Information & Communication Technologies Authority

Document Ref.: ICTA/01/2023/RES

RESPONSE TO CONSULTATION PAPER ON IMPLEMENTATION OF CROWDSOURCING– BASED PLATFORM FOR ASSESSMENT OF QUALITY OF SERVICE (QOS) OF BROADBAND INTERNET SERVICES

09 May 2023

BACKGROUND

The ICT Authority released, on 31 January 2023, a consultation paper on the implementation of a crowdsourcing based-platform for assessment of QoS of Broadband Internet services. Comments on the consultation paper were invited from stakeholders by **28 February 2023**.

The ICT Authority has received comments from the following stakeholders:
 (i)   Respondent A
 (ii)   Ookla LLC
 (iii)   Mauritius Telecom Ltd. (jointly with Cellplus Mobile Communications Ltd.)
 (iv)   Emtel Ltd.

The present paper is a summary of the responses received to the different questions raised in the consultation paper, including general comments from respondents. The views of the ICT Authority with respect to the responses are also provided.

OBJECTIVES OF CONSULTATION PAPER

The ICT Authority, through its consultation paper, has proposed to make available to end-users of Broadband Internet services in Mauritius, a crowdsourcing-based QoS measurement platform that will allow end-users to assess the QoS (including Quality of Experience (QoE)) of the Broadband Internet services to which they are subscribed. The QoS measurement platform would further allow the ICT Authority to make comparative publications on the performance of different Broadband Internet service providers. With the above proposals, the ICT Authority seeks to adopt a consumer-focused regulatory approach, ensuring transparency and empowering consumers to make informed choices of services/service providers.

The following section summarises the responses received to the questions raised in the consultation paper.

1. **What are your views on using 'crowdsourcing' as the main measurement method of the QoS/QoE measurement platform?**	
Mauritius Telecom (MT)	MT opines that crowdsourcing method tends to provide large amount of data with more unknown factors, leading to unreliability and lack of trust in crowd data. It points to some of the issues identified mainly with smartphone-based crowdsourcing measurements, including: uneven distribution of sample (over time and space); biased testing by users; resource consumption (device battery and data volume); uncontrolled testing environment; measurements impacted by subscription limitations (bandwidth capping and Fair Usage Policy); and redundant information due to repeated tests from single device. MT further considers that crowdsourcing method is not mature enough to replace traditional QoS/QoE measurement methods (e.g. measurements made during drive tests) which are more reliable.
Emtel Ltd.	Emtel provided the pros and cons of the crowdsourcing method as the main method of QoS/QoE measurement. Emtel considers that, on the positive side, the crowdsourcing method would provide a large sample size, real world testing, continuous monitoring and cost effectiveness, while on the other hand, there might be a lack of control on the tests conducted, inconsistency in data collected, privacy concerns and unrepresentative sample. Emtel is of the view that crowdsourcing should be used in combination with other measurement methods to ensure the accuracy and reliability of the data collected.
Respondent A	Respondent A points out the weaknesses of the crowdsourcing solution, namely risk of low user adoption rate and unrepresentative sample w.r.t actual experience or profile of end-users. The respondent further opines that crowdsourcing solutions do not report on the actual quality of the applications being used and do not provide a comprehensive view of the problem; unable to provide contextual awareness for actionable insights.
Ookla LLC	Ookla opines that crowdsourcing has its merits as a benchmarking tool, provided there is consistently a good cross section of the population involved in measurements; and data from other QoS measurement methods may be used to complement the crowdsourcing data. It further considers that users' requirements in terms of QoS assessment is a prime factor in the choice of the QoS measurement method.
Respondents have highlighted the weaknesses of crowdsourcing as main QoS measurement method, two of them however also recognising its merits especially when used in combination with other methods. The Authority notes that many regulators which started with the traditional methods of QoS measurements are now also widely adopting the crowdsourcing method. By proposing the crowdsourcing method, the Authority does not exclude the possibility of complementing same with other QoS/QoE measurements methods with a view to having a more comprehensive assessment of quality of service.	

2. Should a data collection device that is separate from the terminal ("white-box") be used rather than a software application in the case of fixed networks?	
Mauritius Telecom (MT)	MT strongly requests that a "white-box" be used instead of software application for fixed networks so that data may be collected independently without user intervention e.g. whiteboxes that test at the router. MT suggests that software application embedded in ONT may also be considered.
Emtel Ltd.	Emtel considers that a white-box may provide more standardized measurement results which would provide a more comprehensive view of the network's performance over time, as opposed to software application which requires user interaction to provide a snapshot of the network performance at a specific moment in time. Emtel however highlights the complexity in deploying the hardware-based measurement method and challenges associated in maintaining the hardware.
Respondent A	Respondent A submits that neither the white box nor software option would resolve the problem inherent to the crowdsourcing solution, namely the lack of wide and representative coverage; it recommends consideration of an alternative solution which is user independent, handset independent and that covers all subscribers, all services and all technologies.
Ookla LLC	Ookla considers that both or either may be used as long as consistency of the data collection methodology is maintained. It notes however that white-box requires ongoing maintenance and management, compared to software platform which is easier to scale. The respondent recommends deployment of a central API which enriches test data with required fields (e.g. device type, plan type etc.); this would allow for a software only or a mixture of both software and hardware across a consistent test methodology.
The Authority takes note of the divergent views on the deployment of "white-box" solution for QoS measurement on fixed networks. The Authority will consider factors such as ease of deployment and maintenance, user-friendliness and cost-effectiveness, among others, prior to any decision on proposals w.r.t. hardware-based crowdsourcing solutions.	

3. Is there any category of Broadband Internet service that you think should be excluded from the proposed QoS measurements and if so, why?	
Mauritius Telecom (MT)	MT submits that the measurements related to the following should be excluded: contents found beyond operator's network control (e.g. on international servers); services operated under free WiFi hot spot; services offered under social packages and volume capping; services for users having reached their volume capping and My.t mobile data packs (as they are not based on advertised speed).
Emtel Ltd.	Emtel proposes to exclude users with limited volume packages and subscribers who have reached their throttling volume limit. Emtel further submits that enterprise and industrial broadband services should be excluded as they usually have different usage patterns.
Respondent A	Respondent A considers that QoE of all subscribers should be measured at all time: the measurement solution should provide an accurate representation of the quality perceived by users and in function of application, access type, location, time, etc.
Ookla LLC	Ookla is of the view that there should be no exclusion so as to ensure a universal view on data collection; but it would depend on the regulator's own usecases.
The Authority seeks to have measurements made on an end-to-end perspective, reflecting the user's actual experience. The Authority will however ensure that limitations and capping with respect to subscribers' packages are highlighted wherever applicable while requesting for proposals.	

4. Should tests be automated (run in background) or be user-initiated (manual) or both? Why?	
Mauritius Telecom (MT)	MT considers that tests should be automated (for both fixed/mobile) to eliminate user bias.
Emtel Ltd.	Emtel is of the view that only a dedicated foreground service is capable of accurately evaluating network performance and quality metrics.
Respondent A	Respondent A is of the view that both options are intrusive and resource intensive, impacting subscribers' experience and affecting their handset batteries.
Ookla LLC	Ookla submits that both may be considered depending on scenario; for instance, automated tests are possible for fixed line services using white boxes, while mobile devices mostly limit background actions.
The Authority takes note of the divergent views regarding the choice of automated versus manual test. Same will be taken into consideration while requesting for proposals.	

5. *What according to you should be the limit on data consumed by the QoS tests?*	
Mauritius Telecom (MT)	MT points out that the data consumed depends on the list of tests, type of tests and tests frequency, which are all configurable.
Emtel Ltd.	Emtel considers that QoS tests need to consume sufficient amount of data to accurately measure network performance, and to provide meaningful insights into the user experience. Emtel further considers that an appropriate design of the test scenarios and test parameters would be required to ensure that the tests provide meaningful and accurate insights into network performance.
Respondent A	Referring to solutions that create scores per application, Respondent A explains that an application such as VoIP does not consume a large amount of data, but must be measured on different parameters such as packet loss and latency to report on the actual subscribers' experience.
Ookla LLC	Ookla conveys that the testing cadence should be set in a way that does not generate capacity issues on the network
Respondents have acknowledged that QoS tests should consume sufficient data for accurate QoS measurements and that consumption would vary depending on nature of tests. The Authority will seek for solutions that ensure efficient data consumption.	

6. *Which main QoS/QoE parameters should be measured by the platform?*	
Mauritius Telecom (MT)	MT submits that the following parameters should be measured for both fixed/mobile: Download speed; Upload speed; Webpage download time; and DNS response time.
Emtel Ltd.	Emtel submits that the following parameters should be measured and made available to the ISP only: Upload throughput; Download throughput; Ping; Technology on which test is performed; Signal strength; Location and Cell ID.
Respondent A	Respondent A lists the following parameters used for creating score per application: Throughput, Packet Loss and Latency.
Ookla LLC	Ookla submits that the following QoS parameters should be measured: Download and Upload Peak and Max throughput for different technologies; Latency; and Jitter. It further lists the following QoE parameters: Video Streaming (start time, rebuffering, time on resolution, failures); Video Conferencing (latency, jitter, packet loss); Web Browsing (load time, first byte, success rate) and Gaming (latency, jitter, packet loss).
The Authority takes note of respondents' proposed parameters for eventual consideration when requesting for proposals.	

7. What other useful QoS-related information should be made available to end-users by the QoS measurement platform?	
Mauritius Telecom (MT)	MT lists the following as other useful QoS-related information: Latency; Jitter; BER; Locally cashed video contents; Service Provider; Testing server; Speed of server; Geographic location; IP Address of testing server; User browser; User's Operating System; User device type; Offer, Time, Event; Environment (e.g. laptop, mobile brand and model, 2G,4G, or 5G).
Emtel Ltd.	Emtel submits the following to be made available to end-users: Upload throughput; Download throughput and Ping.
Respondent A	Respondent A notes that for particular solution that reports scoring to reflect the quality of service, reported metrics must be referenced against the application being used.
Ookla LLC	Ookla points out that information such as Plan details, Bill type, Renewal date, Backhaul connection type, CPE could also be provided with an enrichment API.
The Authority takes note of respondents' proposed parameters for eventual consideration when requesting for proposals.	

8. Do you have any suggestion regarding possible location of test servers to be used by the service provider?	
Mauritius Telecom (MT)	MT suggests that test servers be connected directly to operator's Internet gateway in ISP network; for fixed/mobile test servers to be located at Port Louis, Rose Hill & Floreal.
Emtel Ltd.	Emtel suggests that test servers may either be connected at each ISP/operator premises with the same hardware configuration, or they may be installed at a mandatory neutral location and connected with sufficient bandwidth capacity to each ISP.
Respondent A	Respondent A recommends deploying solution at the operator's core sites or at the internet gateways to cover the majority of traffic.
Ookla LLC	Ookla conveys that position of test servers are generally placed such that a connection is fully saturated with on and off net servers.
Taking into consideration the above responses, the Authority will seek for test servers to be located at such points that allows for a comprehensive view on quality, while ensuring that local operators are benchmarked on comparable basis.	

9. Do you think the service provider should not complement user data with measurement data obtained from its own App in case of insufficient data? Why?	
Mauritius Telecom (MT)	MT considers that service provider should not include measurement data from its own App as same would include results for tests made from end-users' devices, with for instance inherent Wi-Fi connection issues, which may eventually distort the general test results.
Emtel Ltd.	Emtel highlights that should measurement data be collected from publicly available testing platforms, sufficient data would be required to be statistically significant.
Respondent A	Respondent A notes that complementing data would be applicable in crowdsourcing but not required in particular alternative solution.
Ookla LLC	Ookla is of the view that data from different sources may be merged provided methodologies are consistent and synced.
The Authority may allow for complementing of user data as an option but would need to study the proposals from suppliers with respect to same.	

10. Which factors should be considered by the ICT Authority in proposing the format of the comparative performance reports?	
Mauritius Telecom (MT)	MT highlights that operators should be compared based on similar test set-up, location, technology taking into consideration end-user terminals and network characteristics as well as peak time and congestion during special events.
Emtel Ltd.	Emtel submits that the format of the report should be clear and simple to make it easy for end users to understand the results. Moreover, the tool should have a proper methodology to ensure like to like comparison as there are several package offers on the market.
Respondent A	Respondent A notes that existing solution may provide exhaustive, friendly-based reports which could be created by ICTA and populated on ICTA website
Ookla LLC	Ookla points to different examples of use cases and reports issued by other regulators worldwide.
The above responses are noted.	

11. Do you agree that the QoS measurement platform should allow end-users to report QoS issues to the service provider? If so, what kind of QoS issues should be reported, how should the complaints be channelled?	
Mauritius Telecom (MT)	MT is agreeable with the idea that the platform allows end users to report QoS issues, such as Internet speed and session interruptions, provided same are channelled as per their existing complaint reporting procedure.
Emtel Ltd.	Emtel is of the view that it has well established channels for complaint reporting, including QoS issues and as such deems that the platform is duplicative and unnecessary.
Respondent A	Respondent A conveys that a solution to troubleshoot subscribers' complaints may be provided in parallel and not necessarily integrated with the QoS measuring platform.
Ookla LLC	Ookla notes that QoS measurement tools allow for different possibilities of reporting QoS issues; regulators usually adopt approaches which best fit their respective market.
The Authority will take into consideration the established complaint procedure of local operators to ensure that there is no disruption nor duplication.	

12. Please suggest how consumers may be motivated to participate in the measurements.	
Mauritius Telecom (MT)	MT submits that ICTA will need to develop a customer adoption strategy including providing incentives to end-users and organising awareness campaigns for promoting importance of the QoS measurements.
Emtel Ltd.	Emtel is of the view that the Authority might need to implement incentive programs or other initiatives to encourage user participation such as providing more transparency regarding QoS/QoE measurements and how they are used, offering rewards that are valued by end users for using the app and making the measurement app user friendly.
Respondent A	Respondent A reiterates that solution should be user and handset independent and should cover all subscribers, services and technologies.
Ookla LLC	Ookla conveys that the user baseline available for existing QoS crowdsourcing solution can be built upon through advertising and promotional tools.
The Authority takes note of the proposals from respondents, namely: awareness campaigns, transparency on use of QoS measurements, advertising and incentive programs including rewards for use of App. The Authority also takes note that other regulators have resulted to zero rating of the test application to encourage user participation.	

13. Do you agree that the QoS measurement platform should initially be operated on a pilot – basis? If so, do you agree with the proposed duration of one year as pilot phase?	
Mauritius Telecom (MT)	MT concurs with the proposal of one-year pilot phase and proposes a two months testing before the pilot phase.
Emtel Ltd.	Emtel agrees with the proposal of one-year pilot phase and proposes that there should be enough time to collect sufficient data and feedback to make informed decisions about the platform's effectiveness and any necessary modifications.
Respondent A	Respondent A conveys that a pilot of one month can be planned with limited scope.
Ookla LLC	Ookla opines that the concern with crowdsourcing is neither the platform itself nor the roll-out but rather the generation and maintenance of the crowd; time-limiting Proof of Concept or trial may therefore not provide conclusive results. Noting that established crowd-based Saas model having significant test volumes may readily be rolled out, the respondent conveys that efforts should rather be geared towards filling the gaps in requirements between the available Saas tool and the bespoke tool needed.
The scope and duration of pilot phase shall be decided accordingly.	

.

14. Please provide any other general comments or suggestions.	
Mauritius Telecom (MT)	MT submits that, for fixed broadband Internet services, automated testing on dedicated fixed broadband lines is to be adopted for meaningful test results and comparison purposes. For mobile Internet services, MT highlights that data pack offers are not based on advertised speeds, hence publicising results of speed tests would create unwarranted competition on mobile speeds.
	MT recommends that the measurement process be owned by ICTA and that requirements are made binding on all operators at all times. Further, ICTA should ensure independent and representative sampling; clear test specifications; proper testing guides to users and clarity on the type of information to which users will have access.
	MT is of the view that duplication of crowdsourcing-based QoS assessment platforms is not recommended and may face high risk of low customer adoption. MT further opines that instead of a crowdsourcing platform, ICTA should work with operators to find an alternative tool that allows QoS measurement in a more controlled manner.

Emtel Ltd.	Emtel is of the view that there could be a lack of adoption of the test app for several reasons including: lack of awareness; limited functionality; poor user experience; trust and privacy concerns; availability of alternative test applications; and compatibility issues. Emtel is of the view that the collection and use of data in a QoS/QoE platform may raise important privacy concerns and that the Authority will need to ensure transparency and be able to convince the general public that the platform is designed in a way that protects user privacy and complies with relevant data protection laws and applicable laws and regulations. Emtel is of the view that users of Home broadband may not be keen to install a white-box nor have the app installed on their home devices such as laptops or smart devices.
Respondent A	Respondent A recommends to deploy a nationwide solution at the International Gateway or at the operators' core networks; a solution that will be user and handset independent, will cover all subscribers, all services and all technologies.
Ookla LLC	Ookla recommends to use an off-the shelf solution having an established user base with large test volume, combined with an enrichment API to give granular view based on technology type, tariff plans, etc.

The Authority recognises that there are existing QoS measurement applications available for users to measure their own QoS, however the results of the measurements are provided to the user only, none of the existing applications publish the measurement results to the general public. Therefore, the general public may not know the performance of a particular service or service provider prior to subscribing to its services.

Through the implementation of the crowdsourcing platform, the Authority aims at providing the general public sufficient comparative data for them to make informed choices when opting for a service or service provider.

The Authority will also consider the possibility of sourcing of QoS information through other solutions such as drive tests and operator network performance files, etc., in line with ITU recommendations (ITU E.802 and ITU E.804) should there be a need to complement the crowdsourcing QoS data with more comprehensive QoS data.