

Topic: “QoS and **Neutrality** of the Internet”.

A Brief report extracted from an Assignment

Introduction:

Network **Neutrality** is a really intense subject that includes a multitude of political, economical and ethical aspects.

Since the origin of the internet, and because of its historical development focus on the technology, the building the Internet has involved engineers rather than politicians and business people.

Internet being the sum of many network interconnections using the same technologies and norms, there isn't a central body which controls it.

This is really important because it affects the actual debate around the **neutrality** of internet, how and who is able to control what the internet service providers are doing with the network. The actual moderators are just associations that focus only on the technical part making sure that the networks work, for example the ICANN and the IANA are setting the rules and resolving conflicts.

To understand the debate around network **neutrality** it's important to understand what are the principles on which internet has been designed, for example Separation between network technology and services, a Best Effort service model, etc...

There is a non-discrimination and transparency principle that is really important for the defenders of the network **neutrality**, the main principle of the Internet has been to put the intelligence at the edge, the network is just there to carry information without looking at what it is. In the same way the post office doesn't look into the parcels, they just know where it comes from and where it's supposed to go.

The success of the Internet is that the Internet Protocols are really efficient and are constantly improving to find quicker ways to send the packets to their recipient. That is where the concept of quality of services has been introduced into the equation. Because of our use of the Internet and its exponential growth, increasing numbers of accesses and interconnections of networks, Internet tend to be saturated in terms of communications.

For economical reasons Internet Service Providers (ISP) have developed an asynchronous model for the end users, giving them a high capacity in download and lower capacity in upload. Also for convenience reasons users tend to use centralised servers, like “Youtube” or “Facebook”, making the structure unbalanced because it can create jams if many users decide to download the same files at the same time. Quality of Service is a concept that has been introduced to regulate the flows of packets giving priorities to certain protocols or content in order to ensure a quality of service for the end user. It has created grade of services but it’s an evolution of the network, good or bad, it just has to be compliant with the Internet fundamental principles.

There is also an ongoing conflict behind those problems of network saturation, and it is linked to an economic problem between Content Provider/Creators and the Data carriers who have to support the cost of the infrastructure.

Being a content provider can be a highly profitable business, because Internet is ubiquitous you can be established anywhere in the world and still access the world's market at a relatively low cost. In the other hand the Data Carriers have to support the charges of the infrastructure and its extremely expensive because customers are always in demand of better services.

In this short report we will first discuss about the two sides of the Internet **Neutrality** and then introduce the challenges that the concept of Quality of Services raises. We will focus on those two aspects because they are relevant to understand what is the challenge linked to network **neutrality** and the open network.

Network **Neutrality** applied to the Internet

This debate about the control of usage of a communication technology by different private agents for the use of the public isn't recent, it has been massively discussed and from different points of view. From a political aspect it is hard to state that question on a national level when the challenges implies a network that goes beyond nations. Each country has their own policies but we can remark two major players which are the United States with the American Federal Communication Commission (FCC) putting a lot of effort to preserve an open internet and satisfying the Internet providers request. In the other hand in the European Union the European Commission trying to re-design the "Telecoms package" to include this question.

Basically they debate is axed on several aspect of the network and its economy such as the free competition and innovation, anti-trust law, extra services included in the product sold by the ISPs, privacy, interoperability across applications, devices and networks.

The Net **Neutrality** proponent are really worried that without network **neutrality**, competition for new entrants will be impossible, the big ISPs (i.e. the ones with an important number of users) will force them to pay extras for their content to be transported across their network. That is why they consider that the network **neutrality** is a non-discrimination policy set according to the fundamental principles of Internet and therefore a network that doesn't follow those principles is no longer Internet.

A brief summary of those principles shows that the network design philosophy is only covering the technical issues, which is only a part of the problem here:

- *Separation between network technology and services.*
- *End-to-End architecture, and extension of intelligence from the core To the edge of a network.*
- *Scalability.*
- *Best Effort service model.*
- *Distributed design and decentralised control.*

(Fall, 1999)

Again this economical problem between data carriers and content provider is at the origin of this conflict. In response to this issue of competition, network neutrality opponents argue that the revenues are too low in comparison of the cost they have and that it is affecting the budgets for innovations.

They claim the right to use tiered services to generate revenues to drive investments, Tom Tauke, spokesperson of the ISP Verizon claim that there is no incentive for innovations if there are low revenues. The company wants to find a solution to insure the actual level of internet and in the same time build extra services around to add revenue streams without harming the network, allowing creativity through investment. They are thinking about Tele-working, home health, smart grid etc...

The major problem with network neutrality is its complexity due to the different aspects it takes and the facts that agents are only focus on their end of the problem, there is important lack of governance. The real question is how much can they use tiered services to generate revenues around the principal products, and if they are using the same network, shouldn't it be assimilate as part of Internet?

The question of Quality of Services (QoS)

Internet is based on the packet switching technology through the TCP/IP protocols as defined earlier; the network is just there to transport the packets. The quality of service is just an engineering solution used on the transport layer to guarantee a level of performance on the network and shape the traffic.

It will manage priorities of certain protocols to insure that for example the VOIP packets are dealt in priority due to the importance of having a fluid conversation without missing information. This implies the concept of Grade of Services by which will define an application requirement in terms of bit rate, latency, packet dropping ratio, etc...

Not all networks use quality of services but it has an implication on the network **neutrality** by affecting the priorities of certain protocols or application linked. For example multimedia streaming requires a relative high priority because people don't like waiting in the middle of a video and it's crucial that all the pieces are put together in time.

The implications on net **neutrality** are evident if this technology is used to create grades between content creators. For example we can imagine that an ISP asks a content provider like "Youtube" extra fees to carry their videos (costly in resources) to their customer.

What will happen to a brand new video platform without the same revenues as "Youtube", they won't be able to compete on the same level. That also can happen at the other hand of the transaction, the ISP segmenting its services by creating premium Internet products with the option "Youtube plus" in order to get the videos faster than with a standard connection.

That is extremely dangerous because it is in total breach of the fundamental principles of Internet which stands for the best effort services and the separation between technologies and services. Those sorts of solutions aren't being used so far but ISPs are signing peering arrangements and Service Level Agreements with companies which set the rules of the interconnections, defining how to exchange the information and the best practices. But most importantly, that is where the levels of services are defined.

An adding problem is that networks are saturated, p2p, ftp and streaming video and other popular protocols will always fill the "pipes" and adding more bandwidth will not make any difference

"Throwing bandwidth at the problem can't solve it"
Ron Sege (CEO of Ellacoya)

ISPs have an important task and their position isn't really easy, locked with the important cost of the infrastructure and with levels of services requirements. Solutions must be found that will ensure free competition and be compliant with the fundamental principles of Internet.

Conclusion:

To conclude, we have seen that because of historical design, there isn't a central point that controls the Internet, that is one of the reasons that create that lack of governance which is an important problem.

Proponents of Network **Neutrality** are concerned about the free competition and the use of the network and ISPs want to find revenues streams to enable innovations and balance their costs of infrastructure. This debate has been discussed for a long time and its complexity makes the whole process harder, the lack of guidance is not helping. It involves everyone and cannot be only discussed between ISPs and the FCC.

Recently the Informational Technology Industry Council (ITIC) which is an important consortium of IT brands including Cisco, Apple, IBM, etc... has announced that they were also working on project about Internet openness.

The recent tentative of agreement between Google and Verizon and its explosion in the media showed how people are concerned about Internet and its future.

The European Commission has opened a public consultation on the open internet and the net **neutrality** to which this brief report will be sent.

Businesses needs to find revenues streams to allowed investments through innovations and creativity but also insure that the fundamental principles of Internet are being followed. Supporting the cost of the infrastructure is not facilitating but solving problems with technologies need to be driven in a fair economic environment where free competition is possible.

Our usage of the Internet as a democratic tool allowing freedom speech has changed this communication tool in one of the most important evolution of the human kind. Governments can't let private companies ruling this market without guidance.

The way citizen got involved in this battle for Net **Neutrality** will certainly push the debate on internet for mobile phones in the close future. Our usage of internet on phone is limited for the same structural/economic reasons and we will soon need our phone unleash with a real Internet access as we keep increasing our nomad usage of those new toys.

References:

Anderson, Nate, 2007, "Deep packet inspection meets 'Net neutrality, CALEA". Ars Technica. Retrieved 13/09/2010. Cerf, Vinton (2009). "The Open Network. What it is, and why it matters.". Telecommunications Journal of Australia 59(2)

Fall,1999, Department of Electrical Engineering and Computer Science, Lecture 2 – Internetworking. Massachusetts Institute of Technology.

<http://www.numerama.com/magazine/16648-neutralite-du-net-vers-un-projet-d-accord-alternatif-a-celui-de-google-et-verizon.html> Retrieved 13/09/2010.

<http://www.numerama.com/magazine/16413-google-pret-a-sacrifier-la-neutralite-du-net-sur-l-autel-d-android.html> Retrieved 13/09/2010.

http://www.nytimes.com/2010/08/05/technology/05secret.html?_r=2 Retrieved 13/09/2010.

http://www.imprintmagazine.org/life_and_style/digital_divide_issue_net_neutrality Retrieved 13/09/2010.

<http://www.openinternet.gov/workshops/approaches-to-preserving-the-open-internet.html> Retrieved 13/09/2010.

<http://www.eff.org/issues/net-neutrality> Retrieved 13/09/2010.

<http://vonage.nmhoy.net/qos.html> Retrieved 13/09/2010.

http://www.laquadrature.net/fr/net_neutrality Retrieved 13/09/2010.

<http://blog.fdn.fr/category/NEUTRALITE-DU-NET> Retrieved 13/09/2010.

http://ec.europa.eu/information_society/policy/ecom/library/public_consult/net_neutrality/index_en.htm Retrieved 13/09/2010.

http://www.myspeed.com/support/qos_matters.html Retrieved 13/09/2010.