



## THE ECONOMICS OF NET NEUTRALITY: POLICY ISSUES

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**Abstract** *Although the net neutrality debate dates back to 2000s, it received recently renewed attention from IT specialists, broadband operators, content service providers and not ultimately from civil rights activists and policy makers. In this context the study of the impact of net neutrality regulations on the broadband market development is of great interest. The present article outlines the main pros and cons in the net neutrality debate and provides a synthetic analysis of net neutrality key problems and policy issues. Based on a relevant literature review, it gives an account of the potential economic impact of net neutrality regulations. The intended contribution of the present research is to provide additional arguments against price control on the ISPs market, emphasizing at the same time the role of increased transparency and increased competition between broadband operators in securing an open internet.*

**Key words:**

Net neutrality, internet service providers, content service providers, internet users, economics of net neutrality, net neutrality regulation

**JEL Codes:**

L86, L51, E64

### 1. Introduction: Net Neutrality Debate

Net neutrality refers to the principle that all Internet traffic should be treated equally by the internet service providers (ISPs) not discriminating or charging different fees by user, content, site, platform etc. The concept of net neutrality was coined by Tim Wu (2003) and the idea of net neutrality can be traced back to Lawrence Lessig (2001) that led the open access movement. However most of the net neutrality supporters do not require strict net neutrality, and admit that a good ISP will often manage internet traffic when bandwidth is short, dropping less crucial traffic in a transparent manner (Tim Berners-Lee 2010).

The key issue at stake in the net neutrality debate is whether ISPs should be allowed to exercise a certain type of control over the data traffic or they should be prohibited from speeding up, slowing down or blocking the internet traffic based on its source, ownership or destination. Most of the net neutrality advocates fears that if in the future the ISPs will charge for access and usage of the networks, not only the internet users but also the content service providers (CSPs) like Google, Amazon, eBay (or any other website, blog etc.) this would mean the end of the Internet as we know it. More exactly, "Internet would start to look like cable TV" (Lessig & McChesney, 2006) where customers do not have real control over the content they receive. Moreover, it is assumed that allowing ISPs to grant fastest speed to sites that pay a special fee would lead to a two tiered Internet where certain sites and internet services would be prioritized while others would be pushed into the slow lane. Most of the critics joining the

debate are not opposed to open internet principles but doubt that the regulations which prohibit some feasible ISPs revenue flows are the right answer for the problem. Therefore, much of the policy debate concerning net neutrality is devoted to the question whether market for internet access should be a free market or whether some ISPs revenue flows should be prohibited.

### 2. Net Neutrality Regulations

In European Union, in September 2013, European Commission (EC) adopted Regulatory Proposals for a Connected Continent – the EU's new package of telecoms laws, including the bloc's first explicit net neutrality legislation (EC 2013) (Meyer 2014). In this legislative proposal, EC sustains the necessity of protecting net neutrality across EU and the importance of putting an end "to blocking or throttling of competing or data-heavy services". However, EC underlines also the importance of ISPs' "freedom to offer higher speeds or guaranteed quality according to user needs (similar to express mail or recommended delivery for postal services) provided that open internet is not impaired" (EC 2013). In 2014 the members of the European Parliament (MEPs) are expected to back the reforms concerning the telecom sector. In March 2013, European Parliament's industry committee voted rules obliging ISPs to provide users with a single, uniform quality internet connection regardless of the content they are trying to access. ISPs are prohibited to keep the fastest internet connections for their own services at the expense of those provided by their rivals. However,

broadband service providers are allowed to offer better connections for their own specialized business services provided this does not reduce the quality of the basic connection. The European Parliament is expected to vote on the proposal concerning telecom reforms in plenary in April 2014 (Hirst, 2014).

Civil rights groups such as EDRi (European Digital Rights), the German Digitale Gesellschaft, the French La Quadrature du Net, the Austrian Initiative für Netzfreiheit as well as Access Now from Brussels joined forces to defend net neutrality across Europe, launching the campaign Save the Internet. The advocates of the campaign criticize European Commission's 2013 legislative measures concerning net neutrality because it allows ISPs to charge an extra fee for delivering "specialized services". The concept of "specialized service" is not clearly defined in the proposed regulation and it could be applied to any kind of online service. Therefore, the net neutrality activists fear that this would lead to the creation of a two-tiered Internet, where certain services would be prioritized while others would be pushed into the slow lane (Essers, 2014).

In US, the Federal Communication Commission (FCC) already adopted in December 2010 the net neutrality legislative framework. The FCC acknowledges the usefulness of ISPs' "reasonable network management", considering at the same time that CSPs payments for priority arrangements raise significant concerns. However, transparency and competition are considered to be the main remedies to ensure net neutrality (Krämer, Wiewiorra&Weinhardt, 2013:16). In January 2014a US court of appeals ruled against net neutrality federal rules which require broadband providers to treat all Internet traffic equally (Ingram 2014). Big cable operators like Comcast and telecommunications firms like Verizon, which brought the lawsuit on which the court ruled, will be free to award faster speeds to sites that pay a special fee and to slow or block sites and services that compete with favored affiliates (Hiltzik, 2014). The decision was fiercely criticized by net neutrality advocates that sustain that consumers were left without defense against greedy broadband providers.

The debate concerning net neutrality date back to 2000s, but the study of net neutrality is still topical, given the new developments on the ITC market and also given the growing interest in the subject of civil rights activists, law makers and public, in general. The present article provides in the following sections: (1) a concise literature review of the net neutrality problem, emphasizing the main pros and cons and (2) a synthetic analysis of the economic consequences of some proposed net neutrality regulations and policies and their impact on the broadband market. The main

objectives of the research presented in this article are to explain why reasonable and transparent ISPs network management cannot be avoided given the current status-quo of the Internet and to provide additional argumentation supporting the idea that price regulation on the ISPs market is neither the best nor the only solution for securing an open internet.

### **3. Reasonable and Transparent Net Neutrality versus Strict Net Neutrality**

From the beginning, the architectural design of the Internet was guided by principles entailing non-discrimination between data packets based on their content and source. At the same time, some requirements concerning Quality of Service (QoS) entail a certain type of traffic management. End to end principle and best-effort principle establish that all data packets sent to the network are treated equally and that no intermediate node can exercise control over the network as a whole. No matter how important a data packet may be routers would always process their queue according to the first-in-first-out principle. At the same time, there are requirements for reliable transmission of information that is time critical (low latency) or for which it is desired that data packets are received at a steady rate and in a particular order (low jitter). For example, minimizing latency is of great interest for stock exchanges or financial transactions on the Internet. Millisecond improvements in network speeds offer a competitive advantage for financial institutions. Also, voice communication requires both low latency and low jitter. The requirements for QoS are already reflected in the architecture of the Internet. For example, Internet Protocol version 4 (IPv4) and also the current Internet Protocol version 6 (IPv6) contains header information on the traffic class which allows routers to prioritize packets in their queue, facilitating QoS for certain applications. Moreover, content distribution networks (CDNs) are paid by content service providers (CSPs) to improve users' Quality of the Experience (QoE), given the fact that CSPs revenue from advertisements depends on the number of users on a service. The role of CDNs is obviously non-neutral, their function being to build additional infrastructure that bypasses congested routes on the public Internet (Krämer, Wiewiorra&Weinhardt, 2013:2, 11, 29).

Tim Berners-Lee(2010), best known as the inventor of World Wide Web and an advocate of the net neutrality, sustains that a good ISP will often manage traffic so that when bandwidth is short, less crucial traffic is dropped in a transparent way for users. In fact, traffic management constitutes the current status-quo of the Internet and prioritization mechanisms for data packets are by and large implemented in the network

infrastructure of access ISPs. Tim Wu (2013:168) distinguishes between local network restrictions and inter-network restrictions, considering that ISPs should be allowed to manage bandwidth consumption and other matters of local concern but inter-network restriction should be viewed with suspicion.

The case for the enforcement of strict net neutrality rules cannot be really sustained without requiring important changes of the today internet infrastructure. Some of the net neutrality sustainers are not requiring such a radical type of net neutrality; rather they are concerned that the prioritization mechanisms for data packets that characterize today internet infrastructure could be used by ISPs in order to prioritize those services that provide them with additional revenue streams. For example, ISPs providers could send video from a certain media company at the quality agreed by contract while transferring video from competing media companies at a slower rate. Or ISPs could make easier for customers to connect to a particular online shoe store and harder to reach others. Moreover, ISPs could make difficult for customers to reach websites of certain political parties, religion etc. (Tim Berners-Lee 2010). However, the fine line between reasonable and unreasonable network management which benefit or harm the customers could be difficult to be identified and synthesized in concrete and unequivocal regulation and policies. In this regard, the economic analysis of the net neutrality could reveal some of the most important side effects and economic consequences of net neutrality regulations.

#### **4. The Economics of Net Neutrality: Key Policy Issues**

In terms of policies, there are two methods proposed to secure net neutrality: (a) price regulation (ISPs must charge CSPs a price of zero); (b) increased competition between ISPs (removing the barrier to market entry for ISPs) and increased transparency in contractual relations between ISPs and customers.

##### **4.1. Net Neutrality as Zero-pricing Rule**

Whatever the economic sector where price control is enforced it distorts the allocation of resources, creating shortages or surpluses on the market. ISPs market is not an exception from this point of view. Prohibiting ISPs from charging CSPs is a special case of price control and such regulation could substantially reduce investment incentives of broadband suppliers. Without new investments in the broadband infrastructure and with internet traffic which could increase at a rate that cannot be handled by the current technology and traffic management techniques, the Internet could be severely and persistently congested (exaflood problem).

Moreover, the condition that net neutrality regulations seeks to ban (discrimination or favoritism of some CSPs) arise more often when bandwidth is short (Swanson 2007).

ISPs are the operators of a two-sided market, connecting CSPs to internet users, each side preferring to have as many partners as possible on the other side. Internet users prefer to have access to a variety of contents and CSPs are advantaged when available for many internet users in order to maximize their advertisement revenues. The core of the Internet comprise several types of ISPs, performing different roles: (a) the customer access networks which secure physical connection to each household; (b) the backhaul networks which aggregate the traffic from all connected household of a single ISP and (c) the backbone networks which deliver the aggregate traffic from and to different ISPs (Krämer, Wiewiorra & Weinhardt, 2013: 5). Usually internet users are connected to only one access ISP (either because of contractual conditions or because they do not have other choices in the region where they live). At the same time, CSPs are usually subscribed to more than one backbone ISP or maintain their own backbone ISP, like Google. Therefore, the competition between backbone ISPs could outweigh the discrimination or favoritism exercised by ISPs on CSPs. Currently the main revenue source for access ISPs is internet users' subscriptions, while backbone ISPs are paid by CSPs. If internet traffic continues to increase, access ISPs will need sooner or later additional bandwidth and implicitly more funds for additional investments in broadband infrastructure. Therefore it could be the case that access ISPs cannot bear the costs for additional infrastructure investments without tapping additional revenue streams. In this context, access ISPs could increase their revenue either by increasing the fees for internet users or by imposing some fees to CSPs, given the fact that CSPs benefit from the increased bandwidth of the customer access network as well. Krämer, Wiewiorra & Weinhardt, (2013: 7) emphasize that currently transportation network equipment providers like Cisco, Alcatel Lucent and Huawei improved constantly the efficiency of their products such that costs per unit of bandwidth constantly decreased, offsetting the costs' increases that access ISPs worry about.

Net neutrality as zero-pricing rule imposed to ISPs does not secure strict net-neutrality, but it outlaws the non-net neutrality models with two sided pricing regime: (a) the termination fee model where CSPs are charged just to be able to transmit their data to the access ISP's customers but without additional benefits in return; (the termination fee model is a common practice in the fixed and mobile market for voice communication); (b) the

CSPs tiering model where ISPs charge CSPs offering in exchange faster access lanes (Krämer, Wiewiorra & Weinhardt, 2013).

The main arguments for enforcing a zero pricing rule on ISPs market is that such a rule secure cheap market entry for CSPs ensuring that internet users access as many CSPs as possible. In the context of a two sided pricing regime, interconnection will depend on the number of ISPs and its agreements with CSPs, and given the number of ISPs and CSPs worldwide it seems that internet users would have access only to a fraction of the CSPs they have today (Lee & Wu, 2009). Another argument formulated especially against CSPs tiering model is that ISPs will have powerful incentives to block traffic for certain CSPs even if broadband resources are not scarce in order to maximize their profits. However, increased competition and transparency on ISPs market could be the answer for most of the net neutrality advocates' concerns.

#### **4.2. Transparency and Competition on ISPs Market**

Many shortcomings of the non-net neutrality models (with ISPs charging CSPs for access and usage of networks) can be outweighed by contractual relations between internet users and access ISPs. In this case, transparency about the ISPs' network management practices is very important. Krämer, Wiewiorra & Weinhardt, (2013:15) point out that transparency may be achieved top-down or bottom-up. Top-down method is by legislation requiring ISPs to make their network management practices publicly available. However the top-down approach is not entirely satisfactory if the information is not easily verifiable or easy to be understood. From this point of view bottom-up approaches may be more useful. For example the Glasnost project<sup>10</sup> offers online tools for verifying some of the ISPs practices concerning traffic management. Therefore, in a non-net neutrality model, firms which provide monitoring services of ISPs practices regarding traffic management are an efficient market based solution securing transparency for internet users.

Transparency regarding ISPs' network management practices is relevant if competition on the broadband market is not hindered. If ISPs market is really open, any ISP will have enough incentives to not deceive the confidence of their customers. Szoka, Starr, Matthew & Henke (2013) point out that the most important barriers to entry on broadband market are imposed by local government regulation. Although it is widely believed that deploying the broadband infrastructure is the complicated part for broadband businesses, in fact the pre-deployment barriers, imposed by local governments and public utilities are to be blamed for choking broadband competition. Szoka, Starr, Matthew & Henke (2013) point out that the real bottleneck isn't incumbent

providers of broadband, but incumbent providers of "rights-of-way", which are the real monopolists, having the final say on whether an ISP can build a network. Thus the number of potential competitors who can profitably deploy services is artificially reduced. Sometimes local governments can favor one ISP over another. For example, Kansas City and Austin local governments gave Google "rights-of-way" access for little to no cost. On the one side everybody in that region has benefited from clearing regulatory barriers for Google Fiber, but on the other side the benefit will be greater if local governments will clear the regulatory barriers for all the other ISPs providers. Finally, Szoka, Starr, Matthew & Henke (2013) emphasize that local governments became used to think about "rights-of-way" as revenue streams creating huge side effects on ISPs market.

The net neutrality activists' worries concerning the future of the Internet are justified, especially when barrier to entry on the ISP market are high. But the policy solutions proposed entails often side effects and pitfalls that compound the problem rather than solve it. Imposing prices below the market price entails shortages: broadband price regulation is likely to significantly slow the pace of the broadband deployment. When bandwidth becomes short, traffic management could not be avoided – either market based or bureaucratic and politically regulated. The impact of the slow broadband infrastructure deployment could be huge considering that the Internet gradually emerged from a mere network of networks into a market for markets (Krämer, J; Wiewiorra, L. & Weinhardt, C. 2013:3) and that the internet traffic is increasing at a rapid pace. Cisco predicts that global internet traffic is going to triple by 2017. Given the growing number of non-PC devices, more people with more devices will create more content—especially video content. Also, Cisco predicts that the Internet of Things (the network of connected devices, including machine-to-machine (M2M) connections) will be another important driver of growth for global internet traffic (Burt 2013).

#### **5. Concluding Remarks**

Net neutrality supporters typically do not require strict net neutrality and admit that a good ISP will often manage internet traffic when broadband resources are scarce. In terms of policies the question is whether market based solutions are the right answer to the problem or whether internet access market should be regulated, prohibiting ISPs to charge CSPs for access and usage of the network. Market based solutions are transparency (transparent traffic management performed by ISPs contractually agreed & private

agencies which provide monitoring services of the ISPs traffic management) and competition (free entry or at least low barrier to entry on the broadband market). The current state is that barrier to entry on the ISP market are high especially when local governments tends to overcharge broadband provider for granting the "rights of way" (Szoka, Starr, Matthew & Henke, 2013). However additional research is needed in order to outline a clear picture regarding barriers to entry on the broadband market both in US and EU countries. As far as goes transparency of the ISPs traffic management, currently consumers can test what they are getting when they buy "unlimited Internet access" from broadband providers using ISP testing software (such as Glasnost, The ICSI Netalyzr, MeasurementLab etc.). Using this kind of software internet users are able to test if their ISP discriminates against P2P protocols, BitTorrent or against other applications and protocols.

The net neutrality activists' worries concerning the future of the Internet are justified, especially when barrier to entry on the broadband market are high. Nevertheless, the policy solutions proposed entails often side effects and pitfalls that could compound the problem rather than solve it. Price regulation on the ISP market is likely to reduce incentives for investing in infrastructure and this fact could significantly slow the pace of the broadband deployment. If bandwidth becomes short, ISP traffic management could not be avoided – either market based or bureaucratic and politically regulated.

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<sup>i</sup>The website of the Save the Internet campaign: <http://savetheinternet.eu>

<sup>ii</sup> The website of the Glasnost project: <http://broadband.mpi-sws.org/transparency/>