

BEREC Response to the European Commission's consultation on the open Internet and net neutrality in Europe

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INTRODUCTION

BEREC welcomes this opportunity to respond to the European Commission's consultation on the open Internet and net neutrality in Europe.

Electronic communications increasingly take on a strategic dimension in our society – in particular, the economic and social role of an open Internet. At the same time, technological developments, changing consumption habits and evolving business models challenge the relationship between Internet players and trigger the public debate on net neutrality.

BEREC has only recently started to consider the issue of net neutrality, and a definite evaluation of the effect of the current regulatory framework, as recently amended, is difficult to make. BEREC notes that incidents so far remain few and for the most part have been solved without the need for regulatory intervention. BEREC believes that, at present, it would be premature to consider further intervention with respect to net neutrality on an EU level.

As the Commission notes in its consultation, the revised regulatory framework provides NRAs with powers and tools to address market failures, ensure that competition thrives, and protect consumers. It now explicitly recognises the need for NRAs to promote “the ability of end-users to access and distribute information or run applications and services of their choice”. BEREC considers that the current framework including new provisions strengthening transparency and minimum quality requirements can probably address many of the concerns that have been expressed in the context of net neutrality to date.

This, however, does not mean that problems could not arise in the future. For this reason, BEREC believes that it is important that the conditions of net neutrality and the openness of the Internet be monitored over time by NRAs. The effectiveness of such monitoring will depend in particular on the availability of appropriate technical tools to evaluate the deployment of traffic management and the quality of the Internet service. The need for subsequent intervention, such as the imposition of minimum quality of service requirements, could then be evaluated.

We elaborate further on these issues in our answers to the individual questions below. BEREC looks forward to continue to work with the Commission, other European institutions and stakeholders on this important matter.

4.1. 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?*

To answer this question a definition of net neutrality is needed. A literal interpretation of network neutrality, for working purposes, is the principle that

all electronic communication passing through a network is treated equally.

That all communication is treated equally means that it is treated independent of (i) content, (ii) application, (iii) service, (iv) device, (v) sender address, and (vi) receiver address. Sender

and receiver address implies that the treatment is independent of end user and content/application/service provider.

There have been and will continue to be deviations from this strict principle. Some of these deviations may well be justified and in the end user's interest but other forms causes concern for competition and society. To assess this, NRAs will need to consider a wider set of principles and regulatory objectives.

BEREC has conducted a survey among its members and observers. It turned out that in many countries net neutrality has not been intensively discussed yet. Some net neutrality incidents have been reported consisting of throttling of p2p file sharing or video streaming (for all sites or specific sites), and blocking of VoIP in mobile networks. They were addressed in public discussions or referred to NRAs as (mostly) informal complaints. However many of these incidents were resolved voluntarily by the providers, either when they got reported by the press, through straightforward commercial negotiation between the parties or following the NRAs intervention, mostly without any formal proceedings.

More specifically blocking of VoIP in mobile networks occurred in Austria, Croatia, Germany, Italy, the Netherlands, Portugal¹, Romania and Switzerland. Incidents of throttling or blocking of Internet traffic (e.g. of certain websites or – more generally – of the broadband connection, of p2p file sharing or video streaming) occurred in France², Greece³, Hungary⁴, Lithuania⁵, Poland⁶ and United Kingdom⁷. As regards the cases of blocking of VoIP in mobile networks, some operators in some countries allow the usage of such VoIP services⁸ for an extra charge.

The cases mentioned above have been reported by NRAs as related to the net neutrality debate, although they may not necessarily represent breaches of net neutrality.

Even though many of these incidents were finally resolved; this does not mean that problems could not occur in the future.

Competitive bottlenecks may arise because ISPs and network operators have the ability and under certain circumstances the incentives to restrict access or set unreasonable conditions to service providers to their customer base.⁹

There is also evidence of increased consumer awareness and at times dissatisfaction related to Internet performance more generally, and the perceived lack of consumer transparency

¹ In Portugal, in the end of 2009, one operator didn't have any restriction, another one didn't have at that time any restrictions but he reserved the right to limit in the future, the third had no restrictions for subscriptions of broadband access, but in some voice bundle offers VoIP applications were restricted.

² In France there were no formal complaints so far.

³ In Greece, there was a formal complaint about an ISP performing selective degradation of BitTorrent traffic on selected customers. The issue was resolved after the NRA had addressed the ISP.

⁴ In Hungary, the NRA investigated into mobile network operators practice to block Internet traffic from TCP ports threatening with spam and/or hacker activity.

⁵ In Lithuania some mobile operators in the mobile Internet access contracts reserve themselves the right to limit and (or) block the usage of P2P (also downloading of big files, movies, music, games , content and or programs etc.).

⁶ In Poland the complaints primarily refer to blocking specific Internet websites which can pose threat to the operator's network security or to other users. And in 2004-2006 Telekomunikacja Polska S.A. was filtering IP traffic sent from Poland to TPNET by international carriers (O2 – TP dispute) resulted in decision of NRA (non-discrimination obligation) and decision of NCA.

⁷ In UK there have been no formal complaints.

⁸ E.g. Germany: 3 out of 4 mobile operators now allow VoIP, one of them without additional costs.

⁹ See for instance van Schewick (2009)

about the quality of the Internet access service. For example, the majority of NRAs have received complaints about the difference in advertised and actual speeds. Some NRAs have been obliging the ISPs to improve the transparency of information provided to end users/consumers on the quality of the Internet service¹⁰.

The fact that these incidents have not led to a significant number of investigations by NRAs could possibly be explained partly by the existing degree of competition in Europe and partly because of the early stages of market and technological developments.

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

A characteristic feature of the current Internet is that service innovation has traditionally taken place in particular at the edges. This was made possible by the separation of transport and service, i.e. a separation between the network layer and the content/application layer.¹¹ This separation potentially allows competition and innovation throughout the value chain. It also implies low entry barriers on the open platform of the Internet that have provided particularly fertile ground for new content, applications and services to develop.

The migration to all-IP networks, leading to a multi-service network for audio (including voice), video (including TV) and data gives rise to innovation opportunities at both the network and content/application layers and may subsequently impact significantly on market structure. Additionally, due to the increased economies of scope of a multi-service network cost savings are to be expected. Next Generation Networks (NGNs) are expected to provide the ability for providing a range of service quality levels including real-time services that may require quality guarantees.

Against this background there are three main potential problems that we envisage could arise in the future:

1. The scope for discrimination (increased use of technical possibilities, economic incentives and potential vertical integration) leading to anticompetitive effects
2. The potential longer-term consequences for the Internet economy (innovation, freedom of expression)
3. Consumer confusion/harm due to lack of transparency might require monitoring the effectiveness of transparency and quality of service

These problems are discussed further below.

1. Scope for discrimination

A principal concern for NRAs is to which extent and for what purpose traffic management is applied and could lead to anti-competitive discrimination which harms the functioning of the market, and hence also harms consumers. In particular, the emergence of new services such as (for instance) IPTV with guaranteed quality requires specific applications of traffic management which in turn create incentives for network operators and ISPs¹² to 'vertically

¹⁰ E.g. in Portugal, the NRA, under the context of providing information to end users/consumers on the conditions of provision of electronic communication services, has determined that as far as the Internet access service is concerned, the disclosure of levels of quality on access and maximum and average speed must attach a warning stating that the speed provided for any connection, at any time, may not be ensured, as it depends on the level of use of the network and server to which the customer is connected.

¹¹ See also ERG (08) 26final, in particular A.5.1

¹² In this document the term ISP is understood as a provider offering access to the Internet, not as a service provider offering services via the Internet.

integrate' into content, applications and services markets. But there may then be an incentive for operators/ISPs to in turn discriminate against competitor's equivalent services, either by not offering equivalent quality, or offering an inferior version of quality, or even actively degrading the quality of competitors' services (through specific treatment of some data flows within the network, if technically possible, or restrictive interconnection policy). Whether differentiation is judged to be problematic depends inter alia on whether the operator has SMP/no SMP, and whether the service considered is "best effort" or "managed". These issues are addressed in detail respectively in Q8 and Q5.

One important aspect here is that NGNs due to standardisation allow continuation of the separation between transport and service that has governed IP networks.¹³ It also is intended to allow for third party service provision by providing open interfaces. However NGNs may also be implemented in a vertically integrated manner, linking transport and service. This may induce negative impacts on the potential for independent content/application/service providers (including private users) to innovate. Therefore NGNs may introduce incentives for discrimination, e.g. against independent service providers whose services compete with the offers of the vertically integrated operator on the same NGN end user accesses.

Ideally, effective retail competition would act as a constraint on such behaviour, because restricting choice of content, applications and services harms the attractiveness to the consumer of the retail offer. But this requires that consumers can both detect whether discrimination (by means of traffic management techniques) is taking place and act upon this information. Even with transparency measures in place, it will be necessary to be particularly vigilant about the conduct of firms with SMP in a relevant market (and also in the case where de-facto market power may exist, even if that hasn't been formally proven).

2. Potential longer-term impact on Internet economy

Even if direct anti-competitive discrimination is prevented, it is possible that the widespread use of certain types of traffic management techniques could lead to changes in the Internet economy over time. There have also been some concerns expressed relating to the effective exercise of fundamental rights and freedoms such as freedom of expression or privacy, that could arise if operators were to give preferential treatment to some kinds of data flows that they consider more valuable (for instance search traffic, which can bring them additional advertising revenue). (Ref. question 15.)

Finally, if operators and ISPs increasingly allocate most of their capacity in managed services rather than the best effort Internet,¹⁴ this could have a serious effect on the scope for innovation in new content, applications and services which currently benefit from the best effort Internet's low barriers to entry and innovation. Although this is a plausible scenario it need not be an inevitable one. Even if operators might be incentivised to focus their investment on monetisable managed services, strong consumer demand for access to the best effort Internet might deter this course of conduct, assuming that retail competition is effective and that the distinction between managed services and best effort Internet is transparent.

More specifically, if vertically integrated operators intend to implement their NGNs using centralized platforms for service provision, independent service providers would be affected in their ability to integrate their services into the NGN platform thereby curtailing their ability to innovate. For this reason it is important to preserve the open interfaces of NGNs in order to allow the potential for innovation both at the edges and in the core to become effective.

¹³ The ITU considers this separation of transport and service an essential feature of NGNs.

¹⁴ See Q5 on the relationship between best effort Internet and managed services ("two lane approach")

3. Monitoring the effectiveness of transparency and quality of service

Transparency is a key pre-condition in minimising the risk of anti-competitive discrimination and the downgrading of the best effort Internet in favour of managed services. The application of traffic management techniques must be made transparent to consumers. Consumers may not be able to detect the actual application of discriminating traffic management techniques and find it difficult to distinguish between the effects of traffic management techniques on quality of service from the effects of other quality degrading factors. For instance, a consumer who is observing that traffic is routinely throttled may not know whether this is done by intention, or is caused by other factors such as network congestion, which is leading to the degradation of service. Even if operators/ISPs are required to declare which traffic management techniques and policies are being used, consumers may find it difficult to act upon such information if it is presented in a highly technical way which does not explain the 'real world' effects. Thus, it will be important to monitor the effectiveness of transparency and quality of service.

Other parts of the value chain

Previous inputs have focused on problems regarding net neutrality that may arise as consequences from the behaviour of electronic communication services providers. However, the ability of end-users to access and use the content/applications of their choice depends on the totality of the Internet chain, from service providers (like search engines) to terminal manufacturers (smart phones and associated application platforms, connected TVs, etc.). The latter may for instance impede the installation of some software on the equipment provided,¹⁵ whereas the current R&TTE directive (1999/5/CE) provides little guidance or tools to map and watch over those practices.

In this respect, it is important to take into account the entire chain of stakeholders when monitoring the evolutions of markets. This is recalled in the preliminary study commissioned by the Government Offices of Sweden prior to the Visby Conference in Nov 2009 during the Swedish EU Presidency. Particular importance was attributed to the action of the European regulatory authorities in this area. For example, it was emphasised that it was important for regulatory policy, with the aim of promoting competition in the future, to take account of problems related to openness and competition that had become relevant as a consequence of the actions of stakeholders in the equipment and software markets". Being particularly well placed to detect the consequences on net neutrality and the openness of Internet of any behaviour in the Internet chain, NRAs may be able to assist policy makers and provide assistance to competent authorities (competition authorities in particular) on those matters.

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

It is difficult for BEREC to provide a definite answer to this question at this stage, since Member States are still in the process of transposing the revised regulatory framework into national law. Whether the framework is sufficient to deal with the previously identified or potential identified issues will depend, therefore, on how it is transposed, implemented and interpreted, and on whether some of the provisions can be operationally effective in practice.

As to date, the survey carried out by BEREC shows that incidents remain few and most of them have been solved voluntarily. These findings imply that there is currently little reason to undertake any new regulatory measures with respect to net neutrality on an EU level.

¹⁵ However, the US Copyright Office recently declared jailbreaking of the iPhone legal, <http://www.wired.com/threatlevel/2010/07/feds-ok-iphone-jailbreaking/>

As the Commission notes, the current regulatory framework provides NRAs with powers and tools to address market failures, ensure that competition thrives, and protect consumers. It now explicitly recognises the need for NRAs to “promote the interests of the citizens of the European Union by *inter alia* ... promoting the ability of end-users to access and distribute information or run applications and services of their choice” (Article 8(4) including 8(4)(g) of the Framework Directive). BEREC considers that these powers and tools can usefully address many of the concerns that have been expressed in the context of net neutrality to date. These powers exist, of course, alongside a comprehensive framework of competition law.

Asymmetric tools

First, if discriminatory behaviours on the network layer against rival content and application providers become a recurrent feature of the market, NRAs should in principle be able to impose remedies (e.g., non-discrimination) on those providers identified as having significant market power. In particular, the current access regime potentially allows NRAs to impose remedies on ISPs on the basis of Art 12 Access Directive (in combination with the recent extension of the definition of access in Art 2 of the Access Directive).

However, NRAs will then first have to define – taking the utmost account of the Commission recommendation on relevant markets – and then analyse relevant markets. Since the current recommendation entails neither any retail (broadband) markets, nor an IP interconnection wholesale market, the three criteria test will need to be fulfilled. The high burden of proof that this test requires may be an obstacle for NRAs to use this resource, and they must first of all be able to collect the comprehensive set of required information before deciding to undertake this process. If this direction is followed, the Framework provides a comprehensive approach to identify the ‘relevant market’ in which such conduct is taking place, to identify the firm or firms which have SMP within that market, and to target appropriate remedies.¹⁶ Whether the extensive timeframe implicit in such an approach is compatible with fast-moving Internet markets and with agile Internet-oriented actors, nevertheless remains to be seen.

In some countries, the provision of data communication services – on mobile and fixed networks – is at the moment characterised by an oligopolistic structure, especially at the wholesale level. The high burden of proof associated with the existence of a joint SMP may deter, again, NRA to intervene.

Taking into account the Community as a whole, it is likely to often be the case that a multitude of areas (in particular rural regions) will lack suitable competitors for the carriage of any high-speed innovative service, so an existing carrier (and especially an ISP providing access) is in a powerful position. The regulatory principle in Article 8(5)(e) mandates NRAs to take due account of the variety of conditions relating to competition and consumers that exist within the geographic areas within a Member State. NRAs could indeed take these variations in competitive conditions into account when identifying SMP in the markets mentioned above.

Furthermore, in those cases where ex-ante regulation is not considered appropriate, it remains always possible to rely on ex-post competition law, and in particular the prohibition on abuse of market power contained in Article 102 of the Treaty on the Functioning of the EU.

Symmetric tools

Second, under the Framework, regulators can also impose obligations to ensure end-to-end connectivity provided by Arts 4 and 5 of the Access Directive. The interconnection regime

¹⁶ See the Polish case (IP traffic exchange) where the Commission decided that the market had not passed the three criteria test (PL/2009/1019-1020). See also ECJ- Case T-226/10

exists independently of interconnection obligations that are imposed as a result of finding SMP on a market. The regime protects the integrity of the overall communications sector, by giving the possibility to intervene when end-to-end connectivity is at stake. Following the recent revision of the Access Directive, Art 5(1) now explicitly mentions that NRAs are able to impose obligations “on undertakings that control access to end-users to make their services interoperable”. However, due to the new status of the provision it remains to be seen how this article is implemented in the various Member States, and hence how helpful it will be in solving the issues identified. In the view of BEREC the application of this provision in the context of net neutrality requires further clarification.

Third, the revised article 20 of the Framework Directive (“dispute resolution”) now provides for the resolution of disputes between undertakings providing electronic communications networks or services and also between such undertakings and others that benefit from obligations of access and/or interconnection (with the definition of “access” also modified in Art 2 AD as previously stated). Dispute resolutions cannot be considered as straightforward tools for developing a regulatory policy, but they do provide the option to address some specific (maybe urgent) situations. The potential outcome of disputes based on the transparency obligations can provide a “credible threat” for undertakings to behave in line with those obligations, since violation may trigger the imposition of minimum quality requirements on an undertaking, in line with Art 22(3) USD.

Transparency obligations

Alongside these mechanisms for addressing anti-competitive forms of discrimination, the most relevant provisions appear to be the new transparency requirements (Articles 20(1)(b) and 21(3)(c) and (d) Universal Service Directive) and the possibility to set a minimum quality requirement (Article 22(3) of the Universal Service Directive). We elaborate further on the issue of transparency and minimum quality requirements below in this response.

It is worth noting that the effectiveness of transparency measures may itself determine the necessity of taking further action because if consumers are unable to detect the application of traffic management techniques or act upon information provided about traffic management policies to inform their choice of supplier, it is much more likely that forms of traffic management which harm consumers’ interests will be deployed. Therefore, for this to work, transparency requirements need to be implemented in a customer-friendly manner. These measures potentially apply to all operators irrespective of SMP.

The effectiveness of the transparency requirement crucially depends on the ability of the customer to switch to another ISP when he is not satisfied with the service provided (i.e. the competitiveness of the end-user market). This depends on the availability of equivalent alternatives (switching from fibre to DSL might not be considered equivalent) and it also depends on the alternative actually solving the problem (if an application is blocked it will not help if it is blocked at the other ISP(s) as well, or if the user(s) you want to communicate with in the other end also has to change ISP because of blocking). If an equivalent alternative solving the customer’s concern exists an inhibition still remains, relating to customer inertia and to switching barriers like lock-in period or bundling of services or equipment.

The conditions of net neutrality and the openness of the Internet will naturally be monitored over time by NRAs. The effectiveness of such monitoring will depend in particular on the availability of appropriate technical tools to evaluate the deployment of traffic management and the quality of the Internet service. The need for subsequent intervention could then be evaluated.

4.2. 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?*

Any electronic communication network needs certain functions to ensure that the network is capable of providing adequate transmission performance. Traffic management (as distinct from service management) is a subset of such functions. Traffic management functions are carried out at different places and different layers of the network.¹⁷ These transmission management functions may contribute to improve the experience of all users, and are necessary to deliver high quality services of all types.¹⁸

Traffic management may be carried out in a way that is independent of – or dependent of – content, application, service, device, sender address, and receiver address. This means that traffic management does not in itself constitute a deviation from the net neutrality principle. But in some cases, for example blocking/throttling of a specific application (without a clear legal justification), it may constitute a deviation from the net neutrality principle.

Usage of traffic management cannot be qualified per se as right or wrong. This will depend on the purpose for which it is used, the circumstances in which it is used and the impact on the goals of the framework (including effects on competition, efficient investment and openness of the Internet).

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?*

(We understand this question as related to the situation where the general transparency requirements covered in question 14 are present in addition to the specific transparency issue described in this question.)

While there is in practice a continuum of different traffic management techniques, it is indeed possible to describe, in broad outline, the different kinds of services provided in electronic communication networks, by distinguishing between two categories: the access to the best effort public Internet and managed services. The crucial distinction relates to the rationing mechanism applied in case of limited capacity.

Best effort means that there is no guaranteed level of performance (nor priority nor a guarantee for the data to be delivered) without necessarily implying a low quality. The general principle is that all traffic demands are accepted - this is fundamentally an “openness feature”. In cases where the maximum transport capacity is reached this will result in an overall decrease of quality. Best effort networks like the Internet also use traffic management functions, although less stringent and sophisticated than in the managed services environment, to control the traffic flow in the networks.

Managed services are designed to provide guaranteed characteristics (e.g. end-to-end quality or security). These characteristics are generally stated in contractual arrangements.

¹⁷ For details see ERG (08) 26final Annex, Part. 3 “Technical Background Information”

¹⁸ See e.g. van Schewick, Towards an Economic Framework for Network Neutrality Regulation, Journal on Telecommunications and High Technology Law, Vol. 5, pp. 329-391, 2007, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=812991

Technically, managed services rely on traffic management techniques and access restrictions. The application of access restrictions is an important distinction between managed and best effort networks. Whereas in the managed case customers' service requests may be rejected when the capacity limits of a network are reached, best effort networks still try to serve the customers (implying a decrease in quality).¹⁹

Managed services provided across networks require interconnection agreements that guarantee end-to-end quality. Those agreements may be based on agreed transport classes (including the agreement on the specification of the relevant network performance parameters). Such interconnection agreements are currently not widely in place.²⁰ On the contrary, the large interconnection capability of best effort networks is one of its major features, and a major reason for the international success of the Internet.

A "two lane" approach based on a clear distinction of these categories is interesting because transparency should be requested from operators regarding the provision of these two types of service. Indeed, best effort Internet and managed services have to coexist and often share the same infrastructure resources. It is therefore important to enable end-users (including content/application/service providers) to choose the type of service that best suits their need. This request for a clear separation between the "two lanes" in customers' information comes of course in addition to a high level of transparency for each of the services provided, in particular regarding the quality of those services. (For a detailed discussion of the transparency requirements related to the "two lane" approach, see Q14.)

The net neutrality principle is considered relevant for the best effort Internet, but in the managed services environment, a differentiation by service is implicitly required thereby deviating from this principle.

To complement this approach, it is also necessary for regulators to consider the whole picture, i.e. the two lanes simultaneously, since they are of course interdependent. Indeed, the total available bandwidth of a given network infrastructure can be considered as a limited resource, and best effort Internet and managed services that are implemented on this infrastructure will compete for it. The degree of this competition depends on whether the best effort Internet and the managed services are provided on the basis of the same infrastructure or whether specific minimum network resources are allocated to each service. Each provider will have to follow its own network planning concept.

However, in any case there is a legitimate concern that Internet access service could be degraded by the development of managed services. In particular, it is important to ensure that an increase in overall capability of the infrastructure over time would benefit both lanes. In this context, the possibility for NRAs to set minimum quality requirements seems particularly relevant to apply on the best effort lane if needed (see Q. 11/12/13).

Assessment of traffic management may also request looking at both lanes at the same time when specific services, like for instance voice telephony, are provided both on a best effort basis and as a managed service by competing providers. In that case, an extra incentive may exist to degrade the quality of the service provided on a best effort basis.

This approach, based on transparency regarding the two types of services provided, may allay to a large extent net neutrality concerns in practice. However, transparency, information and customer awareness are necessary conditions, since they allow customers to make informed choices, but they are not by themselves sufficient. The end-user access market

¹⁹ See ERG (08) 26 final, Annex, Figure 3 "Traffic engineering model". This figure shows that dealing with capacity limits is not part of the traffic management.

²⁰ See *ibid*, Ch. 3.1.4 "Mapping of classes of service"

must be competitive enough to enable the end-user to switch to another provider in the first instance. Second, switching must be reasonably easy. Thirdly, there has to be at least one other provider offering acceptable quality for best effort Internet access. If all of those conditions are brought together, then transparency can allow competition to become effective in practice.

This shows that there are some limitations on the effectiveness of transparency as a measure remedying network neutrality issues. In particular, the reality of markets often demonstrates the difficulties in benefiting from easy switching (contractual penalties, complexities linked to bundled offers, etc.), and regulation should aim at reducing them. Besides, the availability of various access offers is not necessarily a guarantee that an adequate offer can be found in the market, especially in oligopolistic situations where the “market outcome” could sensibly deviate from policy objectives. This is why the SMP framework can potentially provide an additional instrument in reaching the goals of the framework in the context of network neutrality.

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

Overall, the principles governing traffic management should be the same for mobile and for fixed networks. Mobile network operators and fixed network operators are faced with the same technical problems when administering the operative network and they use the same IP based technology. The incidents reported in question 1 regarding deviations from the principle of net neutrality show the need for applying the same principles to both types of networks.

It is often argued that the shared resources of mobile networks constitute a special case regarding net neutrality. However, mobile networks’ shared resources are on the last link towards the end users, just like cable TV networks (HFC) and some fibre networks (PON). Other fixed networks (e.g. xDSL) have shared resources in their aggregation part of the access to the core. This indicates some similarities between fixed and mobile networks.

Due to the limited capacity of the mobile networks services characterised by high bandwidth demand sometimes cannot be supported. The network operator may take measures in order to avoid that some users consume all available capacity of the access (the cell). The availability for all users of basic services like telephony, web browsing and email should be maintained. Therefore a mobile network access may need the ability to limit the overall capacity consumption per user in certain circumstances (more than fixed network access with high bandwidth resources) and as this does not involve selective treatment of content it does not, in principle, raise network neutrality concerns.

It can be noted that the traffic management itself (especially applied in the lowest layers of the network) will therefore always differ substantially in fixed and mobile networks. For instance the capacity limitations of mobile networks indicate a larger need for traffic management functions that can handle the conditions of the physical media of mobile accesses, i.e. traffic management for mobile accesses is more challenging.

Furthermore, today’s mobile networks still have a much more limited capacity than the next generation fixed access networks, and they cannot easily be upgraded due to limited frequency spectrum. A major reason for the capacity problems of mobile networks is the limited capacity in the backhaul network and not only the access part itself. Furthermore digital dividend spectrum is expected to be used to contribute to broadband coverage particularly in underserved areas. Nevertheless mobile operators are keen to overcome

those challenges by decreasing the overall traffic volume in their radio access networks and backhauls by means of different traffic offload solutions²¹, i.e. femtocells or wi-fi.

Such solutions are becoming a vital component of next-generation mobile broadband deployments. Therefore the fixed component of the mobile network is coming very close to the end user, while the wireless part of the network become smaller and able to deliver fast, reliable and efficient Internet access. There may be stated therefore that differences in the broadband capabilities required for the Internet access will blur between the mobile and fixed access networks in the future.

Therefore there are not enough arguments to support having a different approach on network neutrality in the fixed and mobile networks. And especially future-oriented approach for network neutrality should not include differentiation between different types of the networks.

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?

While local network management is described in previous questions, we here look at forms of differentiation at other levels of the value chain: Interconnection arrangements, Content and application providers and Content Distribution Networks (CDNs)

Some forms of differentiated treatments can be implemented in various parts of the Internet chain – for instance at terminal equipment level as mentioned in Q2.

Content and application providers may also try to prioritize their flow of data. Without specific agreements with operators, they have a limited ability to perform this (despite some techniques available at the application design level). Indeed, due to the design and nature of IP-networks, it is the network operator who practically implements what kind of traffic or services has priority.

During the last few years the hierarchical structure of the Internet has become flatter because of extended usage of direct peering relationships from content/application providers to local ISPs. However, this is not a prioritisation in a technical sense. This kind of “prioritisation” is of another nature than DiffServ, MPLS, DPI, traffic shaping etc (ref. Q4). DiffServ, MPLS, DPI and similar technologies enable prioritisation of data streams or traffic classes while peering/transit result in en bloc treatment of all traffic at the entry point into the other network. This kind of entry points have always existed with different capacities on the Internet.

There has also been a comprehensive increase in the use of CDNs which lead to a more efficient aggregation of content where independent CDN providers offer services to the content/application providers. The use of CDNs is a commercial strategy to overcome the problem of effective data distribution as large content providers can offer their services in a better quality by bringing content servers closer to the end-users. The deployment of CDNs constitutes a shift in the economics of distribution of content, applications and services which is already tending to reward economies of scale in that part of the value chain (in particular large actors of the global Internet arena).

CDNs as a principle do not raise net neutrality issues, but discriminatory treatment in their favour might well do so.

²¹ Sending the traffic to the core of the mobile networks via the fixed broadband connections of the end user, bypassing the radio access network and the backhaul.

The connection of large content/application providers and of CDN providers to ISP networks are both based on general technical peering/transit mechanisms. The major difference is the type of provider involved in the interconnections and not the specific mechanisms. New types of interconnection like paid peering and partial transit are particularly interesting for content distribution. The nature of the different types of interconnection agreements is further discussed under question 10.

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?*

There are two potential concerns associated with the development of managed services offers:

- (i) whether the deployment of 'managed services' with guaranteed quality could lead to anti-competitive effects;
- (ii) the longer term structural impacts on the best effort Internet.

(i) Anti-competitive effects

On the first of these concerns, the current regulatory framework distinguishes between firms with and without Significant Market Power (SMP).

On the one hand, firms with SMP would come under close scrutiny, particularly if they are also present in the downstream market (e.g., through vertical integration). The most important concern would be whether such arrangements favoured the providers' own content, applications and services or that of an affiliate over that of third parties, if the terms of provision were preferential or if the setting of high wholesale prices relative to retail charges could constitute a 'margin squeeze' or the quality provided to rival content providers was inferior.

Where there are no agreements with a particular provider one would expect a network operator or ISP to be indifferent between providers of content applications and services. In this scenario, however, under some circumstances there may still be some concern regarding the ability of a network operator or ISP with SMP to set a 'monopoly rent' for access, which although not discriminatory would nonetheless raise prices in an anti-competitive manner and harm consumer welfare. Furthermore, SMP may have an incentive to degrade the best effort class in an anti-competitive manner, in order to induce customer to pay the higher price for the managed service class.²²

On the other hand, firms without SMP would come under less scrutiny. There are good reasons for this. A firm without SMP which embarks on a course of conduct designed to restrict consumers' access to content, favour one content provider in its access conditions over another or set excessively high prices for doing so may be punished by customers (including content providers) switching to a rival supplier.

It is also important to recall that the conduct in such cases is likely to fall into markets which are not on the current list of 'Relevant Markets' which NRAs are obliged to examine. There is of course scope for NRAs to identify additional markets for examination, but in doing so; NRAs need to follow the 'three criteria test'. This sets a high evidential hurdle for the identification of such additional markets and the timescale for intervention can be long.

²² See ERG (08)26 final, Ch. C.4.2

(ii) Impacts on the best effort Internet

As regards the second concern, it is argued that the deployment of managed services, even if not anti-competitive, could over time harm the best effort Internet, in particular by restricting innovation for services sensible for quality degradation, if it started to decline in importance (or accessibility) or was neglected relative to a managed service environment. This is because the low entry barriers that currently exist on the open platform of the Internet have provided particularly fertile ground for new content, applications and services to develop.

The concern about the prospects of ISPs exerting an undue amount of control over innovation, even in a context where competition is effective, is a legitimate concern but whether or not the concerns are justified in practice will depend on a number of factors. At any given time, there will be different innovation incentives at the network and content layer, which will need to be weighed. Consumer preference for the best effort Internet should also influence ISPs' behaviour, assuming a competitive retail market.

This notwithstanding, it may be appropriate to monitor developments over a period of time to assess whether such problems start to arise. This could inform NRAs views on when or whether to activate their powers to mandate minimum quality requirements for the best effort Internet, and as part of this defining on a forward-looking basis the inter-relationship between these two lanes.

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?*

It is understood that the objective of Q8 is that in the case of managed services, the same quality of service conditions and parameters should be available to all content/application/online service providers which are in the same situation. This in fact seems to imply a non-discrimination rule for all managed services terms (including prices) regardless of SMP. A regulatory intervention to impose such an obligation seems unjustified.

4.3. 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?*

(We understand this question as related to both access and interconnection based on the accompanying text in section 4.3.)

BEREC wants to highlight the fact that the Internet connectivity market has grown from zero to a multi-billion-Euro business in fifteen years. Not only does the majority of the European population use the Internet with some kind of broadband connection, the industry has invested billions of Euros in up-dating the old network and rolling out the new fibre technology in order to provide better services at a lower price to more customers. Never before have so many people had access to so much information, education and business opportunities from all parts of the world. This development has taken place on a commercial basis without any regulatory intervention.

BEREC would like to emphasize that the discussions on providing adequate incentives for investment in NGA networks and the discussions on the openness of the Internet should not be mixed up. The European regulatory framework for telecommunications and the NGA Recommendation are expected to give regulators the instruments at hands to stimulate

competition (by means of access regulation) and to support risky investments (by supporting cooperation, through risk premiums on top of the WACC for certain investments etc.) and thereby provide an independent (of the net neutrality discussion) stimulus to economic growth. So the Net Neutrality debate in Europe should not mix up discrimination/blocking of independent apps/services/content with NGA/NGN investment incentives.

Until today, the revenue streams to the ISP have been mainly provided by the connected end users: mostly the “downstream consumers”, and to lesser extent content/application providers (the two sides of the two-sided market), while some higher tier ISPs also receive revenues from transit agreements with lower tier ISPs. So, when looking at the commercial arrangements governing the provision of access to the Internet, one can distinguish the relations between ISP and end users and the relations between ISPs and content/application providers.

Regarding the first type of revenue streams, from end users to ISPs, many operators express the concern that price and cost may increasingly become unaligned. The flat rate subscriptions currently provided may in case of high data volume usage at peak hours not cover all the costs of the ISP. The solutions commonly envisaged by operators are either to limit the data volume or to increase the price²³. Limiting the data volume or throughput rate may either be independent of data type (data volume caps or bandwidth limits) or dependent of data type (e.g. throttling of p2p file sharing). The first method does not constitute a departure from the principle of net neutrality; while the second method presumably does as specific data types receive a different treatment than other traffic.

There are many existing models to address an imbalance between price and cost according to the first approach – for instance offering price-differentiated access throughputs (this is generally well accepted and raises no net neutrality concerns). Another concrete illustration of the first method is that some ISPs include a “Fair Usage Policy” clause in their end user contracts, which is often expressed in very general terms but is used to justify the application of the mentioned mechanisms. Operators generally state that fair use policies are intended at preventing some “extreme” profiles of consumption (of a minority of users) to degrade the Internet experience of others.

Assessment of these policies should however take two aspects into account. Firstly, “extreme users” are sometimes “early adopters” of what may become the average consumption of customers in the longer term – so there can be a danger in restraining too much the development of new usages (this is a traditional dilemma that operators are used to facing). Secondly, users’ limitations triggered by a volume threshold do not necessarily solve issues of congestion in peak hours. In any case, transparency on the applications of such mechanisms is essential. They should be based on clearly specified parameters and not on vague “Fair Usage” terms.

Regarding revenue streams from content/application providers to the ISPs, they are usually only applicable for directly connected (affiliated) providers. Hosting services and connectivity to the local network are provided on an unregulated basis. Traffic from distant (non-affiliated) content/application providers connected to other ISPs reaches the ISP through ordinary peering/transit interconnections in IP networks. These interconnection arrangements developed without any regulatory intervention although the obligation to negotiate for interconnection applies to IP networks as well. These agreements have been largely outside the scope of activity of NRAs. This appeared justified in particular due to the competitiveness of the transit market on IP backbones.

²³ Other types of solutions are sometimes evoked, for instance monetizing user-related information (e.g. location, consuming habits...).

Problems may however arise in the termination part, where some large ISP exert a control over the access to a great number of end users, but more information on the different types of agreements would be necessary to assess this.

Indeed, the Internet is a network of networks and *interconnection between the networks of the different ISPs* is vital and has developed following multiple forms. Traditionally this interconnection has consisted of either peering (which initially means the exchange of traffic addressed to each party, or “local access”, and was usually free), or transit (which provided a global connectivity – “global access”, and has to be paid)²⁴. Although those terms are often understood as “free” or “charged for”, the reality is more nuanced, as today we experience the introduction of new economic models of these basic interconnection types like paid peering and partial transit.

Paid peering gives local access for a fee and partial transit gives access to a subset of the global network for a lower fee than ordinary (full) transit. The situation is further complicated by the increased blurring of the traditional Tier 1/Tier 2 etc. architecture (for instance some content providers own large networks and are able to “peer” with major operators), as well as the development of alternative models for the distribution of traffic – cf. in particular the deployment of CDNs (see Q7). Another important trend indicated by various operators in the public debate is a growing asymmetry that local networks experience regarding the ratios of incoming/outgoing traffic. This growing asymmetry, along with the other changes mentioned may have an impact on the flow of payments in peering/transit relations.

Interconnection arrangements between networks are not directly related to net neutrality as long as all traffic flows and access/interconnection requests are treated equally (cf. Q5: no access restrictions are to be applied on the best effort Internet).

From this perspective, BEREC considers that the commercial arrangements are currently adequate. The development of the market, including any commercial arrangements, should however of course be followed closely so that regulatory or other interventions can be initiated if the future progress so requires.

4.4. Consumers – quality of service

We answer Q14 before Q11-13 as it makes sense to look into how the ISPs specify the quality of their offers before looking into quality requirements set by the NRAs.

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

BEREC welcomes the enhanced transparency requirements in the regulatory framework. Four main axes for this transparency can be distinguished.

1) Transparency regarding the “*conditions limiting access to and/or use of services and applications*” (Art. 20 (1) (b) USD, second point) is fundamental for the customer to identify deviations from the principle of net neutrality. For example, indications about blocking of port numbers identify applications that can’t be used should be clearly notified, if blocking is to be allowed. To be a useful tool for consumers, this information must clearly specify what this means in a practical way that consumers will be able to readily understand (e.g. what applications can and cannot be used or can only be used in a limited way due to e.g. traffic shaping).

²⁴ For details see ERG (08) 26final, Ch. B.2.2 “Interconnection in existing IP-based networks”

2) Transparency regarding “*minimum service quality levels offered*” (Art. 20 (1) (b) USD, third point) is important regarding the capacity that is made available to the customer. For the best effort Internet end-to-end electronic communication service this value is difficult for the access provider to ensure for the detailed reasons given below. The ETSI Guide (ETSI EG 202 057-4) describes that the network performance of the Internet access could be specified as maximum, minimum and mean value of the data transmission rate as well as the one way transmission delay. As a starting point these parameters would give valuable information about the performance of the Internet access service. However, where the provided access is asymmetric (i.e. greater ‘download’ than ‘upload’ capacity), as is usually the case for ordinary consumers, it is also important that descriptions fairly describe both directions.

When considering the Internet access service, the end-to-end quality of the Internet electronic communication service can’t be guaranteed for any ISP, although the ISP is responsible for his peering and transit arrangements. One possible approach to improve the transparency of the Internet service provided in the future may be to supplement the “access leg” (also referred to as last mile or local loop) values described above with some kind of “interconnection leg” values.

Irrespective of the general and forward looking approach of the discussion regarding net neutrality it might be needed to address current problems of vague contract conditions in the broadband end user market (“up-to”, “unlimited”, “everywhere”, “free”...). The new provision to specify the “minimum service quality levels offered” in the end user contract could possibly be used to reduce the range between the offered minimum bandwidth in the contractual terms and the in fact realised bandwidth after connecting the end user.

3) Transparency regarding “*any procedures put in place by the undertaking to measure and shape traffic*” (Art. 20 (1) (b) USD, fourth point) could constitute an important tool for the NRAs to supervise the situation on behalf of the end users. This kind of information may however not be easy to understand for most end users, as this may include some degree of technical description.

This is important in the transparency context. Methods of translating highly technical descriptions of traffic management to simple, easily understood and easily compared descriptions need to be developed.^{25 26}

4) As well as transparency for consumers, the transparency towards content/application providers should also be considered. Several among these stakeholders have expressed concerns regarding the frequent opacity of management techniques applied by operators, and more generally it seems desirable to promote a better coordination between the various parts of the Internet chain, to support effective development and management of services.

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?*

What instances could trigger regulatory intervention is very much dependant on the market development which in turn is difficult to foresee.

²⁵ As an example these might consist of templates with Yes/No tick boxes and/or strike-out statements, according to what is done (with space for figures, such as bandwidth caps etc). Then a relatively short explanatory text in plain language could be added.

²⁶ A standardised methodology for doing so is given in ETSI EG 202 009-1 Part 1: Methodology for identification of parameters relevant to the Users and Part 2: User related parameters on a service specific basis.

In a competitive market with adequate consumer transparency, an individual operator or ISP which degrades individual services in ways which harm consumers' interests is likely to be punished with loss of market share.

If, however, there was a general trend towards ISPs and network operators routinely degrading best effort Internet traffic in favour of managed services, and that competitive forces were not in themselves sufficient to prevent this trend, and there was in addition evidence of harm to the interests of consumers and/or to the innovation process in consequence, that could be sufficient to justify intervention, e.g. in the form of setting minimum quality requirements (in particular because of unreasonable limitations).

One must consider the possible drawbacks such as reducing competition with regard to quality and variety of offers (some consumers might be satisfied with less qualitative services at lower prices) and regulatory burden.

The Universal Service Directive states that "In order to prevent the degradation of service and the hindering or slowing down of traffic over networks, Member States shall ensure that NRAs are able to set minimum quality of service requirements". Recital 34 of Directive 2009/136/EC clarifies that the "degradation of service" can but does not have to amount to the hindering or slowing down of traffic.

Considering that the new provision of Art. 22 (3) USD allows to set minimum requirements of quality of service (QoS) it is necessary to clearly distinguish between *the concept of QoS* on the one hand and *network performance* on the other hand. QoS is a concept that covers all aspects influencing the user's perception of the quality of the service. For voice services, for example, the QoS relates to the entire transmission path from mouth to ear.

The term QoS is often misunderstood as a synonym for network performance. Network performance is defined and observed as performance of a telecommunication network (or sections of a network) by using objective performance parameters. The relevant parameters are packet delay, jitter, packet loss, packet error (and throughput). They are defined in ITU-T Rec. Y.1540.

Given that QoS can only be specified for service by service including many parameters outside the control of the network operator²⁷ the new provision of Art. 22 (3) USD could be seen as having limited usage beyond network performance, since QoS in the sense defined above would require specifying QoS for a very large list of end-to-end services.

This provision can be implemented through a general "ex ante" monitoring of quality (ref. question 12). If the best effort lane is too degraded, then this option could disappear from the market. The risk might be low but the consequences are potentially quite substantial which justifies ex ante monitoring. In this option, all relevant operators can be monitored. The provision might also, depending on national transpositions of the framework, be considered when NRAs are handling disputes. Here one could imagine that a content provider could complain about his best effort Internet service being unreasonably degraded by an undertaking (ISP). In that case, the NRA could intervene on a specific traffic management practice for instance.

²⁷ Whereas an ISP may have control over his own network, it does not control the terminal equipment and codecs used by the customer. These factors have a significant impact on the achievable end-to-end quality.

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

For many purposes the question could be reduced to whether the user is (consistently) being provided with the advertised bandwidth.

Regarding the meaning of the wording “minimum QoS requirements”, this can be understood as a sufficient performance level of the best effort service, especially needed when this offer is unfairly deteriorated as a result of the development of managed services.

It does not appear necessary to consider the application of “minimum QoS requirements” to managed services, since these intrinsically contain contractual terms relating to quality of provision.

To determine quality requirements, it could be helpful at first to conduct an accurate monitoring study of actual network performance. This could be realized by an independent third party. Performance data revealed by the measuring study could be useful to better define realistic performance goals.

To assess whether the ISP adheres to the quality requirements that are set, measurement tools are needed. Tools for monitoring of the quality of the “access leg” are available today at some NRAs (in Greece, Portugal, Sweden, Denmark, Norway and Italy²⁸) where either the customers, the NRA or an independent body can verify the performance of the user’s access. The concept is based on measuring the broadband performance (data transmission speed) between an end-user location and a measurement server located in an Internet Exchange Point. This makes comparison between different ISPs possible. These tools are often supplemented with statistical methods to provide mean values etc.

A well functioning Internet service provided from an ISP is heavily dependent on the interconnection with other ISPs to reach the complete Internet. The “interconnection leg” of the Internet service is far more complicated to monitor as there are several paths available. Some kind of a “quality index” for combinations of ISPs may be a usable tool to cover this aspect of the end-to-end quality of Internet communication.

(A tool of this kind exists at Swedish IT Incident Centre SITIC available at www.sitic.se)

So far there is not much research activity aiming at detecting limitations of the usage of the bandwidth (e.g. due to traffic shaping measures). One initiative to improve knowledge on this is the Measurement Lab (M-Lab)²⁹ which is a distributed server platform for researchers to deploy Internet measurement tools. Currently, M-Lab provides different tools for Internet users to measure their broadband connection speed, analyze application performance and run diagnostics. These tools e.g. allow identification of whether an end-user’s ISP blocks or throttles applications or applies traffic shaping.

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?*

We are currently at an early stage in the net neutrality debate in Europe. Different approaches are evaluated in several NRAs and the conclusions are still not drawn in many of those cases. It may turn out that in some countries a necessity to impose minimum quality requirements does not emerge whereas in other countries there is a need to do so. Also,

²⁸ In Italy: Under development

²⁹ <http://www.measurementlab.net/>

taking into account the challenges of measuring end-to-end quality (see question 12) it may be more urgent to develop approaches to achieve this.

While national circumstances can be very different, on this topic there is clearly an important European (even international) dimension, which calls for common works as early as possible. It seems difficult however to conclude at this stage on the extent to which the same approaches are needed and/or are possible in respect of different countries.

Because of the need under Art 22(3) to get EC comments or recommendations, and to inform BEREC before setting down and implementing minimum quality requirements, it however makes sense for a common approach to be developed, at least in respect of high-level principles and/or broad approaches. To give certainty to industry, this could be done relatively early by BEREC and EC comments could then be invited.

4.5. 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?

Freedom of expression and citizens rights, as well as media pluralism and cultural diversity, are important values of the modern society, and they are worth being protected in this context – especially since mass communication has become easier for all citizens thanks to the Internet. However intervention in respect of such considerations lies outside the competence of BEREC, and we will not comment much on these issues, although it is noted that as public bodies, NRAs are obliged to respect the rights of citizens if restrictions are imposed on end users' access to or use of services.

On the other hand, there is a clear link between these broader policy objectives and the openness of the Internet which allows commercial and social innovation. The better this openness is ensured the higher the positive impact to these broader goals.