

Net Optimality

as opposed to Neutrality.

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1. The Net Neutrality Cult

With apologies to everyone who is offended by me referring to Net Neutrality supporters as a cult, it has become important to address this elephant in the room and give a background on the origins of Net Neutrality debate. My aim is not to call all supporters of net neutrality in academia as part of a cult. After all, Net Neutrality is an important topic, one that requires knowledge in computer networks, economics and law. However with the recent developments in certain governmental policies and the way Net Neutrality, as an egalitarian concept, has gained public attention, approval and demand without proper understanding of the economic ramifications by the public, I am forced to call the rise of this public movement as a cult. Members of this cult label anyone who does not toe the line on neutrality as a “shill” for ISPs. The fact that both Airtel and Facebook had to market their obviously “un-neutral” schemes as being completely in accordance to Net Neutrality is a testimony to this fact.¹

Net Neutrality originated in a very “un-cultish” manner in a wonderful paper by a law professor Tim Wu in 2003². The paper itself is very balanced and considers opponent viewpoints and their counter-points (many of which will be addressed in further chapters) but by no means does it consider the debate on “Net Neutrality” as “settled”. Instead the reasons for Net Neutrality as a goal is based upon competition and a “level playing field”.

On the one hand, this is an academic topic that deserves attention from network engineers, economists and law experts. On the other hand, public by and large treats this debate as “settled” and “Net Neutrality” as an unquestionable goal; A principle that must not be violated no matter what³. With the exception of Vint Cerf, most of the senior engineers responsible for developing the packet switched internetworking of today oppose “Neutrality” legislation. Dave Farber and Robert Kahn are very vocal about rash regulations that may impede network engineers capability to optimize their networks⁴. Professor David D. Clark, another pioneer involved in early stages of Internet development, has been reported saying “The network is not neutral and never has been”, dismissing as “happy little bunny rabbit dreams” the assumptions of net neutrality supporters that there once was a “Garden of Eden” for the Internet⁵. We can only speculate how Jon Postel would react to the debate on Net Neutrality,

¹ Airtel tried to unsuccessfully differentiate between “service neutrality” and “network neutrality”, when violating the former obviously violates the latter. Facebook tried to assure that both “net neutrality” and “Internet.org” can co-exist, when “net neutrality” obviously outlaws any other special usage plan.

² WU, TIM. “network neutrality, broadband discrimination - Journal on ...” 2010.

<http://www.jthtl.org/content/articles/V2i1/JTHTLv2i1_Wu.PDF>

³ Krämera, J. “Net neutrality: A progress report - (IISM) Information ...” 2015.

<<http://www.im.uni-karlsruhe.de/upload/publications/336c39b3-7a62-4159-bb1a-483f39dd5b24.pdf>>

This paper which provides the current (2012) status of the debate concludes that “*much of the public debate, and even some parts of the academic debate, were driven by emotionality, rather than facts*”. As such, this can be said about the public debate in India too.

⁴ “Father of internet warns against Net Neutrality • The Register.” 2007. 18 Dec. 2015

<http://www.theregister.co.uk/2007/01/18/kahn_net_neutrality_warning/>

⁵ “Net Neutrality: A Further Take on the Debate - Heartland ...” 2015. 18 Dec. 2015

<https://www.heartland.org/sites/all/modules/custom/heartland_migration/files/pdfs/26497.pdf>

but given his history with government⁶ it is unlikely he would have supported achieving “net neutrality” by means of government regulations. Postel once said “The Internet Should Not Be Managed By Any Government, National Or Multinational.”

This paper shall not suffer from such convictions towards Net Neutrality. Net Neutrality is not the ultimate goal of all economic activity in the telecom sector; serving the needs of the consumer is. The telecom sector exists because of the consumer not satisfy some design conditions. While consumers individually may show rational preferences on the market, public rhetoric and egalitarian concepts usually influence them. Such influence makes individual consumers demand certain policies as a part of a herd, which may adversely affect the industry. In other words, a consumer may know what is best for himself but he may not know what is best for other consumers individually⁷. TRAI must not fall for the large number of replies on any side of the debate and instead consider the adverse economic effects of their policies, even if they are demanded by a mob. Because when the policies backfire, the mob doesn't care that they were wrong.

2. Economic Concepts

2.1 Economics of Service Providers

If you have a look at your local grocery store, you will find that it stocks a variety of brands for variety of goods. For toothpaste itself, you will find at least three brands in the store. But the store, by no means, stocks all the brands of toothpaste in existence. It doesn't even stock all brands that it can buy. It can be argued that the grocery store owner, as far as his locality is concerned, is a private party that has the power to pick winners and losers on the market. If the grocery store owner stocks brand A and not brand B, people in his neighbourhood would tend to buy brand A rather than shop at a store that is in another neighbourhood.

To new and upcoming brands, it might certainly seem unfair that established brands enjoy a lot of trust with the grocery store owners. Even established brands might feel frustrated that they are not able to reach marginal users who prefer their products, but not enough to shop at a farther grocery store. From a very narrow view, it seems as if the grocery store owners have an unparalleled ability to influence the market for everyday goods. Yet, there is mostly no cry of foul play or discrimination in the market as far as grocery stores are concerned. Even though discrimination is something that the grocery store owner does everyday. Every month he chooses which brands to stock and how much to stock. From a narrow point of view, his dictatorial powers seem to have no check.

A similar sentiment on large scale misunderstanding of how Internet works is expressed by Network Engineers here: http://www.wired.com/2014/06/net_neutrality_missing/

⁶ Postel attempted to divide the control of Internet Naming between government and non-governmental entities. But was reportedly pressured into undoing this change. Sadly this resulted in US government taking more control over Naming. Considering that most censorship today is fueled by DNS monopoly of ICANN, it should inspire us to fight back: <https://www.opennicproject.org/>
More: <http://www.wired.com/2012/10/joe-postel/>

⁷ Chapter 5, "THE MYTH OF THE RATIONAL VOTER." 2012. 18 Dec. 2015
<<http://www.libertarianismo.org/livros/tmotrvbc.pdf>>

From a wider perspective, it is important to notice that the grocery store owner does not take these decisions in a vacuum; nor do these decisions seem entirely random. His act of picking and choosing “winners” and “losers” is not based on his personal liking of that product or his personal prejudice against others. Amongst the list of priorities, making profit from the store sale is his primary motive. He may be occasionally guided by prejudices and emotions but for such decisions he pays by losing revenue and customers to other stores. In a competitive environment, the grocery store owner has to constantly respond to consumer demand; even changing consumer demand. While it is true that there will be marginal users who would continue to buy his product rather than switch to another grocery store which might be further away, it is also true that there will be marginal users who would make the switch. From a wider perspective, it doesn't appear that the store owner has dictatorial powers. Instead his actions, although taken as a sovereign over his store, are clearly being dictated by the consumer. Even though he has complete authority over his store, his choice of brands to stock seems to reflect the consumer choice as much as possible. The more closer is his stock to consumer demand, the more profit he makes. Every bad decision would cost him “sunk goods” and every good decision would reward him with increased sales and occasionally new customers. All of these actions of the grocery store owner are taken by him based on his month end calculations.

The direction of all economic affairs is in the market society a task of the entrepreneurs. Theirs is the control of production. They are at the helm and steer the ship. A superficial observer would believe that they are supreme. But they are not. They are bound to obey unconditionally the captain's orders. The captain is the consumer. Neither the entrepreneurs nor the farmers nor the capitalists determine what has to be produced. The consumers do that. If a businessman does not strictly obey the orders of the public as they are conveyed to him by the structure of market prices, he suffers losses, he goes bankrupt, and is thus removed from his eminent position at the helm. Other men who did better in satisfying the demand of the consumers replace him.
-Ludwig von Mises⁸

It is not uncommon to find a disgruntled customer who cribs that his favorite store doesn't stock his favorite brand or product. As it happens, the store owner has to maximize his profits, which means not only maximum sale to consumers, but also maximum margin on products. Since cost price of a good reflects the efficiency of the producer in producing that good, a lower margin is indicative of inefficiencies in manufacturing of that particular product by that producer brand. This way, through voluntary interaction between producers, consumers and store owners different economic forces tend towards a balance; even though they never reach it. Changing consumer demand and changing manufacturing technologies makes it imperative that the store owner be able to quickly respond to these economic forces. Even though he may never reach optimality or equilibrium, he must be given the freedom to do so. The store owner is perhaps the only one most capable of making this decision because it is his money and his profits that are riding on it. He is not playing a

⁸ The Sovereignty of the Consumers, Human Action, Ludwig von Mises<<https://mises.org/library/human-action-0/html/pp/747>>

gamble and he is not blindly picking brands to stock. His decision is quite entrepreneurial and requires entrepreneurial knowledge which can only be generated by individuals observing prevailing conditions and who are ready to invest and compete⁹.

If a central authority was given the task to relieve all the store owners of this duty, and to set the stock amount and prices for them it would be nearly impossible for the final distribution of goods in the stores to reflect consumer demand. This problem that a central authority would face has been called knowledge problem¹⁰ by F. A. Hayek and calculation problem¹¹ by Ludwig von Mises. A central authority would lack the local and entrepreneurial knowledge required to make these decisions. Without a competitive environment, the profit/loss mechanism will not play the role as described above and the store owner (and the central authority) would have no means to do effective month end calculations. Such calculations would not be able to tell him which products are in demand and most economic to manufacture.

Faced with such a mammoth task to do industry wide calculations, the government could enforce a sort of "neutrality" in the name of creating a "level playing field". Confused free market supporters will rally to this cause being frustrated by government miscalculations everywhere. At least this way they see new and upcoming producers being given a chance to work in the market rather than government giving out licenses to producers for retail. Regardless of the pros and cons of this approach, this cannot be upheld as an "ideal" or a "cannon law". Very few new producers are able to fare in the competitive market. Very few of them are able to disrupt the established order to better satisfy the consumers. Most new businesses fail. It would seem highly uneconomical to keep buying goods that are not in demand for resale to consumers who don't want to buy it. Compare this to the free market in grocery stores, where the store owner has to constantly look out for changing demands and new products by offering free samples (or letting them be offered by the salesman on his premises) and promotions. If his competitor reacts to the changing market conditions before him, it could mean less profits and occasionally less future customers.

The aim of the grocery store example is not to set it up as an analogy but rather as an example in economic way of thinking. Perfect analogies to the Internet are very hard to come across. The closest I can think of is the phone network (and even there Closed User Group and Toll Free Numbers violate phone network neutrality). The example is given here to demonstrate that there is always a broader perspective to look at the market rather than an isolated view. Grocery store example is obviously not a perfect analogy for the Internet, even though you can call the grocery stores as end-point routers for everyday goods. A grocery store is limited by its size and its ability to change goods already in stock. This way it is much different from the Internet where such limitations either do not exist or they are not very restricting. If a grocery store could directly relay individual user demand to the producer and stock on per user basis, it would. Online appliance stores already do this. They are far more neutral in their approach. This is the reason that the Internet is far more neutral when it

⁹ Kirzner, Israel M., Competition and Entrepreneurship

¹⁰ Hayek, "The Use of Knowledge in Society" <<https://mises.org/library/use-knowledge-society>>

¹¹ Mises, "Economic Calculation in the Socialist Commonwealth"
<<https://mises.org/library/economic-calculation-socialist-commonwealth>>

comes to most users. Whatever perceived neutrality we have today is because of consumer demand not because of government regulations. But by no means should we blindly consider this neutrality as the end goal. Because consumer demand constantly keeps changing and more and more “non-technical” “simple” users are starting to use it. As this happens more consumer patterns will start to emerge in the market and more economic incentives will exist for ISPs to adapt to them, even non-neutrally.

2.2 A level playing field?

“There is all the difference in the world between treating people equally and attempting to make them equal.”— Friedrich Hayek

Another concept that is polluting the debate on Net Neutrality is the concept of a “level playing field” fueled by the neoclassical concept of “perfect competition”.

Conventional economic wisdom calls for the government to create a “level playing field” for competitors to properly compete with each other and provide what consumers demand. However, there are many assumptions in this demand. Central to this demand is the faulty understanding of “competition”.

The general idea of competition that people have is closer to a race track where competitors are waiting for government to signal a “go” after which the competitors will run towards the end line and the first to get there will get to provide the goods to the consumer. Or like a gambling table, where the house (government) sets a “level playing field” for the competitors to compete. These ideas of competition, are different from an economist’s idea of competition. In these game competitions, the situation is deliberately made complicated by human intervention, for fun. The risk in the game of gambling is not “nature generated” but “man generated”. The risks in market are “nature generated”. Not only do producers do not know with certainty what the consumers want, which is the reason products fail in the market, they also do not know with certainty the best means to provide that to the consumers. The knowledge needed to estimate what the consumers desire and how to produce it, has been called “entrepreneurial knowledge” by Israel Kirzner¹². Such knowledge is produced because entrepreneurs are both attentive and risk takers. So rather than opportunities being given out by government in a level playing field (also called equality of opportunity), opportunities are produced by attentive individuals who take risks to grab them.

Not only is this idea of “level playing field” based on a false model of the market, this idea is harmful to its functioning. If producer A is in a better position to satisfy demands of a consumer than producer B, it would not make economical sense to deliberately bring producer A down to the position of producer B. While satisfying the ideological demand for “equality of opportunity” this would do a disservice to the consumer, because now he gets an inferior product. Deliberately creating a competitive environment defeats the purpose of a competitive market. The goal of competition is not to show which producer is better than the other in a “level playing field” but rather to overcome natural risky barriers to get consumers what they want.

¹² Kirzner, Israel M., Competition and Entrepreneurship

In practice however, this policy is far more damaging. Government has the worst track record of being “neutral” and providing a “level playing field”. More often than not, it selectively implements this policy in favour of politically well-connected businesses.

3. Net Optimality as opposed to Net Neutrality

3.1 False Assumption of Net Neutrality

As already mentioned in section 1, Tim Wu introduced the concept of Net Neutrality in his paper “Network Neutrality, Broadband Discrimination”. While the paper itself attempts to address arguments he anticipated (or faced) against net neutrality, the paper starts from an incorrect assumption. In the section “The Case of Net Neutrality” he writes:

The argument for network neutrality must be understood as a concrete expression of a system of belief about innovation, one that has gained significant popularity over last two decades. The belief system goes by many names. Here we can refer to it generally as the evolutionary model. Speaking very generally, adherents view the innovation process as a survival-of-the-fittest competition among developers of new technologies. They are suspicious of models of development that might vest control in any initial prospect-holder, private or public, who is expected to direct the optimal path of innovation, minimizing the excesses of innovative competition. The suspicion arises from the belief that the most promising path of development is difficult to predict in advance, and the argument that any single prospect holder will suffer from cognitive biases (such as a predisposition to continue with current ways of doing business) that make it unlikely to come to the right decisions, despite best intentions.

Well, despite best intentions, this argument defeats Net Neutrality. I share the belief with net neutrality supporters that “the most promising path of development is difficult to predict in advance”. This is the reason why Internet Service Providing must be considered an entrepreneurial activity as much as Application development is considered as one. That applications compete to provide best service to the end users is apparent. But that infrastructure providers compete too, to provide best environment for development of these applications is ignored by the paper. Once entrepreneurial nature of ISPs is recognized, the arguments in favour of government control over ISPs to enforce “neutrality” completely breaks down¹³.

¹³ "Beyond Network Neutrality - Harvard Journal of Law ..." 2005.

<<http://jolt.law.harvard.edu/articles/pdf/v19/19HarvJLTech001.pdf>> Christopher S. Yoo makes similar arguments calling out this false assumption of Net Neutrality advocates.

Van Schewick(2007) is perhaps the only Net Neutrality advocate that acknowledges this assumption but questions the potential of ISPs to innovate compared to large number of independent application developers. However it would be a fallacy to compare number of innovators. Rare as they may be infrastructure innovations usually have had a large scale effect. Series of such innovations gave us the Internet as we know today, making Application/Service level innovation possible. The potential of an

It would be incorrect to assume that a “neutral” environment is the most optimal environment to provide applications most demanded by the end users in the most optimal manner. If ISPs were completely blind and had no entrepreneurial ability then I would have joined Tim Wu in demanding Net Neutrality. For instance, if in our country Internet was run by a monopoly of government ISP, whose entrepreneurial ability is highly suspect, the best option would be to let government be this neutral “level playing field” because a monopoly is devoid of being influenced by profit/loss mechanism of the market and any specific choice it would make would not be susceptible to market correction. While entrepreneurs pay in terms of losses on making infrastructure that does not fit in with market demand, the government subsidises its bad decision with tax money.

However, private ISPs are not blind brain dead organizations lacking any entrepreneurial knowledge, whose only job is to build Internet infrastructure blindly as instructed by the supreme network designers working in some government organization/university. Instead, ISPs employ network designers and engineers so that they can best develop the network with the entrepreneurial knowledge they possess which can be live tested in the market. The assumptions of net neutrality advocates not only do disservice to ISPs but also to the network engineers working in these ISPs. They undermine the ability of these network engineers to adapt to market demand in a competent manner.

Given that private ISPs are entrepreneurial organizations, net neutrality advocates do further disservice by considering any deviation from “neutral” model of the Internet as something nefarious driven by short-sightedness and to be stamped out rather than considering the possibility that ISPs might just be attempting to respond to (changing) consumer demand with the entrepreneurial knowledge they possess (not the governmental agencies nor net neutrality advocates). Second half of Wu’s paper, where he analyses deviations from Net Neutrality in US market, is ripe with such circular logic. There is no economic reason to believe that even under the perfect version of competition that Wu expects from American markets, that optimal network solutions will be “neutral”. So when free competition does not result in “neutrality” Wu makes a case for regulations. Net Neutrality advocates assume neutrality to be the end goal rather than consumer satisfaction. Their hypocrisy lies in the fact that they consider application developers competing for more and more consumer money as something to be celebrated but not ISPs competing for more and more consumer money; that it is plain evil. If application developers need to increase their profits to expand their business, so do ISPs. The fact that ISPs run our infrastructure despite being discriminated against is quite an argument in favour of the market. I would almost feel sorry for them if it were not the fact that most ISPs today function behind protectionist policies of the government.

A common example that is usually cited is the case of “Quality of Service (QoS)”. QoS is a major issue on the Internet especially for VoIP services¹⁴. Network configurations are usually

innovation on the market is highly unpredictable and it is no place for an economist to make such assumption.

¹⁴ Krämera, J. "Net neutrality: A progress report - (IISM) Information ..." 2015.

<<http://www.im.uni-karlsruhe.de/upload/publications/336c39b3-7a62-4159-bb1a-483f39dd5b24.pdf>>

employed in private networks to improve quality of VoIP calls. Yet, any such improvements are obviously against the principles of net neutrality as the routing strategy tends to favour such traffic to decrease jitter and latency. Given the demand for 3G calling services rising, it would be obvious to anyone who understands markets, that ISPs are bound to react to this to provide special connections optimized for VoIP; and charge more for it. Yet, any attempt towards differential pricing to incentivize QoS has been heavily criticized by net neutrality advocates as a way for ISPs to simply make more money off of consumers. If it isn't the most obvious thing that can ever be said: All businesses want to make money off of consumers. But in a market economy the only way they can do so is to serve the consumers themselves; to provide them with what they want to pay for.

To be fair, Tim Wu's paper does mention alternate models of competition that undermine Net Neutrality, but no arguments are presented against those models. The case for Net Neutrality is simply self-generating because of concerns of many of its adherents; and as such is driven by more emotionality rather than logic or facts.

3.2 Net Optimality

Consider any LAN or private network. It is quite common for network engineers to tamper with routing mechanisms, create "fast lanes" etc to optimize traffic in the network and to minimize congestion. With no governmental order being imposed, private networks do not necessarily follow "net neutrality" although they remain fairly "neutral". However why must this concept be restricted to private network? Why can't the Internet work towards optimization?

Even if one believes that "No one owns the Internet" and therefore should not be allowed to "tamper with it", he cannot assume that "neutrality" equals "optimality". Especially when it comes to being optimal enough to provide your customers what they want as fast as you can. Content Delivery Networks (CDNs) in a very strict sense violate the net neutrality principle. Even if it is debatable that CDNs are still neutral and simply hosted closer to your ISP, it certainly violates the spirit of Net Neutrality¹⁵. The reason why sites like Google open near instantly is because they have their servers deep within the ISPs. Large corporations like Google and Facebook can obviously afford these services and have a performance advantage over any new competitors. However, as large consumer demand would indicate, no one wants Google to be as slow as your blog page. In the eyes of majority of the consumers, these bits are not created equal; despite these same consumers chanting slogans of "All bits are created equal". Can you really blame the ISPs for responding to consumer demand?

On the other hand, the slogan "No one owns the Internet" is highly misunderstood. Internet should be better understood as a concept - the idea of interconnected heterogeneous networks. The birth of Internet was with this idea when the researchers worked on creating

There have been quite a few successful developments in improving QoS some of which are already deployed. IPv6 will further cement the ability to discriminate using Deep-Packet Inspection. Calling into question the assumption that Net was neutral from its inception and an important reason for its success.

¹⁵ Wu, T. "Keeping the Internet Neutral? - Digital Repository @ Maurer ..." 2007.

<<http://www.repository.law.indiana.edu/cgi/viewcontent.cgi?article=1485&context=fclj>>

protocols for incompatible networks to communicate with one another. Internet is not owned because ideas cannot be owned; not because the network themselves cannot be owned. Obviously networks are legally owned by both private and public parties. “Internet” of course is a unitary concept. While there can be many interconnected networks, there is only one Internet. It is better to understand Internet as an interconnected networks of private networks; where even the interconnections are done privately; which is has an open invitation to connect to for a fee. The importance of looking at it this way is to break free of this mirage that Internet exist magically with people who just happen to co-operate into creating it. Internet, most definitely, was built upon private trade and competition. It is humanity’s first experimentation in Anarchism in modern times¹⁶. Therefore the economic incentives that lead to its development must not be ignored. Those advocating for Internet to be treated as “public utility” or as a “right” will ultimately bring it down to the level of water supply or electricity supply (in Indian context).

The idea of private networks providing Internet might scare a lot of people, but it is a true fact. But the fact that ISPs are still providing what consumers are demanding should give the scaremongers some pause. From the Hayekian perspective (as discussed in section 2) it might seem like individual network owners have complete control over their network and are the ultimate dictators, however from a larger perspective one can see Internet still forming to produce this ephemeral network of networks. No individual network owner has any idea how the entire Internet is routed. They economically optimize their own networks to compete with others. But in taking part in this activity, from a larger perspective, a spontaneous order emerges. Not a permanent or static one, but an order that constantly tries to adapt to changing demand and constantly tries to reach optimality; even though it never can reach it. Net Optimality is not a permanent concept. Network Engineers cannot sit in a room and design the blueprints for the entire Internet, which is permanently optimal. Not only is the consumer demand always changing, the engineers involved in central design would lack local knowledge needed for these optimizations. They must work on their own network to best provide the service economically and in doing so they end up coordinating to form the Internet. Internet is not only a worldwide experiment in Anarchism, it is the first worldwide experiment in Hayekian Anarchism; because it was spontaneous rather than centrally designed to be anarchistic. Net Neutrality is an idea that is attempting to be the “central design” when it clearly isn’t.

4. Ethical Property Rights and Spectrum Policy

Robert Kahn is particularly concerned that “net neutrality” legislation could impede network engineers’ ability to improve latency and jitter issues. Hayekian understanding of the Internet, as discussed in Section 3, really puts this concern in the center stage. Market is about experimentation and consequent learning. Competitors must have the freedom to experiment as long as they are not interfering with each other, to determine what the consumers want. Conclusions about what consumers want cannot be made from an ivory

¹⁶ “The Internet is the first thing that humanity has built that humanity doesn't understand, the largest experiment in anarchy that we have ever had.” - Eric Schmidt, executive chairman of Alphabet Inc (formerly named Google)

tower of a central planner or a regulator. To presume that a “neutral net” would be in the best interest of the consumers could be disastrous for policy making.

Related to the idea of experimentation is the idea of externalities. Where a company A directly interferes in the operations of company B, it starts to compete in a way which is against the principles of the market. Such actions, as discussed in Section 2.2, actually make real life risks worse. The companies are no longer taking on “nature created risks” but man-made risks created by each other. For proper functioning of markets there is a need for proper arbitration and subsequent definitions of property rights/demarcations.

Net neutrality is particularly an issue in United States, but that issue is disguised over another important issue. United States, over subsequent years, has lost the competitive market that resulted in rapid increase in its Internet infrastructure. Over the years regulations, much like Net Neutrality regulations, all of which were done for egalitarian reasons, have cartelized the ISP market. The new FCC rules for a “neutral net” increase the cost of compliance making it harder for new and upcoming ISPs to follow them. Frankly, net neutrality rules are hardly the worst of the lot. Furthermore, with differential pricing, new ISPs could get a boost from profits helping them compete with more established ones. Equal rules for all become a joke when both the rich and poor man are equally barred from sleeping under the flyover. ISPs are currently rallying against Net Neutrality regulations because it is against their short term interests, but in the long run new ISPs will have to equally follow those regulations with lesser resources at their disposal.

For a functioning market, property rights must be given importance. Ethics in property rights must be geared towards facilitating experimentation to let entrepreneurs discover what consumers want. However, when such goals are lost to create “unfree” conditions in market, especially through regulatory process they must be identified and rectified. While Indian markets, post-1991 liberalization, have become quite competitive, there are still some protectionist policies masquerading as egalitarian ones.

In the telecom sector, the foremost policy that prevents competition and is a barrier entry is the Indian Government’s policy of spectrum allocation and all the attached licenses that go with it.

It is usually assumed that sale of spectrum by the government is the most efficient means to allocate it. However it is worth looking at the history of this idea and how it came to be. For markets generate first, then come the regulations. How market operated before spectrum regulations (and with existing laws) could be the key to understanding what allocations of spectrum allows organizations to compete to provide best services to the consumers.

Broadcast radio seems to have arisen spontaneously in 1921, when the first broadcast stations in New York and Pittsburgh went on the air, reaching thousands of hobbyists with crystal radios. The popularity of broadcast radio spread very quickly, and its commercial possibilities were realized almost immediately. However, the problem of interference was recognized early. If two (or more) broadcasters in the same city chose to transmit on the same (or

very close) frequency, then each interfered with the other's signals and radio listeners were treated to cacophony. This was good for no one, and in the early years, a de facto property right standard of "priority in use" arose; quite simply, the first user "owned" the frequency, and subsequent users had to broadcast elsewhere. This property right was supported by the Department of Commerce and by 1926 was recognized by several courts.

In 1926, Herbert Hoover, Secretary of the Commerce Department, ordered that the Department stop supporting priority in use claims following two unfavorable court decisions. The result was rather chaotic; in major radio markets, interference became the norm as new firms attempted to poach on the frequencies of popular radio stations. In the resulting outcry, Congress passed the Radio Act of 1927, which established the Federal Radio Agency (FRA) with the responsibility of stewardship of the spectrum and the sole right to determine what various frequencies could be used for and who could use them. In the ensuing years, virtually every country in the world emulated the US by establishing a national agency solely in charge of allocating spectrum to uses and assigning it to users. In the US, the Communications Act of 1934 created the Federal Communications Commission (FCC), vesting in it the FRA's spectrum allocation authority.

Since its inception, the FCC has interpreted its authority as the nation's spectrum manager rather broadly ... The standard procedure (until quite recently) was that an individual or firm wishing to utilize spectrum for a specific purpose license for a particular frequency in a particular location applied to the FCC for a license that covered only that purpose, frequency and place. After public notice, anyone else could also apply for the same frequency and location; should there be more than one applicant, a comparative hearing was held to determine which applicant was "more suitable" to discharge the public interest obligations of license-holding ... The award of the license did not grant the licensee any property rights in the spectrum beyond that of the license. The licensee could not use it for any purpose other than that specified in the license.

The results of this process are not difficult to predict. Holders of spectrum are unwilling to give it up, even when they are unable to make use of it. For example, the FCC's experience in the 1950s with UHF television assigned 330 Mhz of spectrum to this use. The experience was not successful, and this band is extremely underutilized. However, license holders are unable to use the spectrum for any other purpose (such as wireless telephony) and are unwilling to give it back. Thus, this prime spectrum provides little value to consumers, while other uses (such as wireless telephony) claim to be in a "spectrum drought." ... Despite the recent moves toward more market-based

spectrum allocation, the dominant mode of managing the spectrum is administrative fiat.¹⁷

As we can see that from its earliest inception, spectrum was being allocated through a way similar to how land is allocated in a market based society. Individuals and organizations put the given resource to use and thereby gain property rights to utilize that resource towards the purpose of commerce. In case of disputes over usage, these disputes are resolved through arbitration which in United States used Common Law principle of “first use” or “homesteading”. United States immediately saw a boom in radio market from 1921-26. The government agency involvement in this process was not because of some chaotic condition caused by everyone trying to block everyone’s spectrum but because of unfavorable court rulings for the government.

Although only a small percentage of spectrum has been finally opened to the market by means of auction, large chunk of spectrum still remains under government allocation through “administrative fiat”. All of which is under utilized and allocated to outdated technologies. Furthermore, as far as market based approach is concerned, auction is not the most honest means to allocate spectrum. In case of land it would make no sense to first exclude all the population from potential property and then have it auctioned off. Initial exclusion, because it is not based in property rights, would be unjust. Auction would add to the injustice by government extracting more rents from the population. As such, all spectrum fees from an economic point of view, must be viewed as extra taxes on the population - a tax that is not rooted in need but in apparent pragmatism that can be questioned historically. License fees required to use spectrum in your locality, as long as it is not interfering with others, must be viewed in similar perspective. Take the case of a popular¹⁸ radio station in Bihar being shut down¹⁹ by authorities because of lack of proper licenses. The station wasn't interfering on anyone's broadcast, yet it had to be shut down because of the policies. If the aim of governmental agencies is consumer welfare, the spectrum policies it has are directly against such aim, and frankly based on quite outdated ideas of central planning and control.

I realize that not all spectrum policies are in TRAI's control. I also realize that market forces have been held back for so long that a sudden removal of restrictions could cause a little chaos and market shock. I also understand that gradualism is more pragmatic in slowly letting the spectrum go back into the market process. However Freedom and Property Rights in Spectrum is a discussion topic whose time has come, if it wasn't already a topic in 1927. Moreover, “substantial strides have been made in radio technology, including wideband radio (such as spread spectrum and ultra wideband (UWB)), “agile” radio (one of several applications of software defined radio (SDR)) and mesh networks (including ad hoc networks

¹⁷ Faulhaber, Gerald R, and David J Farber. "Spectrum management: Property rights, markets, and the commons." *Rethinking rights and regulations: institutional responses to new communication technologies* (2003): 193-226.

¹⁸ "Hundreds want Bihar man's radio station revived ..." 21 Dec. 2015

<<http://suchetadala.com/?id=cb41196e-3c00-be0b-492e8bbb857c&base=sections&f&t=Hundreds+want+Bihar+man's+radio+station+revived>>

¹⁹ "INDIA: Bihar radio man's station shut down - International ..." 2015. 21 Dec. 2015

<<http://web.international.ucla.edu/institute/article/41572>>

and other forms of peer-to-peer infrastructure architectures)".²⁰ These technologies help mitigate spectrum clashes allowing more spectrum sharing and lessen the need for arbitration. It is therefore questionable how really shocking "freedom in spectrum" would be. At the very least, this calls for more research into Spectrum Policy and a research into the means through which more spectrum can be allocated in the market, and how more barriers to entry (more specifically the licenses) into ISP market can be removed.

5. Direct Answers to the Questions of TRAI

Question 1: Should the TSPs be allowed to have differential pricing for data usage for accessing different websites, applications or platforms?

Answer 1: In short the answer is Yes.

As has been noted by many scholars cited in this paper, a strict definition of net neutrality would actually be a regression for the Internet. It would bring into question the legality of Content Delivery Networks (CDNs), network level improvements in QoS including the IPv6. So certainly Net Neutrality cannot be held on a pedestal assuming that "Net Neutrality" equals "Consumer welfare". Such an argument would need to be specifically made.

In the debate between Tim Wu and Christopher Yoo²¹, Wu was forced to concede that there are some good discriminations (like combating network congestion) which can be made (while maintaining that bad discriminations can also be made, making a case for Net Neutrality). However, what are good discriminations and what are bad discriminations is not an exact concept. And as long as no fraud is taking place, free contract between ISPs and consumers will tend to weed out the bad ones; with consumers opting for the good ones. After all, good and bad needs to be defined on the basis of what consumers want. As I argue in Section 2.1, a grocer may appear to be a controller of public opinion on popular household brands but from a wider perspective he is not taking those decisions in a vacuum. He has to look out for his profits in a competitive environment. If he does not stock what is in demand he loses customers. Same is true for telecom services. If a "Zero" plan by a telecom provider A doesn't have a popular service and another telecom provider B does, then consumers will tend to get services of provider B prompting A to reassess his offerings. With national number mobility, moving has now become even easier; and easier it has become for a provider to lose consumers.

Net Neutrality supporters believe that such "Zero" schemes are indication of something nefarious and fraudulent. However, this is based on an assumption that "Net Neutrality" is something to be held on a pedestal and any violation is an act against the consumer. This paper argues that it is not necessarily true. ISPs in a competitive environment have to

²⁰ Faulhaber, Gerald R, and David J Farber. "Spectrum management: Property rights, markets, and the commons." *Rethinking rights and regulations: institutional responses to new communication technologies* (2003): 193-226.

²¹ Wu, Tim, and Christopher S Yoo. "Keeping the internet neutral?: Tim Wu and Christopher Yoo debate." (2007).

constantly appeal to marginal consumers - which include consumers who do not wish to (or can't pay for) a complete Internet pack. There is no reason to believe that a violation of net neutrality principles cannot be a demand from consumers in the market. Especially when an analysis of free market forces in the Internet indicate that what is optimal for consumers need not be neutral (Section 3.2).

As is discussed in section 3.1, the promoters of Net Neutrality assume that ISPs themselves are not entrepreneurial organizations and that any innovation in Tech Industry comes from Application and Service providers. However, innovation need not be technical innovation. It might even be financial innovation. Looking at "Zero" services from a non-dogmatic point of view, it is an innovation on how to reach marginal users. India has an internet penetration of 15% and it has risen exponentially. ISPs should be considered a rapidly growing market as much as "IT Startups". My opponents would allege that ISPs are actually making huge profits and that they are under no threat to allow price discrimination/Zero services. They are right. How much profits the ISPs make is not relevant to this debate. All the high profits indicate is that Internet is really spreading and users are willing to pay that much to use it. High profits have really incentivized Internet penetration in the last decade and it will continue to do so. Even if at a slower rate if Zero services are banned. However it must be noted that in the Wu/Yoo debate, Wu (champion Net Neutrality supporter) concedes almost all points to Yoo but points out that he expects no innovation from ISP and infrastructure industry. But that statement may be relevant for the United States with Internet penetration of 82.4% rising with a linear rate. We (India) need to go a long way and we are moving exponentially faster. Rash regulations could inhibit not only technical innovation but also financial innovation. The differences between US (from where this debate has been imported) and India must be recognized.

Net Neutrality supporters invoke the names of Tim Berners-Lee and Vint Cerf as Internet Pioneers who promote net neutrality. However, with exception of these two, I could find no Internet pioneer who asks for rash net neutrality regulations. Some of the other pioneers who have expressed opinions against this concept regarding it as a simple slogan are: Dave Farber, Robert Kahn and David D. Clark. Also this debate not only has a technical side to it, but also economic side. There doesn't seem to be consensus amongst economists on "Net Neutrality" but by and large their prescription is that ex ante regulations are not needed if current regulations of Anti-Trust and Fraud can handle "bad discrimination"²². Many economists have suggested that governments follow a "wait and watch" routine. In either case, TRAI should not consider the debate as "settled" just because an Internet pioneer's name is mentioned.

I would like to also point out some mis-information being spread by certain Net Neutrality supporters that "Zero" plans is against consumer choice. And that Net Neutrality position is pro-choice. Any honest look at the situation would show that the reverse is true. When Airtel Zero was introduced, no one was forced to switch from their regular Internet packs to Airtel Zero. Earlier the consumers had several options to buy, after the introduction of Zero plan, they had several options plus one plan to choose from. It is important to point out that no one

²² Krämer, Jan, Lukas Wiewiorra, and Christof Weinhardt. "Net neutrality: A progress report." *Telecommunications Policy* 37.9 (2013): 794-813.

is suggesting that Internet plans be taken off the table and replaced with Zero plans. Instead an extra option was provided. If anything, Net Neutrality supporters arguments sound like they do not trust the consumers to make rational economic choice in their own interest. Their arguments are more concerned with "Startups" and how they may lose consumers. But if a consumer is happier with Zero services, I don't see how it is any of their business. What they don't realize is that using Zero service may be monetarily free but it is not "free"; it comes at a cost of not having "full Internet access". If a consumer makes that conscious decision, it is his choice in his interest. The goal of the market place is not to get Startups their consumers, but rather to get consumers their goods. If a startup is efficient in providing those goods, the consumers will come. This disguising of pro-Startup movement as pro-consumer movement relies on scaremongering; with suggestions being made that Internet is being snatched away from consumers and replaced with differential pricing; rather than an extra option being available.

Net Neutrality supporters will also point out that if such schemes are allowed they will foster billing practices which are opaque. But that is no argument because Zero services do not entail opaque billing. It is not part of its definition. There is no reason to assume the same. But there is also no reason to assume the reverse. Yes, businesses sometimes try to break the principles of the market to gain short-term profits (and long term losses). But for such practices we have laws against fraud, false advertising, antitrust, contract violation etc.

There is also a question of vertically integrated services that Net Neutrality supporters raise. Certainly, without rules, if I own the ISP and if I own the service I can use my ISP to offer my service for free. However it must not be forgotten that if my service is poor and I am providing that as a part of my Zero plan, I am driving consumers away. Marginal users fed up of my service will either buy full Internet pack or switch to another ISP. If I can make profits by making my service free, I can make losses as an ISP by making it part of my Zero plan. We cannot make an assumption that success of the service is purely due to vertical integration. Certainly vertical integration helped. But I would like to remind what I explained in section 2.2. The goal of the market is not to determine who performs best on a 'level playing field'. Such level playing fields don't exist. Richer companies will have access to fast servers, CDNs and they will be able to get better employees than their competitors. Google has computing power today that is not easily matched by many. Instead the goal of the market is to satisfy the demands of the consumer. If someone is better placed strategically then the consumer will get a better product. Those promoting a 'level playing field' are often not ready to take seriously the conclusions of this assumption. For instance, Blackberry CEO suggested that in the name of net neutrality Apple must be forced to make its Iphone-only apps (like iMessage) for Blackberry as well. He was laughed at by the media²³ for his misunderstanding of "Net Neutrality". However, his arguments are based on the same 'level playing field' principle. And there are scholarly articles that take concepts like 'carrier neutrality' and 'service neutrality' very seriously. How far are we willing to go?

At the very least, I think that rash regulations should not be passed. The immediate ban recommended by Net Neutrality supporters until further resolution is being rash. As an end

²³ "BlackBerry's CEO thinks net neutrality means Apple should ..." 2015. 23 Dec. 2015
<<http://www.theverge.com/2015/1/22/7870363/blackberry-ceo-open-letter-net-neutrality>>

consumer, I don't see any problems with someone else getting certain services sponsored for him. As long as I keep getting full access to the Internet according to my plan, I have no problems with what other plans may exist. If Net Neutrality supporters are worried about losing access to regular Internet packs, they could have demanded regulations requiring that regular Internet packs not get affected. Instead they demand that 'Zero' services be taken off the table. As a consumer I feel my options are being restricted with proposed Net Neutrality regulations. I am being told what plan I can and cannot take; what plan I can and cannot be trusted with. If I take the option of restricted sponsored Internet, Startup companies and other consumers need to respect that. After all I am the one consuming those services, and I may choose not to.

Question 2: If differential pricing for data usage is permitted, what measures should be adopted to ensure that the principles of non-discrimination, transparency, affordable internet access, competition and market entry and innovation are addressed?

Answer 2:

- (a) Differential pricing by its very nature and phrase is a discriminatory practice. So is hiring person A and not person B. So is buying from bakery A and not B. A truck company agreeing to ferry goods of producer A and not B is discriminatory too. And, yes, a Grocer choosing to put a brand A in his shop and not B is being discriminatory too. But I believe law distinguishes between these kinds of discriminations which are essential for market functioning and discriminations based on color, religion, sex etc. Market functions fine in all those areas. I am certainly no lawyer and this area could be blurry with current legal setup. But it is no argument for Net Neutrality.
- (b) Transparency is a topic independent of Net Neutrality. You can have net neutrality and still be opaque in what you are offering your consumers. Transparency needs to be stressed in honest contracts between producers and consumers. And any dishonesty and opacity must be punished as fraud, as it should be regardless of Net Neutrality rules.
- (c) Zero plans are a financial innovation and an entrepreneurial step. It is a result of ISPs trying to compete with each other to increase their market share. This will not only allow marginal users to gain access to certain services but also open flow of capital from Application/Services sector to ISP sector²⁴. While we have a wide variety of Applications and Services coming up, we must not forget that Internet penetration needs to increase too; and that needs capital. Consumers need not be the only ones who foot the bill.
- (d) As for competition, refer Section 2.
- (e) Allowing Zero plans should not affect Market entry. You can enter the market and still reach your customers through the Internet. Barriers to market entry are those investments without which you can't function in the market. The term would include natural barriers to entry like capital investment or artificial barriers to entry like license fees. But you can enter the market and not be part of a Zero scheme. There is no reason to believe that these zero schemes will be opted in by so many people that it

²⁴ My previous writing on this topic: "Net Neutrality: Where we disagree"
<<http://www.indianlibertarians.org/net-neutrality-where-we-disagree/>>

becomes a barrier. Certainly, the overwhelming response received by TRAI from consumers afraid of losing access to complete Internet, even if a result of scaremongering, is indicative of the demand for “full” Internet. Sure competition might be affected, but that point has been addressed.

Question 3: Are there alternative methods/technologies/business models, other than differentiated tariff plans, available to achieve the objective of providing free internet access to the consumers? If yes, please suggest/describe these methods/technologies/business models. Also, describe the potential benefits and disadvantages associated with such methods/technologies/business models?

Answer 3: This question unfortunately misses the point. Certainly there are many other businesses models which may be neutral and yet sponsor Internet for end users. Some of them mentioned by Net Neutrality supporters are “equal rated” plans and low cap free Internet plans. But it is important to remember that regardless of the claims by “Internet.org” and other organizations, these services are not for “charity”. Charity is not sustainable in the long run; you run out of funding or you have to rely on tax money. Many of these schemes suggested by the Net Neutrality supporters would require tax funding to work. The answers blindly submitted by scared Internet users using the site “savetheinternet.in” openly calls for government investment in infrastructure. It is worth reminding that there was a reason why we moved away from “Government run ISP only” policy for the Internet in India and why TRAI, in its own words, has moved towards a ‘forbearance’ regime. On a side note about “savetheinternet.in”, how dishonest do you have to be to smuggle in a demand for “national fiber optic network” run by Government in a ‘net neutrality’ mass petition which your site users are scared into signing; and then to criticize similarly dishonest mass petitioning by Facebook’s “Free Basics” campaign. To sustainably reach marginal users who can’t or won’t pay for full Internet access, the business model needs to be profitable. If the business models proposed by Net Neutrality advocates were profitable, they would be adopted by ISPs.

Question 4: Is there any other issue that should be considered in the present consultation on differential pricing for data services?

Answer 4: Given that most concerns about differential pricing are blown out of proportion, I see no other immediate issue.

On a long term scale however, I do see the need to address the Spectrum question as raised in Section 4. Modern technologies like mesh networks can only be utilized if there is freedom in the use of Spectrum. Such technologies would foster community based or local ISP based networks, fostering competition and putting to rest the core issue in the Net Neutrality debate. I do have issues with Net Neutrality however I do recognize that in the face of a monopoly or an oligopoly, Net Neutrality seems to become the “band aid cure”. But even then I would maintain that bringing down artificial barriers to entry would be the proper solution to the problem. At the very least, TRAI should look for which of its policies are forming a regulatory cover that protects established ISPs from competition and then reform (if not remove) them.

I would also like to re-highlight the need for punishing false advertisements and hidden costs, in order to foster honest market transactions. However I still maintain that transparency is a topic independent of “Neutrality”. An ISP can be dishonest and still provide “Neutral Net”.