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To: Telecom Regulatory Authority of India
Mahanagar Doorsanchar Bhawan
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India

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Subject: Reply to Consultation Paper on Regulatory Framework for Over-the-top (OTT) services

Introduction

I respond to your request for comments on the regulatory framework for OTT services as a friend of India, a technologist, and an active participant in the international discourse on the future of the Internet. In particular:

- I studied Vedanta philosophy in Kerala from the mid-1970s until the early 1990s;
- I helped found Kerala's first export software company in the mid-1980s, and held an entry visa from 1990-95;
- As vice chair of the IEEE 802.3 task group on Low-Cost Local Area Networks in the 1984-5, I devised the first international standard for Ethernet over twisted pair wiring, transforming Ethernet from a shared cable system to a shared electronics architecture upgradeable to gigabit speeds and fiber optics;
- In the early 1990s I contributed to the initial design of Wi-Fi;
- In 2003 I contributed design features to Wi-Fi for Quality of Service and performance that are now mandatory in all new versions of Wi-Fi;
- I was an invited technical expert at the FCC's first public hearing on net neutrality in 2008;
- I have served as a consultant to Singapore's Infocomm Development Authority since 2011;
- Since 2013, I have been a Visiting Fellow at the American Enterprise Institute where I concentrate on technology policy.
- I founded and publish the High Tech Forum blog in order to educate policy makers on technology subjects pertaining to the Internet and mobile networks.
- My full CV is available at http://bennett.com/resume.pdf.

The views expressed here are mine alone and I have not been compensated for them.

Internet in India and in the US

India's inquiry into the regulation of Internet, broadband, and OTT services is certainly timely. The nation stands at the very beginning of its Internet era, with a mere 20 percent adoption of Internet service.[1] As in most countries, younger, better-educated English speaking Indians are more than twice as likely to use the Internet as others.
By contrast, 87 percent of Americans use the Internet or own a smartphone.[2] Trai rightly observes that India's Internet issues are not the same as America's, a point that seems lost on interested parties who urge India to mimic the US approach to Internet regulation.

Internet use depends on several factors, such as user interest, ability to pay, and infrastructure development. Of these problems, infrastructure is the most difficult to overcome. Broadband networks spread rapidly in the US in the early 2000s because we had the widespread deployment of telephone and cable networks as well as free spectrum for both licensed and unlicensed wireless networks.[3] This is clearly not the case in India, so the fundamental questions about Internet policy concern measures to stimulate the deployment of modern, durable, long-lasting fiber optic and mobile networks.

The cable and telephone networks in the US were initially financed in a vertically integrated manner; this is to say that revenues from local and long distance telephone calls and from cable TV subscriptions and advertisements covered their construction costs. These networks do not exist in India to a meaningful extent, and this absence is a direct result of government policies in the past.

The construction of 21st century networks has therefore just started in India, where the predominant form of electronic communication is the 2G cell phone. The Internet policy framework adopted by the US FCC is not appropriate in the Indian context; in point of fact, it's not appropriate in the US either.

The US has extremely high Internet use, both in terms of users and data volumes, rapidly improving infrastructure, and a dominant share of the worlds most lucrative web properties. Hence, there is actually no evidence that unsolved problems exist in America's broadband markets that need to be addressed by aggressive government intervention. What we have in the US is a professional Internet advocacy class that has attempted to transform a series of minor annoyances into major crises.

When net neutrality emerged as a political issue in the US in 2005, its focus was on the prevention of "paid prioritization", a service that either doesn't exist or is routinely provided by Content Delivery Networks. Advocates wanted it banned because it made

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[1] Pew Research Center, "Internet Seen as Positive Influence on Education but Negative on Morality in Emerging and Developing Nations," March 2015, http://www.pewglobal.org/2015/03/19/internet-seen-as-positive-influence-on-education-but-negative-influence-on-morality-in-emerging-and-developing-nations/.

[2] Ibid.

[3] Richard Bennett, *G7 Broadband Dynamics: How Policy Affects Broadband Quality In Powerhouse Nations* (Washington, D.C: American Enterprise Institute, November 2014), http://www.aei.org/wp-content/uploads/2014/11/G7-Broadband-Dynamics-Final.pdf.

them uneasy.[4] Despite claims that the Internet as we knew it would cease to exist if Congress didn't take action to protect the Internet from new services, Congress did nothing and the Internet continued to improve.

In 2007, net neutrality was redefined or expanded to cover the blocking of services that competed with services offered by network operators.[5] Comcast, a major cable operator, capped the bandwidth that could be consumed by (generally unlawful) peer-to-peer file "sharing" programs such as BitTorrent in order to prevent movie pirates from degrading the quality of VoIP services such as Vonage. The FCC took the side of the critics and issued a transparently unlawful order sanctioning Comcast after it had stopped the practice in question.

In 2010, the FCC developed another definition of net neutrality after Congress again refused to ban it by law; this formulation banned three practices, blocking, degrading, and paid prioritization. Fearful of the power the FCC granted to itself in the design of this order, carriers challenged and won again.

This year, the FCC made a third attempt to create authority for itself to regulate the Internet in a remarkable order that is once again unlikely to survive court challenge because it failed to respect the notice-and-comment requirements of the Administrative Procedures Act. But whether the FCC's 2015 Open Internet Order is lawful or not, it should be clear that the agency's objective at this point is simply to secure a court victory; preserving the health of the Internet itself is simply a pretext.

The reality in the US is that broadband Internet services (not "access services" since they make the consumer's computer a part of the Internet) have never been subject to legally binding, industry-specific regulations. There has never been a legitimate net neutrality complaint in my country, and the Internet works as well as it does here because it's in the interest of all parties for it to work well.

Internet Service Providers cannot sell services without a vibrant economy of "edge" or OTT services; OTT providers cannot implement services without vibrant networks; device manufacturers thrive by supporting the widest possible range of applications; and users demand more and better applications constantly.

There is a role for regulators in this market, but it is a narrow one. The traditional US model is to treat ISPs and OTT services as deregulated Information Services, subject to a common regulatory framework placing priority on the build-out and improvement of advanced networks.[6] Where networks do not exist, US policy either provides subsidies

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[4] Jonathan Krim, "Executive Wants to Charge for Web Speed," Washington Post, December 1, 2005, http://www.washingtonpost.com/wp-dyn/content/article/2005/11/30/AR2005113002109.html.
[5] Peter Svensson, "Comcast Blocks Some Internet Traffic," *Associated Press*, October 19, 2007, http://www.nbcnews.com/id/21376597/ns/technology_and_science-internet/t/comcast-blocks-some-internet-traffic/.
[6] Ev Ehrlich, "A Brief History of Internet Regulation" (Progressive Policy Institute, March 2014), http://www.progressivepolicy.org/wp-content/uploads/2014/03/2014.03-Ehrlich_A-Brief-History-of-Internet-Regulation1.pdf.

for wired builds, or depends on alternate technologies such as satellite and terrestrial wireless, both of which are supported by user fees.[7] Interconnection was not regulated in the traditional model, but that may change if the FCC's current attempt to carry out political objectives is successful. It certainly is the case that interconnection is currently accomplished by a mixture of settlement-free peering, paid transit, and paid peering.

In general, the US Internet community shares a consensus that competition between service providers is preferable to prescriptive regulation.

I have written two blog posts on the subject of net neutrality in India, "Net Neutrality in India: Missionary Zeal v. Zero-Rating" and "Net Neutrality's Passage to India".[8]

Questions

Question 1: Is it too early to establish a regulatory framework for OTT services, since internet penetration is still evolving, access speeds are generally low and there is limited coverage of high-speed broadband in the country? Or, should some beginning be made now with a regulatory framework that could be adapted to changes in the future? Please comment with justifications.

It's never too early to protect an emerging market from over- or under-regulation. The task for regulators at every stage in the development of a national Internet economy is to identify and correct shortcomings in the *status quo*. India's low adoption (AKA "penetration" or "subscription") rate cries out for correction, while the desire of some parties for a free ride does not.[9]

Trai should embark on a program to improve infrastructure by easing barriers to deployment and upgrade; it should encourage wider ownership of smartphones and larger computers; and it should directly subsidize the deployment of fiber-optic cable and cell towers in unserved areas. Where practical, it should depend on free market solutions to emerge and apply stimulus where they don't. These practices have proved effective in other large, expansive nations such as the US, Canada, China, and Russia.

Question 2: Should the OTT players offering communication services (voice, messaging and video call services) through applications (resident either in the country or outside) be brought under the licensing regime? Please comment with justifications.

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[7] Bennett, *G7 Broadband Dynamics: How Policy Affects Broadband Quality In Powerhouse Nations.*
[8] Richard Bennett, "Net Neutrality's Passage to India," *Tech Policy Daily*, April 23, 2015, http://www.techpolicydaily.com/communications/net-neutralitys-passage-to-india/; Richard Bennett, "Net Neutrality in India: Missionary Zeal v. Zero-Rating," *High Tech Forum*, April 2015, http://hightechforum.org/net-neutrality-in-india-missionary-zeal-v-zero-rating/.
[9] "The Battle for Neutral Internet: Join Times Campaign," *The Times of India*, accessed April 24, 2015, http://timesofindia.indiatimes.com/The-battle-for-neutral-internet-Join-Times-Campaign/campaignlanding/46863420.cms.

Richard Bennett Comments on Trai OTT Consultation

Both OTT players and networks should be freed of licensing for the most part, but they should both be permitted and encouraged to actively manage their portions of the market for malware, viruses, unlawful content, and conditions that harm access of users to the applications, services, and content of their choice. This approach has proved successful in both developed and developing nations. India's experience with a highly regulated, centrally managed economy from independence until liberalization is additional justification: when other nations had safe, cheap, fuel-efficient cars, India had the Ambassador.

Question 3: Is the growth of OTT impacting the traditional revenue stream of TSPs? If so, is the increase in data revenues of the TSPs sufficient to compensate for this impact? Please comment with reasons.

Networks have high fixed costs and low marginal costs; upgradation is, in my estimation, a marginal cost that is borne by user fees. Data volume pricing is somewhat troublesome because it has a very loose relationship with either fixed or marginal costs, although it motivates upgrades that permit higher data volumes. OTT substitution serves a social priority because it motivates users to upgrade from 2G to 3G and LTE smartphones.

Question 4: Should the OTT players pay for use of the TSPs network over and above data charges paid by consumers? If yes, what pricing options can be adopted? Could such options include prices based on bandwidth consumption? Can prices be used as a means of product/service differentiation? Please comment with justifications.

OTT services are generally supported by advertising sales, a significant source of revenue to pay for upgrades if properly directed. TSP costs of supporting OTT are highly dependent not only on data volumes but also on costs of transporting data over distance. Hence, TSPs should be allowed to levy interconnection fees to OTTs as far as they related to transport costs from the OTT's location to user locations. There need not be explicit price controls for interconnection because both TSPs and OTTs have an interest in high adoption and smartphone upgrades.

Pricing and bundling are both means of stimulating adoption and upgrades.

Question 5: Do you agree that imbalances exist in the regulatory environment in the operation of OTT players? If so, what should be the framework to address these issues? How can the prevailing laws and regulations be applied to OTT players (who operate in the virtual world) and compliance enforced? What could be the impact on the economy? Please comment with justifications.

Regulators generally are biased against traditional TSPs and in favor of OTTs for a number of reasons: consumers view OTTs more favorably because they provide advertising based services that appear to be "free" to consumers who don't realize that they're the product that's sold to advertisers; TSPs are the traditional adversaries of regulators while OTTs are fresh faces with no unfavorable history; and TSPs are easier to regulate than OTTs.

Yet the approach that has produced competition worldwide is facilities-based competition for TSP services, light-touch regulation or deregulation, and considerable freedom to set prices, differentiate, and aggressively seek new customers. In general, TSPs and OTTs are both in same business: Information Technology. They are both selling services that are driven by Moore's Law, and these services can be counted on to improve relentlessly year after year.

To the extent feasible, all IT services firms should be regulated or deregulated the same way. Whoever provides information services should be respected, whether born TSP or OTT.

Question 6: How should the security concerns be addressed with regard to OTT players providing communication services? What security conditions such as maintaining data records, logs etc. need to be mandated for such OTT players? And, how can compliance with these conditions be ensured if the applications of such OTT players reside outside the country? Please comment with justifications.

These are national policy questions best answered by those more familiar with India's national security concerns than I am.

Question 7: How should the OTT players offering app services ensure security, safety and privacy of the consumer? How should they ensure protection of consumer interest? Please comment with justifications.

These are national policy questions best answered by those more familiar with India's national security concerns than I am.

Question 8: In what manner can the proposals for a regulatory framework for OTTs in India draw from those of ETNO, referred to in para 4.23 or the best practices summarised in para 4.29? And, what practices should be proscribed by regulatory fiat? Please comment with justifications.

The ETNO proposal in 4.23 is often misunderstood. The Internet operates on the principal of "hot potato routing" where networks exchange traffic in an asymmetric fashion, switching it from the originating network to the destination network as early as possible. In practice, this system only works fairly for symmetrical flows (in which the two parties to a connection generate equal quantities of information) and for large networks. OTTs are often more parasitic than traditional Internet services.

In the scenario where the OTT hosts its content in Mumbai and the customer resides in, say, Pathanamthitta, Kerala, the TSP will probably be responsible for carrying data the entire distance in both directions. If the OTT has a presence in Thiruvananthapuram, the TSPs costs are much lower and the OTT's are slightly higher. In terms of overall social welfare, it's best for consumers for the OTT to have multiple points of presence. So the

answer is to allow TSPs to create interconnection policies that incentivize OTTs to maximize social welfare by decentralizing their footprints.

It should be noted that the BEREC objection that end-to-end QoS is "neither commercially nor technically realistic" betrays ignorance. End-to-end QoS is essential to mobile voice in 2G, 3G, and LTE systems. I would be happy to arrange a demonstration for BEREC.

As to best practices, the ETNO list is neither complete nor essential, but the statement is unclear as the descriptions are terse. It's reasonable and probably necessary to separate real-time from non-real-time packets at switching centers, common practice in the West. It's also reasonable to provide premium and generic backbone services as Korea does; and FRAND is generally good, if maddeningly vague.

Question 9: What are your views on net-neutrality in the Indian context? How should the various principles discussed in para 5.47 be dealt with? Please comment with justifications.

I would caution against accepting the opinions of the sources cited as anything more than poorly-informed speculations; Professor van Schewick has not reliably distinguished the Internet's essential features from its accidental and historical ones. She makes the following errors:

1. Over-values small enterprises; innovation is actually more common in large companies such as Google and Apple who can afford to fail.
2. Major innovations – those that are disruptive rather than incremental – do require "permission", if that term extends to negotiation. In order to operationalize the iPhone, Apple had to negotiate deals with TSPs, chip companies, display manufacturers, and battery producers. Having done that, it had to court application developers have in turn had to live up to Apple's App Store policies. The process for Google with Android was even more complicated since it has to deal with handset producers.
3. Cultural and political interactions are much more centralized than she imagines.
4. She overestimates networking costs in relation to the overall cost of innovation businesses. If a firm can't pay for networking, it's unlikely to able to pay the much higher costs of engineering.

These errors are understandable because van Schewick is neither a technologist nor an engineer nor an innovation scholar; she's a law professor who in fact has not even studied law.

The Ofcom wish list is full of contradictions and exceptions because the ordinary consumer is not capable of understanding network management practices. The important part of their statement is contained in point one on competition and switching.

Their assertion in point 4, *Quality of Service assurances*, is simply false:

There is a concern that if prioritization by TSPs becomes widespread, then the un-prioritized traffic will be so degraded that the CAPs that do not participate in prioritization will suffer competitively.

Quality of Service measures are subtler than Ofcom realizes and "prioritized" traffic interacts with un-prioritized traffic in different ways than they imagine. Traffic is degraded by the bandwidth consumed by concurrent flows on shared facilities; if I am making a Skype call on my iPhone while you are watching a cricket match on your Samsung and we're both connected to the same sector of the same cell tower, my call will be degraded by your video regardless of prioritization; degradation is a function of bandwidth. If our TSP seeks to correct the degradation that your high-bandwidth activity imposes on my low-bandwidth activity, Ofcom sees villainy. This is naïve and harmful.

Before imposing QoS restrictions, it's necessary to undertake a detailed analysis of the QoS needs of different applications and evaluate means of harmonization impartially. It's no wonder than citizens of the US and Japan use twice as much mobile data per person as do the Brits.

Question 10: What forms of discrimination or traffic management practices are reasonable and consistent with a pragmatic approach? What should or can be permitted? Please comment with justifications.

This is a very long list, but the major headings are classification, prioritization, reservation, scheduling, resource allocation for codes, and concurrency systems such as MU-MIMO, SDMA, OFDMA, and beam forming. All should be permitted because each has a legitimate purpose. I would suggest reading the forthcoming Broadband Internet Technical Advisory Group (BITAG) report on differentiation.

Question 11: Should the TSPs be mandated to publish various traffic management techniques used for different OTT applications? Is this a sufficient condition to ensure transparency and a fair regulatory regime?

This is information that may be provided by TSPs under non-disclosure to prospective partners. It is commercially sensitive information that should not become fodder for an AIB video.

Question 12: How should the conducive and balanced environment be created such that TSPs are able to invest in network infrastructure and CAPs are able to innovate and grow? Who should bear the network upgradation costs? Please comment with justifications.

The Internet is built on the principle of cooperation; in fact, has been called the largest example of global cooperation ever seen. The Internet works because it's in everyone's interest for it to work; nobody doing business over the Internet can succeed if it doesn't.

This cooperation comes about from a series of interconnection agreements, most of which are handshake deals. It continues with cooperation to identify and curtail malware and Denial of Service attacks and daily conversations. Occasionally there are disputes and firms stop connecting to each other directly. But these disputes have costs that are ultimately resolved in a mutually satisfactory way.

In the large sense, upgradation costs are ongoing and shared; always have been and always will be. But some firms turn to regulators to put a finger on the scale and give them a better deal than they could otherwise obtain. Does Trai have the wisdom to do that in a way that does not distort the market for future, unknown products and services?

I urge caution against interventionist regulation. Where possible, let the parties negotiate.

Question 13: Should TSPs be allowed to implement non-price based discrimination of services? If so, under what circumstances are such practices acceptable? What restrictions, if any, need to be placed so that such measures are not abused? What measures should be adopted to ensure transparency to consumers? Please comment with justifications.

Volume-based discrimination is acceptable, as is charging for QoS.

Question 14: Is there a justification for allowing differential pricing for data access and OTT communication services? If so, what changes need to be brought about in the present tariff and regulatory framework for telecommunication services in the country? Please comment with justifications.

I am unable to address the current framework.

Question 15: Should OTT communication service players be treated as Bulk User of Telecom Services (BuTS)? How should the framework be structured to prevent any discrimination and protect stakeholder interest? Please comment with justification.

I am unable to address the current framework, but it sounds reasonable.

Question 16: What framework should be adopted to encourage India-specific OTT apps? Please comment with justifications.

Demand creates supply. As more Keralites get smartphones, it's a given that more Malayalam-language apps will emerge for cricket, film, political argumentation, Kathakali training, the removal of snails from padi fields, and coir trading. This dynamic is unstoppable. Create the conditions that foster innovation and it will follow. In other states, literacy is an additional prerequisite but otherwise the process is the same.

Question 17: If the OTT communication service players are to be licensed, should they be categorised as ASP or CSP? If so, what should be the framework? Please comment with justifications.

As stated, all IT firms should be deregulated, but profits should be taxed.

Question 18: Is there a need to regulate subscription charges for OTT communication services? Please comment with justifications.

This is the role of competition. Regulatory price controls are generally corrupt.

Question 19: What steps should be taken by the Government for regulation of non-communication OTT players? Please comment with justifications.

None, as this is the path to corruption.

Question 20: Are there any other issues that have a bearing on the subject discussed?

The previous questions do not place enough emphasis on the two key issues, technology development and markets. Unlike public utilities, information technology businesses are dynamic, constantly improving and disciplined by competition. Embrace the change, emphasize the opportunities, and encourage the development of well-functioning markets. Monitor markets for signs of failure, and intervene only when necessary.

It would be wise to proceed with the assumption that broadband markets should be deregulated unless and until evidence proves that some form of regulatory intervention is necessary.