Tonse Opinion
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TRAI consultation paper on Broadband Quality of Service – A step in right Direction!

Indian Telecom regulator, TRAI has released really interesting consultation paper titled "Bandwidth required for ISPs for better connectivity and improved quality of service" on 15th January 2009. The reason we feel this paper is really interesting is for a couple of reasons. It signals a definitive move beyond just worrying about broadband penetration levels and providing the so-called "always on 256 Kbps" connection to people. It also points to increased awareness levels of Internet subscribers who are paying close attention to their broadband experience by virtue of using bandwidth hungry applications.
In this article, we will summarize the consultation paper from TRAI and provide our thought on some of the issues raised by the consultation paper.

TRAI Consultation Paper Summary

The TRAI paper attempts to address the complaints from broadband subscribers where they complain of getting speeds that are lower than what they subscribed for. The problems, according to the paper can be categorized in three broad categories

- Operational Problems – Poor quality of access network, limited availability of end links and improper connection configurations by the operators
- Network Design Problems – Incorrect network architecture, scalability issues, bandwidth issues, network congestion etc.
- Customer Problems – Issues due to customer equipment such as older computers with slower processors and inadequate memory, low end modems and other access equipment and possibility that the customer machines are infected with worms, viruses causing slowdown.

After identifying the possible reasons behind slower than anticipated Internet connection, the paper goes on to concentrate on issue of latency, bandwidth utilization and contention ratio. It is noted that the issues of bandwidth utilization and latency are taken care of by previous regulations from TRAI. In QOS regulation released in October 2006, TRAI recommends having bandwidth utilization during peak hours below 80% at an average. It also requires the ISP to meet the subscribed speed obligations at least 80% from the ISP node to the user end point. The same regulation also mandates higher bounds for latency numbers from ISP gateway to International Gateway and from ISP gateway to nearest NAP port abroad via terrestrial and satellite links.
It is believed by TRAI that contention ratio does not have any benchmarks set in India and that could be one of the leading problems for poor speeds experienced by the subscribers. Contention Ratio for a typical ISP is defined as "Number of subscribers sharing same bandwidth". In other words, if contention ratio is 20 for a network, the ISP will provision for 1 Mbps bandwidth capacity from upstream bandwidth providers for 20 users with subscribed speeds of 1 Mbps each. Internationally contention ratio of 50 was accepted for home Internet users and contention ratio of 20 was accepted for business

users. TRAI points out in the consultation paper that contention ratio as high as 400 are also seen on networks operated by Indian ISP.

In summary, TRAI has asked the stakeholders to submit their thoughts on setting up benchmarks for the contention ratio (what should the benchmark values be), whether setting up contention ratio benchmark will help Indian broadband users and other suggestions on improving quality of broadband for end users.

Tonse Analysis

We appreciate the efforts undertaken by TRAI to ensure that the broadband subscribers are not shortchanged by the service providers. Through our market research and analysis we know that Internet users in India are very savvy and increasingly using applications demanding very low latencies (real time video/audio) and higher amounts of bandwidths (downloading large videos/songs, working from home etc). This is right time to address issues related to "experience" of broadband rather than focusing on connectivity. However, we believe TRAI recommendation of setting benchmark for contention ratio falls short of providing effective solution to the problem.

There are about 5.05 million broadband users in India according to TRAI estimates and bulk of them – more than 4 million are DSL users. Amongst the DSL users, vast majority of DSL users are offered broadband services through copper lines owned by state run agencies such as BSNL and MTNL. As ULL – Unbundling the Local Loop is not really allowed, no new carriers have made inroads into offering DSL services by laying their own copper infrastructure (Airtel DSL services being exception). So while discussing broadband issues, we have to keep in mind that very large number of these (close to 3.5 million) are indeed running over last mile copper lines owned by BSNL/MTNL. The users of these services are plagued by two ills:

- Unreliability of the service – While the service is "Always ON", it is not "Always UP". Far too many disruptions are present in the service.
- Speed Issues – The other problem, which the TRAI paper is attempting to address.

Before discussing the "slower speed" issue, we need to understand that measuring the speeds of broadband service is really tricky. It is more about user experience than actual speed. For example, if a user is attempting to view 4 minutes video clip from YouTube and the user has to stare at the "buffering" screen more often than watching the video; his user experience suffers and he would categorize the connection as "Slow". The reasons behind this phenomenon are more complicated than we think.

In DSL, the quality and speeds end user experiences depend very heavily on quality of the copper and distance of the user from the central office. While 18000 Feet is widely accepted as maximum loop length for DSL, it is well understood as the distance from CO increases, DSL exhibits problems. In addition to this, various other problems with copper may pose problems for the end user. Bridge Tap (points of copper loop with unused/dangling sections of cable teed off the main cable); Splits (where one leg of a pair is incorrectly connected to another pair) and general poorly maintained copper wires will affect the DSL connection by a great deal. We would encourage TRAI to push for regulations in this area to ensure that the existing copper infrastructure is free of these problems or at least there is an effort to track quality of copper.

Another concern area (although not of great concern) is the end user equipment. We highly doubt if the consumers are aware of firmware upgrades released to fix issues and/or boost performance of the modems. In addition, as TRAI also points out; slower computers running on insufficient RAM also will affect user experience. We realized that this is not probably the biggest cause of customer frustration, but we believe that it is a factor to be considered nevertheless.

Next issue at the heart of this discussion is bandwidth availability and ISP peering. The table below summarizes availability of International bandwidth in India.

Submarine Cable	Landing Stations	Landing Station Owned by	Type of Cable System	Designed capacity of Existing Cable	Equipped Capacity (GBPS)	Utilized Capacity (GBPS)	% Used
SMW3w	Mumbai	VSNL	Consortium, Protected	212 GB	20	20	9.43%
SMW4	Chennai Mumbai,	Bharti VSNL	Consortium, Protected	1.20 TB	20 20	11 16	2.25%
SAFE	Cochin	VSNL	Consortium, Unprotected	5 GB	5	5	100.00%
FLAG (Reliance)	Mumbai	VSNL	Hybrid, Protected	160 GB	20	10	6.25%
i2i	Chennai	BSNL	Private, Unprotected	8.40 TB	160	12	0.14%
TIC	Chennai	VSNL	Private, Unprotected	5.10 TB	320	16	0.31%
Falcon	Mumbai	Reliance	Private, Unprotected	2.56 TB	2.5	1	0.04%
Indo-Sri lanka Cable	Tuticorin	BSNL	Private, Unprotected	960 GB	20		
Total	**CLS - 6 Cables - 9**	**4**		**18.60 TB**	**587.5**	**64**	

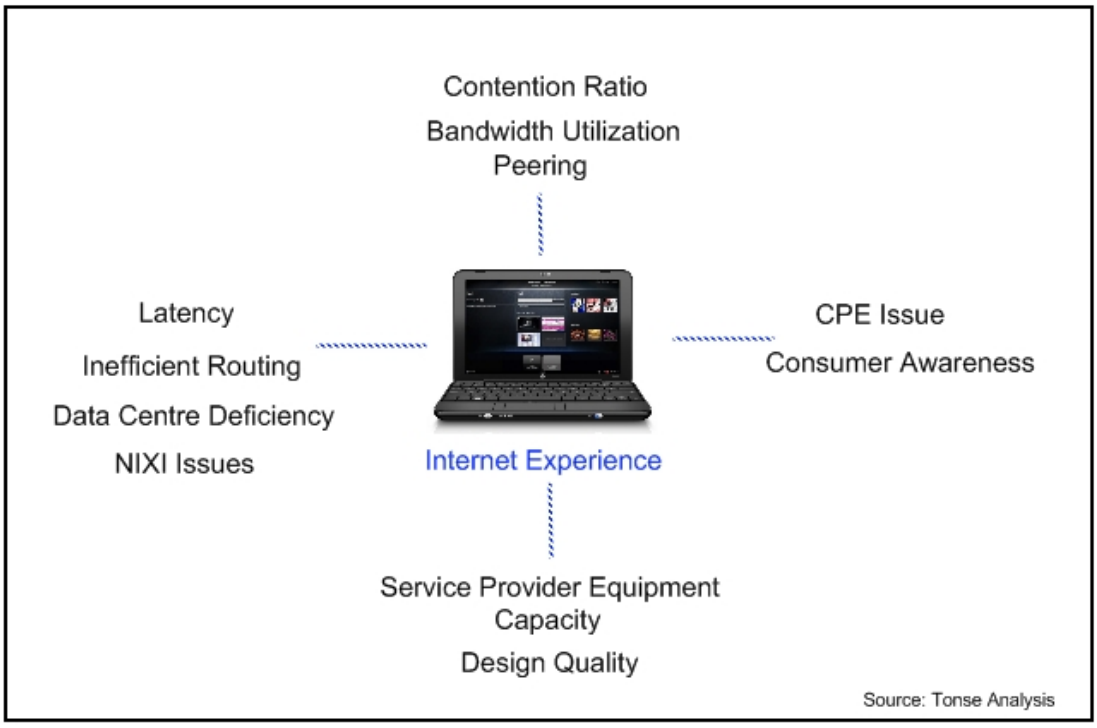
Table 1 International Internet Bandwidth availability in India (Tonse Compiled Data – October 2008)

In India the international bandwidth prices are at least 4 to 5 times more than international market price. We have 20 TB capacity through 4 landing station owners but only a little less than 3% is lit up and used. The landing Station owners are VSNL, Bharti, Reliance and BSNL (latest addition with 960GB indo-Sri Lanka cable). The prices are determined and closely controlled but the limited players who have the capacity and hence we do not see competitive pricing in the market. TRAI had recommended some time back that any ISP who leases bandwidth be allowed to resell the bandwidth. While this is not directly related to Quality of Service, if these recommendations are followed-through, the bandwidth prices will drop significantly allowing smaller players to lease more bandwidth reducing the need to have higher contention ratios for these players.

Another significant issue is poor pairing of Indian ISPs with other ISPs. NIXI was set up to tackle issues of domestic pairing between ISPs, and while it faltered for a long time due to low participation, things are now looking up for NIXI with much higher participation from ISPs. However, there is still a lot of room to grow. Indian ISPs still

need to better peer with other ISPs to make more efficient use of the NIXI. Unless they are committed to the user experience, the situation will not improve.
However, lot of content accessed by Indian people is located on servers outside India and poor peering arrangements Indian ISPs have with International ISPs may cause the data to take non-optimal routes (More hops) increasing latencies and degrading end user experience.
There would be many other reasons for the issues facing Indian customers ranging from ISP equipment lacking enough horse power to support customer needs to inefficient network design – including improper routing configurations.

Factors Affecting Internet Experience in India



In summary, we laud TRAI's effort to enforce regulations on the ISPs to provide better quality of service, translating to better user experience. However, we believe that contention ratio alone is not going to solve the issue. Many of the issues we touch upon above will actually justify a deep dive by regulator and/or other bodies to understand the extent of impact on Indian customers. Tonse will carry out own study on these topics going forward to better understand impact of each of the problem areas mentioned. The diagram above summarizes probable areas Indian ISPs, regulatory bodies, network equipment vendors and other stakeholders need to focus on to make sure most efficient use of existing infrastructure is made, capacity is added where it is lacking and changes to regulation are made to positively impact QOS/Broadband experience of Indian subscribers.

Disclaimer: Please note that these are web-sourced inputs and Tonse Telecom has not validated the claims or current state of offerings of these companies.

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