Cisco Systems (India) Private Limited
RMZ Infinity, 1st Floor, Plot no-15,
Udyog Vihar, Phase-IV,
Gurugram -122015, Haryana ,India
Tel : 0124 4402000 Fax : 91-124-4402007

Response to TRAI Consultation Paper on Net Neutrality (issued 4 Jan 2017)

Cisco Systems, the world's largest manufacturer of networking equipment and a market leader in the provision of network management solutions and applications. Cisco has monitored and contributed to the discussions around this issue in many different jurisdictions and welcomes this opportunity to provide feedback to TRAI as it explores opportunities and options to promote and protect the Open Internet. Our responses to the questions posed in the Consultation Paper issued on 4 Jan 2017 are below.

As we elaborate further below, Cisco believes that given the evolution and differences of perspectives of regulators around the world, the major technological advances that will transform broadband networks' architecture, how the traffic is managed and the financial implications and current state of the industry, it may be worthwhile for TRAI to take more time before implementing a regulatory framework that may turn out to be too rigid and out-pace a rapidly changing environment. TRAI may be better off monitoring closely how these issues evolve in the next three to five years, and then with more perspective, create the appropriate regulatory framework. While we appreciate the research TRAI has conducted, we respectfully submit that it is too premature for India to move forward with the proposed regulatory framework.

Q.1 What could be the principles for ensuring non-discriminatory access to content on the Internet, in the Indian context? [See Chapter 4]

Cisco believes that for the Internet to continue to be a world engine of economic growth, social cohesion and new jobs, and for companies to be successful in this environment, all players across the Internet value chain need to thrive. Therefore, it is critical that Internet policies encourage innovation in both the network and in applications, enable the network to become faster and more robust, and foster new transformative services and applications.

The Internet will prosper only if all players succeed. It is thus imperative that net neutrality policies are balanced and support the entire Internet ecosystem.

Cisco believes that to have a thriving Internet, everyone should have the right to access any legal content and applications through the use of any device, but also to advance network managed applications such as telemedicine, high-definition video solutions, and e-learning applications among others.

Cisco has long been a supporter and advocate for Open Internet principles, particularly as articulated in the Federal Communication Commission's 2005 Internet Policy Statement[1]. Open Internet principles can help shape service provider or operator conduct and consumer expectations

[1] https://apps.fcc.gov/edocs_public/attachmatch/FCC-05-151A1.pdf

and facilitate the organic development of the broadband market. Consumers are best served by a flexible approach that permits providers to respond to evolving needs in ways that best serve the interests of consumers. Technology, business models, and consumer demands are evolving at a pace that regulation cannot match, and prescriptive rules drafted today will rapidly become obsolete. The imposition of rigid and over-inclusive rules could well deny providers the needed flexibility, thus inhibiting investment and innovation and ultimately harming consumers.

The key goal is to maintain an open Internet and permit networks to be adaptively managed to optimize the needs of different subscribers, applications and new services without jeopardizing consumer protection, competition and carry on as an important tool for the exercise of freedom of speech.

It is also very important to note that the perspectives of regulators around the world on the topic of net neutrality continues to evolve. In particular, in the United States, that will be a new review to re-evaluate the rules that were instituted during the previous administration.

There have also been, and continue to be, major developments in the Internet network architecture, how traffic is routed, and the role of caching (where the network automatically caches particular content that becomes popular). Such technical features and architectures will change how networks are built and how networks route traffic.

Net neutrality rules need to be flexible enough to cope with the technological evolution, and not be a hindrance to innovation that can create a better end user experience.

Regulators also need to keep in mind the financial health of the industry – there is an increasing trend around the world that the revenues of operators are decreasing or flat, and it is impacting operators' ability to invest in infrastructure upgrades. Net neutrality rules should not stand in the way of operators' ability to recover the cost of network investment and innovative new services.

Any new rules that India implements should allow network providers ample flexibility to promote investment and foster competition, and serve the interests of consumers even as the Internet continues to evolve. In particular, rules should not prospectively restrict or prohibit prioritization of traffic. India should not adopt any non-discrimination requirements in a way that will severely limit the ability of providers to respond to fast-changing market conditions and evolving consumer needs. India has a broadband marketplace that is competitive and becoming more so. There is no reason to limit the ways in which network services and applications may be offered to consumers; otherwise, it would threaten to depress investment in networks, applications, or both, and inhibit innovation. Network operators should retain broad latitude to manage their networks to respond to ever-changing traffic patterns and other developments. The growing demands placed on broadband networks threaten the user experience and the value of the network. Enhanced network management offers viable and tailored means of addressing those demands.

Q.2 How should "Internet traffic" and providers of "Internet services" be understood in the NN context? [See Chapter 3]

(a) Should certain types of specialised services, enterprise solutions, Internet of Things, etc. be excluded from its scope? How should such terms be defined?

(b) How should services provided by content delivery networks and direct interconnection arrangements be treated?

Please provide reasons.

India should adopt principles that are future and innovation-proof. End users should be able to access any legal content, services and applications of their choice through their service provider. This is the basic principle of the Open Internet and net neutrality. In the environment of a best effort Internet, networks need to be managed to ensure to the greatest extent possible that the right packets are delivered to the right place at the right time.

Not all bits are created equal – different types of traffic have different requirements. When different packets arrive at a router at the same time and there is congestion, some packets will be momentarily dropped. They will automatically try again in a few milliseconds. However, if the packet is for a time sensitive service such as VoIP, the delay may distort the image or sound, negatively affecting the end-user experience. If the packet is for an email, a short delay of a second would not cause any negative impact to the recipient of the email. This is why different types of data are given different kinds of treatment and why implementing a principle that all data is equal would deteriorate our Internet experience.

The ability to manage traffic, including through prioritization, is important to provide the best Internet experience to the most number of consumers. Given that it is not financially feasible to construct Internet facilities that can meet all short-term peaks in traffic, allowing service providers to prioritize time sensitive traffic over non-time sensitive traffic can improve the consumer experience of many consumers without meaningfully impacting other consumers. The use of technology to manage traffic is much more cost effective than utilizing scarce capital to construct facilities for use on limited occasions.

Managed or specialized services can develop in a way that does not fundamentally interfere with the continued robustness of the Internet access service. Indeed, the revenues created by offering additional managed or specialized services is critical to supporting further investment in network infrastructure. Consumers are best protected though transparency about the way Internet access potentially shares capacity resources with other specialized services to ensure that there are no anticompetitive or anti-consumer effects. Network management and capacity enhancements effectively maximize the consumer experience at the lowest cost. Removing the ability to manage the network will drive up costs, degrade the consumer experience, or both.

India should create a broad definition of managed or specialised services. The Internet continues to evolve and many applications, services and IoT developments have not been created yet. Limiting specialized services to a narrow set of services or features will inhibit innovation, one of India's most valuable asset.

The category should encompass all services that are offered separately and in addition to Internet access service. Care should be taken to avoid the inherent risk of creating definitions that become obsolete given the fast pace of the evolution of networking technologies. The focus should be to ensure that the offering of these services is consistent with the offering of Internet access service.

Q.3 In the Indian context, which of the following regulatory approaches would be preferable: [See Chapter 3]

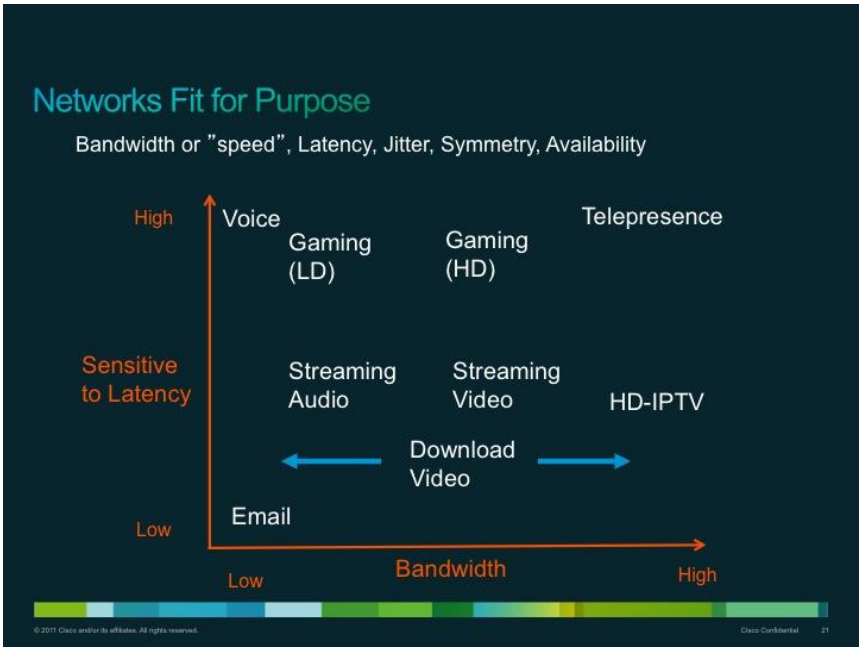
(a) Defining what constitutes reasonable TMPs (the broad approach), or

(b) Identifying a negative list of non-reasonable TMPs (the narrow approach).

Please provide reasons.

It is essential that service providers can effectively manage networks. Different applications and services have different network requirements to function optimally. The massive growth in data

and other requirements, including latency and symmetry, indicated by the Cisco's Visual Networking Index (VNI) studies[2], leads to the need for more sophisticated and adaptive network management. In India, we expect mobile data traffic to grow 7-fold from 2016 to 2021 at a compound annual growth rate of 49%, reaching 2 Exabytes per month (the equivalent of 492 million DVDs each month), up from 266 Petabytes per month in2016. Some applications and services will need high-speed download capacity that is not time sensitive. Others will use high bandwidth one-way streaming in which latency is a factor. Applications such as VoIP will not require high bandwidth but will be symmetric and need very low latency. Others, like Telepresence and other high definition real time two-way video, will require very high symmetric bandwidth, low latency, and no jitter. In other words, different applications will require differing network requirements and, as a result, the optimal network will need to be adaptable to be 'fit for purpose'.



Network operators deploy tools to ensure that packets associated with latency- and jitter-sensitive applications arrive on time, and that the end user's experience is not disrupted by network congestion.

In cases such as these, without enhanced network management, all traffic will share the same fate and all services will be impacted. It is not an "either/or" situation. Both options, increasing capacity of the network and introducing quality of service, will effectively maximize the consumer experience and should be pursued in parallel.

Just as networks ranging from traditional telephone networks, electric grids and water supply systems are built to avoid peak load problems to avoid uneconomic investment and costs, broadband networks need to be designed to balance demand and provide the best possible performance to the largest number of subscribers at affordable prices. Network techniques such as IP routing or packet differentiation are used to alleviate congestion, ameliorate capacity constraints and enable new services in a cost effective way. Ultimately, the consumer will be the beneficiary of advanced network management.

[2] http://www.cisco.com/go/vni

Nowadays, with so many devices connected to the Internet, the need to prioritize is clear. For instance, one individual's wearable or connected toothbrush cannot take precedence over the traffic informing on a flooding event in the city. Shaping traffic is a powerful and cost effective approach to overcome the need to build networks for peak loads, avoiding unnecessary and burdensome costs on consumers. To make the most out of these tools, service providers must be permitted to engage in traffic shaping and network management to reap the benefit of a more cost effective broadband infrastructure and mostly to provide a better service to consumers on those networks.

Clearly, the advocacy for traffic shaping does not in any way imply the support for the misuse of such ability to the detriment of competition or consumers. Nonetheless, if the concern from the policy standpoint is on the abuse of such ability, the abuse in itself should be the concern of the policies in discussion and not the default prohibition of healthy and required tools for the better and faster inclusion of India into the ecosystem of the digital economy.

To clarify how the Internet works, and how the many available services can coexist and function properly, we would like to share a brief video that details how network management is essential for users experience online and considerations for governments developing policies in this area. The video is available at https://www.youtube.com/watch?v=ZonvMhT5c_Q

Reasonable traffic management plays a fundamental role in ensuring a good end-user experience and is an integral part of network management. While operators should not be permitted to block, throttle, degrade or otherwise apply anti-competitive measures against specific content, applications or services, traffic management is not in itself anti-competitive.

India could consider a general principle rule that permits reasonable traffic management that treats equivalent types of traffic equally in accordance with their technical requirements (e.g. VoIP sensitivity to time delays), while apply stricter conditions for traffic management measures that target specific content, applications and services.

Reasonable traffic management ensures that the day-to-day delivery of best effort Internet can be maintained while there are clear protections against bad behaviour. The terms of reasonable need to be clear, i.e. transparent, proportionate, non-discriminatory and not anti-competitive. As non-discriminatory can be interpreted in different ways, India should in particular make clear that non-discriminatory does not prevent operators from treating different types of traffic differently in accordance with their technical requirements.

Traffic management measures that target specific content within a type of traffic, e.g. a specific VoIP call within all VoIP traffic, should only be permitted under stricter conditions. However, it should ensure that it does not cut across the reasonable traffic management as a general rule.

Traffic management is an essential set of tools that are vital for a fully functional Internet. A bright line should be drawn between the unreasonable blocking that no one wants, and the necessary reasonable management techniques that ensure the fast, reliable and scalable networks that we all rely on, and need as consumers. Rules on blocking against specific content, services and application should be formulated to prevent legal uncertainty between reasonable traffic management and stricter conditions on blocking and throttling.

Q.4 If a broad regulatory approach, as suggested in Q3, is to be followed: [See Chapter 3]

(a) What should be regarded as reasonable TMPs and how should different categories of traffic be objectively defined from a technical point of view for this purpose?

(b) Should application-specific discrimination within a category of traffic be viewed more strictly than discrimination between categories?

(c) How should preferential treatment of particular content, activated by a user's choice and without any arrangement between a TSP and content provider, be treated?

and Q.5 If a narrow approach, as suggested in Q3, is to be followed what should be regarded as non-reasonable TMPs? [See Chapter 3]

Internet access providers need to be able to implement reasonable traffic management measures that are non-discriminatory. Traffic management practices should be deemed acceptable and reasonable when they are intended to:

- ensure the security and integrity of networks;
- reduce or mitigate the effects of congestion of networks;
- ensure the quality of services and applications made available to users;
- allow the proper offer of specialized services to users; or
- prioritize emergency services where this is necessary.

The framework to evaluate reasonable network management practices should allow for maximum flexibility in any rules pertaining to network management, including specialized Internet Protocol (IP) routing of traffic, packet differentiation and filtering to ensure that Internet access providers remain free to engage in pro-competitive network management techniques to alleviate congestion, ameliorate capacity constraints and enable the development of new services.

The regulation must work to ensure that providers retain the ability to develop and offer innovative new services to customers who value these products. The issue is not the ability or not to offer such products, but the obligation of the providers to make explicitly clear what the customer is signing up and paying for.

Consumers are best served by a flexible approach that permits providers to respond to evolving circumstances in ways that best serve the interest of users.

Q.6 Should the following be treated as exceptions to any regulation on TMPs? [See Chapter 3]

(a) Emergency situations and services;

(b) Restrictions on unlawful content;

(c) Maintaining security and integrity of the network;

(d) Services that may be notified in public interest by the Government/ Authority, based on certain criteria; or

(e) Any other services.

Please elaborate.

Certain circumstances require different treatment for important public policy goals. Emergency services and other public safety requirements need not be treated the same as other services on the network. Restrictions on unlawful or harmful content (e.g., spam, malware) must be permitted for the security and integrity of the network and the safety of individuals. These goals can be accomplished either by exceptions from the regulations or by permitting their effect as part of reasonable network management principles, or both.

Q.7 How should the following practices be defined and what are the tests, thresholds and technical tools that can be adopted to detect their deployment: [See Chapter 4]

(a) Blocking;

(b) Throttling (for example, how can it be established that a particular application is being throttled?); and

(c) Preferential treatment (for example, how can it be established that preferential treatment is being provided to a particular application?)

As the goal of these regulations is to prevent consumer harm, it is best to review the impact of the potentially offending conduct on a case-by-case factual inquiry rather than to define the limits of the behaviour. For instance, traffic prioritization may be considered throttling or preferential treatment by some, but it may also enable new and better services as well. As such, it is better to let the regulator adjudicate the question of consumer harm with all the facts, rather than to try to define exactly what behaviour is permitted.

Q.8 Which of the following models of transparency would be preferred in the Indian context:[See Chapter 5]

(a) Disclosures provided directly by a TSP to its consumers;

(b) Disclosures to the regulator;

(c) Disclosures to the general public; or

(d) A combination of the above.

Please provide reasons. What should be the mode, trigger and frequency to publish such information?

Cisco supports an open Internet where consumers can, within their contracted service plans (i.e., bandwidth, traffic volume and quality of services) have access to their choice of legal Internet content; be able to run applications of their choice; attach any devices they choose to their broadband Internet access; and, receive meaningful information regarding their broadband Internet access service plans. Much more effective than a rigid and restrictive regulatory framework, transparency of plan information and the ability to determine if the terms of a plan are being met, are critically important tools for enforcing the other principles and ensuring consumer protection.

The service provider should make the disclosure publicly so that it is available to its consumers, the public and the regulator equally. Additional disclosure should be made when there is a material change to the operator's practice or policies.

Reasonable disclosure requirements with regard to all material terms of service for broadband Internet access services and other Internet services facilitate consumer choice and market competition. With appropriate limitations, disclosure requirements ensure that consumers understand the comparative benefits and drawbacks of competing offerings and can choose the ones best suited to their needs.

However, the disclosure regime should not undercut the flexibility that providers need. In particular, network providers should not be required to disclose detailed technical, proprietary, or competitively sensitive information regarding their services.

Q.9 Please provide comments or suggestions on the Information Disclosure Template at Table 5.1? Should this vary for each category of stakeholders identified above? Please provide reasons for any suggested changes. [See Chapter 5]

To provide specific and meaningful information, the following are topics suitable for disclosure:

(1) Network practices, including congestion management, application-specific behaviour, device attachment rules, and security measures;

(2) Performance characteristics, including a general description of system performance (such as speed and latency) and the effects of specialized services on available capacity; and

(3) Commercial terms, including pricing, privacy policies, and redress options.

Service providers compete on a broad range of dimensions – from branding to consumers' plans, specialized services, promotions and more and more importantly, on broadband speed and quality of service. Broadband speed and QoS are key competitive differentiating factors that are the result of the service providers' network architecture strategy (which includes technology architecture, deployment, network management practices, among others).

Altogether, the technology strategy constitutes a core strategic competitive factor that service providers need and should be able to keep confidential. Therefore, any disclosure obligations should not undercut the competition secrecy and flexibility that providers need. In particular, network providers should not be required to disclose detailed technical, proprietary, or competitively sensitive information regarding their services.

Q.10 What would be the most effective legal/policy instrument for implementing a NN framework in India? [See Chapter 6]

(a) Which body should be responsible for monitoring and supervision?

(b) What actions should such body be empowered to take in case of any detected violation?

(c) If the Authority opts for QoS regulation on this subject, what should be the scope of such regulations?

There is an emerging consensus that governments must avoid overly prescriptive attempts to cast into law or in the applicable regulation lists enumerating or narrowly defining the types of services other than the Internet access services that deemed "deserving" of specific levels of quality. Such attempts are bound to get it wrong in many cases. It is not necessary to have these prescriptive definitions and conditions on innovation as long as there are strong and clear safeguards to ensure an open and reliable Internet and a regulatory authority empowered to oversee compliance with the existing safeguards.

Q.11 What could be the challenges in monitoring for violations of any NN framework? Please comment on the following or any other suggested mechanisms that may be used for such monitoring: [See Chapter 6]

(a) Disclosures and information from TSPs;

(b) Collection of information from users (complaints, user-experience apps, surveys, questionnaires); or

(c) Collection of information from third parties and public domain (research studies, news articles, consumer advocacy reports).

While a regulator has access to many sources of information for enforcing its regulations, it is best to focus on actual complaints from affected parties. This process will concentrate the resources of the regulator on addressing actual problems in the marketplace that affect consumers. Addressing theoretical problems from non-affected parties will not only waste the resources of the regulator but also may chill innovation in the marketplace.

Q.12 Can we consider adopting a collaborative mechanism, with representation from TSPs, content providers, consumer groups and other stakeholders, for managing the operational aspects of any NN framework? [See Chapter 6]

(a) What should be its design and functions?

(b) What role should the Authority play in its functioning?

A multi-stakeholder process can be very effective at addressing highly technical issues in a way that informs the regulator from experts while ensuring that all affected parties are represented. Such a mechanism exists in the United States in the form of the *Broadband Internet Technical Advisory Group*[3] which has produced many important reports on technical aspects of Internet access service and network management. A similar process may be fruitful in India.

Q.13 What mechanisms could be deployed so that the NN policy/regulatory framework may be updated on account of evolution of technology and use cases? [See Chapter 6]

and Q.14 The quality of Internet experienced by a user may also be impacted by factors such as the type of device, browser, operating system being used. How should these aspects be considered in the NN context? Please explain with reasons. [See Chapter 4]

Many factors impact consumer experience on the Internet and it would be far too complicated to address them all or to regulate them in any meaningful way. These issues are best left to future inquiries.

[3] https://www.bitag.org