

Submission to the European Commission's
Public Consultation on

The Open Internet and Net Neutrality in Europe

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1 Executive Summary

Deutsche Telekom Group welcomes the opportunity to contribute to the Commission's fact finding by responding to the public consultation on the complex issue of open internet and net neutrality in Europe. While the public debate in the media has been revolving around hypothetical threats to European citizens 'net freedoms' there has been a clear lack of economic reasoning and due consideration of the technological realities. This submission aims to shed light on those missing aspects and to thereby contribute to a sensible public deliberation on the future of the Internet.

Proponents interpret net neutrality emotionally and not from an objective point of view

First of all it is important to note that "there is no set definition of net neutrality"¹ and that interpretations vary widely, dependant on the particular interests of the respective actor citing neutrality principles in order to formulate a claim. Contrary to the understanding "that [net neutrality] represents the idea that all data on the internet should be treated equally, whatever its source or destination" cited by the Commission, Deutsche Telekom shares the view of Internet pioneer Vinton G. Cerf:

*"One persistent myth is that "network neutrality" somehow requires that all packets be treated identically, that no prioritization or quality of service is permitted under such a framework, and that network neutrality would forbid charging users higher fees for faster speed circuits. To the contrary, we believe such features are permitted within a "network neutral" framework, so long they are not applied in an anti-competitive fashion."*²

Deutsche Telekom is committed to the Open Internet and to "net freedoms". The introduction of QoS-differentiation and traffic management supports these goals.

Deutsche Telekom Group supports the principle of 'net freedoms' for European citizens and businesses. For network operators it would be self-defeating to attempt to restrict these freedoms. In the competitive European markets for broadband access any business strategy that is based on restricting customer choice is doomed to fail. Acknowledging that the needs and expectations of our customers are highly heterogeneous, we strive to offer tailor made solutions. Therefore DT is committed to the Open Internet. The introduction of differentiated levels of quality does not contradict this goal. Traffic management and QoS-differentiation are the necessary means to enable the development of new services, to handle exponential traffic growth, to keep our networks running and to maintain connectivity to the Internet for all our customers. Furthermore, if there was no prioritization so called quality insensitive services that require a relatively large bandwidth would crowd out quality sensitive services, i.e. ambient³ video could deteriorate video conferencing services to the point of unacceptable Quality of Experience (QoE). The digital revolution would be prevented

¹ Commission press release on the launch of the consultation IP/10/860, 30 June 2010

² Letter signed by five internet pioneers to the FCC:

http://www.openinternetcoalition.org/files/FCC_NN_Letter_Cerf.pdf

³ Ambient video is defined as persistent video stream that does not require the users attention and therefore is running in the background, e.g. nannycams, petcams, home security cams, etc.



from realising its full potential if the specific quality and security requirements of services such as eHealth can not be guaranteed through network management.

Today's "best effort" internet will continue to exist in a managed NGN

There is no reason to assume that once the transition to "all IP" Next Generation Networks (NGN) is completed the internet as we have come to know it will suddenly cease to exist and be replaced by a complicated system of "toll roads". Today's "best effort" Internet is here to stay. The differentiated offers of the future will be based on guaranteed levels of quality which will be built on top of the "best effort" internet. It seems to be a common misunderstanding that competition will manifest itself primarily in different specifications of quality of service (QoS) levels while the "best effort" class will be neglected. Instead a realistic perspective is that there will be an industry wide intrinsic motivation to agree on international standards for QoS levels in order to produce meaningful service quality across network boundaries, i.e. end to end, especially when one acknowledges the meta trend of ever increasing convergence. As regards the 'best effort' quality, in the face of fierce competition for retail customers all ISPs will have strong incentives to not only compete on price but also in the provision of a "best effort" service that meets their customers' expectations. This competitive dynamic can not lead to a deterioration of service provisioning.

Customer transparency will be the key to success in the market place

Besides being obliged by the European framework for electronic communications to provide meaningful information to the end customer every player will have an intrinsic motivation not only to be clear about the terms and conditions in the contracts but also to keep the customer informed and satisfied after a contract has been signed. This includes being transparent about traffic management practices and possible limitations. Higher tiers of quality at a price premium would fail in the market place if the customer does not understand the product and fails to see the benefit.

Regulatory intervention in competitive markets would create distortions

There is no need for further intervention since the market mechanisms work. There will be no need to actually apply the newly obtained regulatory tool of setting minimal quality standards. Deutsche Telekom Group fully agrees with the Commissions initial assessment⁴ that competition and transparency will ultimately safeguard the open character of the internet and assure the 'net freedoms'. In the absence of market failure or insufficient competition it would be a significant deviation from established best practices in economic regulation to implement remedies that would severely restrict access network providers in their economic freedoms as well as in their core competence: the management of networks.

⁴ As specified in the Commission declaration on net neutrality, OJ L 337, 18 December 2009



The current EU regulatory framework safeguards the Open Internet

We are confident that the ongoing evaluation will come to the conclusion that the current EU policy framework is absolutely sufficient with regard to net neutrality, provided that the sensible and facts based analytical approach is being continued. We also expect the Commission to consider the wider implications on a global scale and the high dynamics of the internet economy when deliberating the need for further regulatory or legislative action. It is far from certain that the perceived gatekeepers of today will also be the gatekeepers of tomorrow as economies of scale and positive network externalities are manifesting themselves on various levels of the internet value chain.

QoS-differentiation and price differentiation will contribute to financing the roll out of broadband infrastructure

It is important to acknowledge that the introduction of differentiated levels of quality will contribute to financing the roll-out of broadband infrastructure. This will also benefit those customers who face limited availability of bandwidth today. When regarding the distribution of traffic volumes generated and consumed it becomes evident that a small group of so called 'heavy users' is generating an over proportionally high traffic load on the network. In 2009 3% of our mobile customers generated 53% of the IP traffic. A new regime that cuts cross subsidies from the average to the heavy user by attributing the cost of capacity expansion to those that actually cause it would be fairer than today's regime and contribute to an efficient roll-out of infrastructure.

Competition will not only lead to better quality and individually tailored offers but safeguard a diverse and affordable internet experience

Market research clearly shows that "one size does not fit all". We expect policy makers to respect the heterogeneity of our customer base by continuing to explicitly allow for further differentiation of products and services, both with respect to price and quality. The introduction of specified - and possibly standardized – quality classes on top of best effort internet access will lead to a situation where one of the most important differentiators between networks will be the provisioning of best effort connectivity. This is true for fixed as well as for mobile networks. Competition will not only lead to better quality and individually tailored offers but ultimately safeguard a diverse and affordable internet experience.



2 Background of the debate

While much of the public debate on Net Neutrality has been revolving around the future accessibility of content and potential restrictions of the basic right to freedom of expression, the heart of the matter is economic by nature: changing the rules for the internet economy would ultimately determine the distribution of revenues across the entire value chain. Any such intervention needs to be carefully considered and especially so when deciding on the future of the Internet. The concept of Net Neutrality has been described as a “solution in search of a problem”, which highlights the fact that there is no actual problem in the European broadband markets.

The Net Neutrality debate started in the United States with the Madison River Case and gained new momentum with the “online” campaign of Barak H. Obama in 2008. While stating that there is no actual problem Mr. Obama perceived a need for policy action as early as 2006.

After the presidential election and the appointment of Julius Genachowski as chairman of the FCC the US regulator proposed to extend the original four Internet Freedoms from the FCC’s 2005 policy statement⁵ by a non-discrimination and a transparency principle as well as extending their applicability to mobile networks. For this purpose a so-called Notice of Proposed Rulemaking (NPRM) process was launched in October 2009. This process and the corresponding public consultation have stimulated the public debate on both sides of the Atlantic since. While the regulatory situation in the US remains unclear⁶ the revised European regulatory framework for electronic communications is in the middle of being implemented into national law across the member states.

The other essential difference between the EU and the US that needs to be kept in mind is the regulatory treatment of the wireline broadband market. This difference is a consequence of FCC decisions that revised the unbundling obligations introduced with the US Telecommunications Act of 1996. While under EU-law all network operators with significant market power (SMP) are obliged to grant non-discriminatory access to their broadband networks, infrastructure access is unregulated in the US. Because the regulatory framework in the US is not enforcing non-discrimination in the access part of the networks the net neutrality debate has surfaced and is focussing on establishing non-discrimination on the next layer, i.e. the transport layer.

When contemplating the need for more prescriptive regulation it is important to acknowledge this difference. There is a wide choice of alternative internet access offers in the European broadband markets. Extrapolating a potential need for further regulation from the wireline broadband access market in the US to all access network providers risks not only to pre-determine market structures and results through regula-

⁵ FCC Policy Statement 05-151, adopted August 5, released September 23, 2005

⁶ The D.C. Court of Appeals ruled on April 6 2010 that the FCC lacks the legal competence to enforce the “Four Freedoms” adopted in the policy statement 05-151. As a consequence the FCC has proposed the reclassification of internet services and the so called “common carriage rules” applicable to telecommunication services. While this process is still ongoing the FCC launched a “further inquiry” on the 1st of September 2010 as part of its deliberation of rules to safeguard the open Internet and net neutrality. In this process the FCC is looking for further clarifications on “managed services” (or additional online services) as well as on the necessity of extending the principles to the mobile sector.



tion – which is always a second best solution compared to competitive outcomes – but also to severely reduce investment into new infrastructure and to limit innovation.

These likely effects need to be weighted against the Commission acknowledgment of the sector's needs in its Progress Report⁷ on the Single European Electronic Communications Market 2009:

Electronic communications markets such as voice telephony are maturing and growth in the sector is slowing down. Future sustainable growth will require new service innovation and business models. It is now imperative to move to the next generation environment, with its new opportunities and challenges. This transition requires significant investment in enhancing the capacity of fixed and mobile networks.

3 How to define Net Neutrality?

Contrary to a simplistic understanding of net neutrality or Internet neutrality – all data packets should be treated equally, independent of their content, source and destination – a closer investigation finds a multitude of proposed concepts, none of which has been endorsed with universal acceptance or been codified as legal definition. The English version of Wikipedia⁸ identifies three main concepts:

- i) **Absolute non-discrimination:** attributed to Tim Wu of Columbia Law School this definition claims that “Network neutrality is best defined as a network design principle. The idea is that a maximally useful public information network aspires to treat all content, sites and platforms equally. This allows the network to carry every form of information and support every kind of application. The principle suggests that information networks are often more valuable when they are less specialized – [...]”⁹.
- ii) **Limited discrimination without QoS tiering:** This definition, found in the ‘Internet Freedom Preservation Act¹⁰’ which was proposed to the US House of Representatives in July 2009, “would allow quality of service discrimination as long as no special fee is charged for higher-quality service”.
- iii) **Limited discrimination and tiering:** This approach is credited to Tim Berners-Lee and allows higher fees for QoS as long as there is no exclusivity in service contracts. “If I pay to connect to the Net with a certain quality of service, and you pay to connect with that or a greater quality of service, then we can communicate at that level. That’s all. It’s up to the ISPs to make sure they interoperate so that that happens. Net Neutrality is NOT asking for the internet for free. Net Neutrality is NOT saying that one shouldn’t pay more money for high quality of service. We always have, and we always will”¹¹.

⁷ COM (2010) 253/final3, Brussels, 25.8.2010

⁸ http://en.wikipedia.org/wiki/Network_neutrality Section 1

⁹ Tim Wu, Network Neutrality FAQ http://timwu.org/network_neutrality.html

¹⁰ <http://www.opencongress.org/bill/111-h3458/text>

¹¹ <http://dig.csail.mit.edu/breadcrumbs/node/144>



While the first and most absolute definition implies that non-discrimination is to be interpreted in the widest possible form as absence of discrimination it is evident that this includes an immediate normative valuation: future innovation should occur on the edge of the network only, not on the network itself. This in itself can not be considered technologically neutral and would – if actually implemented – severely discriminate network operators versus anyone else in the internet economy.

The US proposal for limited discrimination does in principle allow for future innovation on the network but at the same time fails to provide the needed economic incentive for this innovation. A ban of priority pricing is unduly dismissing the most fair and practicable mechanism to decide who gets to actually use those higher qualities. Why would anyone be satisfied with less than the highest possible quality if there is no price for obtaining it? This approach neglects two **basic economic principles**. Market pricing is the most efficient mechanism to allocate a scarce resource, such as top tier quality, to the individuals valuing it the most. Second, the classic “tragedy of the commons” would unfold: the internet users, acting independently and individually completely rational, would deplete the shared resource bandwidth even though this is in no one’s interest.

This “tragic” tendency to deplete the shared resource is evident when acknowledging the fact that today 3% of our mobile users are generating 53% of the traffic carried on our mobile networks. While this is individually rational in the absence of economic incentives and intelligent network management, this results in favoring the “bullies” and damaging the utility for the vast majority of the users. The same can be observed on the other side of the market. In order to raise the probability that their own services and contents will reach their users in a timely manner in a best effort environment, some providers have adopted the practice of sending the same data packets multiple times. While this obviously creates tangible effects on the Quality of Experience for their own users, the providers that respect the established protocol, e.g. sending every packet once and re-send when prompted to, are unduly discriminated against and risk being crowded out.

The third definition which is based on limited discrimination and non-exclusive tiering suffers neither from a normative innovation-bias nor from evident economic shortcomings. By axiomatically classifying the internet economy as an extension of (and therefore integral part of) the real world economy and consequently proposing to apply the same guiding principles this definition respects both the basic economic principles and established regulatory best practice. Furthermore it balances the interests of consumers and economic actors by essentially promoting to apply non-discrimination rules to the internet **in accordance with established competition law**.

As a company we need to be able to innovate and finance our investment. An implementation of either the first or second definition would severely damage our legitimate business interests. Those two definitions also lack the economic incentives needed to prevent the “tragedy of the commons” and would ultimately lead to socially and economically suboptimal results. Of the three, only the third definition which is based on limited discrimination and non-exclusive tiering meets the criteria. As long as product differentiation, experimentation with new business models and future innovation (both on the network as well as on its edge) continue to be not only allowed but legally guaranteed, we fully support neutrality principles.



It is of prime importance to correctly **draw the fine line between welfare maximizing product differentiation and anti-competitive discrimination**. While performing this exercise it is not helpful to base the reasoning on diffuse assumptions on future business strategies and derive hypothetical scenarios. Economic theory and competition law provide the tools for the evaluation but require facts for the analysis. This implies, that the evaluation can not be performed independent of an actual case, i.e. it is not possible to derive a per se rule that can establish the socially desirable and economically efficient results for all possible cases. Consequently it is theoretically impossible to justify an ex-ante ban of QoS differentiation and tiered pricing before an actual introduction and test in the market place.

What is certain is that output and **total welfare may be expanded when product differentiation is efficient**. This implies that some users will be facing lower prices while others will be facing higher ones. Deutsche Telekom Group will empower the consumers to take the decision that best reflects their individual preferences. In any case, allowing for product differentiation will increase the variety of the offered products and services. This by itself is assumed to increase total welfare and has been an explicit goal of sector specific regulation.

It is equally important to note that EU competition law clearly defines the circumstances under which discrimination needs to be controlled for. According to Article 102 of the Treaty (ex Article 82 TEC) a dominant position “within the internal market or in a substantial part of it” is the first requirement and the actual abuse of such a position the second. Those two conditions need to be cumulatively met in order to justify a sanction. Before coming to conclusions, a sound analysis will also have to include the determination of the relevant market, the competitive positions therein and the assessment of whether or not an actual practice is abusive and anti-competitive or not.

4 The market approach has been successful

It is undisputed that the internet has outperformed even the keenest expectations over the last decade. Economic research shows that the broadband infrastructure is a main driver for innovation, economic growth and employment. The IT sector is the source of massive spill over effects to a large number of industries.

- Telco investment explains one third of economic growth in the last 20 years throughout the OECD economies¹².
- ICT represents 5% of the total GDP driving about 50% of productivity growth in the EU¹³.
- In a best case scenario broadband development can trigger the creation of more than 2 million new jobs and create the equivalent of € 1080 billion in economic activity related to value-added online services between 2006 and 2015¹⁴.
- For the EU-27, the value added by the ICT industry at current prices amounted to € 592.7 billion in 2007, representing around 5 % of GDP. This is less than in the US (6.4 %) and Japan (6.8 %)¹⁵.

All of this has happened and is happening without any kind of regulatory intervention in traffic management practices. The market mechanisms alone assure that customers get what they demand.

When focusing on the developments in the sector itself the following main developments have been identified in the Commission's 15th Implementation Report¹⁶:

- "... the maturing nature of traditional markets such as fixed and mobile voice telephony presents significant challenges to growth. The rapid rate of growth witnessed since liberalisation has slowed in recent years. Increases in data revenues are not yet compensating for declining voice revenues."
- "The economic climate weakened user spending." And "According to the European Information Technology Observatory (EITO), growth in 2009 was close to zero"
- "Investment declined and largely focused on fixed networks. In most countries, however, investment in next generation access networks is still limited, ..."
- "Most broadband lines are based on xDSL technologies. The deployment of high-capacity broadband is still limited, with about a quarter of lines providing more than 10 megabit per second (Mbps). Europe is falling behind when it comes to next generation access. Lines based on fibre to the premises only represent between 1.8% and 5% of all fixed

¹² Röller, L.H. and L. Waverman (2001): "Telecommunications Infrastructure and Economic Development: A Simultaneous Approach," *American Economic Review*, 91(4), 909-923.

¹³ Neelie Kroes, "A Digital Agenda for Europe", Opening remarks at press conference, Brussels May 19th 2010

¹⁴ Fornefeld et al. (2008): "The impact on growth and productivity", study by MICUS on behalf of the European Commission, URL: http://ec.europa.eu/information_society/eeurope/i2010/docs/...

¹⁵ European Commission, "Europe's Digital Competitiveness Report", 17 May 2010

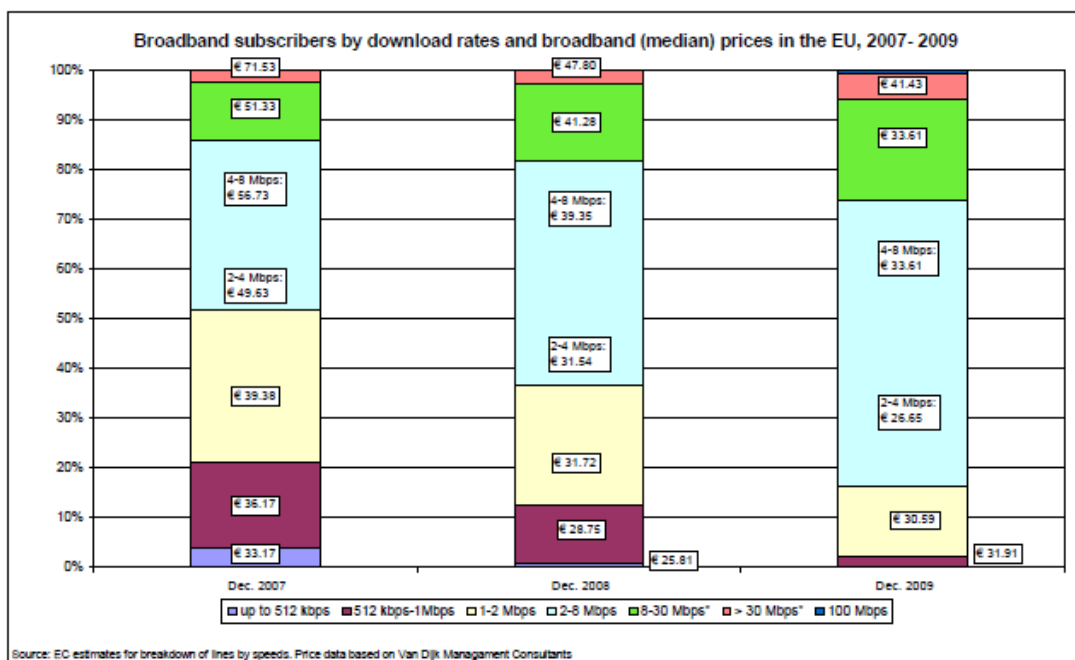
¹⁶ COM (2010) 253/final3, Brussels, 25.8.2010

broadband lines, pointing to the need to improve the conditions for the deployment of next generation access networks (NGAs).”

- “While much of the growth of recent years has been driven by mobile communications, the sector is now at a crossroads. While accounting for more than 80% of overall mobile revenues, the share of voice communications in terms of traffic is declining to the benefit of data, which puts great pressure on network capacity. Mobile internet revenues only drive 4% of the total mobile revenues.”

These findings need to be contrasted with the fact that “[u]sers have increasingly been receiving faster internet access for similar prices”¹⁷, as illustrated in Figure 1.

Figure 1: Broadband speeds and prices in Europe



A market result where consumers are benefitting from increased choice and lower prices while the network operators are facing severe obstacles to roll-out new infrastructures allows only one conclusion: the European markets for broadband access are highly competitive, benefitting the users and spilling over positive externalities into other sectors.

¹⁷ COM (2010) 253/final3, Brussels, 25.8.2010



5 Need for new business models

The correct analytical framework for the Internet economy is a two sided market. On one side there are customers who benefit from access to a wide variety of content and services. On the other side, there are content providers who benefit from access to a wide range of end users. Since this is given on an open platform like the Internet the so-called indirect network effect is maximized. Against this background, it is only consistent that all parties who benefit from accessing and using the platform pay the fair share of the costs they create (economic equivalence principle). These costs are particularly large when investments in high-performance networks are triggered, for example the technology change to LTE and the investment required to roll out Fibre to the Home (FTTH). These costs can not be entirely passed on to the end customer. This is the primary reason why penetration pricing is applied when introducing new network goods.

An efficient network materializes only when a critical mass of participants is attracted. At the beginning the network effect and the resulting benefits are relatively small. Because these benefits are determining the willingness to pay it is a sensible strategy to resort to comparatively low introductory prices at this stage. With the passing of the critical mass the network effect increases dramatically and that would theoretically increase the users willingness to pay. This theoretical consideration runs contrary to the experienced price cuts in the European market place. Therefore the willingness to pay on the end user side remains limited and uncertain. Consequently the content providers who benefit particularly from quality networks need to bear a fair share of the network costs.

The current model has tried to achieve this by offering attractive service bundles to end customers. When moving from dial-up internet access to always on broadband data plans, the industry introduced attractive flat rate price plans for access customers. This 'penetration pricing' strategy did not aim to recover the full long run incremental costs of operating the platform but to attract the 'critical mass' that is needed to gain relevant network effects. All a content owner on the second side of the market needs to do in order to connect to the platform is to choose a provider for connectivity to the internet. Since the physical location of the content is largely irrelevant in an interconnected world, content owners may choose from competitive offers in a worldwide market place.

As a consequence, the costs of building and running access networks are currently being covered through end user pricing. If the end users' willingness to pay was correlating to their consumption of data volumes and retail pricing was unrestricted there might not be a problem at all. But as pointed out in chapter 4 there is a clear disconnect between the rising traffic volumes and the price level in the retail business. This puts the network operator under threefold pressure:

- **Performance pressure:** in order to avoid congestion and the crowding out of quality-sensitive applications capacity extension needs to be complemented with sensible and customer oriented network management. Because internet access is offered in competition, not meeting the performance challenge will result in losing customers.

- **Economic pressure:** the continuation of the necessary capacity build out can not be financed at the current price level. It would be economically inefficient to steadily and progressively raise the capacity without sending a signal of scarcity. Today's business model of operators clearly lacks this signal despite there being clear limitations to capacity.
- **Policy pressure:** those who benefit from the current system would like to "freeze" this model through the introduction of additional economic regulation. While sharing the goals to keep the internet open in order to maximize consumer choice and enable innovation network operators need to be able to manage traffic and test new business models in the market.

While it is evident that the current model is not sustainable it remains unclear exactly what the new business model will be. It is however certain that a sustainable model will need to allocate the costs to those who draw the benefits from capacity expansion. It will also have to allow all players across the value chain to innovate and recover their investments.

6 DT's way forward to the open Internet

Faced with heavy competition in the market and a clear need to develop new business models Deutsche Telekom has decided to take a pro active and pro competitive stance and continue to transform the company from a classical Telco into a "Telco plus". While we remain convinced that infrastructure remains the key driver of our business we see clear potential for growth in offering differentiated network capabilities and online services. We will both partner and compete with other Internet industry players in order to develop those markets. The roll out of Next Generation Networks will enable us to offer increasingly standardized interfaces that add indispensable intelligence to our networks.

For every technology company, innovation is a constant challenge by nature. In addition to a technology company's internal innovation process, DT strives to spur external innovation by offering third parties standardized and open access to the capabilities of DT's networks and IT systems. Every interested third party is invited to use these capabilities as readily available, reliable building blocks to realize their very own product and service ideas. By employing the creativity of the whole telecom and IT ecosystem, many more concepts can be tested in the markets and eventually be developed into products than by a single company alone. As we will offer third parties also the capability to charge end-users and therefore monetize services, we expect many new business models to emerge in the market. This plurality of competing choices benefits our customers and unfolds the full innovation potential of the telecommunications infrastructure combined with the creativity of the internet world.

A number of capabilities are already exposed today, e.g. standardized interfaces to send text messages and set up telephone conferences. The exposure of other capabilities such as charging end-users is ongoing work in progress. Other telecommunication companies as well offer application programming interfaces (API) to companies or developers to build new services for their customers on the basis of a telecommunication company's enabling services.



A very particular network capability is QoS. Its technical nature is much more complex than that of other capabilities, and so its introduction into our networks is only in a very early stage. However, as soon as differentiated levels of quality will be implemented in our networks, we will bring relevant third party offers on a non-discriminatory basis to the market. QoS will allow interested parties to offer high quality applications, e.g. in the area of videoconferencing, smart grid and e-health.

We believe that our open interfaces will significantly lower market barriers for innovative companies. Through the usage of these powerful building blocks, undertakings can focus their resources on innovation. Our open interfaces will therefore strengthen the dynamic innovation culture of the open Internet. We are convinced that not only the classic internet industry will benefit from these interfaces but that this effect will be transferred to other industries such as energy, healthcare, media and transportation.

7 Key Conclusions

Closely observing the public debate on the open Internet and net neutrality Deutsche Telekom Group acknowledges that the ongoing transition from previously separate networks to “all IP” Next Generation Networks is provoking fears of an imminent “colonization” of the Internet by network operators. While these fears are addressed most vocally by “net activists”, the wider public is neither perceiving an actual problem nor expecting a disruptive change in the way internet access is provided.

Deutsche Telekom Group is committed to continuing to provide best effort internet connectivity. This implies, that we will continue to invest in our networks. Our customers expect us to be able to cope with ever more “bandwidth hungry” services and contents and keep our networks running smoothly. In order to meet this expectation we have been and will have to continue relying on network management. As traffic volumes are expected to grow at rates that physical infrastructure roll out will not be able to keep up with the role of network management will most likely increase in the future. While this is being done to maximize customer benefit and choice it may induce certain restrictions. We are committed to communicating the implemented measures transparently and allow our customers to take informed choices about the services and products that best meet their individual needs.

The introduction of guaranteed levels of quality will be realized in addition to the continued provision of best effort internet access. The availability of differentiated products at competitive prices will further stimulate the digital economy and ultimately benefit everyone. It is foreseeable that those additional QoS levels on top of best effort will have to be standardized internationally in order to allow End-to-End guarantees. Consequently competition in the provision of QoS levels will manifest in the form of price competition and to a lesser extent in quality competition. The class which will see both competition in price and quality will be the best effort class. It is most rational to expect that network operators will keep competing for end customers by providing attractive best effort connectivity, allowing access to all content. In sum, the introduction of quality classes will increase the variety of the offers and customer choice. Guaranteed End-to-End quality is expected to create added value and enable



new and innovative services. This will not only increase total welfare but also stimulate competition and innovation.

We have outlined that there is a need to test new business models in the market and that the traditional over provisioning approach is no longer a sustainable model. Therefore, the forward looking deliberation on the policies that best promote an open and innovative Internet should not get side tracked by discussing “if” network management should be allowed or not. The relevant question is where the fine line between beneficial service differentiation and anti-competitive discrimination should be drawn. The discussion so far has demonstrated that it will be practically impossible to define this in a static set of rules that is both assuring the status quo and not restricting future innovation on the networks as well as on their edges, e.g. in services and business models.

The careful European approach to net neutrality regulation has produced the desired results so far. Competition itself is bound to achieve strictly better market outcomes than any kind of newly introduced economic regulation. When looking at the bigger picture of the internet economy it becomes evident that problematic market power will most likely not reside with network operators in the future. While Telcos compete in open standards and are interconnected worldwide, thereby providing universal connectivity, proprietary standards have been introduced on other layers of the value chain. Those closed standards allow for active segmentation of markets and lead to problematic concentrations which allow the proprietors to leverage network effects to their own benefit. It would be shortsighted to exclusively focus on the perceived gatekeepers of today when deliberating on how to best maximize customer choice.



8 Consultation Questionnaire

8.1 *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?

Currently we do not perceive any actual problem of net neutrality and the openness of the internet. For the German market, the national regulatory authority (Bundesnetzagentur) has affirmed this assessment repeatedly, both in statements to the media¹⁸ as well as in expert hearings and conferences on the subject of net neutrality.

For further details please consult chapter 4 (page 9) of this response.

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

The discussion of network neutrality frequently mixes up two different and separable issues, namely discrimination of other players and quality of service.

The first term relates to the possibility that network operators might use their control over the infrastructure to slow down or block certain data packages to hinder competing services. This would reduce competition and hence economic welfare. In the presence of strong competition (as is the case in Europe), network operators do not have an economic incentive for this kind of discrimination: any such behavior would be detected and provoke an immediate market reaction punishing the operator which adopts such measures with “churn”.

There is no reason to assume that competition will be weaker in the future. In the European fixed markets, increasing infrastructure competition by upgraded cable networks such as in Germany and continued regulatory obligations on SMP operators, such as non discriminatory access to access networks, are safeguarding this outcome. The mobile markets are characterized by strong infrastructure based competition between networks. Beyond that, general competition law provides effective safeguards against potential abuse of dominant positions in the market.

In fact, more and more telecommunication companies (including Deutsche Telekom) are voluntarily attracting developers from the outside by opening up capabilities of their networks to third parties. The contribution from external developers promises to create innovative services for their customers. This is a strong indicator that discriminatory behavior is increasingly seen as a competitive disadvantage in the market.

¹⁸ See for example the article written by BNetzA chairman Matthias Kurth, published 24 August 2010 in the Frankfurter Allgemeine Zeitung.

Online Version: <http://faz-community.faz.net/blogs/netzkonom/archive/2010/08/25/matthias-kurth-wettbewerb-ist-der-garant-fuer-netzneutralitaet.aspx>



That is why openness, a wide variety of choices, and the unrestricted access to any lawful content, services, and applications have always been and will remain basic characteristics of internet access markets in Europe. A plethora of network operators and service providers offers a wide range of differentiated access products and services. Customers decide which content, services and applications they want to access.

The consultation document correctly refers to the fact that a number of mobile providers do not allow the unlimited usage of VoIP services from third-party providers in every tariff. This measure cannot be considered as anti-competitive discrimination because the customers always have the option to choose a specific tariff plan which allows using VoIP services or to change their network operator. As long as at least one operator in every national market offers the option there is choice. Some operators have even opted to proactively integrate third party VoIP offers in their own products and have adapted their network design to accommodate for this. While there has been a time when mobile VoIP services were not accessible on any network in certain countries this situation has been remedied by competition. This – again – demonstrates that market solutions will provide the offers that are demanded by the customers.

Network operators are committed to providing choice and quality for all customers. Offering differentiated products and services to all players in the internet value chain increases variety and strengthens competition. Therefore it would be unwise to limit the net neutrality debate to access networks exclusively, as such an approach risks to ignore the dynamics of the internet economy. It is not an unlikely future scenario that new dominant positions could arise in other parts of the internet value chain, for example in the search engine or social networking platform markets.

The second issue at hand is the introduction of quality of service (QoS) differentiation. Internet traffic is increasing dramatically not only due to additional users but due to high-data-rate applications such as online video streaming, peer-to-peer file sharing etc. Despite network operators constantly increasing their network capacity, congestion is an everyday phenomenon especially during peak hours and affects all users negatively by reducing their Internet experience. The extent to which quality suffers due to congestion differs dramatically with respect to data rate, quality sensitivity and economic value. Video and file sharing services use an extraordinary large part of the available bandwidth and therefore have large external effects, whereas other services involve a comparatively small bandwidth usage. Certain services are not affected by congestion, whereas the quality of other services is severely reduced. Finally, the individual users' willingness to pay for certain services differs, which in sum results in different economic values for specific services.

Evidence has shown a tendency for high-value quality-sensitive services being crowded out by services which have a low economic value (e.g. file sharing) and are less sensitive to the quality of the transport service. This results in economic inefficiency due to decreased user experience as well as limited business revenues in these markets. Innovative services requiring high quality levels may not be developed at all even if they would meet a high willingness to pay in the marketplace. This in turn has a negative impact on economic growth and employment. Theoretically, it is possible to avoid a majority of congestion problems by building up large reserve capacities in order to assure that all network traffic can be forwarded immediately



even in the situation of extremely short-run peak loads. But even then packet loss would not be avoidable completely. The technical reality is that a small percentage of packets will get lost in transmission. Experts call this the “natural rate” of packet loss.

In the long run this strategy of over-provisioning capacity is not only economically inefficient and a waste of resources but also burdens network operators with unbearably high costs. They can not justify their investments while being confronted with a situation of ever decreasing or stagnant price levels in the retail markets and traffic volumes that grow exponentially. As a consequence, over-provisioning is no longer a sustainable business model for network operators.

The only efficient method to solve situations of congestion when not all incoming traffic can be conveyed instantly is to assign rights to specific services to be transported with a certain priority by an adequate pricing mechanism based on the willingness to pay, known as priority pricing in the economic literature. Providers of quality sensitive services will have a reason to pay for a certain priority, if the users of these services (or indirectly the advertisers) are willing to pay for a certain quality of these services. Quality-insensitive services will be adequately served with a best effort quality. Competitive network markets will bring forth a specific quality of service system (QoS) with differentiated quality classes and differentiated prices in order to adequately deal with heterogeneous services regarding quality sensitivity and economic value. All users can choose from the available service classes and respective prices and will thereby be treated equally. That way, a market driven QoS concept results in an economically efficient rationing of scarce network resources and avoid crowding-out problems.

A too strict application of network neutrality principles could prohibit market-driven differentiation between services in case of congestion. Rationing would then be done by chance and not by economic value, which is clearly inefficient from an economic point of view.

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

As stated in the consultation document itself, net neutrality has not emerged as a problem in Europe. This indicates that the regulatory framework is capable and sufficient to deal with this issue.

Moreover, general competition law complemented by the instruments of the EU telecoms regulatory framework provides effective instruments and remedies to deal with potential anti-competitive behavior. The revised EU regulatory framework contains sufficient regulatory measures to avoid problems in the context of net neutrality and provide a sound basis to safeguard competition and the openness of the Internet. Thus, no further legislative prescriptions or regulatory interventions are needed.



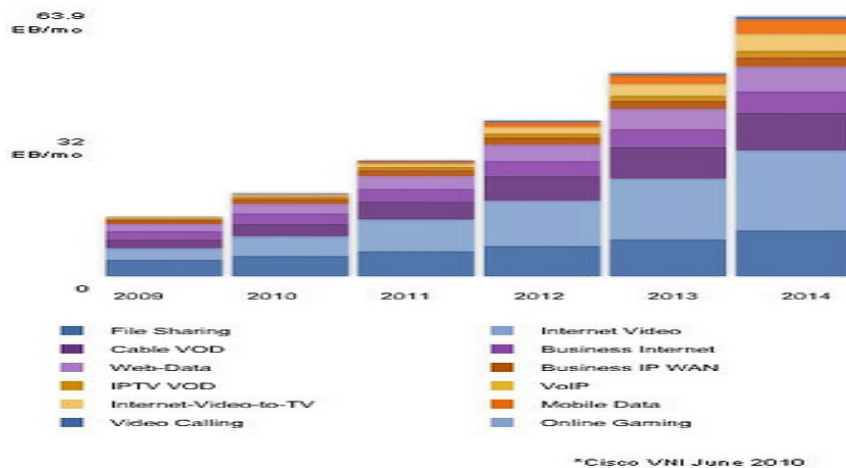
8.2 Traffic management/discrimination

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?

Most importantly network management is needed in order to mitigate network congestion which is a daily phenomenon during peak hours. Traffic estimates¹⁹ project a massive increase in volumes (see Figure 2). The ever increasing demand for and consumption of video services²⁰ has been identified as the main driver. The load this generates will increase when the ongoing transition to High Definition video will be completed.

According to Cisco estimates global IP traffic will quadruple by 2014. Over the same period mobile data alone is expected to multiply by factor 39. In order to keep the networks functioning and to assure connectivity to the Internet for the customers network operators need to implement traffic management measures. The traditional over-provisioning approach is no longer economically sustainable, i.e. investment in capacity extension can not be justified when faced with exponentially growing traffic volumes and ever decreasing price levels at the same time.

Figure 2: Expected overall growth of global IP Traffic (in Exabyte per month)



Source: http://newsroom.cisco.com/dlls/2010/prod_060210.html

Traffic management is also an essential mechanism to enable the differentiation of products and services. Different services have specific quality requirements that go well beyond mere bandwidth²¹. Some new services even depend on guaranteed levels of quality (telemedicine for example). In this respect, traffic management is an

¹⁹ Cisco Visual Networking Index (VNI),

http://www.cisco.com/en/US/netsol/ns827/networking_solutions_sub_solution.html

²⁰ This category includes TV services, Video on Demand and peer-to-peer sharing of video content.

²¹ The most relevant parameters today are delay, jitter and packet loss.



enabler for increased variety in products and services as well as for further innovation on the Internet.

At the same time it is important to point out the clear distinction between classical managed voice services and Voice over IP (VoIP). Voice telephony services have to meet extensive legal obligations and regulatory requirements that have existed long before VoIP was even technically feasible and will have to continue to meet them once the transition to NGN is completed, e.g. caller line identification (CLI) and suppression thereof, guaranteed emergency call functionality including exact localization of the caller, obligations for lawful interception, accuracy of billing solutions, access to value added services (VAS), requirements with regard to call drop rates and times to setup a connection as well as other interoperability obligations.

All those requirements could not be met if telephony would become “just another data service” in the NGN world, not even if there was a specialized QoS-voice-class. This is mainly due to the fact that the solution needs to meet all those requirements end-to-end, i.e. across network boundaries. Contrary to “best effort” provisioning of VoIP over the internet which can be characterized by the separation of the transport and the service layer, telephony will continue to depend on the close integration of these two layers. Without this close integration it would be impossible to meet the high expectations and requirements of our customers.

In order to comply with the regulatory requirements and to meet customer expectations extensive planning and testing has been conducted to prepare the migration to IP. Just as with the migration from PSTN to ISDN all²² functionalities of the old system have to be supported - due to legal obligation - by the new one. Another constant is the calling party network pays (CPNP) billing system which will continue to feature charging in function of the time the service is used. The technical as well as the economical implementation of the NGN voice solution make clear that VoIP can not be seen as a perfect substitute and that telephony can not be classified as an internet data service. This distinction is not only of regulatory relevance but also important in regard to security and consumer protection. Without a clear separation between the internet and telephony network providers could not protect their customers from unsolicited communication such as SPAM and SPIT²³ as well as from misuse.

After having demonstrated the necessity of traffic management and thereby having answered the first part of the question we will now address the second part and illustrate the technologies used in practice. Since fixed and mobile networks have different characteristics we need to differentiate between the two when describing the technologies used.

In the **fixed network** QoS is implemented for business products such as “Company Connect²⁴” and for the provisioning of a managed IPTV service. IPTV consists of linear (= TV) and non-linear (= Video on Demand) streaming services which are both critical applications with respect to the required bandwidth. Traffic management and QoS prevent that customers experience a lack of quality of the video transmission due to bandwidth shortage. While the managed IPTV service and best effort Internet

²² Excluding „dial-in“ services for internet access in this specific case.

²³ SPIT stands for Spam over Internet telephony, i.e. unsolicited voice messages and commercial offers.

²⁴ <http://www.telekom.com/dtag/cms/content/dt/en/584898>

data traffic do share the same physical infrastructure in the aggregation network and on the access line they are produced over two distinct platforms, so called Virtual Local Area Networks (VLAN). The capacity need for IPTV is planned and monitored in order to build out the required infrastructure to both deliver IPTV at the level of quality allowing it to compete against the established TV delivery platforms (cable and satellite) and the continuation of best effort internet access.

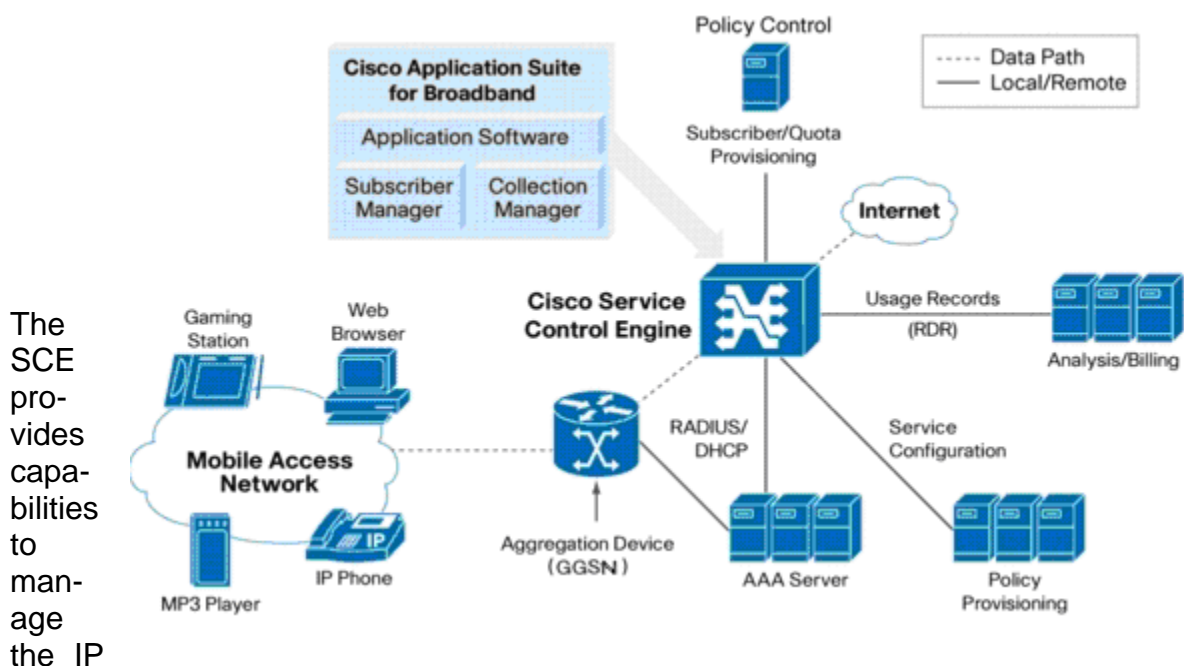
Further implementations of QoS in the fixed network are currently being explored but have not passed the stage of feasibility testing yet.

On our **mobile networks** we have implemented traffic management measures by relying on a so called Service Control Engine to enforce our tariff options in the form of policies. The implemented solution can classify application-level traffic by groups of subscribers based on price plans and is thereby a necessary means to achieve the goal of increasing the efficient use of network resources.

Bandwidth management can be applied to network traffic on a global platform level, subscriber, or individual flow-level hierarchy. The SCE is used to control distribution of network resources, to manage the scarce resource of the mobile IP network while trying to provide maximal user satisfaction.

The Service Control Engine technology comprises both hardware and software integrated into a dedicated network device. This platform (SCE) resides on the IP network behind the GGSN, see Figure 3. The platform is deployed in a redundant manner to meet our high-availability requirements.

Figure 3: Example²⁵ of a Service Control Solution



²⁵ Cisco provides a publicly available illustration on their respective product website: <http://www.cisco.com/en/US/products/ps6151/> this is merely an example of a possible implementation and is not documenting actual implementations on our networks.



network, offering a level of granularity when creating and deploying traffic management policies. The optimization of application traffic is done by:

- Report on types of application
- Service Differentiation by applying bandwidth management controls including using time-of-day policies
- Using dynamic subscriber policies including speed step down on breach of Fair use policies

Reporting Capabilities: The SCE programmable application- and protocol-detection system can detect multiple protocols with the IP network which is kept up to date using a signature mechanism to identify new application streams, which can then be detected and controlled. This reporting capability provides the network operator with the ability to analyze traffic flows in order to monitor network usage for scalability and capacity planning.

Service Differentiation: The SCE is used to identify, classify and guarantee performance for an unlimited array of IP- or content-based service offerings running across existing transport. Interactive and delay-sensitive applications such as real-time messaging, video streaming, VoIP, gaming, voice chat, and even web browsing can be prioritized without negatively affecting other applications such as e-mail or simple file transfer. More importantly, allowing performance to meet the needs of individual applications and customize Internet packages to meet individual subscriber needs improves the quality of the Internet experience for all users.

The SCE technology is also used to enhance Deutsche Telekom's mobile service security by managing E-Mail SPAM. This is achieved by limiting the number of e-mail sessions an individual subscriber can have in anyone active data session.

Dynamic Subscriber Policies: Dynamic control of subscribers is used to allow service differentiation when a Fair Use Policy (FUP) of a price plan is breached. This can result in the redirection to a landing page to allow a subscriber to re-purchase or purchase a new tariff or use reduced bandwidth when this FUP has been reached.

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?

Transparency can address the concerns about openness and competition in the internet and will empower consumers and businesses to make rational choices reflecting their individual preferences.

The question distinguishes between information regarding managed services and regarding the 'best effort' internet. Managed services, defined as the services for which a network operator guarantees a specific level of quality, are not in conflict with the provisioning of best effort access to the public internet since managed services will be offered on top of best effort internet.



When managed services are offered in a bundle with internet access, as is the case with IPTV offers, it is the providers' obligation to adequately inform their customers about the specific conditions and traffic management policies. If for example a fixed bandwidth is being reserved for the IPTV service the informed customer is in the position to make an informed decision about his bandwidth consumption. In this respect transparent information is capable of allaying possible net neutrality concerns as the final decision about bandwidth allocation resides with the end user.

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

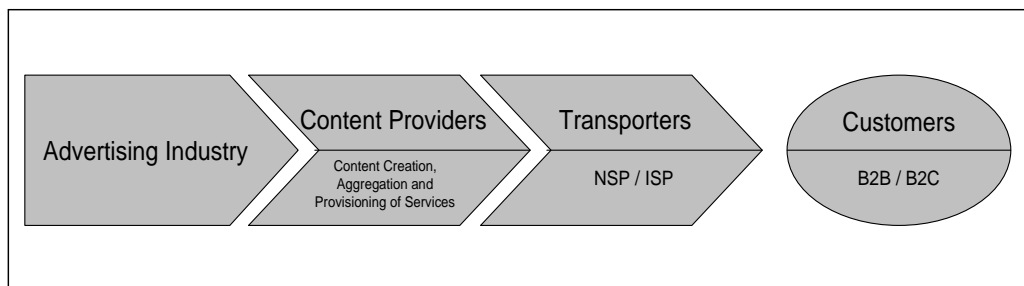
The EU regulatory framework for electronic communications does not distinguish between fixed and mobile networks. General competition rules equally apply to both fixed and mobile network operators. We believe that no further network-neutral or network-specific rules are required to safeguard the open internet.

Nonetheless, mobile and fixed networks do have different characteristics. Due to the shared spectrum of individual mobile cells, mobile networks today tend to face more severe capacity restrictions.

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 prioritization affect other players in the value chain?

In order to answer this question it is instructive to describe an Internet-specific value chain first. Figure 4 shows an analytically simplified illustration of the value chain and its main actors: advertising industry, content providers, transporters and customers.

Figure 4: Stylized illustration of the Internet value chain



The role of the transporter is subdivided into Network Service Providers (NSP), which provide the backbone network, and Internet Service Providers (ISP), which operate the direct connection to the end customer over the access network in the broadband business. The established network operators often combine the role of ISP and NSP, due to the fact that they have economic incentives to jointly run access and backbone networks. The role of the content provider can be subdivided into the compilation or creation of content, and the aggregation of content and additionally the provision of services such as Voice over IP telephony. The role of the customer can be subdivided into business customers (B2B), or the public sector and private customers (B2C).



When looking at the entire value chain prioritization is a common practice. For example ads (in the form of banners and/or links) are placed corresponding to the willingness to pay of the advertisers. The functionalities of networking platforms are differentiated in free basic services and paid for premium services. Others have built up worldwide content delivery networks (CDN) in order to speed up or prioritize the paid for delivery of content e.g by hosting the content on servers near to the customers. The often cited “fast lanes” across the internet exist already. Without them the business models of online delivery for music, video, games and applications would not have been successful in the market place and software updates could not be distributed as efficiently as they are today.

All those differentiations and prioritizations have not harmed the players on other levels of the internet value chain or slowed down innovation. To the contrary, they have increased variety and customer choice, both of which are characteristics of competitive markets. Therefore it is not evident why the introduction of non exclusive QoS-levels on the transport layer should harm competition and innovation or prevent the “two guys in a garage” from successfully entering the market. Such offers might even lower the barriers to entry as innovators will be able to build on existing networks and technologies.

DT’s strategy is to open up capabilities of our networks for usage by third parties, to spur innovation on top of our networks for the benefit of our customers. A number of capabilities, such as sending text messages or hosting telephone conferences, are offered already today. Once differentiated levels of quality are implemented in our networks, we will also introduce QoS-offerings for third parties – be it big players or small start-ups - on a non-discriminatory basis.

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?

In general, quality and price differentiation increases the benefit of customers and businesses alike and therefore the economic welfare. Just as content providers have differentiated offerings for different prices (e.g. standard and premium content and services) network operators need to be allowed to offer differentiated QoS to accommodate heterogeneous customer needs. There is no reason for a per se banning of differentiated offers by access providers as long as the differentiated products and services are being offered non-exclusively to all players in the internet value chain.

All content/application/online service providers should be treated equal in case of QoS differentiated IP-transport, i.e. the same QoS conditions and parameters should be available in terms of non exclusive commercial offers to all interested parties, subject to technical feasibility and capacity constraints. Any practices by a dominant undertaking that could harm competition, whether on the network layer or on other layers of the internet value chain, should be addressed by the competent authorities based on competition law rules. Any legal obligations regarding the provision of managed services by network operators going beyond the competition rules would



severely restrict the development of new sustainable business models and would prevent network operators from innovating and investing efficiently.

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?

As already stated above, the strong competition in the access markets prevents network operators from discriminating against competing services in terms of quality of service, because such measures would have a negative effect on the competitiveness of the undertaking, i.e. would weaken its market position. If anti-competitive discrimination occurs nonetheless, general competition law and the EU regulatory framework are sufficient to effectively abate discriminatory treatment in the market. Therefore, no additional measures are needed, neither in the form of a voluntary industry code of conduct nor in the form of additional regulatory obligations.

8.3 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?

Today's internet ecosystem has to be described and analyzed as a two sided market. On one side end users pay access fees to their network operator of choice. These fees are typically flat rate offers that increasingly feature fair use policies in the form of volume caps. Competition is strong in these markets and wholesale regulation sets a price ceiling on the revenues.

On the second side of the market commercial interconnection arrangements among network operators as well as between network operators and application, service and content providers are governing the transport of IP-traffic. This side of the market is completely competitive and unregulated. On the international market for transport capacity two commercial arrangements have become a de facto standard. If the exchanged traffic volumes are nearly symmetrical the two interconnection partners may agree to unpaid exchange. In an asymmetrical situation the party which sends more traffic may have to pay for the difference in volumes.

Today the network operators are shouldering the financing of network upgrades and modernisation in the face of exponentially increasing traffic flows. They recoup their costs almost entirely from the end user side of the market. The current model will not be sustainable in the medium term because it lacks the economic signals to rationalize traffic generation. This leads to a situation where ever increasing traffic volumes are contrasted by a slowly but steadily declining price level for internet access.

Considering these circumstances and the above mentioned inability to keep rolling out capacity proportionally to the increase in traffic volume the need for a new sus-



tainable business model becomes evident. It is too early to predict which business models will strike a fair balance between the different actors in the internet value chain. However, to allow for efficient outcomes, policy makers and regulators should promote market solutions and establish a level playing for all actors in the internet value chain. Players on all layers of the value chain should be subject to comparable standards of data protection, consumer protection and transparency, and policy makers should act where this is not the case. A level playing field also implies that potentially anti-competitive behaviour of undertakings with market power on any layer of the value chain is adequately addressed.

In an ecosystem as dynamic and competitive as the internet market solutions will always produce superior results compared to regulatory interventions, especially when measured in total economic welfare.

8.4 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?

Best effort service provision is characterized by frequent but often extremely short delays, jitter and packet loss due to congestion, which may significantly reduce the quality of certain applications. The revised EU regulatory framework introduces a competence for NRAs to apply minimum quality of service requirements in order to prevent the degradation of service and the hindering or slowing down of traffic over networks, see Art. 22 paragraph 3 of the Universal Service Directive.

To justify intervention, (1.) such degradation would have to be significant and not only temporary, (2.) the NRAs have to attest that the market itself is not able to provide services in a sufficient quality, i.e. insufficient competition or market failure, and (3.) the NRAs have to prove that less distortive instruments such as transparency are not sufficient to solve the problem.

Due to strong competition in the European broadband access markets any network operator that intentionally degrades the best effort internet provision in order to promote managed, QoS-based services would lose customers to alternative operators or providers: As a majority of customers is expected to subscribe to a best effort based basic broadband access package any degradation would seriously damage the reputation of a provider. Hence, network operators will not only compete on price but also in quality when offering internet access. Under these circumstances regulatory intervention could actually be counterproductive.

Regarding the “better than best effort” service classes (QoS classes) network carriers have a strong interest to voluntarily negotiate and agree on specific requirements for the various QoS classes. This is because standardized interconnection is a prerequisite in order to be able to offer and deliver guaranteed end-to-end quality across network borders. A proven and efficient way to establish QoS standards would be to delegate this competence to an international technical standardization body where all



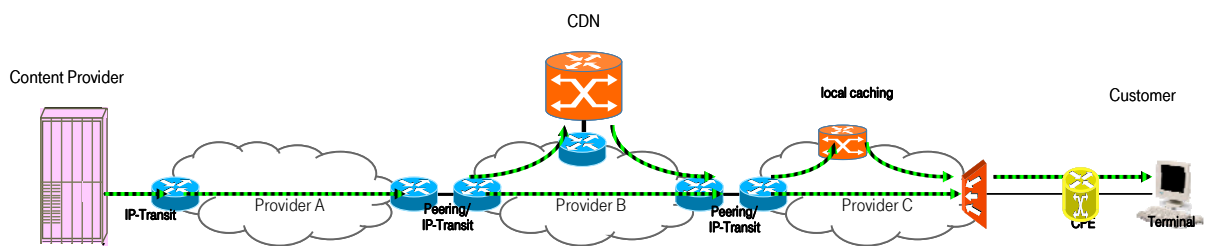
stakeholders are represented and the technical knowledge is assured, e.g. the International Telecommunication Union (ITU).

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

The first part of this question has already been addressed in the answer to the precedent question.

Concerning the monitoring of quality of service it is important to note, that this would require to develop, implement and finance a highly sophisticated system capable of precisely determining which elements in a complex system are performing in accordance to the expectation and – even more importantly – which elements are causing delays. In practice this is highly complex since a data packet travels from a content provider to an end customer on average through ten servers, i.e. takes ten “hops”.

Figure 5: Cisco Service Control solution integrated into a GSM network



For the time being DT is highly sceptical that such a monitoring system would be operational in a reasonable timeframe and could be operated efficiently, i.e. without creating avoidable overhead. At the same time it is important to note that most players are already subject to close monitoring today, be it through other players in the value chain, consumer protection organizations and agencies or the specialized press/media.

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?

As stated in the answer to question on possible triggers (see question 11) we see no scenario in which a regulatory intervention and a mandatory setting of minimum QoS requirements would be needed. Due to the fact that the interconnection between networks has an international dimension, this issue is beyond the scope of a single NRA. The market participants themselves should agree on the relevant parameters to specify QoS requirements, preferably within an international technical standardization body where all stakeholders are represented and the technical knowledge is assured, e.g. the ITU.



As pointed out before, we expect competition to be very intense both on the price of best effort internet access as well as in the quality dimension. An imposition of minimum quality of service requirements on the best effort class would eliminate an important differentiator and lead to reduced variety. It might also be leading to increasing price levels.

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

Transparency is the key to overcome reservations concerning needed and reasonable network management measures. Transparent information on the differences between the various service offers enables consumers to make informed choices according to their individual preferences. At the same time transparency gives operators the flexibility to offer differentiated products in order to meet different consumer expectations. Therefore transparency is to the benefit of both the consumers as well as the operators who have the interest that consumers are informed and thereby can choose between differentiated products regarding quality and price. Thus Deutsche Telekom Group fully subscribes to transparency measures regarding consumers' access and usage of the internet.

Operators will clearly outline in their terms and conditions whether and to which extent access, bandwidths and volumes may be limited in each of the different offers to enable consumers to choose the product which best meets their individual requirements. Consumers will be provided with a clear and understandable explanation of the quality of the end user experience and how their connection will be managed to deal with congestion. Furthermore consumers are entitled to use the applications, legal content and services of their choice in line with the agreed terms and conditions.

These transparency measures should apply to all actors in the internet value chain. The quality of service in the internet depends on various aspects which are influenced on different levels. Many of these aspects e.g. transit routes and content servers as well as environmental influences are beyond the control of the access network operators. In order to fully inform the consumer and explain to him where possible limitations to his connection may come from transparency should not be limited to the access network operations but be implemented in the entire internet value chain.

The transparency requirements which have been introduced by the revised EU regulatory framework will provide a legislative guarantee of a set of specific information for consumers concerning their internet connection. As these standards already are sufficient and will likely be enhanced automatically by competition, as consumers are free to choose from a wide range of providers and options to access and use the internet, there is no need for further regulatory intervention to assure transparency.



8.5 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?

Network management measures deal with keeping the network and the services that are provided over the network up and running smoothly. They are implemented in order to mitigate congestion and enable QoS-differentiation. Furthermore traffic management measures enable new and innovative services that depend on specific quality requirements, such as eHealth, eMobility or ePayment solutions.

Network management measures are by no means equivalent to screening or filtering the content which is being transported over the networks or used to monitor individual peoples' internet usage. Thus, they do neither affect internet users' rights regarding freedom of expression nor do they restrict media pluralism and cultural diversity. Their purpose is to provide a reliable network connection in case of congestion. Hence, network management measures are positively contributing to the exercise of citizen's fundamental rights, because operators will be able to safeguard the continued access for citizens to all forms of expression in the internet age.