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## A CASE STUDY ON NET NEUTRALITY

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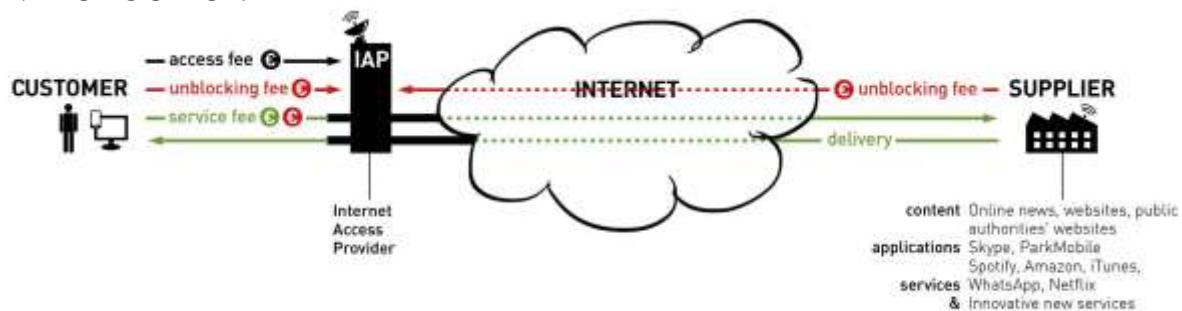
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### ABSTRACT

Net Neutrality is the principle that every point on the network can connect to any other point on the network, without discrimination on the basis of origin, destination or type of data. This principle is the central reason for the success of the Internet. Net Neutrality is crucial for innovation, competition and for the free flow of information. Most importantly, Net Neutrality gives the Internet its ability to generate new means of exercising civil rights such as the freedom of expression and the right to receive and impart information. In this study, we will explain Net Neutrality, why it is important, why certain Internet access providers believe that they have an interest in violating it, and we will address common misconceptions.

**KEYWORDS:** Net Neutrality , IAP , IP , ISP , P2P , TCP , VoIP

### INTRODUCTION



The Internet is a global, interconnected and decentralised autonomous computer network. We can access the Internet via connections provided by Internet access providers. These access providers transmit the information that we send over the Internet in so-called data “packets”. The way in which data is sent and received on the Internet can be compared to sending the pages of a book by post in lots of different envelopes. The post office can send the pages by different routes and, when they are received, the envelopes can be removed and the pages put back together in the right order.

When we connect to the Internet, each one of us becomes an endpoint in this global network, with the freedom to connect to any other endpoint, whether this is another person’s computer (“peer-to-peer”), a website, an e-mail system, a video stream or whatever. The success of the Internet is based on two simple but crucial components of its architecture:

1. Every connected device can connect to every other connected device.
2. All services use the “Internet Protocol,” which is sufficiently flexible and simple to carry all types of content (video, e-mail, messaging etc) unlike networks that are designed for just one purpose, such as the voice telephony system.

Net Neutrality is most commonly defined as the principle that Internet users can connect to any other point in the network. Users can create, access and use any content, service and application they choose, without discrimination, restriction or limitation imposed by those who run the infrastructure.

Internet access providers enable us to communicate, browse the web or transfer files over the Internet, to make our own websites globally available and to use services such as email, social media or Internet telephony. Everybody, and in whatever role, and all organisations, of whatever size and style, is able to participate



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globally. Everybody is able to access services and to offer services. Let's say you want to watch a video online: You connect to the Internet, open your browser and navigate to the video service of your choice. This is possible because the access provider does not seek to restrict your options.

Without Net Neutrality you might instead find that your connection to video service A is being slowed down by your access provider in a way that makes it impossible for you to watch the video. At the same time, you would still be able to connect rapidly to video service B and maybe watch exactly the same content. Why would your access provider do such a thing? There are many reasons: for example, the internet access provider might a) have signed an exclusive agreement with this second video platform or b) provide their own video services and therefore want to encourage you to use these instead of the service that you initially preferred. This is just one of the many reasons for violations of Net Neutrality. Such discriminatory measures are often called "traffic management".

### WHY IS NET NEUTRALITY VIOLATED ?

#### THE THREE MAIN REASONS :

There are many reasons why Net Neutrality is not respected, among the most frequent ones are:

#### **Access providers violate Net Neutrality to optimise profits**

Some Internet access providers demand the right to block or slow down Internet traffic for their own commercial benefit. Internet access providers are not only in control of Internet connections, they also increasingly start to provide content, services and applications. They are increasingly looking for the power to become the "gatekeepers" of the Internet. For example, the Dutch telecoms access provider KPN tried to make their customers use KPN's own text-messaging service instead of web-based chat services by blocking these free services.

Another notable example of discrimination is T-Mobile's blocking of Internet telephony services (Voice over IP, or VoIP in short), provided for example by Skype, in order to give priority to their own and their business partners' services.

#### **Access providers violate Net Neutrality for privatised censorship**

In the UK, blocking measures by access providers have frequently been misused to block unwanted content. For instance, on 4 May 2012, the website of anti-violence advocates "Conciliation Resources" was accidentally blocked by child protection filters on UK mobile networks.

Another example is Virgin Media. The company provides access to the Internet and increasingly uses Deep Packet Inspection (DPI). Virgin is now using this same privacy invasive technology to police their network in attempt to protect its own music business. In all of these cases, private companies police their users' connections to censor what they guess may be unwanted content.

#### **Access providers violate Net Neutrality to comply with the law**

Governments are increasingly asking access and service providers to restrict certain types of traffic, to filter and monitor the Internet to enforce the law. A decade ago, there were only four countries filtering and censoring the Internet worldwide – today, they are over forty. In Europe, website blocking has been introduced for instance in Belgium, France, Italy, the UK and Ireland. This is done for reasons as varied as protecting national gambling monopolies and implementing demonstrably ineffective efforts to protect copyright.

Some politicians call for Net Neutrality and demand filtering or blocking for law enforcement purposes at the same time. However, it is a paradox to create legal incentives for operators to invest in monitoring and filtering or blocking technology, while at the same time demanding that they do not use this technology for their own business purposes.

### WHAT IS DPI ?

Deep Packet Inspection (DPI) Information that we send and receive through the Internet travels in so-called "packets", with "envelopes" indicating sender and receiver. Unlike normal network equipment, DPI looks not just at the envelopes but into packet contents, and can be used to disrupt or block certain packets based on what they contain. DPI can be used for innocuous reasons (to fight spam or viruses), but also to carry out surveillance or to censor information as this technology makes it possible to capture information from network traffic and assess it in real time. In Russia for instance, Cisco's Deep Packet Inspection solutions are allegedly



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being used by the government to block access to certain websites. Cisco's DPI tools are also being used in Germany by T-Mobile on mobile networks.

### REASONS FOR NET NEUTRALITY

**No discrimination** – Net Neutrality is the principle that all types of content and all senders and recipients of information are treated equally. This principle upholds the right to freedom of expression which includes, according to Article 19.2 of the United Nations' International Covenant on Civil and Political Rights (ICC PR), the freedom to seek, receive and impart information and ideas of all kinds. Without Net Neutrality, Internet access providers would become gatekeepers of the access to content on the Internet, with the power to decide what we can read and write and with whom we are allowed to communicate.

**Free Expression** – The history of the Internet shows very clearly that Net Neutrality encourages creative expression. The ability to publish content and to express opinions online does not depend on financial or social status and is not restricted to an elite. There is a huge trend towards people sharing information and experiences online, sometimes referred to as web 2.0. This means that individuals, small businesses, traditional news sources and large businesses can all create content that is available to everybody. Net Neutrality enables information to travel through the network without being restricted or blocked, thereby enabling a vibrant digital environment, full of ideas and innovation.

**Privacy** – Measures to undermine Net Neutrality can have a direct impact on our privacy (DPI). In a non-neutral Internet, providers would be able to monitor our communications in order to differentiate between messaging, streaming, peer-to-peer (P2P), e-mails and so on. According to a recent study, some European access providers are already doing so via the use of Deep Packet Inspection (DPI) for their commercial benefit. The reuse of this technology for government or intelligence purposes is inevitable.

**Access to Information** – Net Neutrality is also the catalyst for the creation of diverse and abundant online content. Nonprofit projects like Wikipedia, blogs and user-generated content in general have the same conditions to access and publish information as large, commercial Internet players. Without Net Neutrality, we would have a two-tier Internet where only those who can pay would be able to access information or get content delivered faster than other users.

**Democratic Process** – Net Neutrality improves the quality of democracy by ensuring that the Internet remains an open forum in which all voices are treated equally. It ensures that the ability to voice opinions and place content online does not depend on one's financial capacity or social status. It is therefore a powerful tool in facilitating democracy, enabling diverse ideas to be expressed and heard.

**Tool against censorship** – Without Net Neutrality, network operators can block or throttle not only services, but also content. The fundamental shift in information communications technologies over the last 10 years has facilitated revolutions and it offers the possibility of greater social reforms through greater transparency and the free flow of information.

**Consumer choice** – Net Neutrality ensures access to content and offers greater consumer choice by allowing more players to enter the marketplace. Therefore, the amount of online information is vast and growing, leading to intellectual and cultural interaction that was scarcely imaginable twenty years ago. Without a neutral net, access providers can prioritise applications or services, thereby creating "walled gardens" in which consumer choice is limited.

**Innovation and competition** – Net Neutrality continues to foster innovation, as individuals and companies alike can create content and provide new services with the online world as their audience. Any individual can upload content at relatively little cost. An unrestricted Internet gives market access to small and medium enterprises or start-ups that might not otherwise have a competitive edge against larger corporations. Without Net Neutrality however, access providers are allowed to restrict access needed by innovators that seek to develop online services. Innovators would have a smaller and less predictable marketplace for their services.



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For example, a start-up company might not be able to reach all access providers' customers, or pay potentially thousands of providers to do so.

**Digital Single Market** – Net Neutrality is a cornerstone for the completion of the Digital Single Market. It removes barriers and allows users to freely communicate, fully express themselves, access information and participate in the public debate – without unnecessary interference by gatekeepers or middlemen. By contrast, a non-neutral Internet contributes to the fragmentation of the Digital Single Market. The European Parliament acknowledged this danger by adopting a resolution on “Completing the Digital Single Market” in October 2012, in which it “calls on the Commission to propose legislation to ensure Net Neutrality”.

**Protecting a global Internet** – As soon as access providers start making use of traffic discrimination tools to interfere in global communications for their own commercial benefit, governments will be tempted to use the technology for public policy goals – in fact, Western governments are more and more often asking providers to restrict certain types of traffic, and to filter and monitor the Internet to enforce the law. In other parts of the world this has led to “national Internets”, such as the Chinternet” in China and the “halal” Internet in Iran. The principle of Net Neutrality will help protect the global Internet.

### TEN POINTS TO SAFEGUARD

#### Net Neutrality

1. The Internet must be kept neutral and open.
2. Accessibility between all endpoints connected to the Internet without any form of restriction must continue to be upheld.
3. All forms of discriminatory traffic management, such as blocking or throttling should be prohibited, unless as part of objectively necessary traffic management measures.
4. Traffic management should only be allowed as a narrowly targeted deviation from the rule. It must be either necessary, proportionate and legally required, or required to address a transient network management problem which cannot be dealt with otherwise.
5. Legal clarity must be established to determine what types of traffic management are legitimate under which circumstances.
6. Access providers have to indicate in their contracts and advertisements a guaranteed minimum bandwidth, maximum latency and quality measures for the connection (so that customers can determine whether a particular connection can e.g. be used with Skype). Access providers have to provide tools to verify those standards. These standards must be determined with a statistical method that has to be published.
7. We need to establish a clear set of obligations for access providers regarding the neutrality and best effort of the Internet broadband services on the one hand, and for specialised services that are not transported via the Internet on the other.
8. By default, only header information should be used for traffic management. The use of deep packet inspection (DPI) should be reviewed by national Data Protection Authorities (DPAs) to assess compliance with the EU's data protection and fundamental rights framework.
9. End-users should be able to report violations of the points above to an authority defined by the government. This authority must have the necessary resources to enforce the above conditions.
10. EU-wide legislation on Net Neutrality should provide for financial sanctions with a sufficient dissuasive effect.

### GLOSSARY

**Best effort** The Internet operates on a “best effort” basis in contrast to the telecoms world's end-to-end voice circuit with a guaranteed Quality of Service. This is because data traffic is often short and bursty and the overhead involved in trying to reserve resources in advance for such traffic would often be wildly excessive. In addition, there are simply too many networks involved in the Internet to allow all the direct contractual relationships that would be needed for generalised QoS. See also peering.

**DOCSIS** DOCSIS is an international telecommunications standard that permits the addition of high-speed data transfer to an existing cable TV system.

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**End-to-end principle** The end-to-end principle is part of the Internet's core architecture. This principle asserts that Internet communications should be controlled at its endpoints rather than by intermediaries. The "transmission pipe" does not discriminate against the sender, recipient or content of the data transmitted over the network.

**Filtering** The act of blocking specific packets of data when they travel through networks based on pre-defined criteria. It can be used as a technique to implement security firewalls but also to censor communications.

**IP (Internet Protocol)** IP is a communications standard that allows computers to send data packets to one another. IP is the basic communication technology of the Internet.

**IP address** An IP address is a numerical address that is assigned to every device connected to the Internet (check our booklet "How the Internet Works"). As household or business routers will often display just one IP address for all of the people connected to it, the IP address can identify a group of people rather than just one individual.

**Internet access provider** An access provider is a company that offers access to the Internet, that operate fixed/mobile infrastructure or provide access to infrastructure.

**ISP (Internet Service Provider)** ISP is the general term for companies or organisations that provide access to the Internet and related services. There are different types of ISPs, such as access, hosting, virtual and transit providers.

**Peering** Many networks on the Internet swap traffic with their peers without payment. This is a sophisticated response to a complex environment. Accounting and billing and even negotiating the contracts in the first place involve costs for any organisation. At its simplest, your access provider's network is paid for by its subscribers. It may then buy bulk transit to access the rest of the Internet. But if it can then simply swap traffic with its peers then this can be win-win for all concerned. It would be illogical to pay your peer when they will just have to pay you back - and in addition you would both need to assume the costs of all the overheads of such an arrangement.

**Peer to peer (P2P)** A decentralised system where the end-users ("peers") are connected directly with each other via the Internet.

**Throttling** Throttling means the intentional slowing down of services, applications or content by an Internet access provider.

**Transmission Control Protocol (TCP)** TCP is the protocol responsible for verifying the correct delivery of data and keeping track of data packets. TCP helps to detect errors and to trigger retransmission until the packets are correctly and completely received.

**TCP/IP architecture** TCP and IP are the most common as well as the oldest standards for Internet communication. As most transmissions of data across the Internet take place using TCP on top of IP, the name TCP/IP has come to represent the complete suite of protocols used on the Internet. These protocols define the rules that computers must follow in order to communicate with each other and send data to the right destination.

**Traffic management** ISPs have always engaged applied mechanisms to control traffic flows to preserve the security of the network or to avoid congestion. If ISPs engage in supplementary practices (in addition to the existing congestion control by TCP/IP) to inspect and to differentiate traffic, this is often referred to as "traffic management".

**VoIP (Voice over IP)** A set of data communications protocols and technologies to enable voice to be sent over the Internet or over separate, IP-based networks.

### CONCLUSIONS

In this paper, we have studied about net neutrality. We have explained the main characteristics of net neutrality, and DPI, digital single market, why net neutrality violated, and the points to safeguard the net neutrality. In this paper, a survey of the research work on reasons of net neutrality is presented.

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