OpenSignal Response to TRAI Consultation Paper 6/2017
Data Speed Under Wireless Broadband Plans

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ABOUT THIS DOCUMENT

The purpose of this document is to respond to questions raised by The Telecom Regulatory Authority of India (TRAI) in relation to its Consultation Paper on *"Data Speed Under Wireless Broadband Plans".*

This document has been specifically prepared for the TRAI and contains confidential and proprietary information relating to OpenSignal, its methodologies and solution. It is being submitted strictly on the understanding that the information contained within this document will be treated with the same care and attention that the TRAI treats its own confidential and proprietary information.

ABOUT OPENSIGNAL

OpenSignal is the global standard for mobile experience trusted by consumers and industry stakeholders alike. With over 20 million downloads on consumer devices globally, OpenSignal uses real-world, on-device measurements to offer a suite of analytics solutions providing competitive intelligence, preventing revenue leakage and offering independent brand endorsement. Customers include tier-1 mobile operators, telecoms regulators and industry analysts. For more information or any questions, please visit the OpenSignal website.

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Introduction

Mobile communications is now one of the most important aspects of the lives of most citizens. A well-functioning mobile communications system can add considerably to the productivity of a country and the quality of life of those who live in it. Ensuring that mobile networks function at levels that achieve this is a core role for the regulator.

In India, as in most countries, the market for mobile communications is competitive. In theory competition drives optimal levels of investment and incentivises innovation. In practice, there can be many reasons why the market does not function optimally. As the TRAI has identified, these can include accurate and easily understood consumer information and the tools to ensure regulatory compliance.

This situation is complicated by the difficulty in specifying the quality of a mobile network, the problems in measuring it, and the fact that requirements change quickly. For example, the expectation for monthly downloads is now some 1,000 times greater than a decade ago.

Current metrics

Most assessments of network quality tend to be based on speed and coverage. These are valuable metrics but need to be analysed with care. For example, at speeds below 1Mbits/s many apps and features will not work well on a smart-phone. Above around 5Mbits/s they will be unconstrained by speed and further improvements may not be noticed by the user. Hence, a network offering 20Mbits/s may be no better in practice than one offering 5Mbits/s.

Coverage is similarly nuanced. A network with excellent rural coverage but many not-spots in urban areas may well drop more calls than one with apparently lower levels of coverage but fewer not-spots. An understanding is needed of those areas where there is poor coverage coupled with the volume of people affected.

For these reasons, any measures that simply specify percentage of geographical coverage and some form of peak speed will be of limited value and may, in some cases, cause consumers to make inappropriate choices.

Current measurement approaches

Networks are difficult to measure, as TRAI has found. The key parameters vary on a metre-by-metre and minute-by-minute basis. They have daily and weekly peaks as well as peaks caused by new apps, or newsworthy events. The can change suddenly when new spectrum or technology is added or degrade over time as the subscriber base grows. Current approaches seek to measure networks using specified drive-tests and installed test-devices, but these can only sample a very small fraction of the times and places the network is in use and hence have there can only be very low confidence in their accuracy.

Towards a true Quality of Experience

As discussed above, network parameters such as speed and coverage may bear little resemblance to the quality experienced by the user. Quality of Experience (QoE) is a metric that is intended to align with the user's experience of the use of the phone and network, as opposed to a Quality of Service (QoS) or network-specific

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metric. As an example, page load time on a website would generally be seen as a QoE metric whereas network speed is a QoS metric. Clearly there is some relationship between the two but it is non-linear, complex and may change over time.
There is no industry-standard approach to calculating QoE. Most approaches tend to:

- Divide the usage into different application classes, where all uses in each class have similar QoE requirements.
- Score each class.
- Derive an overall weighted average across classes.

A typical division of usage might be along the lines of:

- Voice calling.
- Video calling.
- Video streaming.
- Web browsing.
- Social media / messaging.
- Gaming.
- Email and other productivity.

A typical class might then have some rating – for example for voice calling there is a rich body of evidence around how the subjective "mean opinion score" (MOS) compares to underlying network parameters such as latency, data rate and error rate. Deriving the scoring system will ideally use subjective data, but in some cases there may be acceptable objective approaches – such as deducing the page load time for web browsing and using this as a likely good proxy for experience.

Moving towards QoE rather than QoS is an important step in ensuring accurate consumer information that can lead to a competitive market and to network investment optimised to user needs.

Why crowd sourcing is the best way to measure network performance

Historically, coverage was measured using drive-tests where carefully calibrated equipment was placed in a vehicle and a specified route driven. This has advantages of repeatability and is accurate in so far as it goes. However, obviously, such measurements are limited in scope, hard to do indoors, and depend on the route chosen. They are also open to gaming, with operators concentrating their coverage improvements on known drive-test routes.
The user experience is often different. Handsets may have poorer performing antennas than those used for drive-tests, may be inside a bag when a call arrives, the user may be inside a vehicle and so on. Consumers often feel that coverage data does not reflect reality, which they find typically worse.

The best way to understand the consumer experience is to use the consumer device to make the measurements. This then incorporates their real-world issues such as poor performing handsets and partial device shielding. This is sometimes known as crowd-sourcing. A measurement app is installed on a number of handsets which frequently collects data and sends it back for central processing.

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As noted above, crowd-sourcing is also the only practical way to gain sufficient data to provide coverage maps that are truly representative of actual use, linked to where users are and the applications they are trying to use. It has overwhelming advantages such as:

- Low cost to collect.
- Provides real-time insight into user experience.
- Can reveal useful information such as the relative performance of different handsets.
- Comparable across countries.
- Can provide indoor and outdoor measurements and, with appropriate processing, these can be distinguished.
- Can also measure Wi-Fi connectivity which is becoming an increasingly important element of the overall connectivity package.

Indeed, crowd-sourcing is the only way to measure real user experience on a dynamic and user-weighted basis, delivering results that align with user experience.
An important factor in insightful information is understanding the indoor versus the outdoor experience. Typically, some 80-90% of mobile usage is indoors, hence indoor performance is of far greater relevance to most users. However, most drive-test measurements are made outdoors. With crowd-sourcing and advanced machine-learning it is possible to deduce which measurements were made indoors and to deliver coverage maps segregated by indoors and outdoors performance. This insight is immensely valuable for operators, regulators and consumers.

Making consumer information available

The consumer has an apparently simple question – "which mobile network would be best for me?" However, this is a complex and personal question. It depends on their location, their movements, the apps and services that they use, the budget they have for monthly fees and their tolerance for imperfections. Simple measures, such as the average speed of a mobile network, are very poor proxies to answer this question.

The ideal solution would be a personalised recommendation based on their actual movements and actual usage of applications. Crowd-sourced data can go a long way to providing this. Using an app, users can assess the performance of different networks in areas where they have coverage issues. By delivering nuanced QoE data across sub-national areas such as cities and major towns, users can look at typical customer experience in areas relevant to them. By moving from raw speed and coverage, more representative measures can be provided that really mean something to consumers.

Recommendations

TRAI has recognised that current approaches are inaccurate and difficult to deliver. It should exhibit leadership in moving India to an approach that is accurate, low-cost, defensible and future-looking. The advantages are overwhelming and the knowledge and technology is in place to achieve it. OpenSignal would be delighted to work closely with TRAI to provide the necessary understanding and expertise to revolutionise mobile communications in India.

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Answers to consultation questions

Q1: Is the information on wireless broadband speeds currently being made available to consumers is transparent enough for making informed choices?

No. As set out above, information on speed and coverage, however accurate, is insufficient for even the most well-informed subscriber to make accurate decisions. Only detailed, geographically-specific quality of experience metrics can achieve this.

Q2: If it is difficult to commit a minimum download speed, then could average speed be specified by the service providers? What should be the parameters for calculating average speed?

No. As above, speed alone is not a sufficient measure for most consumers, and setting any minimum speed is fraught with difficulties and is of limited value. Instead a QoE metric should be used which blends speed, latency, availability and application usage.

Q3: What changes can be brought about to the existing framework on wireless broadband tariff plans to encourage better transparency and comparison between plans offered by different service providers?

Apps, such as that provided by OpenSignal can help subscribers select the size of data package they need and other factors of tariff selection, narrowing the choice and making the comparison much simpler.

Q4: Is there a need to include/delete any of the QoS parameters and/or revise any of the benchmarks currently stipulated in the Regulations?

Yes. As set out above, an entirely new approach is needed based on QoE, taking into account coverage, availability, not-spots, speed, latency and reliability.

Q5: Should disclosure of average network performance over a period of time or at peak times including through broadband facts/labels be made mandatory?

No. There is no need for this if crowd-sourcing is used since this can deliver all the network performance data needed.

Q6: Should standard application/ websites be identified for mandating comparable disclosures about network speeds?

No. With apps running on the handset, the actual websites that each consumer routinely uses can be tested, delivering accurate results.

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Q7: What are the products/technologies that can be used to measure actual end-user experience on mobile broadband networks? At what level should the measurements take place (e.g., on the device, network node)?

As set out above, end-user experience is critical and is best measured using apps installed on user devices. Only these can determine the performance that the user actually perceives.

Q8: Are there any legal, security, privacy or data sensitivity issues with collecting device level data?

Possibly. Generic network performance data, as currently collected by OpenSignal, does not contain information such as the user's name or contact details, but nevertheless needs to be treated in a sensitive and secure manner, as would any personal data gathered by any organisation.

Q9: What measures can be taken to increase awareness among consumers about wireless broadband speeds, availability of various technological tools to monitor them and any potential concerns that may arise in the process?

There are many ways that Government announcements, use of PR and social media and other approaches could raise awareness. In particular, mobile operators could be mandated to inform subscribers about the availability of apps that can assist them in their choice prior to signing them up to a contract, or allow a cost-free switch in the first 30 days.

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