



**Converging or diverging: IMS, Web 2.0 and Net Neutrality  
(Track #1 Innovative Broadband Access Technologies)**

*Telefonica*

Antonio J. Elizondo



**MUSE Autumn School 2006  
(October 19-20, Bilbao)**

# Convergence is one of the current bywords...

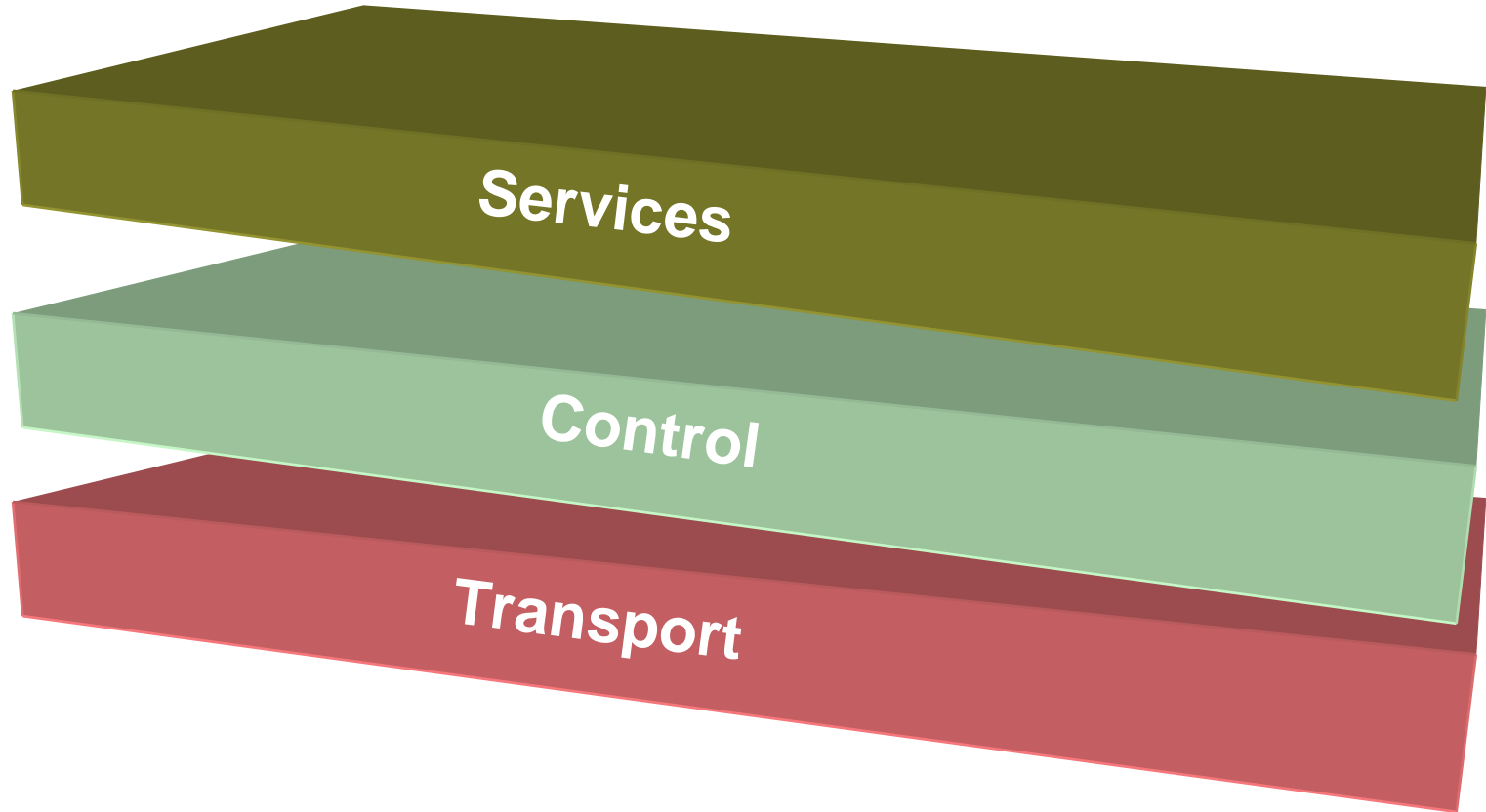


- > ...but can have different meanings
  - Digital Convergence
    - The process by which separate media (audio, video, data) become digital
  - Media Convergence
    - The removal of entry barriers across the IT, telecoms, media and consumer electronics industries, creating one large 'converged' industry.
  - Network Convergence
    - A single network infrastructure can transport any kind of media
  - Services Convergence
    - Same service can be accessed through different access technologies
  - Devices Convergence
    - The device is capable to connect to different access networks
  - Fixed Mobile Convergence
    - Same services can be accessed from fixed and mobile networks

# Are we really converging? Towards where?



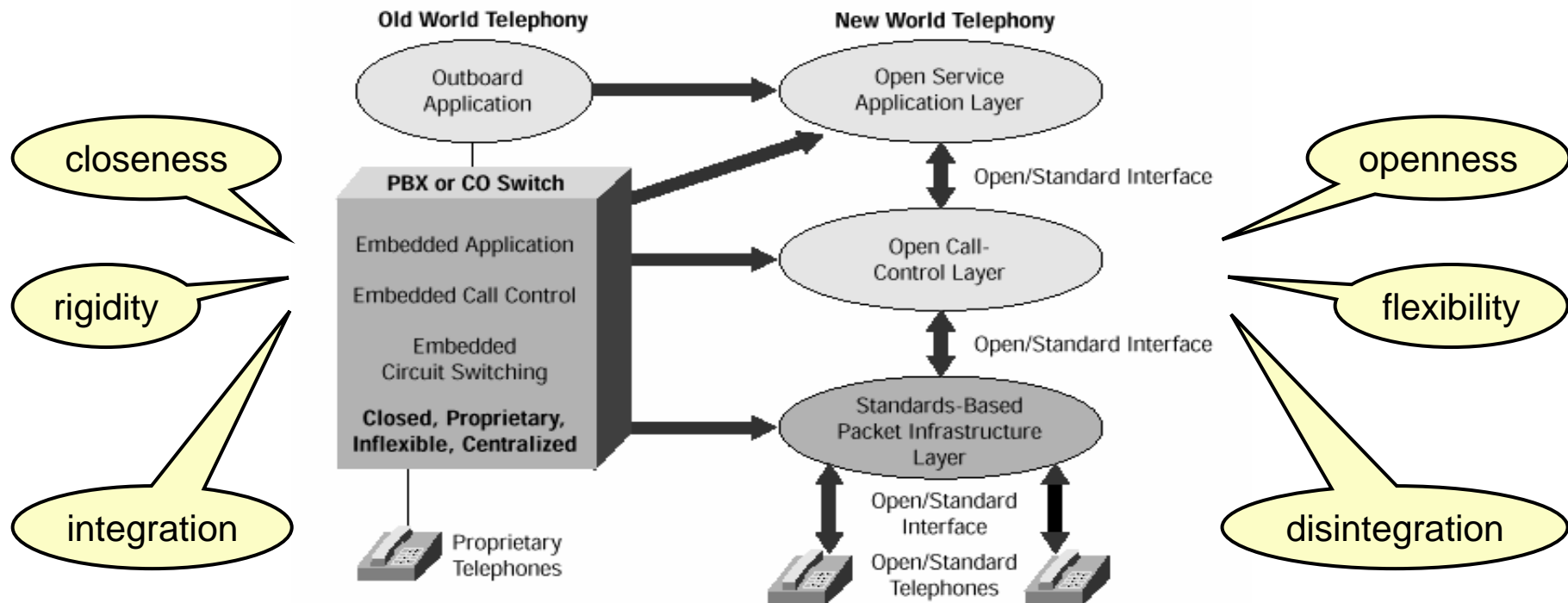
- > The Telco view: NGN, IMS
- > The Internet view: web 2.0
- > The debate: Network Neutrality



# The Telco motivation



- > Service and infrastructure were naturally merged in PSTN
  - However, digitalisation made possible to start thinking on networks that were able to provide multiple services

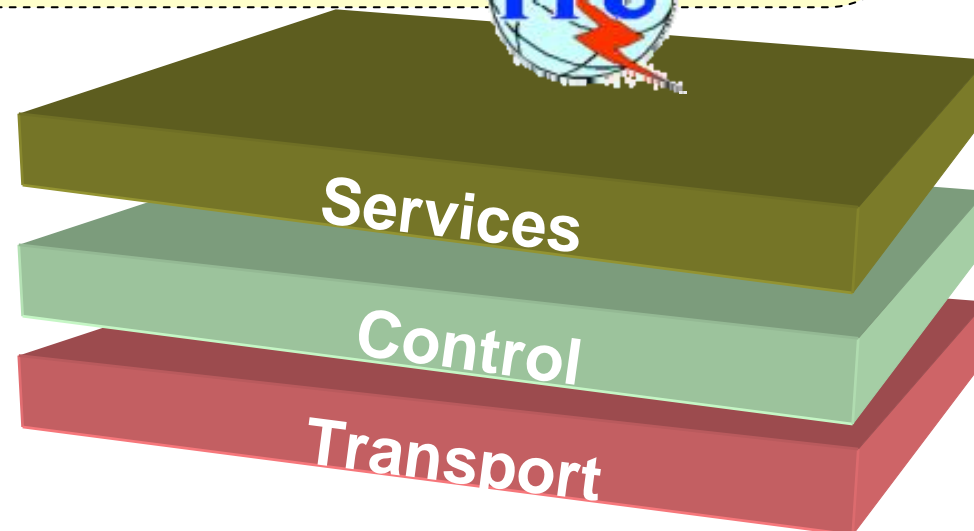


# Next Generation Network



**Next Generation Network (NGN):** A **packet-based** network able to provide telecommunication services and able to make use of multiple broadband, QoS-enabled transport technologies and in which **service-related functions are independent from underlying transport-related technologies**. It enables unfettered access for users to networks and to competing service providers and/or services of their choice. It supports **generalized mobility** which will allow consistent and **ubiquitous provision of services** to users.

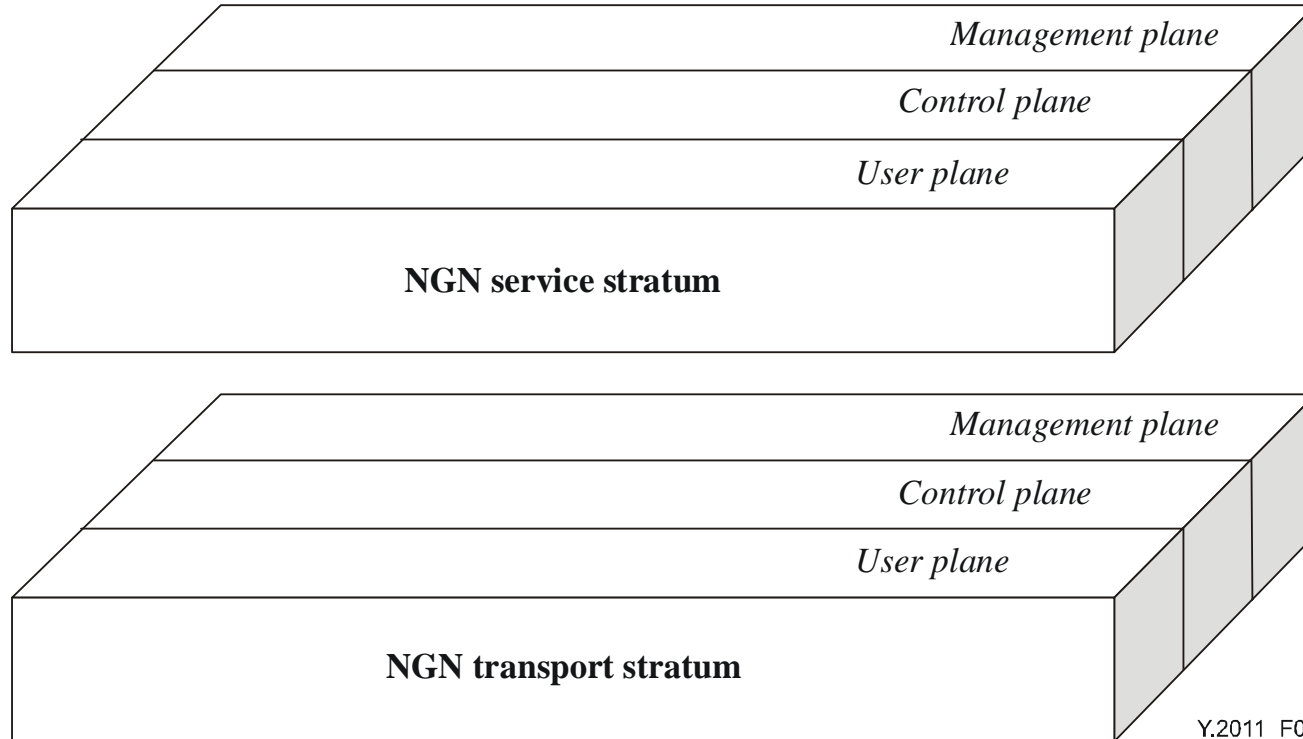
(ITU-T, Rec. Y.2001, 12/2004)



# NGN Basic Reference Model (acc. Y.2011)

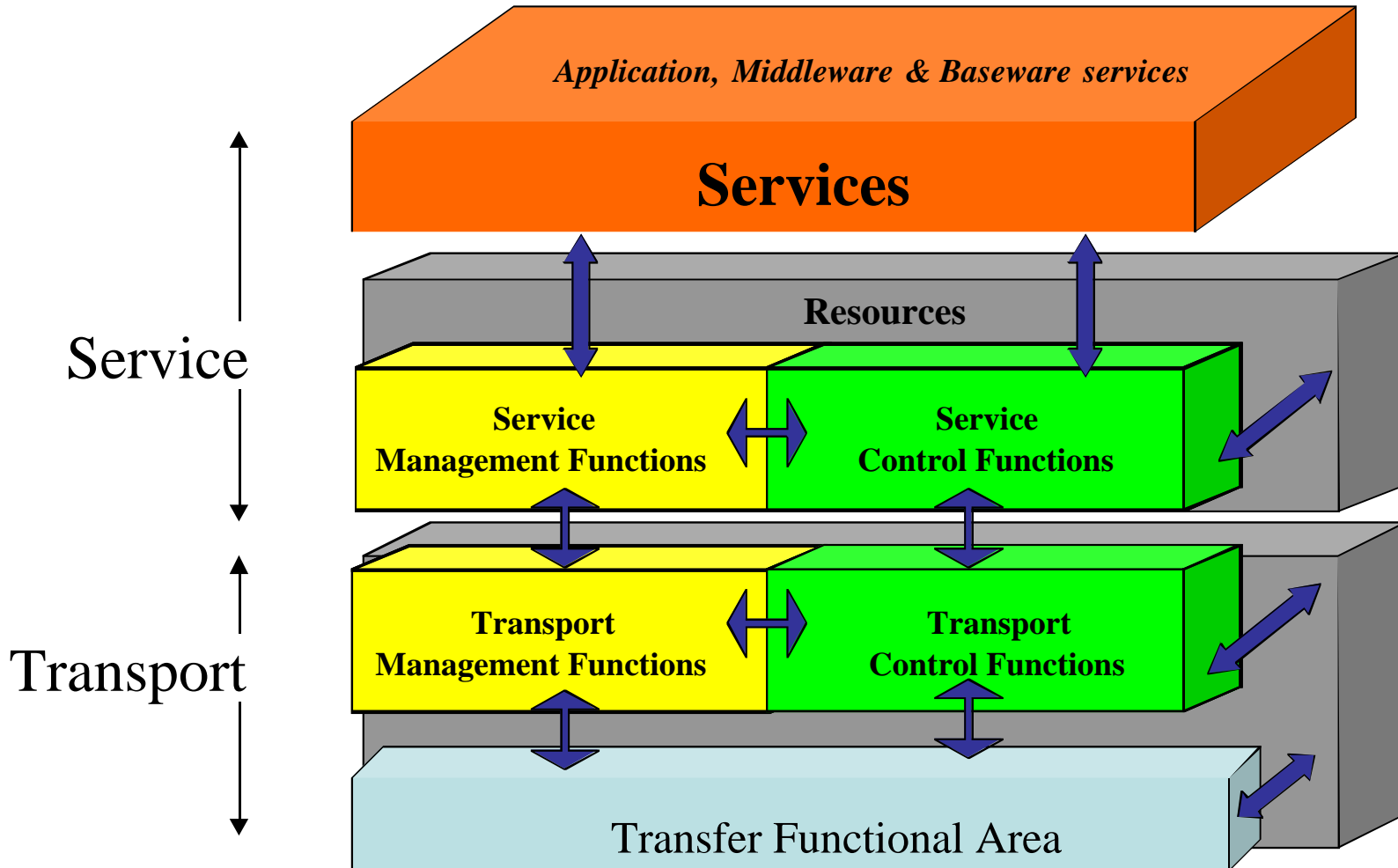


- > The **separation of services from transport**, allowing them to be offered separately and to evolve independently, is the key cornerstone of NGN characteristics

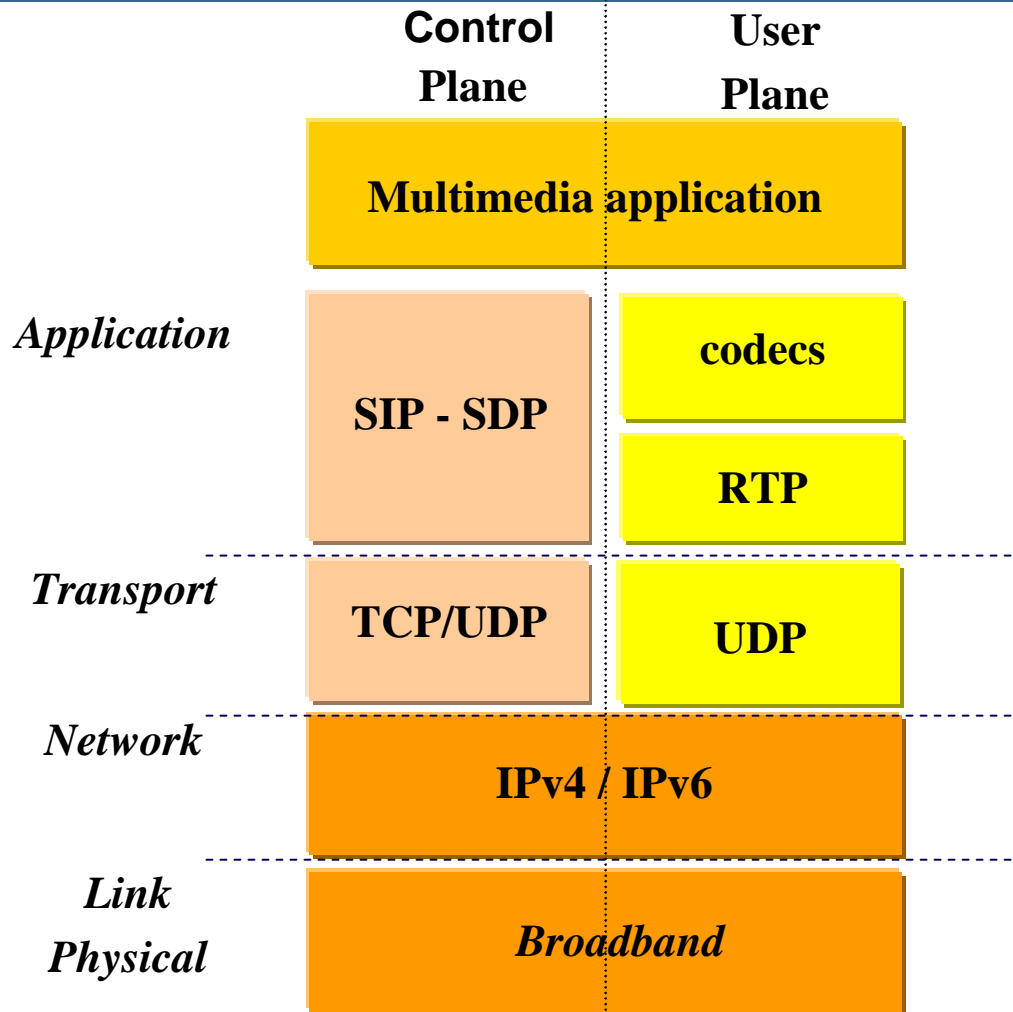


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# NGN General Functional Model (acc. Y.2011)



# IP multimedia services planes and layers

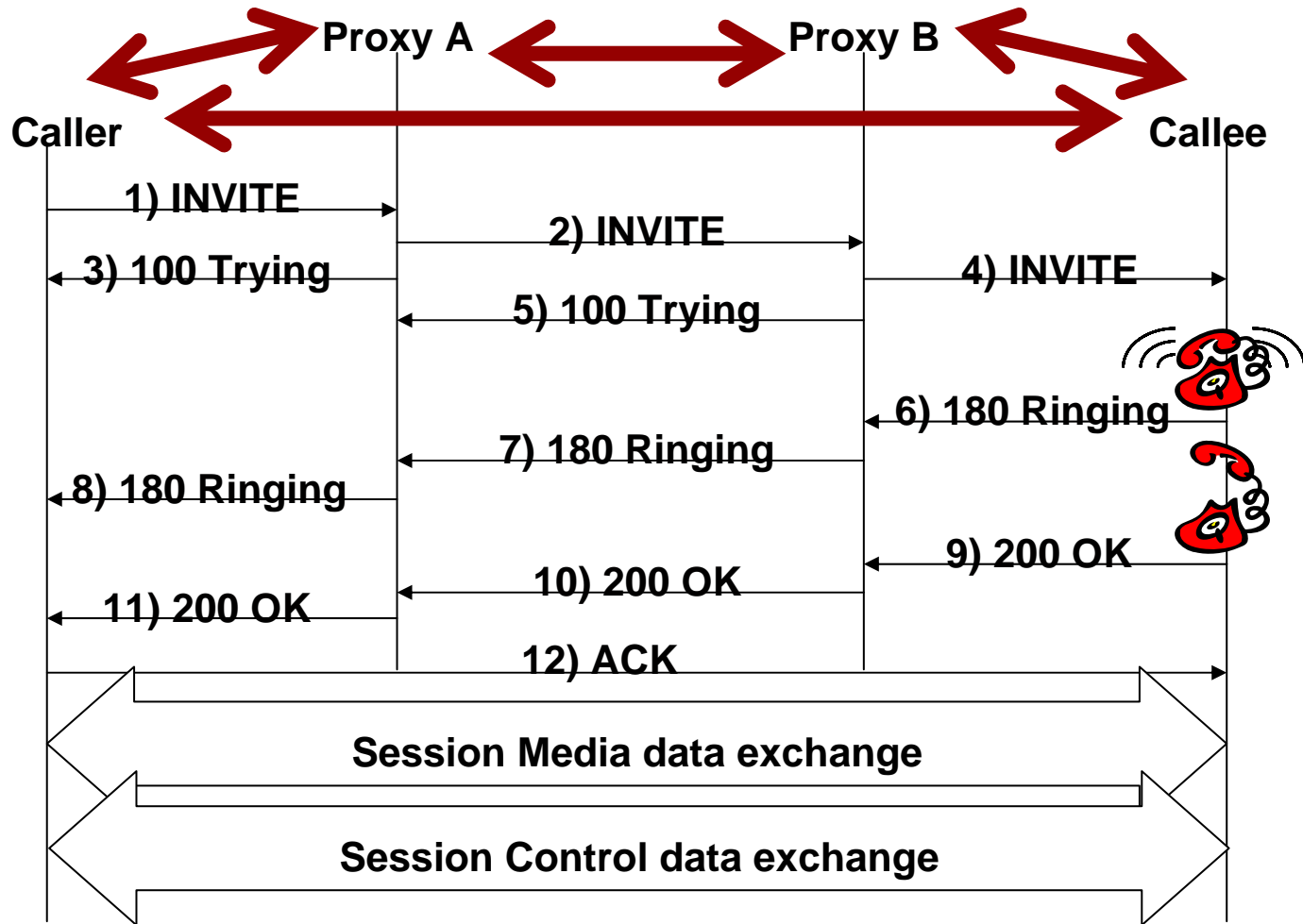


# Sipping SIP (Session Initiation Protocol)

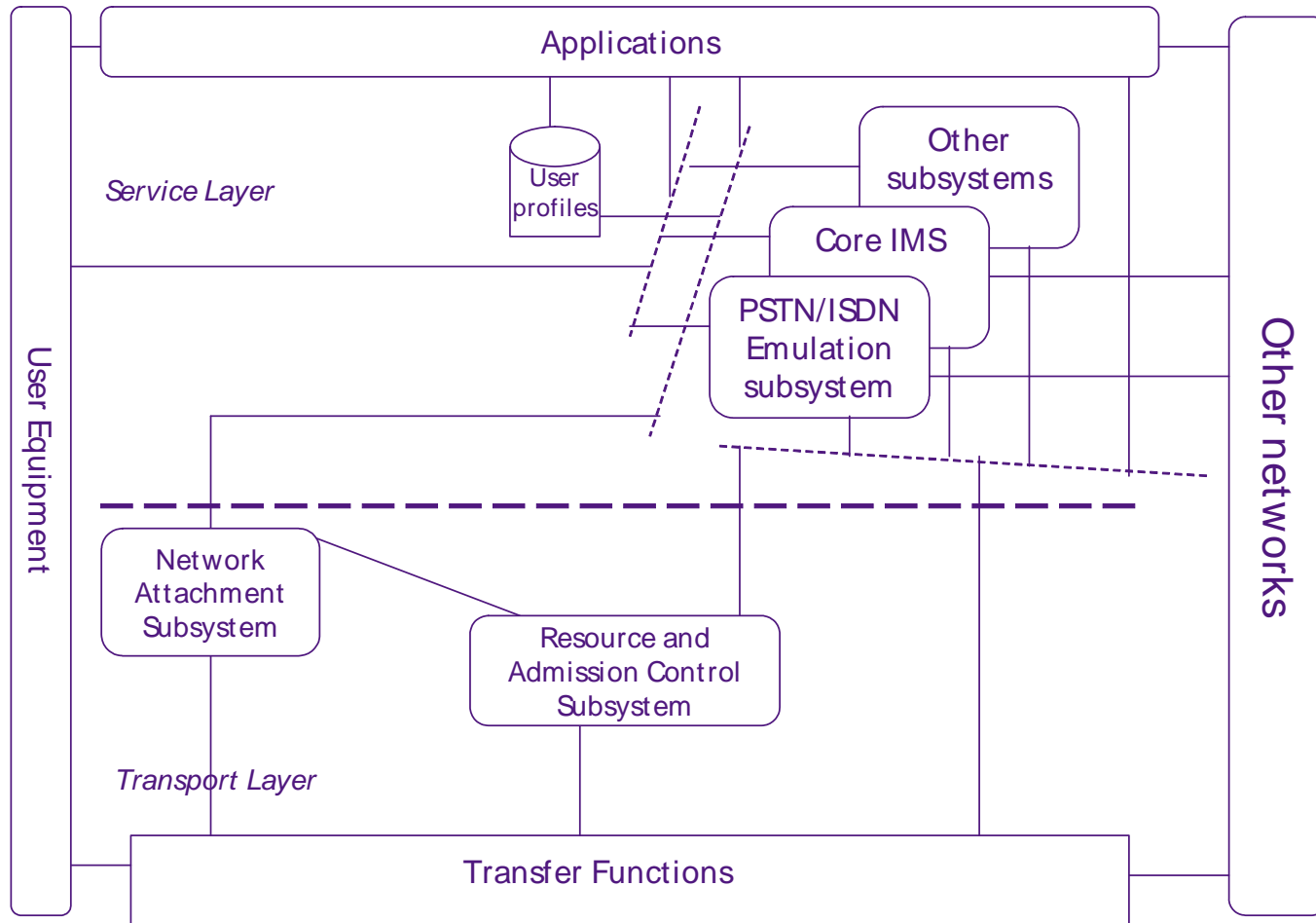


- > (http like) application level protocol independent of the transport layer developed by the IETF
- > It allows to control (establishment, modification and tear down) of multimedia sessions.
- > It follows a client/server architecture
  - User agents (mandatory)
  - Servers (optional)
    - proxy, redirect, location, registrar
- > Aspects to be covered
  - User location
  - User capabilities
  - User availability
  - Call establishment
  - Call control handling

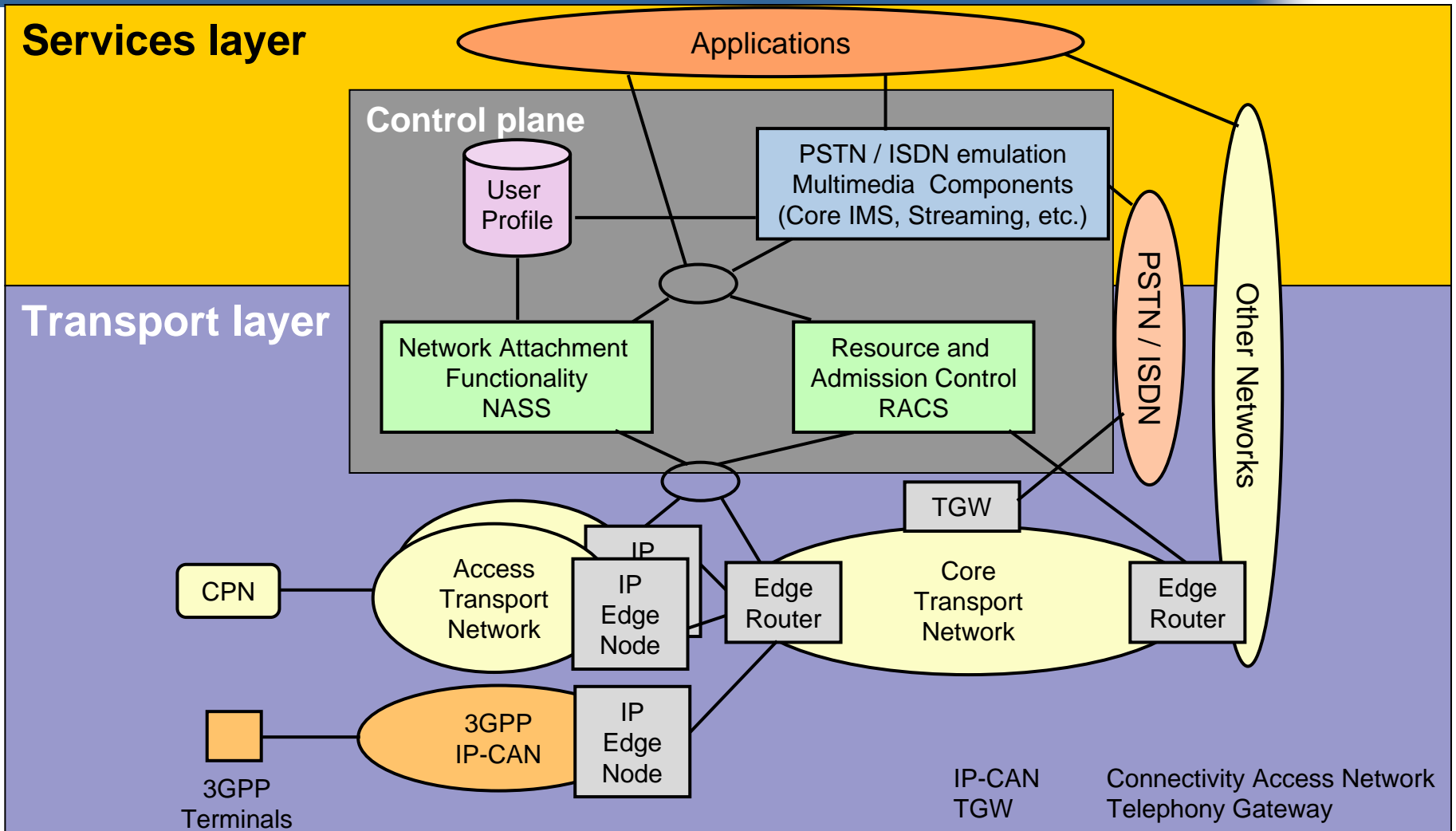
# SIP way of working



# NGN realization: ETSI TISPAN NGN overall reference architecture

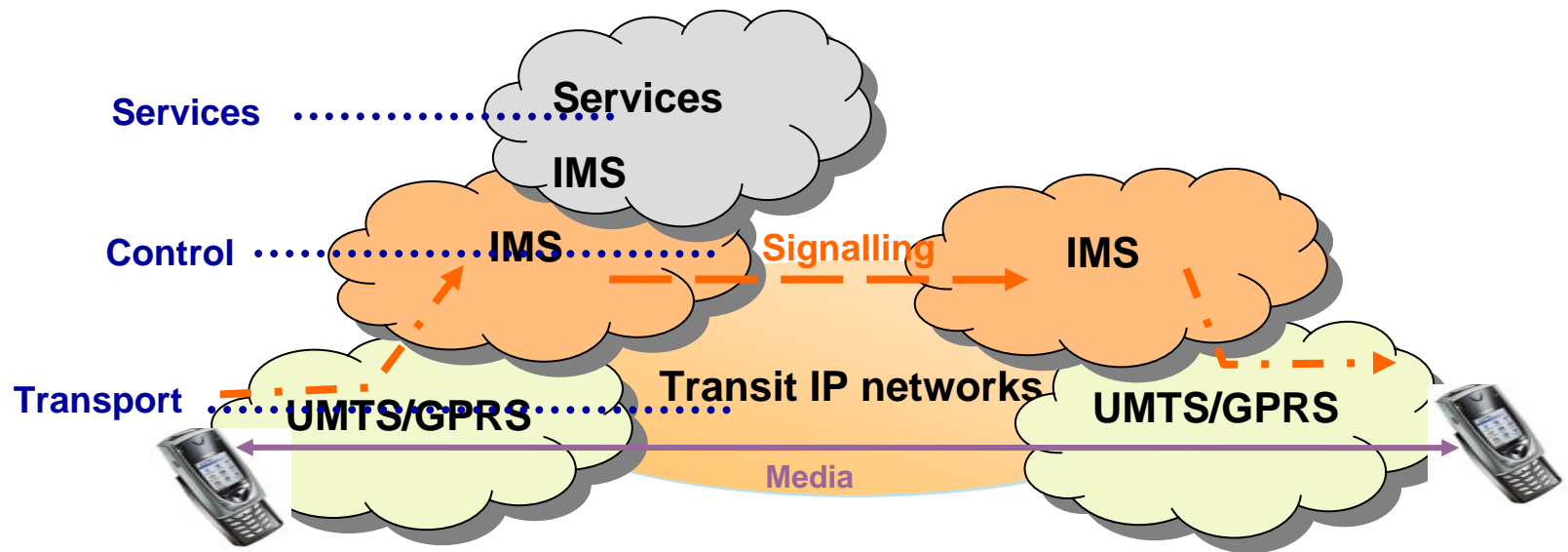


# ETSI TISPAN NGN Architecture R1 Overview

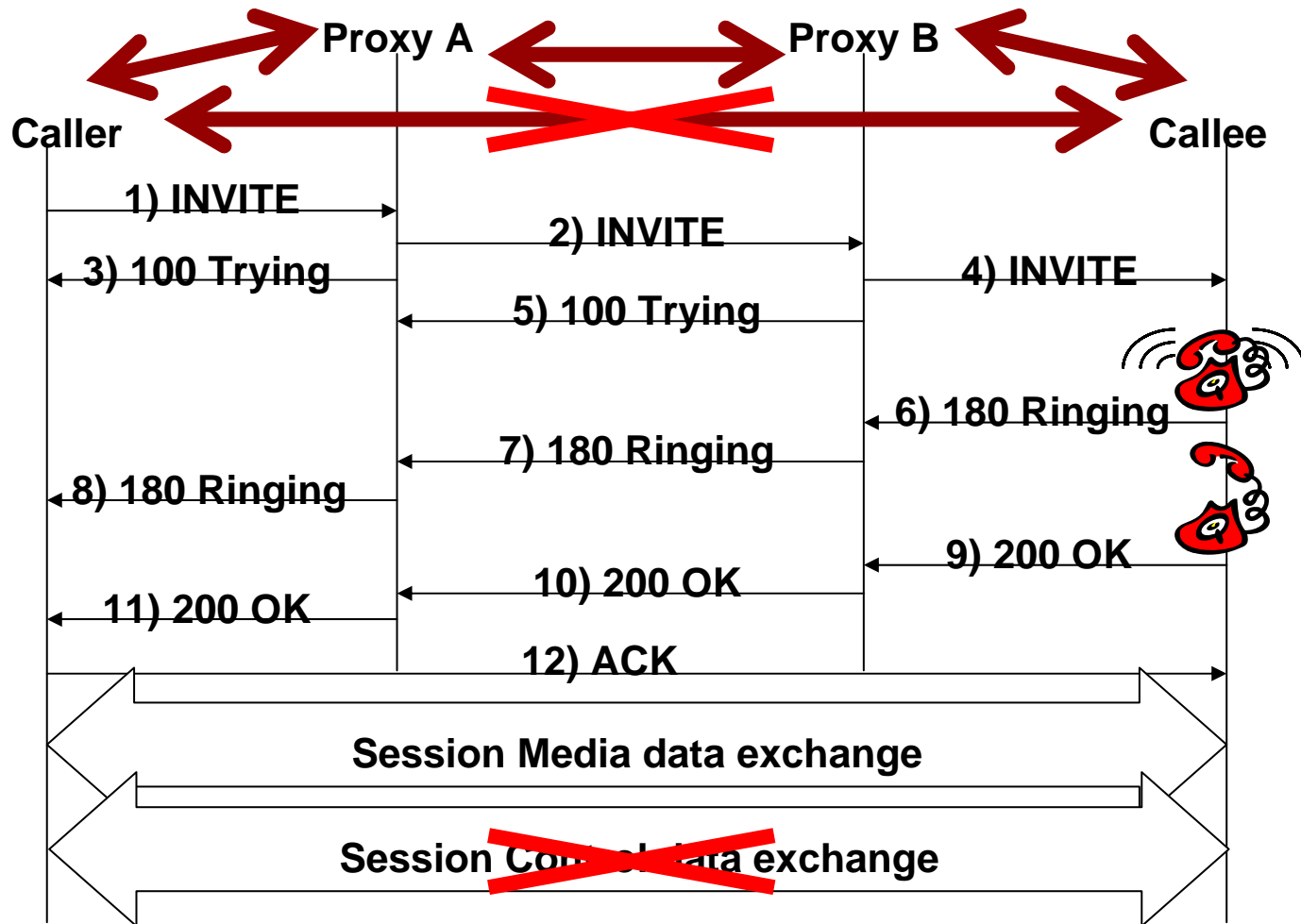


# IMS working model

- > IMS is the control plane of the service layer
- > Media and control traffic is conveyed via GPRS/UMTS and transit IP networks
  - Control traffic is always conveyed through IMS (client-server)
  - Media traffic can be directly exchanged between terminals (peer-to-peer)

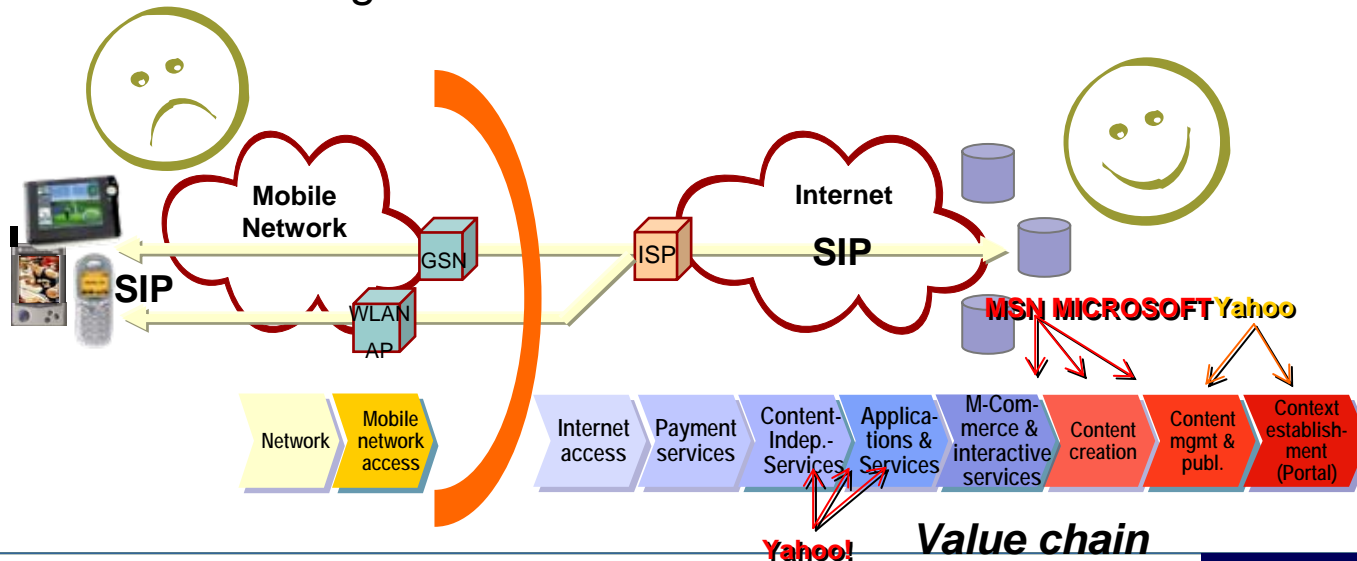


# Shipping SIP: IMS takes (and modifies) SIP for its own purposes: keeping control



# IMS – (main) operator motivation – value chain control

- > Telco and Internet worlds convergence
  - RISK: Operators as mere carriers
- > Loss of the value chain control
  - Network transport as a commodity
  - Potential reduction of revenues
  - Business stagnation

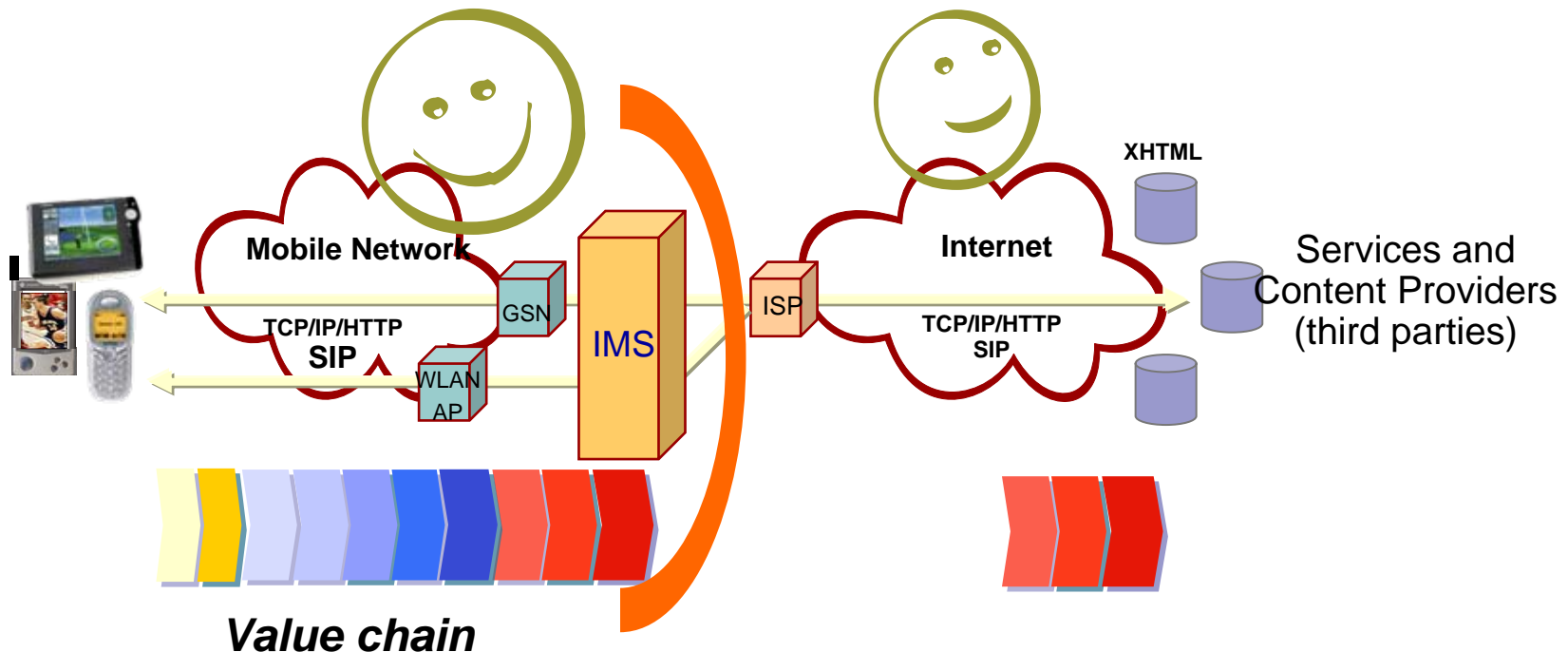


# IMS – (main) operator motivation – value chain control



> IMS provides control of the value chain:

- Telco provider keeps specialised roles: content and services, which are supposed to provide added value
- Value can still be added by third parties





# The renaissance of the Web -> Web 2.0



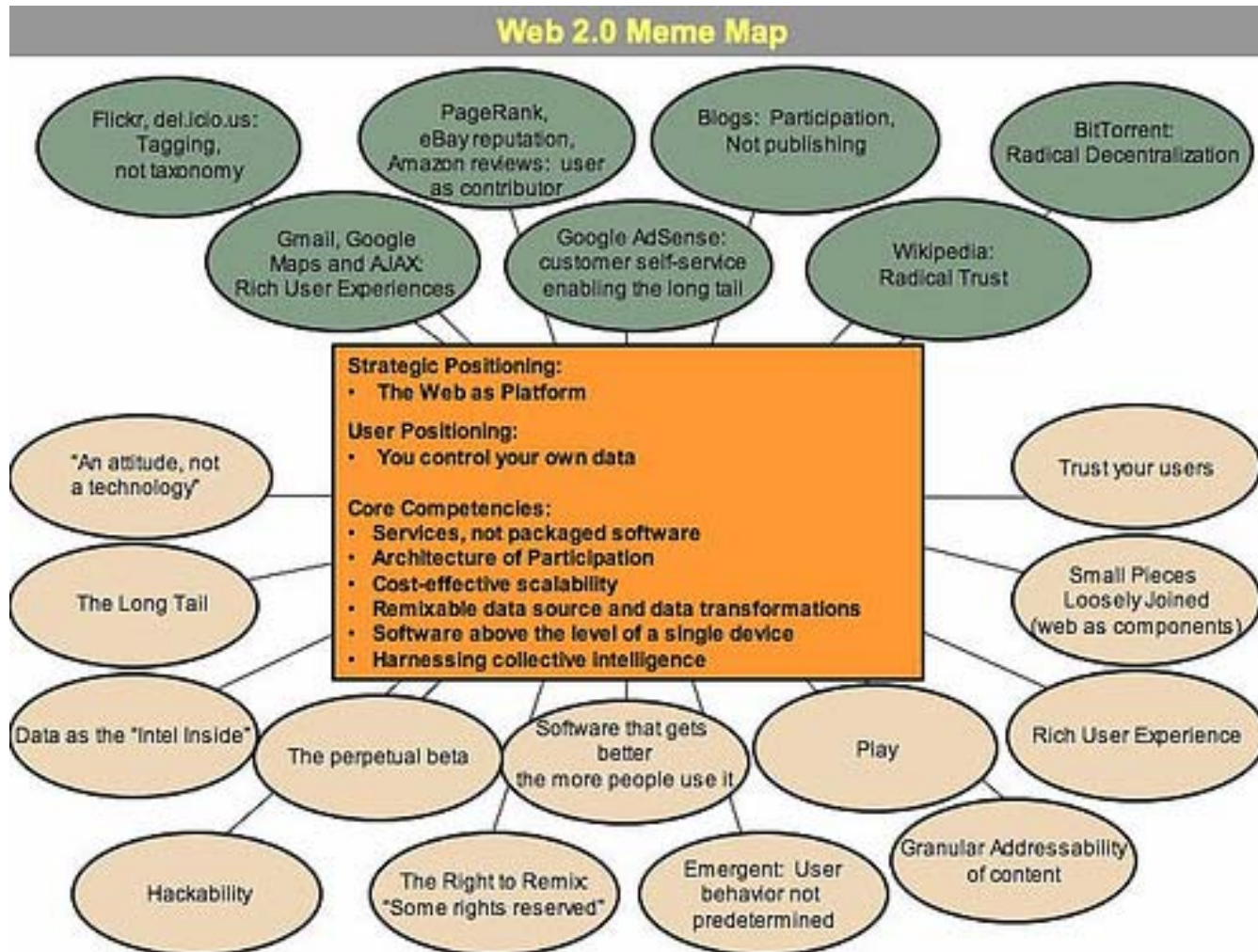
The concept of "Web 2.0" (coined by Tim O'Reilly) was suggested to remark the fact that far from having crashed (as a consequence of the dotcom bubble) the Web was/is more important and dynamic than ever...



Technology-heavy NASDAQ Composite index evolution

Web 1.0	Web 2.0
DoubleClick	Google AdSense
Ofoto	Flickr
Akamai	BitTorrent
mp3.com	Napster
Britannica Online	Wikipedia
personal websites	blogging
evite	upcoming.org and EVDB
domain name speculation	search engine optimization
page views	cost per click
screen scraping	web services
publishing	participation
content management systems	wikis
directories (taxonomy)	tagging ("folksonomy")
stickiness	syndication

# What is Web 2.0?



- > 1. The Web As Platform
  - Software and data as a service
  - “Long tail” effect - mass servicing of micro-markets
- > 2. Harnessing Collective Intelligence
  - Peer production
  - The wisdom of crowds
    - Fostering innovation at the edge
  - Network effects from user contributions
- > 3. Data is the Next Intel Inside
  - Data is the key differentiator
- > 4. End of the Software Release Cycle
  - Perpetual beta status – incremental enhancement

- > 5. Lightweight Programming Models
  - Simpler technologies like RSS and AJAX
  - Design for "hackability" and remixability.
    - Innovation in Assembly, reuse
    - “Some rights reserved” vs “all rights reserved”
- > 6. Software Above the Level of a Single Device
  - the “new” Web should be transparent and accessible across any device
- > 7. Rich User Experiences
  - web based applications with rich user interfaces and PC-equivalent interactivity
    - AJAX

# Thinking in Web 2.0 – by Dion Hinchcliffe



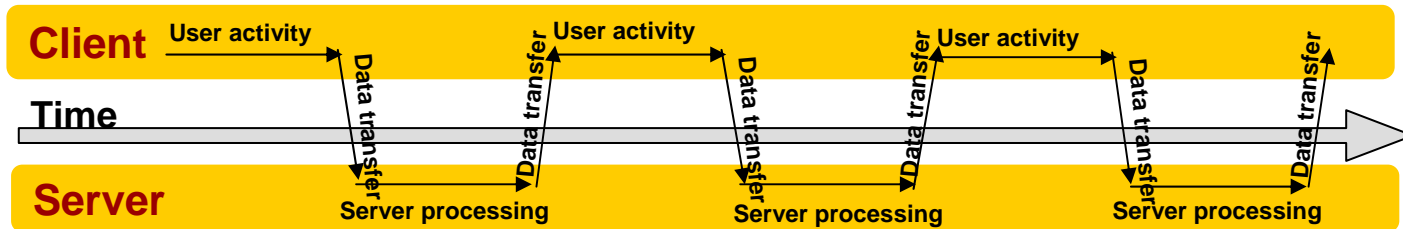
- > Before you even begin, understand your goal simply
- > The link is the fundamental unit of thought
- > Data belongs to those that create it.
- > It's about data first, experiences and functionality second.
- > Be prepared to share everything with enthusiasm.
- > The Web is the platform; make it grow.
- > Understand and embrace the "capability gradient".
- > Everything is editable.
- > Identity on the Web is sacrosanct.
- > Know thy popular standards and use them.
- > Obey the law of unintended uses.
- > Granulate your data and services.
- > Provide data and services that are for user's individual benefit.
- > User-driven organization and filtering are not just nice to have.
- > Offer/use rich user experiences.
- > Embrace and enable rapid change and feedback.

# AJAX (Asynchronous JavaScript And XML)

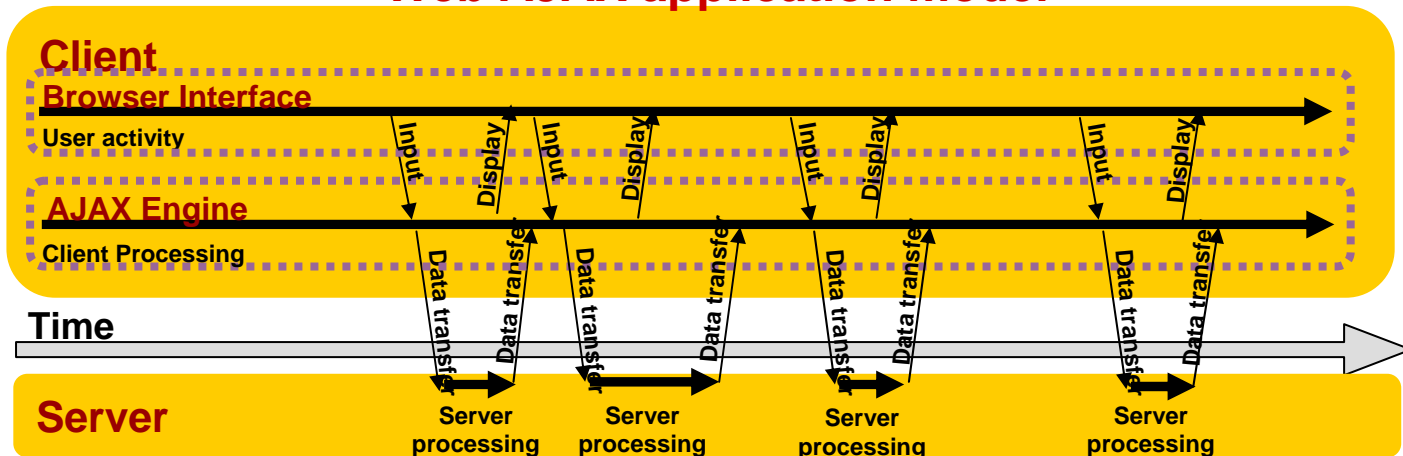


- > AJAX is a web development technique for creating interactive web applications by means of using existing technologies.

## Traditional client-server application



## Web AJAX application model



- > "Ajax isn't a technology. It's really several technologies, each flourishing in its own right, coming together in powerful new ways. Ajax incorporates:
- standards-based presentation using XHTML and CSS;
  - dynamic display and interaction using the Document Object Model;
  - data interchange and manipulation using XML and XSLT;
  - asynchronous data retrieval using XMLHttpRequest;
  - and JavaScript binding everything together.“
    - By Jesse James Garrett of web design firm Adaptive Path.



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- > A web feed is a data format used for serving users' frequently updated content.
  - Content distributors *syndicate* a web feed, thereby allowing users to *subscribe* to it. Making a collection of web feeds accessible in one spot is known as *aggregation*.
  - The two main web feed formats are RSS and Atom
- > RSS is a family of web feed formats. The acronym "RSS" is variously used to refer to the following standards:
  - Really Simple Syndication (RSS 2.0)
  - Rich Site Summary (RSS 0.91, RSS 1.0)
  - RDF Site Summary (RSS 0.9 and 1.0)

# **Network Neutrality: Legislative controversy over Network Neutrality in the U.S.A. and Europe**

# Network Neutrality has two different aspects



- > Theoretically
  - Must networks remain neutral independently of what are they used for?
- > Practically:
  - Must Internet be protected by Legislation?

- > Sorts of arguments (for and against):
  1. Efficiency of the economic system as a whole.
  2. Recovery of investments by operators with the current accounting scheme in the middle term.
  3. Quality of basic Internet accesses.
  4. Innovation.
  5. Precedents.

## A. Mere update of legislation of 1996

- 4 FCC's NN principles are sufficient enough:
  - Freedom to Access Content
  - Freedom to Use Applications
  - Freedom to Attach Personal Devices
  - Freedom to Obtain Service Plan Information
- Current anti-trust laws are enough to prevent abuses:
  - New legislation should clarify them without making them wider.
- Guidelines:
  - Vigilance by the FCC
  - Ex-post measures
  - Conflict resolution in 90 days

## B. Detailed legislative specification of Network Neutrality requisites

- 4 FCC's NN principles and anti-trust laws are not enough.
- A specific legislation, limiting ex-ante what an operator can do, is necessary.

- > Both groups regard themselves as being in favour of network neutrality



**What is the most efficient way of achieving such a NN without colliding with other rights nor harming incentives to investment?**

- > However, only second kind of bills are referred to as “pro-net neutrality” :
  - Internet Freedom and Nondiscrimination Act of 2006 (HR5417)
    - A.k.a., Sensenbrenner-Conyers Net Neutrality Bill.
    - Approved
  - Network Neutrality Act of 2006 (HR5273)
    - Reference for other “pro-NN” bills and amendment
    - Markey (D-Massachusetts)
  - Internet Freedom Preservation Act (S2917)

# Supporters and detractors of legislation on net neutrality (I)



## > For:

- Main companies providing application and Internet services:
  - Google, Yahoo, Ebay, Amazon, Microsoft, IAC/InterActiveCorp...
  - Vinton Cerf (Google) :
    - ***“As we move to a broadband consumer network, the Internet's openness is being threatened (...) As a result, carriers increasingly will have an economic incentive to use their power to block competitors, seek extra payments to ensure that Internet content can be seen, and generally control consumer activity online”.***
- Non-profit associations and lobbies:
  - Moveon.org, Save the Internet, Free Press, Public Knowledge, TechNet...
- Political parties:
  - Broadly speaking, the Congress and Senate members most favourable to NN regulation belong to the Democratic Party.

# Supporters and detractors of legislation on net neutrality (& II)

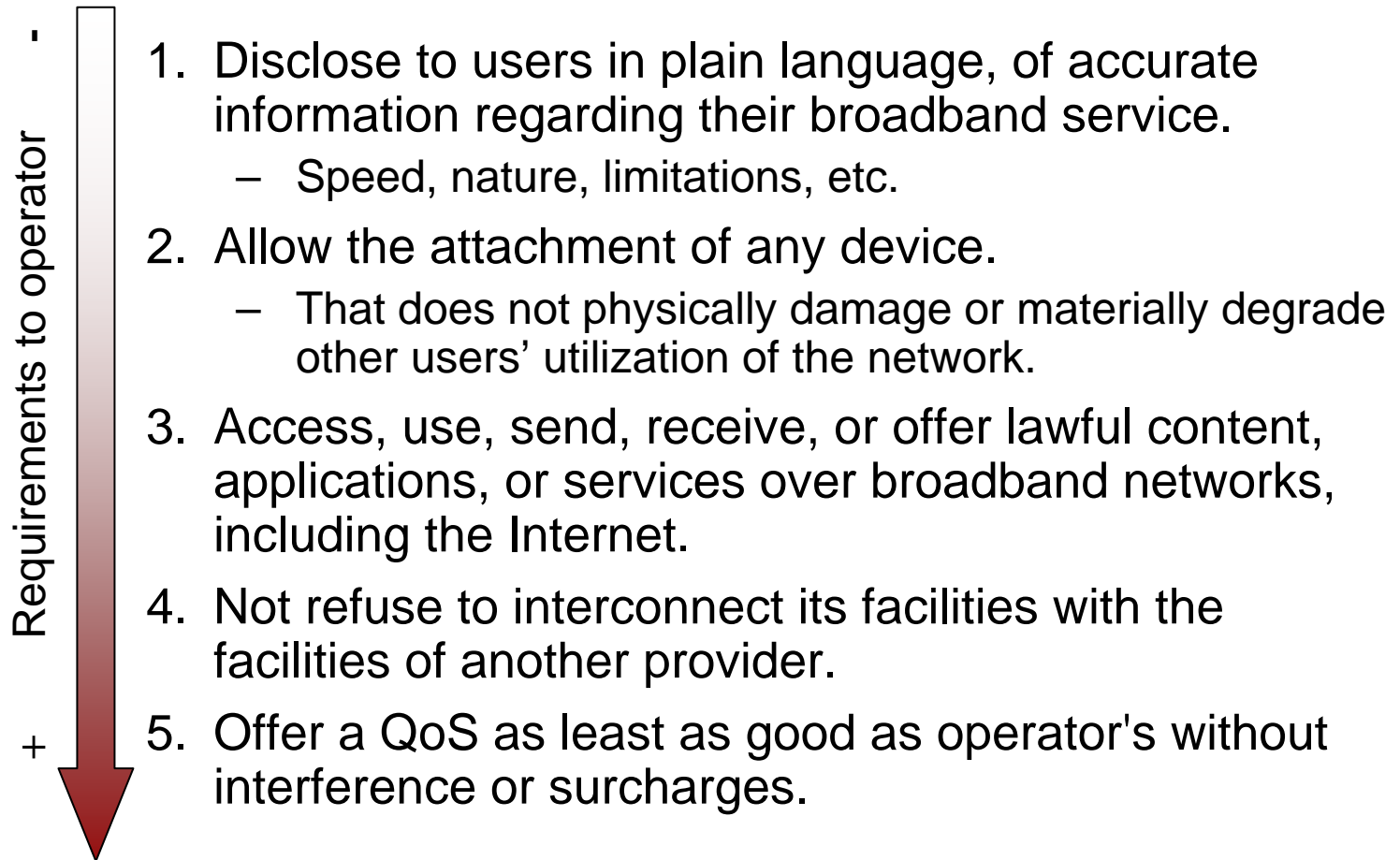


## > Against:

- Telcos:
  - AT&T, Verizon, Deutsche Telekom, France Telecom, Telecom Italia...
- Some of the most important cablecos in the U.S.A.
  - National Cable & Telecommunications Association (NCTA)
- Non-profit associations and lobbies:
  - National Black Chamber of Commerce
  - Ludwig von Mises Institute
  - Progress and Freedom Foundation
- Equipment manufacturers:
  - Cisco, 3M, Qualcomm, Corning...
- Political parties:
  - In general, Republican Party representatives have supported that:
    - Current anti-trust laws and FCC action are enough to avoid abuses of dominant position.
    - New laws on net neutrality should only clarify current anti-trust laws.

# “Pro-net neutrality” bills

## 5 levels of net neutrality



- > Point of view of the commissioner (Viaviane Reding)
  - Walled gardens should be avoided (“IMS hard” approaches).
  - Regulation is convenient for the new networks.
  
- > Point of view of the European Commission
  - NN with no ex ante regulation, similar to “no pro-NN” approach in the U.S.A.
    - Current regulation already prevents operators from discriminating among users in similar circumstances.
    - National regulators already have regulatory duties that prevent them from degrading QoS.
    - If competition is effective, specific NN regulation is not necessary
      - If there were demand, there would always be an operator that offered what other is restricting.
  - However, in order to avoid severe QoS degradation, UE will define minimum levels of QoS.

**What is the minimum acceptable QoS for *best effort*?**

# This is not a new debate



- > Smart networks vs stupid networks (belheads vs netheads)
- > Centralised intelligence vs distributed intelligence
- > Stupid terminals vs smart terminals
  
- > However, there are intermediate positions between "black and white" approaches.

- > It states that, whenever possible, communications protocol operations should be defined to occur at the end points of a communications system, or as close as possible to the resource being controlled.
- > According to the end-to-end principle, protocol features are only justified in the lower layers of a system if they are a performance optimisation.
- > When designing a network architecture, do not overload it with too many functionalities which most of them probably will not be used at the end.
- > That is, select the appropriate level of smartness/stupidity of your network architecture.

- > “Our belief is that there is a single dominant source of structural change in the communications industry. This trend is the separation of network connectivity from user-facing application services and content. The phenomenon is both technical (“everything over IP”) as well as financial (separate purchase of access and service).”
  
- > “In all cases, there are many “leaks” in the abstraction of Internet Protocol that the operator can exploit: network topology, geography, location, identity, relationships between edge nodes, distribution, billing, and so on. Every one of these gaps between theory and reality is a business opportunity.”

- > An assumption of abundance, rather than rationed scarcity.
  - Example: Share a hundred images in a picture-sharing service rather than sell one MMS.
- > A preference for openness, rather than hoarding of assets and information.
  - Example: How much brand value is lost locking down Bluetooth from reaching its full potential to users?
- > A change for most from a network-centric view in favour of focusing on customer data, billing, relationship, distribution and partnership assets.
  - Example: What is the real value of the call detail records in creating intelligent call routing services?
- > A desire to connect people above the promotion and consumption of media content or information services.
  - Example: Why invest so heavily in streaming video from media conglomerates when user preference and revenue consistently comes from the sharing of user content and experiences?

- > A willingness to learn from, and interact with, the broader world of Internet players.
  - Example: What are the lessons of Skype for telcos wishing to broaden the reach of their voice and messaging products to new platforms?
- > Agility and innovation in core messaging and voice products, in contrast to today's stasis.
  - Example: Vonage's troubles partly stem from having merely replicated POTS, rather than having innovated.
- > Getting away from the fear of "dumb pipes". Utility businesses can be very profitable given the right cost base, and funding/pricing approach.

# Some interesting bibliography



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