

Network Neutrality: Challenges and responses in the EU and in the U.S.

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Network Neutrality

- Introduction
- Technological background
- Economic background
- Quality differentiation and evolving business models
- Differences between the EU and the US
- Recommendations

- How should we define network neutrality?
- Why does net neutrality raise concerns?
- What harms are known to date?

How should we define network neutrality?

- Network neutrality has taken on various meanings:
 - The ability of all Internet users to access the content or applications of their choice.
 - Assurance that all traffic on the Internet is treated equally, whatever its source, content or destination.
 - Absence of unreasonable discrimination on the part of network operators in transmitting Internet traffic.
- The use of various forms of quality differentiation for Internet traffic has been routine for decades.
- This differentiation serves in most cases (but not necessarily in all) to benefit consumers.

Why does net neutrality raise concerns?

- Breaches of network neutrality have raised a range of different fears related to:
 - Anticompetitive behaviour
 - Innovation
 - Freedom of expression
 - Consumer awareness
 - Privacy
- The issues that have been raised are in practice subtle and complex.
- A simplistic, one-size-fits-all solution could potentially raise equally serious concerns.

What harms are known to date? /1

- The European Commission conducted a public consultation on network neutrality in late 2010.
- The Commission found a consensus among “...network operators, internet service providers (ISPs) and infrastructure manufacturers that there are currently no problems with the openness of the internet and net neutrality in the EU ... They maintain that there is no evidence that operators are engaging in unfair discrimination in a way that harms consumers or competition. This general view is supported by a number of Member States.”

What harms are known to date? /2

- There have been scattered complaints, some of them credible, of
 - mobile network operators (MNOs) blocking or charging excessive prices for VoIP
 - blocking or throttling of traffic such as file sharing
- BEREC considers the incidents relevant, but
 - they “... may not necessarily represent breaches of network neutrality”;
 - many were finally resolved “without any formal proceedings”; and
 - the incidents “have not led to a significant number of investigations by NRAs”.

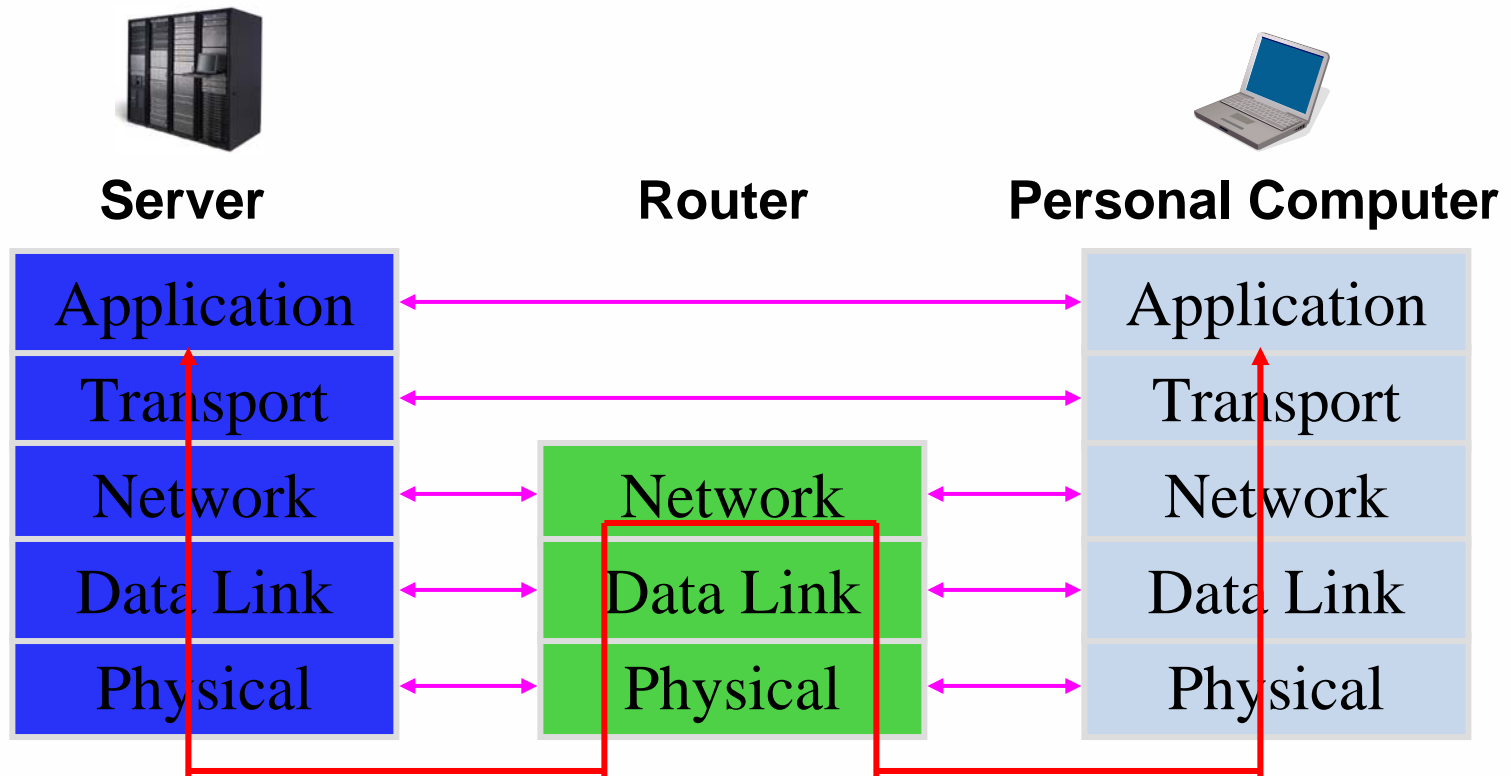
What harms are known to date? /3

- There appear on balance to be few if any documented, clearly problematic incidents in Europe to date.
- There is no demonstrated, sustained pattern of systematic and abusive discrimination.
- Despite all of this, possible concerns for the future remain.

Technological background of net neutrality

- The Internet protocol suite
- Quality of Service (QoS) and Quality of Experience (QoE) in an IP-based network

The Internet protocol suite



Quality of Service (QoS) in an IP-based network

- **Bandwidth:** the maximum number of bits that a transmission path can carry.
- **Propagation delay:** The time that a packet requires, as a function of the length of all transmission path and the speed of light through that particular transmission path.
- **Queuing delay:** The time that a packet waits before being transmitted. Both the average delay and variability of delay (jitter) matter, since the two together establish a confidence interval for the time within which a packet can be expected to arrive at its destination.
- **Packet loss:** The probability that a packet never reaches its destination. Packet loss in an IP-based network is a normal response to congestion, rather than a failure mode.

Quality of Service (QoS) and Quality of Experience (QoE)

- QoS parameters and mechanisms are important to enable network operators to design, build and manage their networks, but they are not directly visible to end-users.
- Crucial for end-users, however, is the quality that they personally experience during their use of a service.
- These Quality of Experience (QoE) requirements are strongly dependent on the application.
 - E-Mail has little sensitivity to packet loss and delay.
 - Real-time two-way Voice over Internet Protocol (VoIP) tends to be highly sensitive – delays more than some 150 msec cause problems.
 - One-way video may or may not be sensitive, depending on user expectations for how quickly the stream starts (zapping time).

Economic background of network neutrality

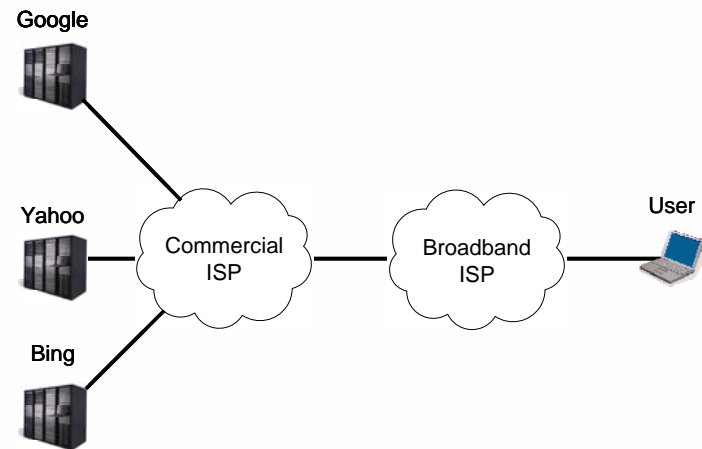
- Quality differentiation
- Economic foreclosure
- Two-sided (or multi-sided) markets

Quality differentiation

- Quality differentiation and price differentiation are well understood practices.
- In the absence of anticompetitive discrimination, differentiation generally benefits both producers and consumers.
- We typically do not consider it problematic if an airline or rail service offers us a choice between first class and second class seats.

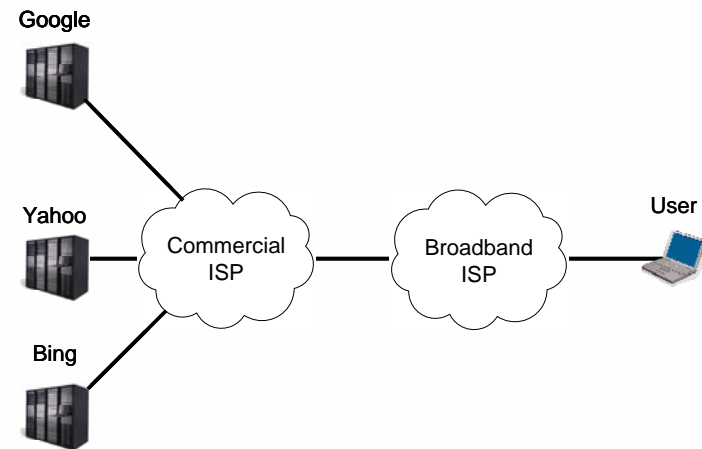
Economic foreclosure

- When a producer with market power in one market segment attempts to project that market power into upstream or downstream segments that would otherwise be competitive, that constitutes economic foreclosure.
- Foreclosure harms consumers, and imposes an overall socio-economic deadweight loss on society.



Two-sided markets

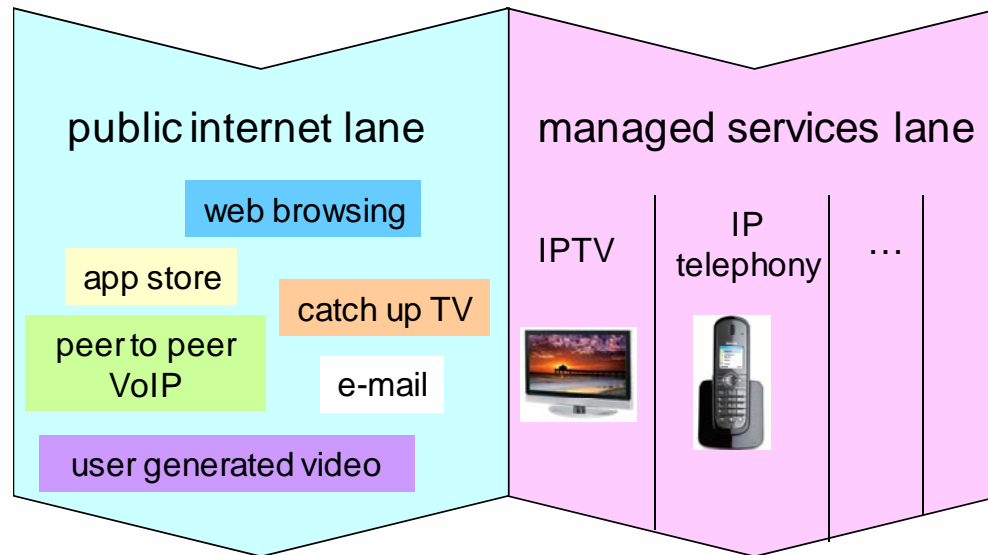
- The Internet can be thought of as a two-sided market, with network operators serving as a platform connecting providers of content (e.g. web sites) with consumers.
- Under this view, some disputes are simply about how costs and profits should be divided between the network operators and the two (or more) sides of the market.



Quality differentiation and evolving business models

- The emergence of the Two Lane model
- Possible evolution of business models
- Relative merits of different scenarios

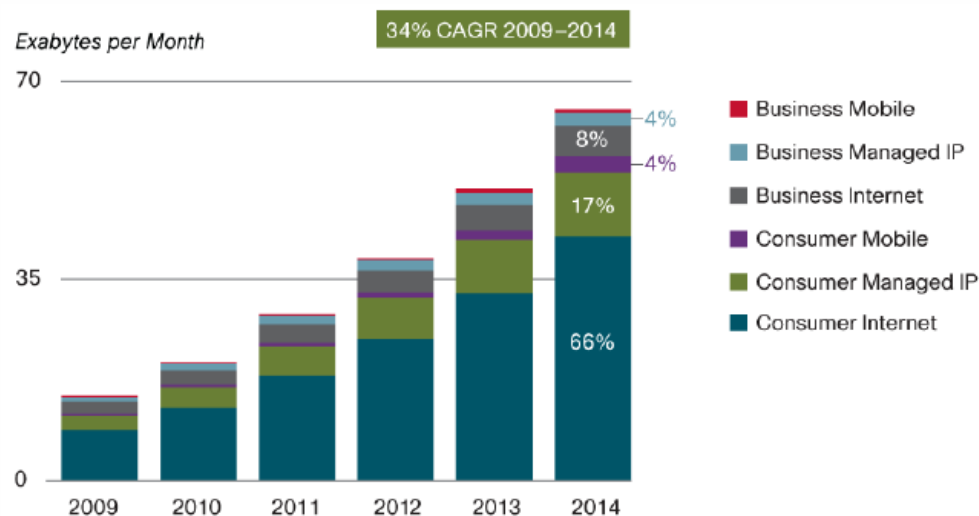
The emergence of the Two Lane model



- **Managed services lane:** Individual arrangements for QoS-sensitive services such as VoIP and IPTV.
- **Public Internet lane:** A single arrangement for all non-QoS-sensitive services.

Possible evolution of business models

- Little change from today
- Continuation and further expansion of two-lane model
- The managed services lane is opened to other providers
- End-to-end service guarantees become possible in the public Internet (QoS-aware interconnection)



Source: Cisco VNI, 2010

European Parliament, IMCO Committee, Brussels, 26 May 2011

Relative merits of different scenarios

- The relative desirability of the scenarios differs somewhat in terms of their impact on competition, innovation, and to some degree consumer awareness. The more open scenarios seem preferable.
- We see little difference in terms of freedom of expression and privacy implications.
- The Two Lane model is in use today *within* networks, but rarely *between* networks.
- Opening up of the managed services lane is not so far-fetched. Consider QoS-aware bitstream access.
- QoS-aware interconnection is promising, but unlikely.

Differences between the US and the EU

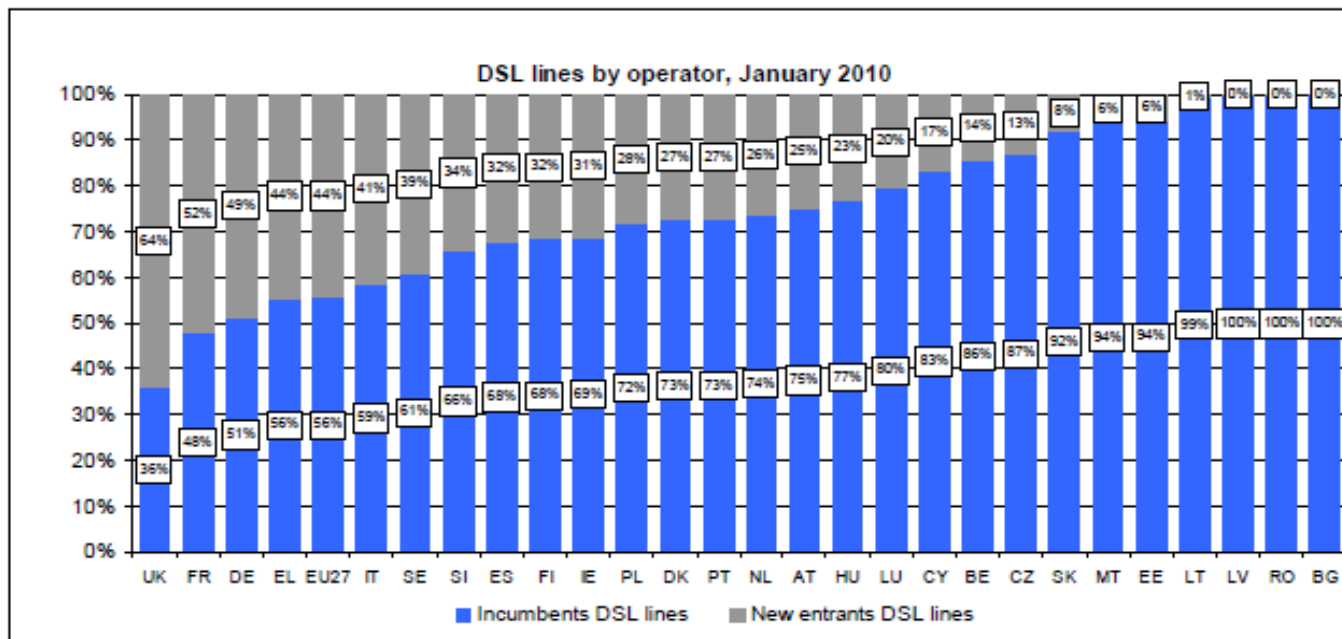
- Different market structure
- Different regulatory framework
- Different applicability of competition law

Market structure: US

- Most US homes could receive broadband from either a cable television provider or a telecommunications provider.
- Cable broadband reaches 38% of US households, ADSL and FTTH 30% (US FCC 2010 data).
- Competitive providers (using LLU, shared access, or bitstream) have largely disappeared in the US (less than 2% share), resulting in a market environment that is essentially *duopolistic*.
- Mobile broadband is widespread, but serves as an *economic complement* to fixed, not as a *substitute*.

Market structure: EU

- The European competitive environment is richer overall.
- Cable coverage is uneven among Member States.
- LLU, shared access and bitstream are generally effective, but there are substantial differences among the Member States.



Source: 15th Implementation Report, 2010

European Parliament, IMCO Committee, Brussels, 26 May 2011

- *Telecommunication services* are subject to numerous regulatory obligations; *information services* are subject to few explicit obligations.
- This distinction historically enabled the FCC to avoid regulating the Internet core.
- During the George W. Bush years, the FCC classified broadband access when bundled with Internet service to be an information service.
 - Weakened or lifted procompetitive remedies, thus reversing the growth of retail competition for DSL lines.
 - Lifted non-discrimination obligations.

- The FCC issued an Open Internet ruling in December, 2010.
 - **Rule 1: Transparency:** A provider of broadband Internet access service must publicly disclose accurate information regarding its network management practices, performance, and commercial terms sufficient for consumers to make informed choices ...
 - **Rule 2: No Blocking:** A provider of fixed broadband Internet access service shall not block lawful content, applications, services, or non-harmful devices, subject to reasonable network management.
 - **Rule 3: No Unreasonable Discrimination:** A provider of fixed broadband Internet access service shall not unreasonably discriminate in transmitting lawful network traffic over a consumer's broadband Internet access service.
- The ruling thus imposes fewer burdens on mobile networks.
- The ruling is being aggressively challenged in the courts and in the House of Representatives.

Regulation: EU

- Provisions for competitive access (LLU, shared access and bitstream) continue to be generally effective.
- Revisions to the regulatory framework were enacted in 2009, with transposition required *now*.
 - The ability of end users to access content, applications or services of their choice is now an explicit goal of European policy.
 - Providers of electronic communication services must inform end users of their practices in regard to traffic management, and provide end users with the right to change providers without penalty if they are dissatisfied with a change in these practices.
 - Empowerment of NRAs to impose, if necessary, minimum QoS obligations on an SMP operator.

Competition law: EU and US

- In Europe, competition law is generally viewed as an *ex post* complement to *ex ante* regulation.
- In the US, by contrast, competition law is largely pre-empted by sector-specific regulation as a result of a number of court rulings (Trinko, Goldwasser).

Recommendations

- Do not impose any further network neutrality obligations until there is sufficient experience with the obligations already imposed through the 2009 amendments to the regulatory framework to make a reasoned judgment about their effectiveness;
- Support both technical and policy research to enhance the effectiveness of the consumer transparency obligations, and to ensure that the minimum QoS obligations can be effectively imposed should they prove to be needed;
- Continue to study the aspects of network neutrality where complaints may have some basis, including (1) charges and conditions that mobile operators impose on providers of Voice over IP (VoIP), and (2) impairment of peer-to-peer traffic; and
- Reserve judgment on any further obligations until there is a clearer vision of what harms to societal and/or consumer welfare, if any, are visible once the 2009 provisions are fully implemented.



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