BRIEFING PAPER

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Ensuring Quality of Service for Mobile Internet: Learnings for India

Quality of Service (QoS) is as important as digital inclusion. A high coverage with bad QoS is as good as no service. It would be a capital not used efficiently like a low quality road which cannot sustain for long. Mobile Internet in India suffers from a number of ailments which are linked to quality such as slow speeds, outages and connection drops. This paper compares Indian QoS framework with countries like Brazil, Pakistan and Singapore and tries to build, from the learnings, a strong case for effective regulation of mobile internet quality standards in India.

Background

As per a recent report titled, 'Mobile Internet in India 2014', the average monthly mobile bill for user has increased by 13 percent from ₹387 in 2013 to ₹439 in 2014[1], owing to mobile internet. In 2013, mobile internet contributed 45 percent of total bill, which in 2014 rose up to 54 percent.

India has experienced exponential growth in the mobile internet market over the last few years. Driven by demand, the market seems to be only growing further. It is estimated that by June 2015, the total number of mobile internet users in India will cross 213 million. In 2013, there were 173 million mobile internet users.

To ensure that this dynamic growth is accompanied by competition, efficiency as well as consumer satisfaction, it is important that the same be supported by a framework of well-structured regulations and clear roles of stakeholders. The focal point of this paper is Quality of Service (QoS) of mobile internet (2G and 3G) in India and how the regulator is ensuring QoS. The paper traces the current role of TRAI (Telecom Regulatory Authority of India) and draws lessons for the same from other countries.

Is Quality of Service (QoS) important?

Yes, it ensures a competitive and transparent market but for that end consumers should be fully aware of the actual terms of services offered. For technical and intangible services like internet access, it is not possible for consumers to evaluate the QoS by themselves. Further, due to lack of technical awareness, consumers may not be able to determine the QoS being delivered as compared to that being advertised by the service providers. This is where CSOs (Civil Society Organisations) can play a pivotal role in detecting potential degradations in service quality by measuring performances.

To ensure quality internet service, Telecommunication Regulators globally have enlisted QoS parameters with minimum threshold values in their regulations for the telecom operators to comply with, for the services they render. Although for many countries, regulations are in place for fixed broadband and internet QoS, many countries are yet to frame the same for wireless/mobile data services.

Where do we stand? India and its QoS Architecture

Regulations: TRAI, in December, 2012 issued "Standards of Quality of Service for Wireless Data Services Regulations, 2012" to ensure the quality of Wireless Data services in India. It introduced a list of QoS parameters on which the performance and quality of services is being monitored in India.

In July 2014, TRAI introduced a clause in the regulation that mandates operators to publish minimum download speed for their wireless data plans. Operators

also have to ensure that the minimum download speed specified is delivered not less than 80 percent[2] of the usage time. This was introduced as the advertised speeds and actuals differed substantially.

Indian QoS comprises of technical parameters like data transmission attempts, minimum download speed, average throughput, latency, PDP context activation success and drop rate. These parameters are averaged over a month for reporting. More details on the QoS parameters may be found on TRAI's website3.

Implementation: TRAI directs all service providers, providing wireless data services, to submit compliance reports every quarter in accordance to the QoS parameters specified in the regulation. The operators are required to submit their report within 15 days at the end of each quarter.

TRAI, based on the data provided by operators in their quarterly reports, issues a quarterly performance report which is published on the regulator's website. These reports indicate operator's performance against the QoS benchmarks laid by regulator. In case of non-compliance, TRAI can levy penalty upto ₹50,000 for failing to meet any QoS parameter per instance per indicator which can increase to ₹100,000 in case of repetitions[4].

Other than this, TRAI also publishes reports from independent agencies which engage on the assessment of QoS and customer satisfaction surveys of telecom services in various licence areas. TRAI has also developed mobile application which can be used to provide instant feedback on QoS provided by the operator. Consumers can respond to surveys through websites and applications. This comes in handy to assess the consumer satisfaction of telecom services in an area.

TRAI has also appointed three audit agencies viz. M/s CS Datamation Research Services Pvt. Ltd., M/s TUV SUD South Asia/TUV SUD Group and M/s IMRB International to conduct audit and assessment of QoS measurements provided by various service providers in different zones and service areas in India[5].

TRAI Penalises Telcos for Poor Service

Telecom regulator TRAI imposed cumulative penalty of ₹5 million on nine mobile operators for failing to meet quality of service benchmarks in the 2nd quarter ended June 2013. Under existing regulations, TRAI can impose up to ₹50,000 penalty on telecom operators for failing to meet any quality of service parameter for mobile services and up to ₹100,000 for repeating such failure.The regulator can also impose a penalty of up to ₹1 million if it finds that telecom operators have submitted false compliance report on quality of service benchmark.

Source: Times of India, December 25, 2013

Quality related challenges in India

Internationally, internet customers have fallen prey to practices such as misleading advertising, unfair contract terms, and unfair billing practices.[6] The condition could not be different in India. Set out below are some of the challenges pertaining to quality in India:

1. *Misleading advertisements:* Use of terms like 'up to' for data speeds and non-compliance with the same is common occurrence. Non-disclosure of provisions of services like data speed, contract terms, latencies et.al are matter of concern for consumers which influence consumer satisfaction.

2. *Non-compliance with Transparency Directions:* The Transparency Directions require service providers to provide, on their website and also in all advertisements published through any media, information related to data usage limit, and speed of connection, in respect of all tariff plans offered under fair usage policy. They also require service providers to intimate the customer upon 80 percent usage of the quota. Such conditions are rarely met.[7]

3. *Non-compliance with QoS regulations:* TRAI's report on on compliances of QoS regulations shows as a long list of service providers who do not meet the benchmarks set for 2G and 3G services.[8]

4. *Data Collection:* There is no tool which collects information directly from the consumer's equipment (mobile and computer), which may help the regulator with genuine data on the performance of internet without a risk of any fudging.

5. *Interrupted Services:* Weak telecom infrastructure (3G coverage only 30%[9]) in India causes drops in network on the move. Power outages or power savings activities by operators cause shutdown of base stations, particularly in the rural area during nights, which results in interruption of internet services.

6. *Principle parameter for QoS:* The QoS of mobile internet is mainly judged on the speed/throughput experienced by the user. But in a weak telecom infrastructure throughput can't represent QoS holistically. It is required to base the QoS regulations of another parameter or a set of parameters which can represent the QoS more effectively.

7. *Performance Monitoring:* TRAI publishes State-wise quarterly performance reports for wireless data services. These reports list the performance of ISPs on the technical parameters listed in the QoS regulations but it is not easy for local people to comprehend such technical information.

Cross Country Experiences in QoS

In this paper, the quality monitoring and assessment framework has been reviewed for 3 countries namely - Brazil, Pakistan and Singapore. These countries have QoS parameters/guidelines for mobile internet as well. Brazil has been a great example of achieving high mobile coverage in the country, while Pakistan is a neighbouring country, sharing common issues like high population and low literacy levels. Singapore is one of the technologically advanced nations in Asia, which can provide learning lessons for India. Key statistics of the countries being reviewed are given in the table 1.

Brazil

Regulations: ANATEL has established QoS regulations which focus on minimum and median actual speed, service readiness and transparency of connection. In October 2011, through Resolution No. 575, ANATEL released Regulation on Quality Personal Mobile Service Delivery Management which sets QoS parameters for the operators to comply with.

Regulations set a key target of universal access to broadband with a minimum speed of 1 MBPS for approximately R$35 Brazilian Real (US $15.50)[16]. Also, operators have to ensure minimum average connection speed; which will increase year-by-year, from 60 percent of the maximum speed in the first year to 70 in next and 80 in the subsequent year.

The QoS parameters in Brazil represent a number of factor ranging from consumer satisfaction to consumer centricity to technical measurement. The non-technical parameters include the number of complaints (quantum) and complaints handling (response time). The technical parameters comprises of factors like successful connections, drops, compliance to the contracted speed, latency to servers, jitter, packet losses and availability. The complete list of indicators may be found on ANATEL's website[17].

Implementation: The quality measurement is done by a private entity which is chosen through bidding process, by a committee represented by the operators and ANATEL, but is contracted by the Operators. PricewaterhouseCoopers International, with technical help from SamKnows, is measuring quality by collecting samples for network indicators directly from the consumer equipment.

These measurements are submited periodically to the regulator based on which a report comparing QoS of operators is prepared by ANATEL for each month . The operators are then rated and ranked in each of the 27 Brazilian States according to their QoS performance. These reports are published on ANATEL's website and other media for public reference.

As the goverment is actively paricipating in the infrastructure development for telecommunication under the PPP (Public-Private Partnership) model, the operators are investing more to improve the quality of networks.

Pakistan

Regulation: Pakistan Telecommunication Authority (PTA) in order to raise the quality of broadband services in Pakistan released the regulations on Broadband Quality of Service Regulation in 2014. The Authority has incorporated technical as well as non-technical KPIs (Key Performance Indicators) which are being used to measure the quality/performance of the internet.

The regulation is common for the wired as well as wireless BSP (Broadband Service Providers) like mobile internet. These KPIs include technical parameters like network availability, link speed, service availability, retainability, bandwidth specifications including speed, contention ratio, round trip time, packet loss and jitter while the non-technical parameters include tariffs, customer services, complaints, outages and billing issues. The complete list may be found on the PTA's website[18].

Table 1: Key Statistics of Countries

	Brazil	Singapore	India	Pakistan
Population (million)[10]	204.2	5.6	1251.6	199.1
Geographic Area (Km^2)[11]	8,514,209	683	3,287,240	770,880
Internet Launch Year	1988	1987	1995	1995
Internet Penetration (percent)	53.37	80.73	19.19	10.84
2G Coverage (percent)	99[12]	99	90[13]	90[14]
3G Coverage (percent)	90	99	30	01[15]
Regulator*	ANATEL	IDA	TRAI	PTA
Quality of Service (QoS) Parameters	Yes	Yes	Yes	Yes
Minimum QoS Values	Yes	Yes	Yes	Yes
Penalties on Non-compliance	Yes	Yes	Yes	Yes
Number of Mobile Operators	8	5	15	6

*ANATEL: *Agência Nacional de Telecomunicações*
TRAI: Telecom Regulatory Authority of India
IDA: Infocomm Development Authority
PTA: Pakistan Telecommunication Authority
Sources: various websites

Table 2: QoS: Singapore and India Compared		
Parameter	**Singapore**	**India**
Network Availability	**> 99 percent**	**> 98 percent**
Latency (Local)	< 85 ms	< 120 ms
Latency (International)	< 300 ms (terrestrial)	< 350 ms (terrestrial) < 800 ms (satellite)
Bandwidth Utilization	90 percent during peak hours	< 80 percent during peak hours
Broadband Connection Speed	Not Specified	> 80 percent of specified from user to ISP
Service Activation	Not Specified	100 percent in 15 working days
Customer Support (percentage calls answered by operator)	Not Specified	60 percent calls in 60 seconds 80 percent calls in 90 seconds
Source: LirneAsia[19]		

Implementation: PTA ensures the QoS in two different ways. First, it conducts its own surveys and tests to ensure the quality standards for broadband internet. Second, the BSPs are required to test their services in accordance to the parameters prescribed by PTA in their regulation. Outcomes of these tests have to be submitted to the regulator periodically i.e. every quarter.

The BSPs have to ensure that the data is submitted within 30 days after the end of each quarter. The data submitted by BSPs is liable to be audited and inspected by the representatives of the PTA, with or without prior notice. PTA publishes survey results, service test results and ratings of BSPs for the information of general public.

QoS regulations for internet in Pakistan have a good mix of technical and non-technical parameters which also focus on network and service availability. It is yet to be seen how these regulations have actually helped Pakistan in improving the quality standards of internet in the country.

Singapore

Regulations: Telecom regulator of Singapore, Infocomm Development Authority (IDA), has a different approach for QoS management. Internet Service Providers (ISPs) are required to report quarterly on some select parameters on QoS to IDA as well as it is mandatory for them to publish accurate and complete information for the services they claim to provide or advertise. This ensures transparency on the services offered by the ISPs and also enhances the overall customer satisfaction.

The entire framework is weaved around the speed of internet service to be experienced by the user. It mandates the ISPs to publish speed, plan and other details on ISPs' websites, digital & press advertising materials, and any other publicity or marketing materials. Publications requirements in detail may be found on IDA's website[20].

Implementation: All ISPs providing fixed residential broadband and consumer mobile broadband services publish the typical broadband Internet access download speeds likely to be experienced by end users, in addition to the theoretical maximum speeds. All ISPs, as the regulations state, also publish such information in all advertising and publicity materials, as well as their websites.

The operators have to submit quarterly reports to IDA on their service quality. Surveys on mobile coverage are carried out by IDA to monitor mobile operator's performance. The methodology for data collection largely follows the requirement imposed on the mobile operators by IDA. The results of these surveys are published on the IDA's website. In case of non-compliance to the QoS guidelines by operators, IDA has provision to penalise upto $50,000 for each instance per standard on quarterly reporting, which increases on subsequent instances[21].

Conclusions and Recommendations

As seen from the select countries, quality evaluations for mobile internet services differ with countries. Singapore doesn't have conventional reporting methodology for QoS monitoring, still the country is doing well to manage the quality standards of mobile internet (83 percent satisfaction amongst customers in 2010[22]). India and Pakistan have technical as well as not technical parameters for QoS regulations, but still the consumer satisfaction might not be high.

In case of Brazil, the country size is bigger than India. The population is scattered throughout the country and the density isn't very high. The unique part of Brazil's QoS regulations is that it mandates

Table 3: QoS Parameters: A Comparative Table for Countries reviewed															
	Customer Service	Speed (Throughput Download/ Upload)	Latency	Jitter	Availability	Connections	Drops in connections	Activation	Transmission Attempts	PDP	Min. Speed	Retainability	Contention Ratio	Tariff	Outages
Brazil	✓	✓	✓	✓	✓	✓	✓								
India	✓	✓	✓				✓	✓	✓	✓	✓				
Pakistan	✓	✓	✓		✓							✓	✓	✓	✓
Singapore		✓	✓		✓						✓				

the operators to raise QoS levels year on year, especially the speed. Despite more than 90 percent mobile network coverage in the country, the customer dissatisfaction in 2010 was as high as 90 percent[23]. Brazil becomes a classic example where the country achieved a lot in mobile internet penetration but failed in QoS.

These evidences make it clear that having QoS regulations doesn't ensure customer satisfaction and high quality of services neither does the mobile penetration. Ideally the market forces should encourage the operators to raise their QoS levels, but regulations always guide a way to ensure it being done.

Based on the countries reviewed, it is clear that there is no silver bullet to ensure QoS, that too in a country which is striving hard on digital inclusion. Considering the learnings, the paper suggests few recommendations which might help in promoting QoS standards in India.

Recommendations:

1. **Nutritional Label[24]** – Misleading advertisements and non-compliance of Transparency Directions can be curbed if operators disclose complete information to the consumer in advertisements, time of sales and on operator's website. Singapore's case shows a healthy customer satisfaction riding on transparency of information. In India, this challenge may be dealt with a "nutritional label". A "nutritional label", a label like on packaged food products, for ISP services can provide comprehensive information on the network quality to the user and thus, helping them making an informed choice.

2. **Data collection cost for QoS monitoring** – Like SamKnows collects data from user devices in countries like Brazil and Singapore, the data collection incur data use which accounts to monetary charges. In a cost sensitive country like India, most of the consumers might not be willing to bear such cost. Since data collection may prove pivotal in ensuring QoS standards in India, at some point of time, this need to be considered by the regulator while developing strategy for the same.

3. **Latency centred approach[25]** – The countries reviewed seem to have their QoS parameters knitted around speed, which, in itself, may not the best parameter which can describe QoS holistically. Latency describes the connection quality by time (in ms) to and fro from the servers, is a very relevant parameter especially when it comes to web browsing. Moreover, end to end latency is less sensitive to the signal strength at the device, which makes it more easily measurable for mobile internet than speed alone, which depends highly on signal strength.

4. **Performance Monitoring** – Brazil, in its quarterly performance reports, publishes indexes and rankings between the operators based on their quarterly performance for each of the 27 states. The operators, in turn, make efforts on quality to keep their ranking high. Even though TRAI publishes quarterly performance reports for all 23 regions of India, it doesn't rank or index the operators based on their performances. Moreover, the reports are too technical for a common man to understand. Indexing and ranking might help the consumers choose between services.

5. **Strict penalties on Non-compliances** – Though, TRAI has imposed penalties on operators for non-compliances in the past, they need to be stricter with successive instances of the same. Singapore, in their regulations, provision hefty penalties on successive irregularities. Service interruptions owing to power outages or power savings should also count as non-compliance and should form a part of QoS regulations.

Endnotes

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This Briefing Paper prepared by Rohit Singh, Assistant Policy Analyst, CUTS Centre for Competition, Investment & Economic Regulation (CUTS CCIER). With support from the Ford Foundation, Indian Institute of Technology (IIT), Delhi had recently conducted a study to evaluate the QoS provided by four companies – Airtel, IDEA, MTNL and Reliance across three states, New Delhi, Madhya Pradesh and Jharkhand. The states were selected in order to cover urban, semi urban and rural areas. The objective of the study was to do an audit of the quality of services provided and understand the potential problems in the network or application design. Consumer Unity Trust Society (CUTS) International, Jaipur has collaborated with IIT to map the potential role of relevant stakeholders in the captioned study to ensure QoS.