

Response to the Questionnaire
for the Public Consultation on
the Open Internet and Net
Neutrality in Europe

Table of Contents

Foreword	ii
Management Summary	ii
Who We Are, and Why We Responded	ii
A Few Words on Terminology	iii
Main Issues for Consultation	1
The Open Internet and the End-to-End Principle	1
Traffic Management / Discrimination	3
Market Structure	5
Consumers – Quality of Service	6
The Political, Cultural and Social Dimension	7
Any Other Issues	7
Appendix: Bibliography	10

Foreword

Management Summary

Our proposal provides a compromise between the NGO/activists demand for a totally agnostic Internet, and the TelCo/CellCo demand for a totally commercial Internet. It also embraces television and radio services to benefit national economies in avoiding building a separate multimedia network.

The fixed and mobile operators' current business models no longer match the evolution of services and revenue flows. Their current models are only based on downstream data rate, ignoring QoS and cloud services. Investments are growing. Hence **TelCos will have to charge each other for the QoS they provide for forwarded traffic.** Consequently **consumers and commercial on-line service providers will also have to pay for QoS.** This enables TelCos to get ROI from those who triggered the investments in the first place.

Non-commercial services must get a fair share of QoS and traffic volume, to enable and ensure political, social and cultural advancements. The consumers' payments to the operator will only cover the basic costs of connecting him, and the QoS and traffic volume of the non-commercial services. Commercial traffic will have to be paid by the commercial operations generating it.

Since in the industrial countries, the Internet is becoming the primary means of finding businesses and services, it becomes a meta-marketplace. **Safe, fair, and non-discriminatory access is hence essential to businesses and consumers alike.** So we must find a way of **applying existing legislation and regulation** in this new space, too.

Linear multimedia services, i.e. **television and radio** will come to the Internet infrastructure as well. In the days when everything is data, there is no point in building separate data networks for Web and Multimedia content. Each of the networks can carry both, so **let's save time and money, and build no more than one single data network.**

Who We Are, and Why We Responded

Condition-ALPHA is a privately held consultancy, focussing on the digital broadcast and digital multimedia industries. Its founder, Mr. Alexander Adolf is one of the pioneers of digital television in Germany. For more than 15 years, he is participating in international standardisation at executive and management levels. Our customers and partners range from regulatory bodies, to public and commercial broadcasters, to technology providers, to equipment manufacturers, to content providers, to consumer associations.

It is our vision that in the mid-term (2020), all information and entertainment services, will be based on IP protocols, i.e. the Internet. This, for fixed and for mobile services. The first indicators we see are HbbTV, Apple TV, Google TV and Yahoo! TV. Not only is it becoming possible to provide audiovisual entertainment services via the Internet, but also have important market players on both, the TV/radio side (HbbTV), and the Internet side (Apple, Google, Yahoo!) demonstrated interest and seem confident that business models can be developed.

These breaking, technological and economical developments have so far not been considered widely by legislation and regulation. We thus highly welcome this timely, and forward looking consultation as an opportunity for sharing our ideas not only with our customers, which cover the technological and economical aspects, but also with political players and lawmakers. We feel that businesses are thinking too short-term, and are too stake-holder value focussed to apply any meaning to such long term perspectives other than feeding them into their strategic marketing teams, where they vanish. We not only think that Internet technology will become pervasive (“Internet of things”) in the long term (we need to introduce IPv6 first), but we are also convinced that the Internet and the services that run on top of it, will already in the mid-term become the primary tool for making business and exchanging information. Hence its importance for national economy, politics, culture and society can hardly be underestimated.

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A Few Words on Terminology

Different domains use different terms. As in this area, we are faced with an intersection of many domains, we would like to clarify a few terms which seem to be often used interchangeably.

QoS (quality of service) denotes a set of concrete, technical parameters, specific to the transmission protocols and transmission schemes used. They are often expressed in “milliseconds”, “packets per second”, “retransmission count”, asf. It is used most appropriate when describing service agreements between network operators, or between network operators and on-line service providers.

QoE (quality of experience) denotes a perceived quality of the end-user experience. It is often expressed as “Standard Definition video”, High Definition video”, “fast path for on-line gaming”, asf. It is used most appropriate when describing the quality of a service offering to a non-technical person.

Bandwidth is a technical parameter, used in communications engineering. It denotes the maximum sine frequency that can be modulated onto a carrier signal. It is expressed in “Hertz”, “Kilohertz”, or “Megahertz”. It is used most appropriate when describing the characteristics of a radio channel, or of a material for optical fibers.

Data rate is a technical parameter that is used in information theory. It denotes the amount of information which can be transmitted in a given time-slot. It is expressed in “Bits per second”, Kilobits per second”, “Megabits per second” or “Gigabits per second”. It is used most appropriate when describing the throughput of a communications channel, like for instance the downstream throughput of a DSL service.

Main Issues for Consultation

The Open Internet and the End-to-End Principle

Question 1: *Is there currently a problem of net neutrality and the openness of the internet in Europe? If so, illustrate with concrete examples. Where are the bottlenecks, if any? Is the problem such that it cannot be solved by the existing degree of competition in fixed and mobile access markets?*

1. Fixed network operators:

- 1.1. Are reserving data rate for **their own VoIP telephony services**. This limits the data rates for other services. It has however not had a noticeable impact on consumers' perceived QoE yet. The same holds for the **video-on-demand services** offered by many operators.
- 1.2. Are **trying to make consumers comply** with their business model (see answer to question 4). This involves imposing limits on heavy users (e.g. file-sharing), and trying to incentivise them to change their behaviour (e.g. offering a cash bonus in exchange for signing an agreement to abstain from flat-rate models).
- 1.3. Do not see an incentive to provide higher **up-stream data rates**. These would be required to enable enhanced cloud services. Imagine synchronising a two gigabyte repository of files with the cloud server at 512 kilobits up-stream data rate (typical consumer or small business connection). The initial upload of the data would take about 9 hours. The probability of the operation performing correctly and smoothly for the whole 9 hours without connection errors is negligible. Thus, de-facto the limited up-stream data rates **prevent consumers and small businesses from being able to use cloud storage services and/or exchange user-generated content**¹.
- 1.4. Are **limiting the data rates for consumers** when using on-line services which generate high data volume at high data rates (like e.g. YouTube™). This occurs because the infrastructure investments for keeping up with the data rate and volume requirements grow faster, whilst the DSL subscription prices are falling. The operators have not succeeded in raising money for their investments from neither the commercial service operators, nor the consumers.

2. Mobile network operators:

- 2.1. Are confronted with many of the issues that fixed network operators are facing (cf. above) and are reacting in similar ways. Many **mobile, flat-rate data plans** include terms that, if a certain data volume

¹ Note that user-generated content is not limited to audiovisual content, but also includes textual content, Web sites, etc.

is exceeded, the connection will be **throttled to a rather low data rate for the rest of the month**. The reasoning behind these terms is that the QoE should not be unreasonably impaired for “well behaved” users. This does however not match up with consumers’ and small businesses’ expectation when purchasing a flat-rate data plan.

- 2.2. Some few operators are **blocking 3rd party audio-visual chat services** like e.g. Skype to avoid technical and commercial impact on their own voice services. Cases have been reported in the US, Canada, and various T-Mobile subsidiaries throughout Europe. User reports seem to hint that in some cases the blocking seems to be restricted to cheaper data plans, and not applied on premium rate plans.
- 2.3. Do not see an incentive to **bring down data roaming costs**. Their arguing is that data roaming is predominantly used by businesses. With the growing popularity of social networking and cloud services however, this assumption no longer holds. De facto, the **data roaming costs are generally prohibitive** to consumers and small businesses. The recent EU regulation to limit the data roaming costs per month prevents bad surprises, but given the tariffs, it practically means checking for new email once or twice a day. Mapping/navigation or social networks are certainly out of the question for consumers and small businesses, when abroad.

Question 2: *How might problems arise in future? Could these emerge in other parts of the internet value chain? What would the causes be?*

3. In the mid-term future, multimedia services like **television and radio** will also be distributed via the fixed and mobile Internet infrastructure. Both, consumers and service providers have expectations on the QoE, that cannot be met with the currently installed technology. **Large infrastructure investments are thus due**, and for these streaming services to work, the **QoS on the network needs to be managed**. Network operators need to be either incentivised or obliged to provide suitable QoS management.
4. We expect that this will not be possible without an **ROI for the network operators in exchange for the guaranteed QoS**. This new revenue stream will of course incentivize operators to allocate more and more resources to those paying services. **It must be ensured that non-commercial services retain a fair share, too.**
5. Following up to the points raised above, we think that **three principles are essential**:
 - 5.1. **“May Charge”**: Fixed and mobile network operators must be enabled to charge **commercial** on-line services for the data volume and data rate they generate.
 - 5.2. **“Must Carry”**: Fixed and mobile network operators must be obliged to guarantee a minimum level of QoS and QoE for **non-commercial** on-line services, and that free of charge.
 - 5.3. **“Equal levels”**: Since the on-line business is global by nature, it is essential that the standards are in a first step **harmonised** within the EU. In a second step, they will need to be harmonised with other economic players around the globe. This would be a task for the G20, just like the recent agreement on measures in the financial markets, which also need to be global. Ultimately, the fair treatment of non-commercial on-line services can be seen as a matter of human rights, since in non-democratic societies, these often are the only means of establishing plurality.

Question 3: *Is the regulatory framework capable of dealing with the issues identified, including in relation to monitoring/assessment and subsequent enforcement?*

6. The **short answer** is: **no**. The **long answer** is: data networks have become a public utility, just like electricity, telephone, water and railways. Businesses vitally depend on them. For the “classical” public utilities, suitable and efficient regulatory frameworks are in place, all based on the same principles. These principles will need to be applied to data services as well. For citizens, data services should be promoted to Services of General Interest (SGI). Without access to email and web browsing, finding a job has become very difficult.
7. A second aspect comes into play here: since data networks are bi-directional, citizens use them for exchanging views, art, for NGO-types of activity and many other things. These contribute to social life and development. Hence **a regulatory element from the broadcast domain** should be adopted: the **Open Channel**. It allows citizens to get a fair share of the costly infrastructure resources, in order to further plurality, make minority voices heard, etc. Applied to data networks, this means that **a guaranteed minimum of the network resources must be available for non-profit on-line services**.
8. Since the envisaged QoS-managed services will require packet inspection, a clear legal framework must exist, that enables operators to perform deep packet inspection, but at the same time ensures anonymity for consumers. For this, network operators should be obliged to restrict the packet inspection to protocol headers only, and to delete all information pertaining to a session immediately when the session ends. Statistical information for billing purposes can of course be collected.

Traffic Management / Discrimination

Question 4: *To what extent is traffic management necessary from an operators' point of view? How is it carried out in practice? What technologies are used to carry out such traffic management?*

9. Both, fixed and mobile operators have based their business models on the assumption that consumers will need the full data rate only for short periods, i.e. for downloading a piece of content, which are followed by periods of no utilisation by the consumer, i.e. when the downloaded content is rendered on the terminal and consumed. This **consumption-focussed consumer model** implies that consumer terminals will only ever send very few data. Consequently, the overall capacity of the infrastructure is tuned to a certain average request/download/consume behaviour. This tuning is done such that it only guarantees the maximum data rate that is advertised to consumers, for the typical, burst download interval according to this consumer model.
10. With the increase in consumer terminal capabilities - especially for mobile terminals (iPhone, Android) - new cloud applications have entered the stage. These fall into two categories: **social applications** (Facebook, Twitter and similar), and **cloud computing services** (Mobile Me, DropBox, Google Wave and similar). What is common to both, are the increased (compared to the operators' consumer model) up-stream data rate requirements of these applications. They are all based on files (photos, documents, calendar data, etc.) being uploaded by consumers to servers in the cloud, and being shared from there to other consumers. This **fundamental change in consumer behaviour** makes it necessary for operators to limit up- and down-stream data rate utilisation until additional capacities have been installed. The fixed network operators have better succeeded in making this process less obtrusive to consumers, and have been swifter in upgrading their infrastructure than mobile operators. The most prominent example of a mobile operator being overwhelmed by changes in consumer behavioural patterns, are the AT&T mobile network hick-ups after introduction of the iPhone.

11. The **technologies** used:

- 11.1. **Traffic shaping** entails inspection of the traffic, and **delaying of packets** meeting certain criteria. This can happen in any network element such as a router, gateway, etc., but requires significant volumes of packet buffer memory. Use of traffic shaping has been admitted by network operators.
- 11.2. **Traffic policing** is the distinct, but related practice of **packet dropping**. Some complaints by consumers using gaming, file-sharing and other high volume and data rate applications, seem to hint to uses of packet dropping. Network operators so far have declined comments about packet dropping completely, but user reports clearly indicate that it is being used in certain situations. Traffic policing requires maintenance of numerical statistics and measures for each policed traffic flow, but it does not require implementation or management of significant volumes of packet buffer memory. Consequently it is less complex to implement than traffic shaping.

Question 5: *To what extent will net neutrality concerns be allayed by the provision of transparent information to end users, which distinguishes between managed services on the one hand and services offering access to the public internet on a 'best efforts' basis, on the other?*

12. This is essential. And it needs to be carried out in close cooperation with the operators and consumers. A logo programme would be most beneficial. It would enable consumers to assess and compare Internet service offerings from different operators against the requirements of on-line services (hypothetical example: "This service works best on a SocialNet connection."). **All operators should however be obliged to provide support for non-commercial services. We suggest devising the following consumer service logos:**

- Speed 1, 2, 3, 4, ... (sustained downstream data rate expressed in Mbit/s)
- Cloud 0.5, 1, 2, 3, 4, ... (sustained upstream data rate expressed in Mbit/s)
- Game (overall low latency, "fast path")
- Phone (managed service for VoIP and A/V chat applications)
- Radio (managed service for audio streaming)
- Video SD, HD...(managed service for SD and/or HD video streaming)

Question 6: *Should the principles governing traffic management be the same for fixed and mobile networks?*

13. **Yes.** Consumers are not conscious about the technology they are using, they focus on the services they use. If the consumers' Quality of Experience for a given service, relative to other services, is substantially different on fixed and mobile networks, it will make the service less attractive. Hence the principles should be the same on all networks; even future ones which we don't think of just yet.

Question 7: *What other forms of prioritisation are taking place? Do content and application providers also try to prioritise their services? If so, how – and how does this prioritisation affect other players in the value chain?*

14. To our knowledge, **direct prioritisation** is not applied. This is due to legally shaky ground for the network operators regarding privacy and discrimination. How much of the data is the operator allowed to inspect without

violating privacy laws? When influencing the traffic, will he harm anyone's business? On what legal grounds does the intervention occur? This is a wide open area that awaits regulation and legislation.

15. **Indirect prioritisation** takes place in that operators try to incentivize heavy users (e.g. P2P file sharers) to agree to terminating flat-rate service agreements. This happens by either offering a cash bonus to the subscriber for his agreement, or by intermittently throttling the overall data rate available to the subscriber.

Question 8: *In the case of managed services, should the same quality of service conditions and parameters be available to all content/application/online service providers which are in the same situation? May exclusive agreements between network operators and content/application/online service providers create problems for achieving that objective?*

16. On-line service providers should only and exclusively make business agreements with the network operators that hook up each of their data centres. Forcing e.g. Google to strike deals with all or most TelCos around the world to have their services carried is a nightmare scenario.
17. Instead, we propose that on top of the current volume and data rate based pricing models, surcharges for QoS classes are standardised (cf. question 5). Based on this, network operators will charge their up- and downstream peers (including consumers) for the QoS management on the data they forward on the peers' behalf. This will allow money to flow along the chain and all players in the chain get their share.
18. If on-line service providers strike deals with some of the network providers, the money will leap-frog those players in the chain without such agreements. These will not be in a position to make the necessary investments, and the system will collapse.

Question 9: *If the objective referred to in Question 8 is retained, are additional measures needed to achieve it? If so, should such measures have a voluntary nature (such as, for example, an industry code of conduct) or a regulatory one?*

19. With our proposed model, the usual, well-known and well-proven regulatory and legal anti-trust and anti-monopoly tools will do their job in this area, too.
20. We suggest a voluntary self-obligation of the network operators, to keep the barriers low for start-up businesses that offer on-line services.

Market Structure

Question 10: *Are the commercial arrangements that currently govern the provision of access to the internet adequate, in order to ensure that the internet remains open and that infrastructure investment is maintained? If not, how should they change?*

21. The short answer is, no. Operators are not able to recover costs for infrastructure investments (e.g. to account for increased video data rate requirements) from consumers and service providers. The various data service packages offered to consumers are only differentiated by the gross data rate, and the price; not the QoS. On the other side, the commercial on-line service providers (Google et al.) have huge advertising revenues from

attracting consumers to their free services with high data rate requirements. They however only pay for the QoS they get from their local or national operator, not globally to all operators that carry their service.

22. We see two ways out of this:

22.1. Operators start charging consumers extra for certain QoS classes (“YouTube supplement”). This will be unpopular with consumers, so it will need to be done in way such that the cost for the consumer when selecting all the options, will be the same, as today’s premium package. This will likely mean a decrease in revenues for the operators since most consumers will choose only few additional options (if any).

22.2. Operators start charging up- and downstream peers (including on-line service providers) extra money for managed services. This would enable some of the advertising revenues of the on-line service providers to flow back into infrastructure investments. This is “the road toll for the information highway.” We see this as the only viable option. Apparently this option will not be loved by the on-line service providers.

Consumers – Quality of Service

Question 11: *What instances could trigger intervention by national regulatory authorities in setting minimum quality of service requirements on an undertaking or undertakings providing public communications services?*

23. Network operators have no commercial drive to guarantee QoS to non-commercial services, since these can not be charged beyond consumer-level service subscriptions. Hence they must be obliged (cf. Open Channel under question 3) to **guarantee data rate, traffic volume, and QoS for non-commercial services**.

Question 12: *How should quality of service requirements be determined, and how could they be monitored?*

24. The technical parameters depend on the concrete implementation of the services. As such services are evolving rapidly, and new ones are conceived at a fast pace, we recommend leaving the selection of the technical parameters to gentlemen’s agreement between the market players. In this context it is important to ensure that non-commercial services are taken into account and get a fair share of the available network resources (both, fixed and mobile). For this to work, **consumer associations** must be guaranteed to play a role.

Question 13: *In the case where NRAs find it necessary to intervene to impose minimum quality of service requirements, what form should they take, and to what extent should there be co-operation between NRAs to arrive at a common approach?*

25. There should be as set of QoE and QoS classes, which are harmonised throughout the EU (cf consumer labels under question 5). So cooperation and coordination of NRAs is essential.

Question 14: *What should transparency for consumers consist of? Should the standards currently applied be further improved?*

26. As outlined in questions 5 and 13, a logo programme in which different badges represent the different QoS and QoE classes would be best. That way consumers could immediately evaluate whether the service offered by a particular operator will enable the on-line services the consumer wants to use. These logos would need to appear on portal pages and advertisements of both, the operators' offerings, and the on-line services.

The Political, Cultural and Social Dimension

Question 15: *Besides the traffic management issues discussed above, are there any other concerns affecting freedom of expression, media pluralism and cultural diversity on the internet? If so, what further measures would be needed to safeguard those values?*

27. Ensuring fair, reasonable and non-discriminatory access to network resources for **non-commercial services** is essential. Non-commercial services provide platforms for expressions of opinion, artistic expressions etc. They enable citizens to exchange information in a basically unmoderated environment, thus fostering pluralism, diversity, arts and therefore cultural, social and political life and advancements. It must thus be ensured that such non-commercial services **get a fair share of the network resources** and that this access remains **free of charge for the non-commercial service operators**, apart from the basic connection fee that every consumer incurs. So if someone for instance operates a service from the computer in his study room in his spare time and not for profit, the operator shall not be allowed to charge an extra on top of the regular DSL subscription for the extra traffic. The operator shall also not unreasonably restrict the network service such that such non-commercial services are impaired or even stopped (e.g. by filtering specific ports or protocols typically used by them).

Any Other Issues

28. We observe two schools of thinking in both, the technological and the political debates.

28.1. In the technological debate:

28.1.1. The computer science school of thinking. Starting from a theoretical, scientific viewpoint, and the lessons learned in building computer networks, this position emphasizes the strict separation and layering of functionalities, and postulates that the network must be completely agnostic of the applications. Consequently, the default management approach for this camp is best-effort, and the prototypical reaction to bottlenecks is to increase the network throughput until QoE is restored, but stick with the best-effort strategy.

28.1.2. The telecoms engineering school of thinking. Starting from an engineering viewpoint and the lessons learned in building the telephone, radio and television networks, this position emphasizes the end-to-end management of QoS and QoE. In the past, telecoms networks have been dedicated infrastructures. One service, one network. In this environment, managed services have allowed exploiting the infrastructure to its physical limits, and have allowed sustainable, commercial operations.

28.2. In the political debate:

- 28.2.1. The economist school of thinking. Starting from a capitalist viewpoint, this position emphasizes the fact that the large investments being made to install the infrastructure, must be recovered from consumers and commercial users. And since it is a commercial operation, a little profit would do well, too.
- 28.2.2. The citizens rights school of thinking. Starting from a citizens movement viewpoint, this position emphasizes the fact that the Internet as a global, relatively cheap, widely available, and fast means of communication has become an underpinning of citizens rights, grass root and similar movements, and that any attempt to restrain or limit this communication channel, is an assault at freedom as such.
- 28.3. Interestingly we have observed a convergence between the camps in the technological debate in the migration of communications (telephone etc.) and multimedia (television, radio etc.) services to packet-based, IP infrastructures. For the computer science community this meant leaving the lab/office environment, and taking their systems out into wide open where virtually any device will be connected eventually (Internet of Things). For the telecoms engineers this meant letting go of the one-service-one-net paradigm and enabling their services on a wide variety of infrastructures. In this convergence, we see both camps watering down their positions and move towards each other. It turns out that to scale better, a best-effort network needs to adopt some service-based management techniques, and that to diversify better, a vertical application needs to surrender some of the efficiency to allow introduction of generic interfaces. By looking at the systems examined in [DVB BlueBook A145](#) this convergence of system architectures becomes very clear.
- 28.4. A convergence of the camps in the political debate seems less likely at this point. We would like to point out, however that the position currently taken by the citizens rights camp, namely that “all packets must be treated equal,” is a technical solution, not a requirement. We believe that when the actual requirements behind this proposed solution have been unveiled, the road to compromise will become much more accessible. As an obstacle to this, we think that the current positions of both political camps would be adverse to what the camps are (or should be) trying to achieve:
- 28.4.1. At the moment, the network operators seem to prefer charging the on-line service providers directly. This is however sharply rejected by the on-line service providers. And for good reasons. In practice this would mean that the on-line service provider would have to enter business agreements with all network operators along the path to each of the countries where they want to offer their service. In the case of a network malfunction (e.g. deep sea cable interrupted), the traffic gets re-routed, and the on-line service provider would need to enter new business agreements with the now newly involved network operators. In practice a global on-line service provider would probably soon have to have business agreements with most network operators in the world. This raises the bar for rolling out new services to a level that would practically be prohibitive. This lack of new content and services in turn, would then render the broadband service offerings less attractive for consumers.
- 28.4.2. The citizens rights movement's demand that all packets shall be treated equal will probably defeat the actual goals of the movement. Currently network operators apply traffic management on a per TCP connection basis, i.e. per port number. In practice this means that any application that uses the most TCP connections in parallel, wins over the other applications and gets most of the network's resources. From the application's point of view, it must only try to send as many packets as possible to achieve a higher throughput. In the competition between non-commercial services versus commercial operations, the result of the who-can-send-more-packets competition is clear. Of course advertising fueled, international corporations will be able to flood the network

and consume the resources. We thus believe that the citizens rights movement should rethink their message. We believe that “fair share” or “open channel” policy would much better reflect their objectives. In the broadcast industry, regulation reserves part of the capacity (the “open channels”) for non-commercial activities by the citizens. This model has worked very well, and the open channels provide a valuable platform for plurality, minority concerns, and other socially important aspects. We believe that the “open channel” model would be the best starting point for a corresponding regulation on the broadband networks.

Appendix: Bibliography

- **Alexander Adolf: “Net Neutrality and Multimedia Services”**
Condition-ALPHA Technology White Papers, September 2010
http://www.condition-alpha.com/Condition-ALPHA/Publications_-_Download_Read_Enjoy.html
- **Brightcove Inc. / TubeMogul.com: “Online Video & the Media Industry”**
Quarterly Research Report, Q1 2010
<http://files.brightcove.com/brightcove-whitepaper-online-video-and-media-industry.pdf>
- **OFCOM: “Traffic Management and ‘net neutrality’ - A Discussion Document”**
2010-06-24
<http://stakeholders.ofcom.org.uk/consultations/net-neutrality/>
- **DVB: “Digital Video Broadcasting (DVB): Internet TV Content Delivery Study Mission Report”**
DVB BlueBook A145, 2009-12
http://www.dvb.org/technology/standards/A145_Internet_TV_Content_Delivery_Study.pdf
- **David Flynn: “Mobile carriers seek to block Skype on iPhone, BlackBerry”**
apcmag, 06 April 2009
<http://apcmag.com/mobile-carriers-seek-to-block-skype-on-iphone-blackberry.htm>
- **Dan Redding: “The Future of the Internet”**
Smashing Magazine, August 11th, 2010
<http://www.smashingmagazine.com/2010/08/11/the-future-of-the-internet/>
- **Richard Sietmann: “In den Startlöchern - Wie sich die Netzarchitekten die Zukunft des Internet vorstellen”**
c’t Magazine, issue 21/09
<http://www.heise.de/ct/artikel/In-den-Startloechern-973293.html>