mobile telephone service quality e.g. the Quality of Experience (QoE). This document also highlights the benefit to the TRAI, to their Mobile Network Operators (MNOs) and to subscribers of measuring QoE rather than focussing on a network centric view that measures Quality of Service (QoS).

3. Our summary of TRAI objectives

We summarise the TRAI objectives as follows;

- Determining levels of customer experience service quality that should be provided by MNOs.
- Observing / Monitoring MNOs achieving required levels of customer experience.
- Generally, protect the interest of consumers of mobile telephony service.

4. National standards

The TRAI have specified standards to be achieved by MNOs and detailed parameters that qualify the quality of given service aspects such as call performance along with a statement regarding a uniform methodology of deriving/calculating those parameters. Aside from stating how a service quality parameter is calculated, the TRAI have also determined how parameters (Key Performance Indicators – KPIs) are aggregated in dimensions of time (e.g. averages per month) and geography (e.g. service areas).

5. Traditional methods of QoS measurement

One of the problems that Wadaro observes in all networks is a reliance on traditional methods of QoS measurement. These are Drive test and Core Network probing. In recent years we have observed some vendors portraying their products as those that measure QoE but they are in fact always a variant on core network probing.

However, these traditional methods of QoS measurement are not sufficient to enable MNOs to comprehensively measure their service quality and thereby enable them to invest efficiently in service improvements. The fact that users of mobile services we all suffer lack of signal, failed call setups or dropped calls at some time shows that the traditional method of service measurement it inadequate.

In addition, the fact that the regulator is primarily reliant on performance reports created and delivered by the MNO (or NW infrastructure provider) means that there is no independent monitoring of QoE.

6. Quality of Experience measurement enables quality improvement

The most accurate source of service quality measurement data lies with the consumer. It is the consumer that is affected by good or poor service. Unfortunately, consumer's opinion or emotion induces a positive or negative bias to their input so, as a source of data, they cannot be relied upon to provide an accurate measure of service quality.

Some vendors have attempted to develop Smartphone App solutions to measure service from within consumer mobile phones. Although a measurement solution based on Apps could provide a great platform for QoS and QoE measurement, these Apps tend to be deleted by the mobile phone user. If the App does persist in the phone, it is usually referred to only when there is a problem so data from the App then includes a natural negative bias in KPI.

A method that enables the acquisition of accurate KPI from the consumer side and without the associated issues of using Smartphone applications is to use Client software in the SIM card. Such a Client is under the control of the MNO (or in this case can be under the control of the TRAI) and would render a true picture of service quality 24x7 and across all geographies in India including in-building and remote areas .

7. Questions and Answers

This section of the document refers directly to the questions posed in the TRAI document 1). Answers to TRAI questions are given in the light of a method being deployed that utilises the SIM card in the consumer mobile phone as a source of KPI reporting.

"*Measurement is the first step that leads to control and eventually to improvement. If you can't measure something, you can't understand it. If you can't understand it, you can't control it. If you can't control it, you can't improve it.*"

— H. James Harrington

7.1. Question 1 - QoS mandate at sub-service area level

"*In case QoS is mandated at a sub-service area level, which option (LDCA-wise or District Headquarter/ city/ town-wise or BTSwise) you would recommend? Please comment with justifications.*"

Given the primary objective of measuring MNO service quality is to engage with them to ensure that subscribers receive the best quality service possible, we recommend that measurement is related directly to the subscriber and not to based on geography or radio equipment.

Network availability, persistence in connection to service, and quality of service over that connection determines the consumers Quality of Experience. By reflecting on QoE, the TRAI stated Network Service Quality Parameters (page 7) are translated as follows;

Network Availability – How accessible is service for the consumer. We agree that BTS/NodeB and eNode B outages will lead to lack of service availability. However, there will be cases during outages when consumers are not using their mobile phone and therefore the outage does not affect them.

In addition, some consumers can be at a location that can be covered by cell sites being served by a different BTS/Node B/eNode B. In this case, the outage of one serving cell is compensated for by a working cell site.

Our view is that Network Availability is a measure of how well a consumer can connect to their service provider Radio rather that BTS outages.

Connection Establishment – This could be a summary of the consumer's experience of call setup. The most frustrating aspect of failing service is call setup. Generally, consumers have a tolerance for call drops which is much higher than failed call setups so this should be an area of service that MNOs should try ensure works well.

From the consumer's perspective, a failed call setup arises from a lack of Radio coverage or some other core network problem such as congestion. Using only the SIM as a source of KPI, failed setups can be qualified by both Radio Link Failure (RLF) during setup and call end cause codes as specified in 3GPP TS 24.008. With this information, MNOs (perhaps with support from the TRAI) can better determine where they should invest their resources to improve call setup performance (e.g. either in the radio network or in the core network).

Connection Maintenance – This addresses the consumers QoE from service while connected (e.g. call performance). As for call setup performance, call drop rates are categorised by RLF or core network failure.

In answer to the TRAI question above, our recommendation is to measure service across all of India and to focus on 'hot spots' or poor service (lack of accessibility, poor call setup performance and dropped calls). In doing so, any 'masking' of poor service arising from aggregation of KPI within service areas, towns, districts or at the BTS level will be avoided and the actual impact on consumers will be reported.

7.2. Question 2 – CDR calculation

"*Question 2: How should the call drop rate calculated – either at the Licensed service area level calculated during TCBH, or calculated during the Cell Bouncing Busy Hour (CBBH) at BTS level should be the benchmark? Please give your views on each parameter, with justification."*

Radio networks are intrinsically unreliable. Their performance is subject to variables such as interference cause by new buildings, changes in weather and load. Consequently, continuous measurement is recommended so that seasonal changes, metro, urban and sub-urban development can be factored into how the TRAI engage with MNOs to address the effects of change in radio environments.

With reference to the explanation provided in section 7.1 (Question 1 - QoS mandate at sub-service area level) our recommendation is measure service 24x7 across all of India with a focus on hotspots of poor service. Such hotspots will be a factor of hour in day combined with location. What the TRAI may want to know is which subscribers are systematically subject to poor service, where and when.

7.3. Question 3 – Revision of benchmark parameters

"*Question 3: How should the benchmark for the network parameters be revised? Should it be licensed service area wise or district wise or BTS- wise or a combination? In such cases what should be the benchmarks? How should the benchmarks be measured?lease give your views on each parameter, with justification.*"

Assuming that KPI are being sourced directly from the consumer, dimensions to reporting include time, device type in use, location, service type and service quality. The derivation of KPI as stated in the document 1) are viewed to be adequate for the purposes of measuring consumer QoE. Aspects such as POI congestion naturally fall out of QoE reporting as networks transmit the origin of cause

codes (see 3GPP TS 24.008) so the TRAI will be able to determine the effective impact on consumers of congestion between networks.

7.4. Question 4 – Network agnostic KPI

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The SIM card is an intrinsic aspect of service delivery in modern networks (this excludes 2G CDMA networks). A SIM is needed to authenticate users to all network types offered by an MNO so a measurement solution based on the SIM is intrinsically technology agnostic. Furthermore, as measurement from the SIM 'follows' the consumer, the performance of dynamic changes of serving network type (Radio Access Technology or 2G, 3G and 4G) can be observed. An example of this is Circuit Switch Fallback (CSFB from 4G to 3G or 2G for Mobile Terminated (MT) voice calls in none VoLTE capable networks.

7.4.1. B. Additional parameters to measure network related quality of service parameters for cellular mobile telephone service:

We suggest the mandate of RTL to be unnecessary. MNOs should be at liberty to set timers appropriately and to adjust them in response to the effect those timer settings have on consumer experience.

7.4.2. QoS perceived by the customer

Per comment made in section 6, we do not recommend direct engagement with the customer as their input to KPI is subjective. The TRAI will benefit more from applying an independent automated solution for measuring customer QoE than by engaging with consumers directly.

8. Question 7 – Customer satisfaction index.

"*Question 7: Do you think calculation of customer satisfaction index will help in QoE of the consumer? If so elaborate the methodology of the calculation of such indexes. What are the latent variable that need to be defined and how are they to be calculated? Please comment with justifications.*"

Our response to this question is definitely **Yes**. This response is qualified by our suggesting that QoE itself should be measured to help MNOs invest appropriately in service for the benefit of their customers. Clearly Wadaro has a bias towards using the SIM as a source of KPI as Wadaro products are founded on the same. However, we can offer references;

- A variety of MNOs have or are using the SIM to measure QoE with a view to optimising investment in service quality
- A telecommunications regulator that uses the SIM to measure QoE delivered to consumers by their MNOs.

9. Question 8 – Punitive measures to incentivise service quality improvements

"*Question 8: What are your views on introducing a graded financial disincentives based on performance and what should be such quantum of financial disincentives for various parameters? Please comment with justifications.*"

Fines are not always a successful method of getting MNO's to deliver better service as the costs are simply absorbed into the annual operating costs. It may be cheaper for the MNO to pay a fine rather than invest in new infrastructure or network optimisation.

We agree that there should be a linear relationship between the magnitude of fines applied to MNOs and their service quality. However, and with a view to being fair to the MNO, measures of quality need to be accurate and full qualified to ensure that a fine is being applied for the correct reason. For example, is the cause of a dropped call due to the inadequacies of the network or the poor quality of the device used by the consumer (see 9.1)

9.1. A network centric measure of quality is unfair to the MNO

Wadaro has deployed Customer QoE measurement solutions across several networks. A national telecoms regulator has also procured our SIM based solution to help police the performance of all their MNOs. Our experience tells us that there are some factors leading to poor KPI that are not within the control of the MNO. For example, consumers may buy unapproved devices (mostly from China) with poor radio performance. Those devices inject a negative bias into all KPI and unless such devices are considered in reporting then fines may be unjustly applied to the MNO.

A consumer-side solution for QoE measurement such as one based on the SIM will provide the TRAI with an accurate and independent measure of service quality that cannot be provided by traditional solutions such as Drive Test and Core Network probing.