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**Via Electronic Submission**

Mr. Asit Kadayan  
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**Re: Counter Comments on TRAI Consultation Paper on Net Neutrality**

Dear Mr. Kadayan,

Measurement Lab (M-Lab) submits this brief letter to the Telecom Regulatory Authority of India (TRAI) as a counter comment in the proceedings on its Consultation Paper on Net Neutrality. With the successful round of comments, a number of stakeholders contributed diverse perspectives on the issue of measurement and monitoring. Our response is intended to highlight a number of constructive recommendations from others, and provide further information where it appeared to be needed.

In their comments, EBG Federation, Citycom Networks, and others raised questions about the methods used in the detection of application-specific throttling and other traffic management practices (TMP). These comments state that without privileged information about how a network is operated, external accounting for all traffic management practices is difficult and that results can be affected by factors outside of the control of telecommunication service providers (TSP). While these principles are both worth consideration, academic researchers and national regulatory authorities have been actively engaged in measuring traffic management practices for well over a decade to considerable success. The adoption of TMP measurement tools by TRAI would build on a rich history of research and implementation, and align with the current agenda of BERECA and other regulators.

Although different tools may pursue slightly diverging methods, the most common approach to assessing throttling or prioritization within a TSP is through comparative technical measurements under controlled circumstances.<sup>1</sup> Since factors related to network topology and test conditions can substantially influence

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<sup>1</sup> Glasnost: [http://broadband.mpi-sws.org/transparency/results/10\\_nsd\\_glasnost.pdf](http://broadband.mpi-sws.org/transparency/results/10_nsd_glasnost.pdf)

the outcome of the test, these variables are held as controls. Systems such as Glasnost and Neubot perform at least two measurements, one with a baseline protocol (e.g. VPN or HTTP traffic, protocols believed to be unaffected by TMPs) and one implementing the protocol of interest to researchers (e.g. Bittorrent, video, or VoIP). These measurements are conducted in short succession of each other against the same server, so the results should not be affected by network architectures, scheduling algorithms, packet routing paths, device capabilities, or other variables. The independent variable that is measured is solely whether the protocol is handled differently on the network, resulting in differences in speed, latency, loss, or other metrics between the two.

As Broadband India Forum and Tata Teleservices note, single measurements are not definitive proof of traffic management policies. This concern was what prompted the foundation of M-Lab – the need to provide rigorous tools for collecting consistent measurements from diverse perspectives with assurances that the testing environment meets the strict standards of regulators. As more tests from other users on the same TSP reflect the same pattern of deviations based on protocols, confidence builds that the behavior is possibly the product of TMPs.<sup>2</sup> From our experience, TRAI would not need to sanction specific tools or maintain a preset threshold of measurements in order for such measurement regimes to be useful, particularly when combined with user surveys and regulatory disclosures. As Mozilla notes, the fact that monitoring is occurring often has a positive effect itself, even if the measurement regime does not cover all possible TMPs.

Koan recommends that the measurement platform provide the opportunity to engage in the network tomography to determine where TMPs are implemented, advice that aligns with Tata Teleservices and Citycom’s suggestion to test end-to-end connectivity that reflects the performance of Internet users.<sup>3</sup> We agree with these proposals. While TRAI leaves open questions about regulating interconnection and CDN arrangements, no matter how it handles these issues, it should monitor as broad of the TSP topology as possible in order to understand where problems may arise. While we understand that TRAI may be concerned primarily with TMPs or QoS issues resulting from within an access provider’s network, we strongly encourage TRAI to measure beyond solely the provider’s immediate network or to a CDN directly connected to the network. Afterall, interconnection issues can impact consumer access. Measuring the end-to-end performance would ensure that TRAI is well positioned to monitor changes in the interconnection ecosystem that could degrade performance. This would also align with the requirements of the FCC’s Measuring Broadband America and other monitoring programs.<sup>4</sup>

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Shaperprobe: <http://conferences.sigcomm.org/imc/2011/docs/p473.pdf>

Differentiation Detector: [http://dd.meddle.mobi/td\\_details.html](http://dd.meddle.mobi/td_details.html)

<sup>2</sup> These do not provide “definite determinations” (Novi Digital Entertainment) or “itself inform a regulator as to the purpose” of TMPs (Centre for Internet and Society), but historically they have provided common sets of facts within opaque circumstances and have been invaluable indicators of a need for further scrutiny.

<sup>3</sup> The approach also has the added benefit of addressing Tata’s concern about measurement being an imposed operational and financial burden on TSPs, a requirement that could be especially problematic for smaller companies.

<sup>4</sup> M-Lab provides multiple sites connected to different transit providers in locations to clearly account for these differences, and the MBA does collect on-network (within the TSP) tests as useful comparative information that is not included in the final report.

The most common recommendation, raised across public and private stakeholder communities, is that TRAI's MySpeed application be the basis for monitoring of traffic management practices.<sup>5</sup> Mozilla and the Associations of Unified Telecom Service Providers of India provide useful visions as to how a crowdsourced testing regime through the MySpeed could operate. This strategy, combined with public data and open source principles, could satisfy the concerns expressed by Tata Teleservices regarding the neutrality of the testing mechanisms and thresholds for analysis, as TRAI is a trusted body and MySpeed has a sufficiently large installation base.

Telxess Consulting Services and Koan both offer that TRAI should certify a select set of existing open source tools while an indigenous detection system is developed. In our experience, these are not distinct objectives. The tools produced to detect TMPs elsewhere remain directly useful even within the unique telecommunications environment in India. As we noted in our original comment, there are numerous issues that can arise related to TMPs or other network issues, and no single test will cover every potential instance of discrimination or prioritization relevant to a regulator. Instead, the best approach is to utilize infrastructure and testing mechanisms that are agile enough to grow as needs arise. For example, TRAI could use M-Lab and MeasurementKit library in order to conduct existing measurements against addresses and protocols from within its application, and then expand.<sup>6</sup>

TRAI is uniquely positioned to foster a local development community that builds on existing measurements initiatives and adapts them to the issues of concern in India. The Internet Freedom Foundation's recommendation that TRAI to hold competitions to encourage local developers, and Koan's discussion of academic partners are apt. TRAI could identify applications, protocols, and topology issues that are of interest within India's internet ecosystem through stakeholder consultations with TSPs, public interest organization, academic researchers, industry experts, and others. Through partnerships with local institutions these needs could then be addressed through MySpeed, using open source tools to contribute to and benefit from parallel developments by other national measurement systems.

Thank you again for the opportunity to contribute our thoughts on Consultation Paper. As always, we would be happy respond in depth to any further questions from TRAI and other stakeholders on Measurement Lab.

Respectfully submitted,



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<sup>5</sup> For example, recommended by the Broadband India Forum, Associations of Unified Telecom Service Providers of India, Mozilla, and Centre for Internet and Society.

<sup>6</sup> MeasurementKit is the core library behind the OONI application that was mentioned in several comments: <https://measurement-kit.github.io>