Body of European Regulators for Electronic Communications

BEREC

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BEREC response to EC questionnaire on specific aspects of transparency, traffic management and switching in an Open Internet

19 December 2012

1. Traffic management

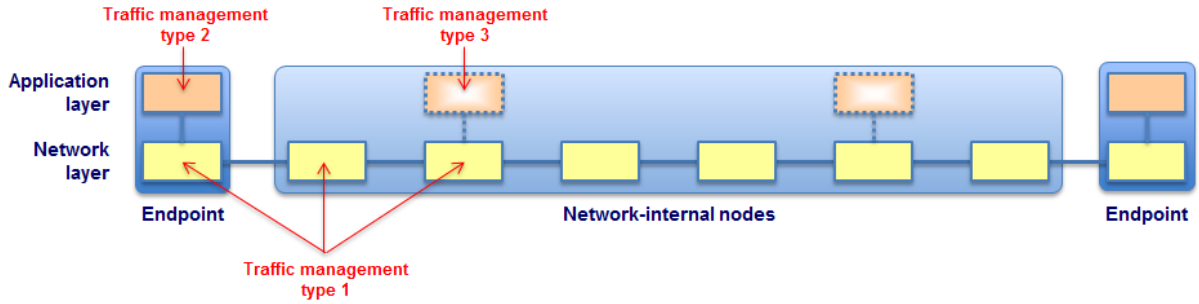
1.1 Traffic management and differentiation

Question 3

Please explain briefly which traffic management techniques are usually applied by network operators or ISPs and how they are technically implemented.

Different traffic management (TM) techniques can be classified according to which layer they are performed at and which network nodes they are performed in, ranging from internal to external network nodes and from the network to the application layer.
BEREC uses the following three traffic management categories:

1. traffic management techniques executed *at* the network layer;
2. traffic management techniques executed *above* the network layer in the endpoints;
3. traffic management techniques executed *above* the network layer in network-internal nodes.



Internet service providers (ISPs) deploy and manage their networks according to the traffic load generated by the end users. The aim is to achieve a network performance that is sufficient to run applications with adequate performance. The basic concept used by ISPs is that transmission capacity is deployed at different network links according to the traffic load that is usually expected.

TM type 1 includes functions performing routing and forwarding of individual Internet protocol (IP) packets over the different links available in the network, based on the destination address of the packets or similar information in the packet header.

TM type 2 includes such functions as congestion control and dynamic adaptive coding. Congestion *control* (not to be confused with congestion *management*, see question 4) is an automatic adjustment of the transmission rate at which data are sent into the network, i.e. the rate is adjusted according to the traffic load in the network.

TM type 3 includes techniques referred to as traffic filtering, traffic shaping and similar terms, and it often uses so-called *deep packet inspection* (DPI). Based on a predefined policy, individual IP packets may be forwarded, delayed or dropped.

When IP networks provide different *traffic classes* or *priority levels*, both type 3 and type 1 are involved. First, packets are sorted into traffic classes which may use some TM type 3

function. Then packets are forwarded through the network using separate queues per traffic class using some TM type 1 function (e.g. DiffServ or MPLS).

(For more details, please refer to section 4.4 in BEREC NN QoS Framework and section 5.1.2 in the BEREC NN QoS Guidelines.)

Question 4

Congestion management is one of the reasons for applying traffic management measures.

a) Please describe briefly how congestion management normally works.

b) If possible, please provide a definition and examples of genuine congestion management measures, i.e. measures which are necessary to avoid or tackle network congestion, as opposed to measures which may be called congestion management but actually pursue other purposes.

a) How congestion management normally works

Congestion management consists of TM techniques that are used in order to mitigate the level of congestion in IP networks. Congestion management can be implemented either in endpoints (users' PCs and servers for example) or in network-internal nodes. The former is named congestion *control*; see question 3.

Congestion *control* was introduced on the Internet as a response to congestion collapses occurring previously. The use of congestion control in endpoints establishes a state of equilibrium between traffic sources and the available capacity in the network.

In IP networks the congestion control function in the endpoints may be assisted by network-internal congestion management functions. This can be performed in an *application-agnostic* way or in an *application-specific* way. The latter is typically performed with DPI technology and may be used to throttle or block traffic from individual applications.

As pointed out in the BEREC NN QoS Framework, congestion can occur in two ways: either on an irregular basis caused by unpredictable/unavoidable situations, or on a regular basis caused by a failure to provide sufficient capacity. This means that following up increasing traffic load with deployment of additional transmission capacity in the network constitutes a long-term congestion management strategy.

b) Genuine and dual-purpose congestion management

Any type of blocking and/or throttling of traffic would necessarily contribute to reduction of traffic load in the network, and could therefore be argued to be some kind of congestion management. The same amount of traffic limitation can be achieved by both application-agnostic and application-specific methods. Both methods will target so-called 'heavy users' more than ordinary users, but with application-agnostic methods 'heavy users' will be treated independent of which application they use.

Application-specific congestion management could have side-effects due to the network effect. The network effect is inherent to the use of applications because the usefulness of applications depends on the number of users of that application. Blocking or throttling of specific applications by one ISP will also have consequences for end users of other ISPs

(who may have unrestricted Internet access themselves) because they may face problems using these applications to reach end users of the restricting ISP.

In addition to potential harm for end users, the blocking and/or throttling of single applications could have a serious impact on the business case for application providers. This could have a negative effect on innovation in the application market, such as increased entry barriers that may prevent new applications from emerging on the Internet, thereby reducing the incentives for innovation, and in the longer term lead to fewer new applications and content.

For this reason, application-agnostic, more than application-specific, congestion management would be considered as genuine congestion management. Specific technical methods that support application-agnosticism are TCP congestion control in endpoints and network-internal functions such as weighted fair queuing (WFQ) and random early detection (RED). Furthermore, there are newer techniques such as a method developed by Comcast (ref. IETF RFC 6057) and upcoming specifications from the Conex Working Group in IETF.

It is, however, difficult to give an absolute answer to whether a TM practice constitutes genuine congestion management or not. Furthermore, we refer to our answer to question 5 below, even though 'genuine' is not equivalent to 'reasonable'.

Question 5

Please provide your views on the following ways/situations where traffic management may be applied by ISPs.

Are traffic management measures: necessary / appropriate / problematic

Please explain your response

a. applied to deliver managed services (e.g. to ensure a guaranteed quality of service for a specific content/applications)

b. taking into account the sensitivity of the service to delay or packet loss

c. used to implement or manage compliance with the explicit contractual restrictions (e.g. on P2P or VoIP) of the Internet access product accepted by the user

d. targeting types/classes of traffic contributing most to congestion

e. targeting heavy users whose use is excessive to the extent that it impacts on other users

f. applied during busy times and places, when and where congestion occurs

g. affecting all applications/content providers in the same way (application-agnostic)

h. affecting (similar) applications/content providers of the same category in the same way

i. used, without other grounds, against services competing with the ISP's own services

j. implemented at the full discretion of the ISP

k. other differentiation criteria (please specify)

Whether TM measures are necessary, appropriate and/or problematic depends on the motivation and implementation of the practice, first evaluating the practice itself and then evaluating the situation in the context of the market.

BEREC considers two main categories of cases for evaluation of TM practices:

(1) Internet access service (IAS) as a whole;
(2) individual applications using the IAS.

Regarding (1), when the quality of IAS as a whole is considered, the relation to specialised services is of particular concern. Regarding (2), several criteria can be used for evaluation of TM practices used for IAS offers, but also restrictions of use in general.

BEREC has drawn the conclusion that it would be neither appropriate nor relevant within the current Regulatory Framework to define a priori reasonable and unreasonable TM practices (e.g. through whitelists or blacklists). Traffic management is not bad or good per se, and each differentiation practice made viable by TM techniques may achieve welfare enhancement or surplus reduction. Therefore, it is difficult to conclude a priori that certain forms of differentiated treatment (a) are reasonable or not, (b) affect competition and innovation, and (c) harm users. That judgement depends, to a large extent, on the objectives and effects of this differentiation on different stakeholders, both intended and unintended. In addition, the assessment depends on the market structure in which these practices take place. This calls for a case-by-case assessment.

BEREC proposes to evaluate 'reasonableness' of TM and contractual restrictions by resorting to the following assessment criteria:

(i) **Non-discrimination between players.** This means that the practice is done on a non-discriminatory basis among all content and application providers (CAPs).
(ii) **End-user control.** It is an important indicator of reasonableness when the practice is applied on request of users at the edge, who can deactivate it.
(iii) **Efficiency and proportionality**. The measures should be limited to what is necessary to fulfil the objective, in order to minimise possible side effects. The intensity of the practice, such as frequency and reach, is also important when assessing its impact.
(iv) **Application-agnosticism**. As long they are able to achieve similar effect, BEREC expresses a general preference for 'agnostic' practices regarding contents and applications. This parallels the fact that the decoupling between network and application layers is a characteristic feature of the open Internet, and has enabled innovation and growth.

The regulatory process when national regulatory authorities (NRAs) evaluate TM practices, and restrictions in general, consists of two phases. First the different service offers are evaluated according to the criteria described above. Then the situation is evaluated in the context of the market, taking into account the availability of (1) IAS offers with sufficient quality and/or (2) unrestricted IAS offers.

Based on these aspects, we can present the following general considerations regarding each sub-question:

a) Specialised services (managed services)

Specialised services are usually provided in order to ensure adequate service characteristics. As long as specialised services are not provided at the expense of IAS service offers, there should be no cause for concern.

However, the conditions in which different content and application providers can – or cannot – access specialised services may be discussed, e.g. if there is vertical integration. When specialised services are a form of 'positive' differentiation (higher priority, quality control etc.), questions about possible discrimination among CAPs may arise, as some of them may

not be able to enjoy the same conditions of delivery as the favoured (often vertically integrated) content, even if they are willing to.

b) Real-time applications

If real-time applications were given preferential treatment in the shape of specialised services, and condition (a) above was fulfilled, there should be no cause for concern.

It is a debated topic to what extent real-time applications such as VoIP can be provided over best effort Internet without performance problems. Real-time applications would usually benefit from preferential treatment during peak hours; however, VoIP applications are offered over best effort Internet today with relatively good speech quality.

An important aspect of this is that (many) real-time applications use UDP instead of TCP at the transport layer, meaning that they are not rate limited by congestion *control*. The selection between TCP and UDP is implemented in the endpoints (i.e. TM type 2).

If real-time applications were to receive preferential treatment (i.e. TM type 3), the next question would be exactly which specific applications should be defined as being real-time. Providing application-agnostic traffic classes that may optionally be used for real-time applications would eliminate the need to give precise definitions of which applications are included in an application-specific case.

c) Contractual restrictions

In the BEREC NN QoS Guidelines, contractual restrictions are evaluated based on the same criteria and methodology as technically implemented TM. The restrictions should, anyway, be clearly described in the user contracts.

d) Use generating high traffic load

Too high traffic load in the network of an ISP could cause communication breakdown, and some mechanism is needed to limit the traffic pressure. As described above, congestion control in the endpoints already performs an inherent adjustment of the transmission rate at which data is sent into the network.

Use generating high traffic load could be limited by either application-specific or by application-agnostic TM. The former would target selected capacity-demanding applications, while the latter would target all capacity-demanding applications equally. Application-agnosticism is one of the criteria set out in the BEREC NN QoS Guidelines, and, as long as such a practice does not breach other criteria set out in the guidelines, it should not cause any concern.

e) Users generating high traffic load

Communication from an individual user on the Internet would affect other users from time to time, since the best effort paradigm is built on shared use of common resources. Defining precisely when use is ‘excessive’ would necessarily be difficult, in particular if the contractual terms do not clearly describe the available bandwidth.

In general, limiting traffic from users generating particularly heavy traffic load, as long as this is done in a way that corresponds to the criteria set down in the NN QoS Guidelines, would not cause concerns. The TM practice should be transparent and clearly reflected in the user contracts. A commonly used practice to limit traffic load without raising net neutrality concerns is to set bandwidth limits or volume caps for the IAS as a whole.

f) Busy times and places

In general, limiting traffic at busy times and places, as long as this is done in a way that corresponds to the criteria set down in the NN QoS Guidelines, would not cause concerns. The TM practice should be clearly reflected in the user contracts.

g) Application-agnosticism

Application-agnosticism is one of the criteria set out in the BEREC NN QoS Guidelines, and, as long as the specific practice does not breach other criteria set out in the guidelines, it should not cause any concern.

h) Similar applications/providers

Affecting similar applications and/or providers of the same category in the same way could be implemented by either (positively) prioritising or degrading dedicated traffic.

Degrading some applications or providers would probably be contrary to Articles 8.4.g and 8.2.b FD. It would fall under the scope of Article 22(3) USD, and should be analysed in the light of the BEREC NN QOS Guidelines. Furthermore, as discussed in the BEREC NN QoS Guidelines, giving some applications or providers *preferential treatment* may at the same time lead to a situation in which improved performance for this traffic actually constitutes a degradation of the performance of the remaining traffic.

Furthermore, such a practice could also lead to an entry barrier, whereby application developers would have to convince the ISP that their traffic should belong to a particular traffic class, thus limiting innovation and in the longer term leading to fewer new applications.

i) Applications competing with the ISP's own applications

BEREC has highlighted the potential risks of this situation, as ISPs have the incentives and the ability to limit retail competition by reducing available options of end users. In this case, ISPs, through TM practices, could reduce the access quality of these applications or even block them in order to avoid any substitution at retail level.

Indeed, most of the examples found in the TMI were related to VoIP blocking in mobile networks; this situation is explained in BEREC's report on differentiation practices and related competition issues in the scope of net neutrality. It has also to be borne in mind, as pointed out in the report, that current tariff structures might need to be adapted to cope with this trend and the impact that VoIP might have on cross-subsidisation between broadband and voice services.

j) Measures at the full discretion of the ISP

The TM practices should be clearly described in the user contracts. Traffic management practices should then be evaluated based on the criteria set out in the BEREC NN QoS Guidelines.

Question 6

The use of managed services may affect the Internet access service in some cases, due to the sharing of access resources.

a. Please explain the impact of managed services on the standard Internet access service ("best effort") in terms of available bandwidth and quality of service.

b. Please explain whether it is possible to offer separate capacity for managed services and the standard Internet access service. If yes, please provide information on the circumstances (costs, technologies) of separating them.

a) Impact of specialised services (managed services) on IAS

What kind of impact specialised service offers have on IAS offers *depends on the ISPs' configuration of their networks* (see sub-question b below). Both service categories usually share the same physical infrastructure and, depending on the ISP's decision, the capacity is divided between the two when they are configured. Since specialised services are usually provided in order to ensure adequate service characteristics, while IASs usually are provided on a best effort basis, ISPs have an incentive to provide specialised service offers at the expense of IAS offers. The BEREC NN QoS Guidelines provide a comprehensive explanation of how to investigate such impact.

Specialised services can be a tool to provide particular services, meet specific needs and trigger additional innovation. BEREC considers that, as long as the criteria described in question 5 are fulfilled, there may, however, be considerable advantages to provide specialised services whereby assured quality can be achieved for specific usage without degradation of the IAS. In cases where the capacity rolled out for specialised services can also be used by the IAS, the outcome may also be a win–win situation, whereby the IAS benefits from the coexistence of specialised services.

b) Separate capacity to specialised services and IAS

The allocation of capacity to different service offers is configured by ISPs in their networks. Different technologies are used in access and core networks. In access networks, technologies that use a shared medium, such as cable-TV/HFC and mobile networks, may be particularly challenging to handle.

In cable-TV/HFC networks, the actual shared medium is the cable segment closest to the customers. However, the DVB-C technology used on the cable segment provides ring-fenced capacity *per service category* by allocating dedicated channels per service.

Furthermore, mobile networks allocate capacity to individual communication sessions based on their specific requirements. Using 3G/UMTS as an example, the communication sessions are routed based on 'PDP contexts' which are established with different quality parameters. Thereby the capacities of specialised service offers and IAS service offers are separated.

In the core networks, MPLS is usually used as an underlying technology in modern IP networks. Network providers configure MPLS paths through their networks for individual service offers and use traffic engineering for allocation of capacity per MPLS path, thereby providing separate capacity for specialised services and IAS.

The technologies used for allocation of capacity to different service offers are already introduced in most providers' networks. There is operational cost associated with configuration of specific service offers, if that is not done already, but the separation between the two service categories as such does not require additional configuration.

Another aspect related to this question, in case the separation of capacity has to be assessed in order to check whether a sufficient capacity is available for IAS, is how precise the definition of specialised services is. If it becomes unclear whether a service offer is a specialised service or an IAS offer, it will become difficult to judge which service category the capacity actually is allocated to.

Question 7

a) Please give examples of "new business models" which could be developed on the basis of managed services by

(i) Network operators/ISPs:

(ii) Content providers (on the basis of agreements with ISPs):

b) How important are these innovative business models likely to become in the next three years? Please substantiate your view by means of available forecasts or studies.

c) What would be the expected benefits in terms of innovation and investment through new businesses (content or applications) benefitting from guaranteed levels of quality of delivery through managed services?

It is not clear what the concept of 'new business models' refers to. In this answer, we focus on new forms of exploiting Internet access, but it could refer also to new services.

a) 'New business models'

The Internet ecosystem allows the supply of new services understood as (a) traditional services but provided through the Internet in a more efficient manner and (b) completely new services, implemented as specialised services. Examples of the first type are VoIP or TV and video on demand services. Examples of the second group are currently more difficult to illustrate, at least by BEREC. However, in the answers from stakeholders to different public consultations, new business and applications could appear in different fields, such as e-Health, but also facilities-based provision of VoIP and IPTV. BEREC is not in a position to evaluate the likelihood of these new businesses appearing.

In addition to new services and applications, new business models could come from innovative ways of exploiting the networks. Indeed, the thriving Internet ecosystem – in terms of both the amount of traffic being relayed and the revenue streams generated over the networks – raises the question of how to share the value and to pay for the infrastructure.

Some ISPs are thus working to develop new business models, in particular, specialised services that capitalise on the deployment of new access networks allowing them to generate additional income from end users and content providers. Specialised services offer a large scope of possibilities, by ensuring an end-to-end controlled level of quality; innovative services focusing on security or health are sometimes mentioned.

In the retail market, new models could involve differentiating Internet access offers, or marketing new specialised services, to obtain a greater contribution from users. However, in a competitive Internet access market, whether fixed or mobile, it is not easy to increase prices if costs are not really increasing, or if users do not perceive a priori a substantially higher value in the service.

Operators can also try to have players located higher up the value chain help cover their costs, especially other operators and CAPs.

This happens in the context where, increasingly, IASs are bundled with specific applications or content subscriptions, leading to growing multi-market contacts among telecom operators, media providers and Internet companies (mainly Internet giants or over-the-top). This is a worldwide trend with an impact, now and in the future, on competitive conditions at national level. Telecom operators consider offering a wider range of applications, and their business

models may evolve in order to create value around the provision of access to the Internet and to ensure higher revenues.

In this scenario, bundling of electronic communication services and other services, belonging to (a) the media sector and, in general, the information society environment, and (b) other sectors (i.e. credit and payments), may set new challenges in order to promote further competition and consumer welfare in the Internet ecosystem.

b) Importance

ISPs often show a great interest in developing new business models. They will fundamentally depend on the industry's initiatives and consumers' response. The current legal framework allows a broad range of innovations. BEREC aims at giving visibility to stakeholders by stating how regulators will react to new situations, in particular by weighing whether minimum requirements for quality of service (QoS) should be imposed.

c) Expected benefits

Specialised services can be beneficial to all stakeholders, by promoting new applications that need a controlled level of quality to be effectively delivered. They are likely to spur new revenue for ISPs from both sides (end users and content providers) and encourage new investments in networks that IAS may also benefit from, as it often shares capacity with specialised services.

This scenario can only exist if IAS keeps being offered at sufficient quality to avoid specialised services jeopardising the open Internet. Therefore, BEREC has provided a methodology for scrutiny of the development of the IAS over time in order to detect potential 'degradation of service', in the *Guidelines for Quality of Service in the Scope of Net Neutrality*.

Question 8

What are likely positive and negative effects of certain traffic management practices on the Internet ecosystem, in particular on innovation and investment, by (i) network operators/ISPs and (ii) content providers? Please explain your view and, if appropriate, distinguish between different traffic management practices.

BEREC has extensively analysed the effects of TM, which can be summarised as follows. Among others, the following concerns have been suggested:

- The development of premium-priced priority Internet access offers, which would allow operators to not only (a) better meet demand from end users and CAPs but also (b) extract value from bandwidth scarcity, could reduce incentives to invest in new capacities (reducing best effort Internet to a so called 'dirt road').

- The development of TM practices that block or reduce the possibilities of development of new applications on the Internet may lead to the situation that purchasing a 'plain' Internet access offer could in the end prove to be too expensive for the average citizen.

- The hindering of applications by ISPs vertically integrated with CAPs might risk the increased development of 'walled gardens', reducing the possibilities for 'one man in a garage' to create new successful applications.

- The development of bilateral agreements between ISPs and CAPs for the prioritisation of the CAP's content on the ISP's network could risk of evolving towards a two-speed Internet, in which only big and already existing CAPs can reach the end user with a good QoS, hence limiting the opportunities for new entrant CAPs and the 'man in the garage'.

Vertical integration gives incentives to ISPs to implement differentiation practices, as they could reduce competitive pressure on their own retail services. The paradigmatic example of this is VoIP; ISPs provide voice calls through the traditional fixed or mobile network, while end users could find substitutes on the Internet (maybe no perfect substitutes but at least viable substitutes for some types of calls) at lower prices (even for free). Indeed, this practice is one of the most widespread according to the data gathered by BEREC.

As this differentiation has the aim of foreclosing, the effects on end users are high because these practices have both static and dynamic effects. The less the competition, the higher the prices and, in addition, restrictions on CAPs could have the effect in the long run of limiting their growth by reducing their potential demand.

In those cases where the ISP providing end users with Internet access is not vertically integrated, potential differentiation practices could affect content and applications not provided by the operator. In these cases, the rationality behind such practice is either cost reduction (understood in broad terms such as network costs, but also congestion management) or income increase. Traffic management would have the aim to move from the current 'no commercial relation practice' between CAPs and ISPs providing end users with Internet access, to a scenario in which the ISP providing end users with Internet access starts charging CAPs, in order to increase the total income of its operations.

BEREC has acknowledged that ISPs should have the opportunity to manage their networks to increase efficiency, minimising the resources needed to provide the service and assuring the best deal to all end users. It is important to note that congestion has some hidden costs that are difficult to measure, as it affects all end users connected to the network. In this sense, a fair TM could be welfare enhancing.

These arguments are valid only if the restrictions are done on a non-discriminatory basis among all CAPs, and using objective criteria such as consumption of resources. In other cases, the rationale behind the ISPs' behaviour could be distortion of competition.

It is important to bear in mind that it could be also the case that ISPs opt to restrict or block in broad terms the content accessible by end users from their connections. In this case, the above conclusions might not be valid because the final outcome of taking together all restrictions is harm to end users by reducing the available choice from their connections. This could be an especial problem in an environment where ISPs tend to block or degrade applications or CAPs on a general basis, including when, for example, a particular ISP blocks a specific application or CAP, another ISP blocks a different application or CAP, and so on. In this context, Internet current features would be very difficult to maintain, affecting end users' welfare.

BEREC has, nevertheless, identified some key elements that could potentially deter ISPs from implementing differentiation practices that harm end users:

- Competition observed at retail level. NRAs have tools under the current framework to enhance competition and prevent the strengthening of significant market power (SMP) positions. Any measure aimed at forbidding an anticompetitive practice would be a second best compared with a scenario in which the market develops in an effectively competitive manner.

- Consumer awareness, market transparency and low switching costs. The sustainability of restrictive practices would depend on consumer awareness of differentiation practices and their ability to exert pressure on the ISPs by their purchasing decisions. The more easily a consumer could detect a restrictive practice and change his or her ISP, the stronger the pressure on IAPs to reduce unfair and discriminatory practices.

Finally, when retail competition is not enough to grant an adequate output for end users (which does not need to be exactly the same as the one observed today), NRAs have different ways to deal with specific behaviours of the ISPs.

1.2 Traffic management and privacy issues

Question 9

It appears that the implementation of traffic management measures requires ISPs to analyse certain information about individual data packets, for instance by deep packet inspection (DPI) techniques. Please explain which type of information needs to be read by ISPs to implement the different traffic management measures. In which layer can this information normally be found?

Different TM measures can be divided along the lines described in the answer to question 3 above. (The description given below is necessarily somewhat simplified compared with exact technical descriptions.)

TM type 1 contains such measures as *traffic routing and forwarding*. These measures are executed at the network layer (as defined in the BEREC NN QoS Framework/Guidelines). At this layer, IP packet headers are inspected by routers, e.g. IP addresses indicating destinations of the communication. TM type 1 may also contains some application-agnostic congestion management functions supporting congestion control in endpoints.

('Network layer' is defined in the BEREC NN QoS Framework/Guidelines as consisting of layers 1–3 in the OSI protocol reference model. For example, the extensively deployed MPLS technology used for efficient IP traffic forwarding will be included.)

TM type 2 contains such measures as *congestion control and dynamic adaptive coding*. These measures are executed in endpoints, above the network layer. Congestion control is described in some detail in the answer to question 4 above. TM type 2 functions are based on state information about the individual communication sessions in the endpoints. Endpoints have access to all information about the sessions that terminates here, as this is a fundamental function of the endpoint where the application software is running.

('Above the network layer' is often referred to as 'application layer' or 'content and application layer' in the BEREC NN QoS Framework/Guidelines. This layer corresponds to layers 4–7 in the OSI protocol reference model.)

TM type 3 contains such measures as *traffic filtering, traffic shaping and deep packet inspection* (DPI). These measures are executed in network-internal nodes, above the network layer. TM type 3 functions run in special purpose network nodes (i.e. they execute functionality beyond ordinary router functions), such as firewalls and gateways. These nodes are inspecting packet content beyond the IP header. How much information the nodes are inspecting depends on how 'deep' the inspection is. In some cases, all content in the

packets is inspected. (However, content that is effectively encrypted cannot be inspected; see question 10.)

Question 10

a. Are there any privacy risks arising from the use of DPI for traffic management purposes, and, if so, what are the implications for transparency and consumer protection?

b. Are there alternative techniques for traffic management that do not involve deep packet inspection? Please provide examples and explain your response. Please compare those alternative techniques with deep packet inspection, in particular in terms of their effectiveness, potential impact on privacy and costs for operators.

Sub-question (a) is out of the scope of BEREC, and this answer is related to (b) only.

Whether alternative TM techniques could be used instead of DPI depends on the goal that one wants to achieve. If the purpose is congestion management, application-agnostic measures could be used instead. This is described and compared with DPI in the answer to question 4 above.

If the purpose is, for example, to block content based on legal justification or protect network security and integrity, few alternatives to different kinds of traffic filtering such as DPI exist. There are some simple measures available that are based on inspection of destination and source address if blocking of *all* traffic towards specific destinations is deemed appropriate.

If some traffic is encrypted, DPI will not work for these packets.

Question 11

Where the user's consent is required for traffic management measures, particularly where such measures might entail access to and analysis of certain personal data by ISPs, please explain how (e.g. in which format) this consent should be sought by the ISP, what prior information needs to be provided by the ISP to the user, and how the user consent should be given, in order to optimise user awareness and user convenience.

Question out of scope for BEREC.

2. Transparency and switching (consumer choice)

2.1. Transparency and general characteristics of the Internet access offer

Question 12

In order to allow consumers to make informed choices, on the basis of clear, meaningful, and comparable information, which elements should be communicated to consumers?

Elements related to traffic management practices:

a) Contractual restrictions (blocking, throttling, other restrictions on application use)

important less important

Please provide reasons for your answer: 7

b) Traffic management policy applied to prioritise certain traffic in specific circumstances

important less important

Please provide reasons for your answer:

c) Whether and to what extent managed services may affect the quality of the best effort Internet (e.g. the possibility of the Internet connection being affected when watching IP-TV or when using other managed services)

important less important

measuring technically feasible (fixed) measuring technically feasible (mobile)

currently measured (fixed) currently measured (mobile)

Please provide reasons for your answer:

d) Other restrictions, please specify:

e) Data allowances (caps), download limits

important less important

Please provide reasons for your answer:

f) What these data allowances enable customers to do in practice (download x hours of video; upload y photos etc.)

important less important

Please provide reasons for your answer:

Elements related to speed and quality:

a) Average speed, typical speed ranges and speed at peak times (upload and download)

important less important

measuring technically feasible (fixed) measuring technically feasible (mobile)

currently measured (fixed) currently measured (mobile)

Please provide reasons for your answer:

b) Respect of guaranteed minimum speed (if applicable)

important less important

measuring technically feasible (fixed) measuring technically feasible (mobile)

currently measured (fixed) currently measured (mobile)

Please provide reasons for your answer:

c) What these speeds allow customers to do in practice (video-streaming, audio-download, video-conferences etc.)

important less important

Please provide reasons for your answer:

d) Latency/network responsiveness (a measure of traffic delay) and which services would be affected thereby (e.g. certain applications such as IP-TV or videoconferencing would be more seriously impacted by higher traffic delays in the network of the provider)

important less important 8

measuring technically feasible (fixed) measuring technically feasible (mobile)

currently measured (fixed) currently measured (mobile)

Please provide reasons for your answer:

e) Jitter (a measure of the variability over time of latency) and which services would be affected thereby (e.g. echoing in VoIP calls)

important less important

measuring technically feasible (fixed) measuring technically feasible (mobile)

currently measured (fixed) currently measured (mobile)

Please provide reasons for your answer:

f) Packet loss rate (share of packets lost in the network) and which services would be affected thereby (e.g. VoIP)

important less important

measuring technically feasible (fixed) measuring technically feasible (mobile)

currently measured (fixed) currently measured (mobile)

Please provide reasons for your answer:

g) Reliability of the service (network accessibility and retainability), i.e. measure for successful start and completion of data sessions

important less important

measuring technically feasible (fixed) measuring technically feasible (mobile)

currently measured (fixed) currently measured (mobile)

Please provide reasons for your answer:

h) Quality parameters for (mobile) voice telephony (call setup success rate, dropped calls, speech quality, other)

important less important

measuring technically feasible (fixed) measuring technically feasible (mobile)

currently measured (fixed) currently measured (mobile)

Please provide reasons for your answer:

i) Other, please specify

General considerations on Transparency key aspects
(This section covers all sub-points in question 12.)

The following findings are derived from the *Guidelines on Transparency in the Scope of Net Neutrality*, published by BEREC in December 2011.

The goal of a transparency policy is to achieve a situation in which end users of all categories are able to make well-informed choices. Transparency related to net neutrality means transparency about the technical and economic conditions of the provision of IASs; in particular, transparency about how Internet access operators deal with TM measures.

A fully effective transparency policy (which can be composed of various approaches and measures) should aim at satisfying all of the following characteristics:

- accessibility;
- understandability;
- meaningfulness;
- comparability;
- accuracy.

There is more than one way to reach the goal of transparency. An effective transparency policy does not necessarily mean that every transmission of information from an ISP or a third party to the end user must fully meet all of these characteristics, but BEREC states that the overall combination of measures should. For instance, if operators include very detailed and technical data in their contractual documents, these may be very accurate but not very understandable. In such a case, it would be necessary to put some effort into complementary transparency measures (implemented by the same operator or other parties), in order to improve understanding of the offers.

To do so, information must be delivered to the right user, in good time and by the relevant party.

Different types of end users and usages

Transparency about the services' features is a key condition for ensuring that all end users gain an understanding of the quality of experience they will get from Internet-related services.

However, the quality of experience is likely to depend on a variety of aspects, some of them rather complex, such as reliability rate, minimal latency, jitter, user expectation and context. Given the diversity of end users, it is likely that many of them would not be able to easily understand the different factors that determine their quality of experience.

In any case, end users do not have the same needs, so key characteristics of Internet offers vary from one type of end user – such as gamers, for whom latency is critical to their experience – to others, such as mobile surfers or application providers (at the retail level).

Three different stages in the commercial relationship between end users and operators: before signing the contract, at the point of sale and after signing the contract

Informed choices are necessary at different stages in the commercial relationship between end users and ISPs; for instance, when initially purchasing a service from an operator and when considering whether to switch to another operator. Transparency policy should cover the whole sales cycle, from potential clients to existing customers.

Two approaches to producing understandable information for end users: direct and indirect approaches

A key element of a transparency policy is to produce information for end users that is understandable. BEREC considers that there is no one-size-fits-all solution for achieving this. The definition, in accordance with the Directives, of the blend of measures that best

suits each market will depend in particular on the situation (existence, awareness, credibility etc.) of third parties. Indeed, a policy mix can be based on two complementary types of approaches: direct and indirect, according to whether the information is transmitted to end users directly by the provider or indirectly via third parties.

Regarding the contents of the transparency policy, BEREC has stated the importance of giving information on three different aspects of the service: its scope and characteristics, its general limitations, and its specific restrictions. Hereafter are illustrated transparency issues in relation to the various items mentioned in question 12.

Elements related to speed

There is a wide array of potential users of information about offers and services. Transparency measures could, therefore, be organised depending on the target of the information, i.e. whether the information is aimed at a general audience or at specific targets such as experts, users of certain applications, or third parties and institutions. The main differences between these various targets rest on their respective will and ability to access, understand and process (e.g. to compare) the information. In this respect, the information provided to a general audience is likely to require a certain amount of conditioning from the information provider, whereas experts may find raw information more efficient. How frequently the information should be transmitted may also be a variable parameter.

However, some categories of users may prefer to rely on first-hand data. This is the case for some expert users (or others with specific requirements), but most importantly for third-party intermediaries, including NRAs. The latter may need to collect some technical data on a regular basis, for instance in order to compile nationwide statistics, or to produce a range of indicators on the quality of services (to be published or not). Other third parties (or at least a selected number of them) may also want to have access to technical values, for example to propose individualised online tests to end users, determining the type of package most suited to their needs (e.g. a certain number of hours of online gaming, streaming, web surfing etc.). Detailed data can also be very useful for the stakeholders that offer real-time monitoring tools, in order to improve their models.

These tools provide an opportunity to compare technical performance between providers through an independent body. However, where the results are based on information volunteered by large groups of users, it may not be possible to take into account geographical or other factors that can affect performance; access to some operators' data can help improve the tools.

- **Average speed, typical speed ranges and speed at peak times (upload and download)**

Speed information refers to the main elements that operators highlight to describe the type of offer a prospective customer is about to purchase. However, some mobile operators do not market their speeds for Internet access on phones (except for mobile broadband by dongle, which can be advertised by speed), so this issue arises more often in debates on the information regarding the quality of the service offered through fixed connectivity (or the smaller market for mobile broadband by dongle).

A specificity of mobile networks that may be more relevant to consider in relation to transparency is the mobility of the users, and the resulting difficulty of providing exact information on the available bandwidth at a specific place in the network and at a particular point in time. This is rendered even more difficult by the uncertainty regarding the number of users and the activity of other users in the same cell.

In technical terms, the advertised speed is characterised by the fixed bandwidth of the access line provided by the ISP. The advertised speed usually covers download speeds. Customers may also need to be informed about upload speeds. In practice, information on upload speeds may be less obvious (e.g. hidden in contract clauses) than information on download speeds.

Applying such a concept of typical (or average) speed probably requires further refinement enabling the end user to understand how an operator defines typical or average speed[1] and/or the contention ratio. Furthermore, it should be specified whether the transparency information relates, for example, to peak hours or the average speed delivered over a 24-hour period.

- **Respect of guaranteed minimum speed (if applicable)**

When providing transparency on minimum QoS (such as speed), end users may also need to be informed about whether this minimum QoS applies in general or different degrees of QoS are provided for certain services/applications. QoS may also vary according to location or the time of the day, for example, or even parameters to be adjusted by the user. Although this type of data may be important for third parties to build relevant comparisons, its importance is more questionable in the case of direct transparency.

Indeed, given that highly technical information on QoS parameters may be of limited value for the average customer (and even difficult to understand), it may be more desirable to inform customers about the implications for the service experience they may typically expect when subscribing to a package with specific QoS characteristics.

On the other hand, this type of data seems key to supporting indirect transparency, either for comparability between ISPs or for the elaboration of average statistics.

Of course, overall QoS (end-to-end) when using a service/application over the Internet is affected by factors outside the scope and control of an ISP. BEREC acknowledges that other factors (e.g. the communication quality provided by networks interconnected with the ISP, or the end user's equipment) impact on the end user's overall experience as well. In BEREC's view, referring to such external factors must not serve as an excuse for not providing the user with transparent information on minimum QoS of the Internet access service offered or other service quality parameters. It does seem desirable, though, to raise the users' awareness that other factors outside the scope and control of the IAS provider are also relevant when assessing the QoS of services/applications.

- **What these speeds allow customers to do in practice (video streaming, audio download, video-conferences etc.)**

As mentioned before, the criterion of understandability is predominant in the information of end users, so practical information aiming at making technical information comprehensible is particularly relevant. The kind of information mentioned in the question appears helpful in this respect.

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[1] BEREC is also considering providing a definition for these terms, in order to assure that they are used in a consistent manner by all the ISPs. This would improve comparability between offers from different providers.

In any case, the need to provide simple, understandable information to the end user should not serve as an excuse for operators not to provide more specific and detailed information. BEREC recognises the challenge of striking the right balance between simplicity and complexity.

Elements related to data allowances (caps) and download limits

Customers should be aware of the 'size' of such a cap (in quantitative terms) and the consequences of exceeding it (additional charges, speed restrictions etc.). Transparency on data caps and download limits is relevant to Article 20(1)(b) 2nd indent. These limitations depend on the usage of the customer, and can have an impact, for example on the bill. Therefore, information on these conditions should be clearly stated and accompanied with the means for evaluating the usage and measuring it over a relevant billing period.

Information about the first aspect – evaluation based on consumption profiles – is important to help end users choose or switch their operator. In order to enable the customer to make informed choices, it is indeed important that they can assess which Internet access package best suits their specific needs.

The second aspect enables users to track whether or not they have reached a contractually fixed data cap. In this regard, tools for measuring the individual data consumption enable the customer not to unintentionally exceed data caps and therefore to avoid charges that may otherwise apply. A 'lighter' approach could involve email or SMS notification when users approach or exceed a use limit. This may be combined with information on the precise consequences of doing so, such as additional costs or speed restrictions imposed. This type of information is also useful for end users to adapt their behaviour (and can, hence, contribute to a more efficient use of networks) and/or switch to a different service.

Informing on what these data allowances enable customers to do in practice (download *x* hours of video; upload *y* photos etc.) is referred to in sub-question c above.

Elements related to other QoS parameters

This section covers parameters referred to in items e (jitter), f (packet loss rate), g (reliability), h (voice telephony) and i (other).

The quality of experience is likely to depend on a variety of aspects, some of them rather complex, such as reliability rate, minimal latency, jitter, user expectation and context. Given the diversity of end users, it is likely that many of them would not be able to easily understand the different factors that determine their quality of experience. Recent studies on customers' awareness regarding QoS notions confirm a low level of comprehension.

Besides, end users do not have the same needs, so key characteristics of Internet offers vary from one type of end user – such as gamers, for whom latency is critical to their experience – to others, such as mobile surfers or application providers (at the retail level).

The diversity of end users – in terms of both their usages and their ability to identify the key elements to satisfy their needs – makes the definition of a transparency policy more challenging than transparency for areas such as traditional voice services (PSTN). It might be difficult for operators to identify a single set of information that is appropriate for all types of end users. If the operator does so, it risks providing too much for some end users and/or too little for others. There is also a need to avoid excessive complexity.

Here, an 'indirect approach' to transparency can play an important complementary role to the information directly transmitted by operators to end users, as specialised third parties could present information adapted to the needs of their target audience.

There is a case for requesting ISPs to provide, on the one hand, information to the general audience, which should first aim at understandability, employing widely used concepts. On the other hand, they could be asked to make a larger array of technical data accessible, maybe to a selected list of stakeholders. Obligations may include the level of detail to provide and the frequency. This represents an extra burden for operators, notably in terms of processes and confidentiality. However, at the same time, this can enable third parties to produce comparison and monitoring tools. However, these are potentially expensive to implement, as they require special software and/or hardware, with potentially only a few customers appreciating and using this functionality. In the end, there is probably no straightforward answer in terms of proportionality.

The above elements also illustrate the response to question 16.

Elements related to traffic management

BEREC has stated the utmost importance, in the scope of the net neutrality debate, of transparency regarding items referred to in a, b (prioritisation), c (impact of managed services on best effort Internet) and d (other restrictions).

As far as transparency measures are concerned, these are the items for which greater improvements must be achieved in order to ensure that users can make informed choices with respect to net neutrality. The inquiries performed by BEREC in 2012 have shown that, in most cases, information provided by ISPs on TM and related restrictions lacks clarity, whereas conditions set out in the contracts or in advertising material cannot be easily compared across the offers.

In particular, users should be able to easily identify which unrestricted offers are available to them, whereas restricted offers should be accompanied with accurate information regarding limitations of usability. 'Accuracy' here implies that the restrictions should not be described in terms that are too vague (e.g. targeting a whole protocol suite instead of the actual applications restricted). Indeed, there must be a room to incorporate evolutions in the TM policy and to implement the related contractual conditions (information, ability to terminate etc.).

In order to make offerings more meaningful and comparable, BEREC finds that it is particularly important to develop common frames of reference about IASs and reach agreement on which practices can be considered as standard network operation and which, on the other hand, should be emphasised in the operators' communication (based on a tiered approach). Common terminology can help make information more comparable and easier to understand; third parties and end users should be closely associated with initiatives aimed at developing understandability. For instance, regarding access speed: average download and upload values should be specified, not only maximum speed.

Such common references and methods to present information appear particularly important at the national level, where the users will factor them into buying choices. Nevertheless, comparability at European level, together with similar framework of references, also bears value for regulators and the markets, and should therefore be enhanced in the longer term.

The utilisation of such information is detailed in other sections of this response (see parts on TM, QoS requirements etc.).

Question 13

Some ISPs currently apply 'fair use policies', which give them wide discretion to apply restrictions on traffic generated by users whose usage they consider excessive. Do you consider that, in case of contractual restrictions of data consumption, quantified data allowances (e.g. monthly caps of x MB or GB) are more transparent for consumers than discretionary fair use clauses?

Yes No

Please provide reasons for your answer.

Yes. ISPs may apply fair use policies in order prevent users from using their Internet access 'excessively'. BEREC has already recommended, in its response to the European Commission's consultation on the open Internet and net neutrality in Europe, that transparency should be based on clearly specified parameters and not on vague 'fair use' terms. If such a fair use policy is applied, the customer should be given precise information about what the operator considers fair use and the criteria it applies to determine a breach of this policy.

In addition, comprehensive transparency requires operators to provide clear information on the action they would take should the customers breach a fair use policy. For example, the operator might apply additional charges or speed restrictions. Transparency on fair use policies may be linked to Article 20(1)(b) 2nd indent.

Question 14

a) When should the elements of information referred to in question 12 be provided to the consumer by the ISP?

b) Which format (e.g. contract, general terms and conditions, separate and specific information, other (please specify)) do you consider appropriate to communicate this information to consumers?

Regarding the methods and tools required for providing information in a transparent way, BEREC states that probably no single method will be sufficient. A combination of complementary measures at different points of the relationship between the customer and the ISP may be necessary to achieve transparency successfully. BEREC recommends the use of different methods that can be used to present information in order to maximise transparency: a tiered approach; real-time information tools; and providing different levels of information to different types of user and at different times of the sales cycle.

The existence of common parameters and indicators is helpful in making the means of transmitting information more effective. NRAs could stipulate which QoS indicators must be provided by ISP, for example on their websites, at points of sale and in the contracts concluded with end users. Alternatively NRAs could encourage the industry to develop its own common approach. Finally, because Internet services and technologies are fast moving and constantly evolving, BEREC sees great importance in regular monitoring to keep information as effective, updated and accurate as possible and thus sustain transparency.

At the point of signing a contract, customer will need information about the service they will be able to receive (e.g. according to their geographic location or line conditions) as well as the most significant contractual conditions that will apply to a certain combination of options in a package. For example, it is very important that the information on QoS included in contracts relates to the most relevant QoS parameters. In order to ensure this, since the most recent amendment of the Universal Service Directive, NRAs may define, where

appropriate, the QoS parameters to be included in the contracts (Article 20(1)(b) of the Directive 2009/136/EC of the European Parliament and of the Council, amending Directive 2002/22/EC on universal service and users' rights relating to EC networks and services). This inclusion in the contracts will be very important in order to allow the end user to make an informed choice and also, in the future, in order to safeguard his or her own rights as a customer.

Once customers have acquired a service, they should be given post-sale information by their ISP, such as changes to TM policies or information about their usage or reaching bandwidth caps, which may, in time, include real-time information. They may also be willing to use third-party tools to check the performance of their service.

Question 15

What would be the (additional) costs for ISPs to (i) collect the various data mentioned in the table in question 12 (e.g. measuring of average speed, jitter, delay etc.) and (ii) communicate the information to their customers. Please provide an estimate of the above costs for your own company or an ISP of your choice explaining your assumptions and methodology, and details about the technical tools used to collect the various data. If possible, please provide a breakdown of the costs.

N/A

Question 16

a) In order to promote transparency and consumer choice, do you consider it necessary that comparable data on the Internet access provided by ISPs is collected and published by NRAs or another independent organisation? Do you think this information should be broken down by geographic areas or different data plans?

b) What are the advantages and corresponding costs of this data collection and publication being undertaken by NRAs or by another type of organisation (please specify which one). Please provide an estimate at EU level or for an EU Member State of your choice.

a) Necessity of collection and publishing of comparable data on Internet access by NRAs/organisations

BEREC stated in its guidelines the potential interest in having third parties (reliable to a certain extent) process and distribute information to end users. The following aspects particularly justify relevant initiatives by NRAs, or other independent organisations, in terms of transparency:

- the variety of usages and interests on the end-user side (see above in question 12);
- the large array of useful forms of information for end users, from general to individual/specific cases.

The latter aspect deserves some further description.

There are different sorts of information that can be included in transparency measures. The individual items were listed in question 12, but another way of categorising them refers to their level of specificity to a particular type of situation.

Some information is of a very general, sometimes 'statistical', nature. A typical example would be a publication from an NRA of some average data regarding a market at the level of a region or an entire country. Such information could be supported by quality tests provided by NRAs. This does not refer to specific direct obligations from the new framework. However, if the end user can be provided with general information about the market as a whole, for instance on the average level of service offered by all providers in his or her area, this can probably help him or her to make an informed choice.

BEREC has observed that, in many cases, information proposed by third parties (typically comparison websites) is still frequently based on a limited set of information (price/speed). There is a clear interest in enabling these mechanisms, which can play a significant role in some markets, to include aspects such as restrictions or differentiated treatment of traffic. Empowerment of users of third parties is a recognised objective for BEREC.

BEREC has no particular view on whether this information should be broken down by geographic areas or different data plans. However, it is considered useful that comparison tools have the possibility to filter and provide to end users information on the main characteristics of the offers existent at a certain location.

BEREC has no particular view on part b of the question.

Question 17

a) Do you consider it necessary to regulate the labelling as 'Internet access' of subscriptions that restrict access to some Internet services, content or applications?

Yes No

Please reason your answer.

b) If yes, which restrictions would be acceptable before a subscription could no longer be marketed, without qualification, as an 'Internet access' product? 10

c) What would be the consequences (including the cost) for ISPs if they were not allowed to market as 'Internet access' an offer with certain restrictions, or if such marketing was subject to mandatory qualification? Please provide quantification for your own company or an ISP of your choice explaining your assumptions and methodology.

a) Labelling

One major challenge to transparency can be where providers use different terminologies for their respective offers, or use the same terms but with different meanings. As a result, the end user may misunderstand certain terms or may not be aware of subtle differences in terminology. For example, when marketing their offer, providers often use terms such as 'data access', 'Internet', 'surf' or 'web' to describe their offers. A typical end user may not be aware that a term such as data access or data flat rate can be used by a provider to indicate that the product does not include the use of VoIP.

Therefore, in order to ensure that the offers are meaningful and comparable, it is important that there be some form of common understanding among customers, at least for the most commonly used concepts. This is particularly relevant because end users will often base their product decision on marketing information without studying (or even understanding) the

details of the general terms and conditions[2]. Defining Internet access service as a reference point may help to raise end users' awareness that offers labelled differently may encompass certain limitations or restrictions.

More generally, a more common terminology (e.g. defining speed, caps or limitations of the offer[3]) would have benefits from an end user's perspective. However, the understanding of certain terms may vary in different countries, according to habits and uses, and there are various ways to ensure a common understanding (stakeholders' common statements, NRAs' guidelines on their websites; see Chapter IV of BEREC guidelines for more details).

Among the terms, those related to consumption (e.g. 'unlimited' or '24/24') may also need some form of convergence, at least tacitly; see also above (on caps etc.) regarding this aspect.

b) Acceptable restrictions

See section on TM.

c) Consequences

BEREC has no particular view on this.

2.2 Switching

The following answers are based on the BEREC report on *Best Practices to Facilitate Consumer Switching*, published in October 2010.

Question 18

a) Please explain what barriers to switching ISPs still exist (if any) and how they can be overcome. Please mention in your reply all direct and indirect factors dissuading consumers from switching (e.g. obstacles linked to the terminal equipment, burden of proof regarding a possible breach of contract, etc.)

b) How should an ISP inform consumers of changes to their packages?

c) What actions by an ISP would constitute a breach of contract or modifications to the contractual conditions which would enable a consumer to be released from a contract?

d) Should customers be able to easily opt out from certain contractual restrictions (up to a completely unrestricted offer) by the same operator?

Yes No

Please explain your response.

If yes, how could this be facilitated?

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2 It seems evident that a consistent and unambiguous use of terminology is also crucial for these contractual terms, particularly given their relevance in the case of legal disputes.

3 Concerning terminology issues with regard to limitations (TM) see BEREC Guidelines on QoS.

e) Do you think that a customer should be allowed to switch to another operator within a reduced contract termination period in case his/her current operator does not at all offer an unrestricted Internet access product or does not allow switching to such unrestricted offer?

Yes No

Please provide reasons for your response.

a) Barriers to switching

Many elements can be identified as direct or indirect factors dissuading consumers from switching. They are listed hereunder and appear to still be generally relevant in 2012.

Lack of consumer information:

Concerns may be expressed on a lack of clarity in pricing structure and lack of adequate price comparison information or the homogeneity of services offered. This may lead to consumers' underestimating the benefits of switching and lead to behavioural biases that may prevent consumers from actively participating in the market and taking decisions to switch. Other concerns may involve how well consumers are informed of the switching process and the implications of switching.

Contractual obstacles:

Some contractual dispositions may have the effect of discouraging switching, or creating disputes between the consumers and the provider that they are leaving due to the consumer's intention to switch.

Concerns expressed in relation to contractual obstacles may involve restrictive terms and conditions and, in particular, financial penalties for leaving during a minimum contract period. In addition to the existence of fixed contractual term periods, additional concern may raise where contracts containing such terms are connected with subsidised equipment, as this may create additional contractual obstacles. Finally, contractual terms providing for the automatic renewal of minimum contract periods (also known as rollover contracts) can also be highlighted as a concern.

Pricing strategies of operators on the retail market:

A key concern raised by NRAs here, in particular, was in relation to the variance in on-net and off-net tariffs, such as where service providers offered free or very low on-net tariffs but much higher prices for off-net tariffs. Other concerns raised include inter-operator charges, such as for porting, or termination rates, all of which may result in higher charges being passed on to consumers. Finally, constraints related to specific tariff plans offered in relation to the purchase of some terminals may also be listed in this category.

Difficulties of the switching process:

First, concerns may be in relation to the length of the overall switching process, from the moment of the consumer's agreement to enter into service with the new service provider and the new service becoming active, which could be an important factor for consumers in weighing up the benefits of switching to a different service provider.

Then, concerns may involve porting processes, on the basis that, if porting resulted in a high level of cost and difficulties, this could have the effect of discouraging porting and/or switching.

Finally, deficiencies in the switching process, such as back-office process difficulties, incompatibilities or lack of processes for closing down existing accounts, may lead to a poor consumer experience too.

Retention activity from the losing provider:

A barrier to switching could emerge from a retention activity by the provider losing the consumer. This operator could try to block the switching process by deliberately failing to provide authorisation codes to other suppliers, or failing to act appropriately, failing to share relevant data with the gaining provider, or discouraging consumers from switching through the threat of penalties, sanctions and debt recovery action.

Another concern linked to the losing provider's involvement in the switching process is that of active retention activity whereby the existing service provider attempts to retain or win back the customer before, during or after the switching process, the ultimate aim being to prevent the customer from transferring to a rival.

Technical issues:

This may include billing problems that arise as a result of the switching process itself or difficulties in getting the necessary technical assistance when changing service provider, switching between platforms and potential loss of service.

Moreover, an important technical issue may be interoperability, according to the fact that a consumer may want to keep using his usual terminal, even if he switches to a different technology, or may want to still have access to the content he bought and saved on his old box, mobile phone, or on the cloud service supplied by his old operator.

Bundles:

The use of bundled services may make the switching process more complex if operators do not allow consumers to opt out from one of the bundled services without abandoning the other ones. Bundled offers are increasingly popular in Europe, including sometimes both fixed and mobile services.

The previous list tries to give an exhaustive view of possible obstacles to switching, but the evaluation of the importance of each one of this factor may differ, for instance according to the specific legislative framework of each European country, or the usages and customers' habits in a given market.

Conclusion

The BEREC 2010 Report proposes an exhaustive description of barriers to switching in broadband retail markets. Nevertheless, to answer this question with a more comprehensive and up-to-date view, some additional work would be needed at the European level:

- first, in order to update the findings gathered in this report;
- second, to develop a more focused analysis on aspects related to net neutrality. This should encompass in particular users' awareness of quality characteristics and specific limitations of their offers, and their capacity and willingness to act upon them, also depending on the variety of relations with (and between) their ISP and their content providers.

In this respect, the investigations performed by BEREC in 2012 suggest that transparency as regards elements related to net neutrality (e.g. TM) is not efficient enough for users to

factor such aspects in their choices. Besides, except in the countries where the existing provisions of the regulatory framework are not fully implemented yet, it may not be straightforward for switching processes and experiences to be improved with the existing set of powers of NRAs. BEREC draft work programme for 2013, however, includes a project to further investigate these aspects. This would help define which are the most critical factors today, and how they should be improved in order to promote the switching process.

b) Views on ISPs' approach to informing consumers of changes to packages

In accordance with the provisions in the revised Universal Service Directive, it has to be considered that, when an ISP changes the conditions of a package[4], it has to inform its consumers in advance, in writing, and give an opportunity to switch to consumers who are not satisfied by these changes.

If the changes in the package concern traffic restrictions, it is important that the operator give practical examples of what will change for the consumer. Typically, the information should state not only which kind of traffic (e.g. a type of protocol) will be impacted, but what are the associated applications and the concrete impact for the users (e.g. downloading time for pictures reduced by half at peak hours).

c) Actions by an ISP enabling a consumer to be released from a contract

Any substantial modification to the items listed in Article 20 USD, which constitute the description of the contract, should enable customers to switch without penalties.

These items are described in more details in the Transparency section (see in particular question 12).

d) Views on the ability of customers to opt out easily from certain contractual restrictions

Customers should be able to switch easily between different offers, whether they want to keep the same operator or to change it. In this respect, an 'easy opt out' should be granted whenever the conditions initially agreed in the contract undergo a substantial change.

However, in the absence of evolution in the contractual conditions, there is no particular justification for operators to apply such an 'easy opt out' from restricted to unrestricted offers. It does not seem proportionate to grant this ability just because the customer wants to opt out from certain contractual restrictions and upgrade to a completely unrestricted offer, remaining with the same operator. Moreover, such an obligation would be difficult to implement in practice.

e) Views on switching within a reduced contract termination on condition no unrestricted Internet access product is offered

The same logic applies as in response to d: the relevant trigger, according to the telecom framework, lies in the occurrence of a modification of contractual conditions.

[4] Some national transpositions allow a consumer to switch to another provider without penalty only when the changes are of material detriment to the consumer.

Question 19

While there may be valid (technical) reasons why consumers do not always get the advertised service speed or quality, should there be a limit on the discrepancy between advertised and actual service parameters (e.g. speed)?

Yes No

Please explain your response. If you consider that there should be a limit on the discrepancy, how should this limit be defined?

In this respect, BEREC has recommended that, instead of advertising the maximum speed, operators should provide, on the one hand, more detailed information on the average performance which can be expected in the main environment settings, and, on the other hand, pre-purchase online tools, so that the users can check what range of performance they may expect given their own situation (see also BEREC *Guidelines on Transparency* and *Framework Report for Quality of Service*).

Some of the factors that create differences between maximum speed (which is sometimes used as advertised speed) and actual speed, cannot be controlled by operators. So a difference between maximum and actual speed can indeed be considered as normal. It must also be acknowledged that exceptional local circumstances may result in an actual performance that is out of 'normal range' for the given parameter.

Question 20

Pursuant to Article 30(6) of the Universal Service Directive conditions and procedures for contract termination shall not act as a disincentive against changing service providers. How could changing of operators be facilitated? Please provide examples and explain your response.

See response to question 21.

Question 21

How could the transparency of bundles (packages including telephony, Internet, TV) be improved for consumers and how could switching be facilitated in the presence of bundles?

Question 20 and 21

Switching could be facilitated by improving the factors listed in question 18; for example reducing contractual engagements, promoting a switching process led by the gaining operator, accelerating the portability process etc. These improvements concern both single and bundled services.

Bundled services present additional difficulties. One of them arises because consumers may wish to opt out from one service without opting out from the other ones; for example, opting out from mobile services but not from fixed services. This means that clear information on the related process (switching possibilities) should be supplied in order to allow this.

Nevertheless, as remarked at question 18, in order to get a better understanding on how switching process could be facilitated in the context of net neutrality, some additional work may be needed at a European level. It should focus in particular on the ability of users to access the content and applications of their choice, and how this can be taken into account

by customers, notably considering the great number of applications which are accessed through broadband offers.

Question 22

a) How important would be the benefits for end-users of improved transparency and facilitated switching?

very important slightly important not important

Please explain your response.

b) What would be the expected benefits in terms of innovation by new businesses (content or applications) as a consequence of improved consumer choice and increased competition between ISPs?

a) Importance of improved transparency and facilitated switching

Transparency and facilitated switching are essential to allow effective competition, benefiting consumers. In the case of the emergence of new competitive offers, which comprise lower prices, better quality and new services, they will not have any effect on consumer welfare if consumers cannot have access to them. Transparency and facilitated switching are the necessary conditions to help consumers have access to new or better offers:

- Transparency allows consumers to be aware of the choices available to them, of the features, capabilities, prices, advantages and disadvantages of new services and technologies (so that they are able to properly assess the potential benefits) and also of the existence and ways of using some functionalities (e.g. number portability) that strengthen their ability to switch. Thus, they are empowered with the information necessary to engage effectively with the competitive process.

- Facilitated switching allows them to select a better offer and to switch between operators without undue effort and costs. The switching process should also give consumers the ability to switch again if necessary, in order to give them sufficient confidence to take the risk of trying a new offer.

The combination of transparency and switching also has an incentive effect on the providers, which are deemed to take into account the better conditions offered in the market and align their own products accordingly.

In the scope of net neutrality, policy makers must promote the ability of end users to access all content, applications and services of their choice (new regulatory objective in the revised Framework Directive). The above discussion shows that improved transparency and switching contribute to this objective, by enabling customers to find and select the ISP product that would best satisfy their choice of content, and also by incentivising operators in the market to provide unrestricted access to a great variety of contents.

However, at the same time, various instances can be envisaged by BEREC in which transparency and switching facilities may not be sufficient. First, effective competition may not be fully implemented in the market. Second, market forces may not properly function because, despite the ability to switch, users are not sufficiently aware of conditions related to net neutrality, and hence are not able to base their switching decisions thereupon. Finally, even if there is competition, there still remains a possibility that the levels of QoS offered by the market are considered insufficient.

b) Expected benefits in terms of innovation by new businesses

Increased competition and improved consumer choice lead to innovation at all stages of the ecosystem: in the network, and also 'at the edge', since CAPs are given a maximal chance to have their product accessible in the markets. In order to gain market share, operators will indeed have to offer access to a multiplicity of services.

(See also question on 'new business models' for more details.)

Question 23

Would the facilitation of switching for consumers trigger any (administrative) costs for ISPs?

Yes No

If so, please quantify them.

BEREC has no particular view on this.

3. IP interconnection issues

Interconnection arrangements between networks take the form of transit and peering agreements. They have traditionally been based on the 'best effort' principle. Disruptions of interconnection or deterioration of interconnection service quality at the wholesale level could lead to a situation in which end users and content providers cannot reach all destinations on the Internet. IP interconnection is, therefore, relevant for this consultation.

Question 24

a) In your view, are there any problems regarding IP interconnection arrangements (between network operators, ISPs, transit providers and/or content providers) that could have an impact on the quality of the best effort Internet?

Yes No

Please explain your response.

b) Are there any specific issues related to the vertical integration of ISPs and transit providers?

Yes No

Please explain your response.

a) Problems regarding IP interconnection arrangements

BEREC noted in its response to the Commission that interconnection arrangements between networks are not directly related to net neutrality as long as all traffic flows are treated equally. A violation of the net neutrality principle is, therefore, considered unlikely if all traffic is treated in a best effort manner. The best effort principle is reflected in today's interconnection agreements across IP networks.

Interconnection on the Internet has operated on the basis of transit/peering arrangements at the higher level and a 'bill & keep' approach whereby the terminating access network operator does not receive payments at the wholesale level for terminating the traffic, but recovers its costs at the retail level from the end user.

Nowadays, QoS differentiation potentially leading to deviations from net neutrality typically occurs only within the ISP's network providing connectivity to the user and, therefore, is not reflected in interconnection agreements across networks at the network layer. Over the Internet, a guaranteed end-to-end QoS across network boundaries does not appear to be realistic in the near future.

However, a disruption of interconnection at the wholesale level could still occur in a best effort world, leading to a situation in which end users cannot reach all destinations on the Internet and, thereby, potentially impacting net neutrality. The evolution of charging practices, notably if Internet access providers connecting end users set abusive charges for interconnection out of a monopoly position, would also need to be addressed.

So far, interconnection has worked efficiently. Disputes have been few and have to date been solved in a relatively short time without regulatory intervention – also thanks to competitive pressure of end users at the retail level.

The current Regulatory Framework foresees that NRAs can impose an obligation to interconnect on a non-discriminatory basis (Article 5 AD). However, it does not necessarily provide a legal basis for mandating free peering.

Overall, NRAs need to better understand these markets. Depending on Member States' respective situations, NRAs may take different approaches: some countries may consider data-gathering exercises useful whereas most others do not consider them appropriate unless concrete problems or requests occur. Considering that the market has developed very well so far without any significant regulatory intervention, any measure could potentially be harmful, so that it should be carefully considered.

b) Specific issues related to the vertical integration of ISPs and transit providers

Generally, different players along the value chain may vertically integrate; e.g. eyeball ISPs, CAPs or content delivery networks (CDNs) may invest in network infrastructures. On the other hand, network operators may also vertically integrate into the other functions.

BEREC holds that if eyeball ISPs gain tier 1 status this may increase their market power. However, this depends (inter alia) on whether it is possible in practice (e.g.) to buy transit services from another tier 1 ISP that peers with the tier 1 eyeball ISP.

Nowadays, more Internet traffic is conveyed without moving across tier 1 backbones contributing to a decreasing role of global backbones. This is for a number of reasons:

- More traffic than in the past is routed using peering rather than transit agreements.
- The practice of donut peering, whereby ISPs directly exchange traffic regionally, also contributes to the bypassing of tier 1 backbones.
- New players have emerged that either did not exist or were less relevant in the past (e.g. CDNs).
- A larger portion of traffic is directly exchanged between large CAPs, CDNs or sometimes even users.
- Using transit may (*ceteris paribus*) imply higher latency than peering. This characteristic of transit implies a relative competitive disadvantage for the transit model if – as can be observed today – more traffic is quality sensitive.
- If larger CAPs (e.g. Google) increasingly invest in their own network infrastructure and deploy their own national or even international backbone, this would also put further pressure on the backbone providers.

Generally, there is a certain consolidation process among backbone providers (as well as among CDNs) (see BoR (12) 33, Ch. 4.4.2 providing some examples). It is not yet clear whether this consolidation process of backbone providers (as well as CDNs) may stop the relative decrease of backbones.

Question 25

Direct peering, Content Delivery Networks (CDN) or Quality of Service Interconnection (between ISPs and content providers) are being developed to propose an enhanced quality of service for content providers and end users.

a) What role can they play in reducing the risk of network congestion?

b) What opportunities and threats do they constitute for:

(i) ISPs,

(ii) content providers,

(iii) transit providers and

(iv) end users?

c) Are there any barriers of a regulatory, technical or business nature that prevent market players other than ISPs from playing a more important role in reducing the risk of network congestion?

Yes No

Please explain and describe possible solutions to such issues.

a and b) The role played in reducing the risk of network congestion, opportunities and threats

Direct peering

With direct peering (sometimes the term 'secondary peering' is used as a synonym) two lower-tier ISPs (which are not tier 1 providers) directly exchange traffic. If two users exchange content on a peer-to-peer basis it is economically sound for the involved ISPs to exchange traffic directly instead of buying transit. This saves transit costs and reduces latency.

CDNs

CDNs are used in order to store data more locally, thereby reducing latency and ultimately improving the user's perception of an application's quality (quality of experience, QoE). Storing content more locally implies that less content needs to be transmitted across transit networks, thereby reducing the risk of network congestion in the backbones.

The CDNs' servers are strategically placed at various locations at the network edges to enable rapid, reliable access from any user's location. By doing so, CDNs provide better performance through caching or replicating content over the mirrored servers in order to deal with the sudden spike in content requests. Stored content is kept current and protected against unauthorised modification.

The users are redirected to the caching server nearest to them. Thus, the user ends up unknowingly communicating with a replicated server close by and retrieves files from that server. This approach helps to reduce network impact on the response time of user requests.

By reducing the network's impact on the overall (end-to-end) quality, CDNs increase the user's perceived service quality when, for example, web browsing or watching videos.

QoS

While QoS differentiation may be an appropriate tool to deal with scarcity of bandwidth in access networks by prioritising, for example, voice services, the situation is different in IP backbone networks, where additional capacity is relatively cheap.

QoS assured interconnection did not play a role within the context of peering and transit. Despite this, there has been a discussion about QoS interconnection with guaranteed traffic classes across networks for some years now. However, there are a number of reasons why QoS interconnection has not yet gained relevance:

- QoS is an end-to-end concept that is not natively supported by the connectionless Internet protocol. Adding such functionality would require the implementation of

additional protocols on top of the IP layer. Also, control planes have to be integrated into the network architecture. This would significantly increase the technical complexity of the system, involving additional cost, and thereby increase the maintenance and administration effort.

- The *transaction costs* associated with negotiating QoS-sensitive interconnection arrangements with a large number of interconnection partners, and of monitoring compliance with the terms of those agreements, have been insurmountable.

- Thus, given the high cost of implementation, possibly lower-cost 'best effort' capacity up to now has been shown to be the strategy of choice. This holds, in particular, when considering the cost decreases in core and backhaul networks. Thus, the question whether implementing end-to-end QoS across networks is economically a viable strategy in the future is largely answered by the costs of simply adding more bandwidth.

- There is a lack of transparency of what constitutes a 'premium' quality and whether the customer is actually receiving this level of quality end-to-end. End-to-end service level agreements, auditing and reporting, including billing and settlement, processes are costly to implement.

- Network externalities imply that the value of higher-quality services increases as more destinations are reachable using the service. To put it differently, there needs to be a sufficiently large penetration to get past the initial adoption hump. Operators may be confronted with a prisoner's dilemma, where no individual party has an incentive to be the first to assure QoS in its network.

- While not implying a guaranteed delivery of data, the best effort approach of the Internet does not imply low performance. Given this, it may not have been an economically viable strategy for operators to implement QoS guarantees across networks. Best effort Internet in most cases results in a (relatively) high quality of experience for users, even for delay-sensitive applications such as VoIP[5].

- Given the best effort transmission transport characteristics, other mechanisms for improving end-to-end traffic exchange performance have developed:
    - endpoint based congestion control for reduction of the traffic load in order to limit the congestion and avoid overloading the network;
    - Internet Exchange Points (IXPs) and increased use of peering in order to improve routing;
    - CDNs – see above.

- Consequently, customers are unwilling to pay much of a premium for better service.

- Traffic classes using prioritisation introduce an incentive to decrease the quality of the 'best effort' class vis-à-vis premium classes to create a willingness to pay for

[5] The fundamental underlying principle is that the application compensates for the variable and non-guaranteed traffic exchange characteristic of the best effort Internet and thus ensures high end-user-perceived quality. In other words, the strict network performance constraints that are mandatory for circuit-switched networks by design are not required in packet-switched networks.

premium quality. Therefore, it creates the need for more regulatory control, including the potential need for a minimum QoS introducing additional monitoring requirements

c) Barriers

The risk of network congestion is reduced in particular by those concepts/business models that contribute to a regionalisation of traffic such as CDNs (caching content closer to the user) or the setting up of more regional IXPs. The emergence of those concepts/business models indicates that there are no such barriers. However, whether such solutions turn out to be successful in practice is decided in the market process.

4. Process

Question 26

a) Do you consider that intervention by public authorities is necessary at this stage? Yes / No

If so, what would be the appropriate level of such intervention?

b) What would be the consequences of divergent interventions by public authorities in the EU Member States?

a) Intervention by public authorities

Public authorities should have the capacity to intervene, given the important challenges at stake in the net neutrality debate. However, regulation should not be unnecessarily intrusive, since flexibility appears indispensable in such a fast-changing environment. In this context, BEREC has stated that regulators would stand ready to act if necessary.

Evaluating the conditions leading to such a necessity, and the type of action to take in that case, has been at the core of BEREC work streams on net neutrality, since its response to the 2010 Commission's consultation on net neutrality and the open Internet. A preliminary assessment from BEREC, then, was to consider the framework issued from the 2009 review a priori sufficient to address most of the identified net neutrality-related concerns:

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.

In the same document, it was nevertheless emphasised that it was 'difficult for BEREC to provide a definite answer to this question'. Whether the framework would be sufficient depended 'on how it is transposed, implemented and interpreted, and on whether some of the provisions can be operationally effective in practice'.

BEREC therefore considered that a close monitoring of national transpositions and market evolutions would be necessary in order to analyse the subject beyond this preliminary assessment[6].

As regards national transpositions, most of them are now completed. In the vast majority of cases, NRAs have been entrusted with a general objective of promoting the access to content, and additional powers to implement enhanced transparency, on the one hand, and of monitoring QoS, on the other hand – which is generally also accompanied with the possibility of setting minimum quality requirements. There is, however, a certain heterogeneity between Member States in the modalities available to exert those powers. In a few cases (e.g. the Netherlands), Member States have decided to enshrine in their national law a stricter framework to ensure the respect of a net neutrality principle.

6 BEREC noted in this respect that: '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'.

Regarding market evolutions, an overview was achieved thanks to the investigation jointly undertaken by BEREC and the Commission on traffic management and other practices resulting in restrictions to the open Internet currently applied in Europe. According to the data gathered from 2011, a majority of ISPs in Europe offer IAS with no application-specific restrictions. In other terms, TM and other differentiation practices are not widespread in Europe, except for some focused practices, mainly on mobile networks, specifically the blocking or throttling of peer-to-peer traffic or VoIP, which may create concerns for end users. One of BEREC's findings is that, while at least 60% customers do not face any such restrictions, at least 20% of mobile Internet users in Europe experience some form of restriction on their ability to access VoIP services[7]. Since the situation varies quite significantly, this overview must, nevertheless, be nuanced when considering a specific national situation.

In BEREC's view, the current context is characterised both by a limited need for intervention to date, but also by important risks (both economic and societal[8]), which some forms of degradations of service would bear. Taking this into account, BEREC has supported the development of NRAs' capacity to prevent such cases, and deal with them, if they should arise anyhow.

Given the competitive nature of broadband markets in most Member States, BEREC has put forward a progressive approach which includes three main aspects: (1) stimulate market forces in order to discipline the provision of IAS offers; (2) monitor the services provided and evaluate whether deviations from net neutrality need to be addressed; (3) ensure, if necessary, the resolution of net neutrality issues, notably in case of excessive degradation of service.

(1) Ensuring that market forces work critically relies on strengthening competition through SMP regulation, promoting effective transparency on retail broadband markets (notably in the light of Articles 20 and 21 USD, which require that providers disclose information on restrictions) and reinforcing users' ability to switch between providers. BEREC acknowledges the limitations of such competition-based approach and forsees cases in which it will be appropriate to go further, through two additional steps.

(2) Detecting and evaluating harmful practices or degradation of service is the second step. BEREC recommends monitoring QoS and market situations, in order to identify potential degradation that may affect IAS as a whole, or individual applications. A list of criteria has been put forward to assess the critical nature of particular situations.

(3) Acting, when necessary, may involve pro-competition and transparency measures. If this does not suffice, regulators should consider making use of additional regulatory

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[7] The data are not clear enough to draw firm conclusions about the remaining nearly 20% of users, who might or might not face such restrictions.

[8] See *BEREC Report on Differentiation Practices and Related Competition Issues in the Scope of Net Neutrality*, notably: 'In the last decade end-users, the economy and our societies have greatly benefitted from the growth in both Internet connectivity and content and applications available to them. This growth has, so far, largely relied on the so called best effort Internet'. BEREC also emphasises the importance of network effects, the 'risk of reducing the intensity of competition between application and content providers', and underlines that 'on a long term perspective, the intensity of innovation could well depend on the permanence of the open platform aspects'.

powers, such as obligations derived from Article 5 AD, dispute resolution competence (including between ISPs and CAPs when this is within NRAs' remits) or imposing minimum QoS requirements according to Article 22.3 USD.

These different aspects put forward by BEREC on net neutrality fully lie within the scope of the revised electronic services framework, applying it through a proactive and demanding approach. They appear appropriate to solve most of the net neutrality-related concerns identified so far, without the need a priori to resort to further legislative developments.

BEREC is committed to the open Internet, and will continue to monitor the evolution of the markets closely in order to ascertain this analysis. A refined understanding of the Internet ecosystem and stakeholders' incentives, including more in-depth study of consumers' behaviour, will be crucial to this assessment.

b) Consequences of divergent interventions

The joint investigation by BEREC and the Commission previously mentioned (*A view of traffic management and other practices resulting in restrictions to the open Internet in Europe*, May 2012) has emphasised that the reality of measures put in place by operators in the different European countries varies considerably, both in terms of the share of the market impacted and regarding the types of practices. In addition, the transparency policy associated with those measures also appears to differ significantly.

While BEREC has recognised the need for a certain level of harmonisation, such a variety of situations also calls for public authorities to be able to adapt their policies to their respective context, while pursuing the same objectives and principles.

On the first aspect, BEREC has striven to develop a common understanding by regulators of net neutrality challenges, and to provide guidelines applicable throughout Europe. In line with this, most public policies implemented in the Member States regarding net neutrality, save for some exceptions, have followed the same principles described previously (efficient transparency, monitoring of QoS etc.), with regulators being at the core of the framework in place.

On the second aspect, BEREC's guidelines have included some flexibility for each regulator to adapt the modalities of its action. In terms of transparency[9], various approaches can be envisaged to ensure that the needed criteria (in particular understandability and comparability) are fulfilled; for instance regarding the presentation of the information, the role of third parties or the type of monitoring tools that could be made available to the users. As regards the measurement of QoS, BEREC has provided important elements of reference[10]; nevertheless, various methodologies and platforms are being evaluated or implemented by regulators. A third illustration lies in the approaches to analyse TM practices, whereby BEREC has proposed common criteria of assessment[11], but recommending a case-by-case evaluation, taking into account the exact nature of the measure, its impact on the users, and the market situation.

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9 See *BEREC Guidelines on Transparency in the Scope of Net Neutrality: Best Practices and Recommended Approaches.*

10 See *A Framework for Quality of Service in the Scope of Net Neutrality*.

11 See *BEREC Report on Differentiation Practices and Related Competition Issues in the Scope of Net Neutrality* and *BEREC Guidelines for Quality of Service in the Scope of Net Neutrality*.

To a certain extent, there is, therefore, some room for divergence between public policies in the Member States. Such heterogeneity may have negative consequences on the various stakeholders involved. Some operators, in particular, have expressed concern about having to micro-manage their strategies, targeting in particular the new power of imposing minimum quality requirements (Article 22.3 USD). Nevertheless, a specific procedure is planned for the utilisation of this power, whereby the Commission will be able to provide comments and therefore limit divergence when it is not required or justified.

BEREC will also continue its efforts in developing a framework for net neutrality issues, in order to ensure that differences between markets are duly taken into account, while avoiding diverging regulatory approaches causing markets to grow farther apart.

Question 27

a) Have you made use of the dispute resolution powers under the Framework Directive in relation to a dispute about traffic management practices?

Yes No

b) Have you also made use of these dispute resolution powers also in relation to disputes between an ISP and a content provider?

Yes No

c) If you have made use, please explain under which circumstances. If you have not made use, please explain whether you consider that these dispute resolution powers would be an appropriate tool for such Internet traffic management disputes?

a) Use of dispute resolution powers under the FD

No, as BEREC is not a regulatory authority.

b) Dispute resolution powers in relation to disputes between an ISP and a content provider

No, as BEREC is not a regulatory authority.

c) Explanation of circumstances

Following the adoption of the revised telecom package in 2009, the chapter on dispute resolution (Article 20 FWD) has been modified to cover resolution by NRAs of conflicts not only between undertakings providing electronic communications networks or services, but also between such undertakings and other undertakings benefiting from obligations of access and/or interconnection[12].

In its response to the Commission's public consultation on net neutrality and the open Internet in 2010, BEREC had already noted the potential role of this revised provision ('with the definition of "access" also modified in Art 2 AD') to address certain net neutrality-related issues: 'Dispute resolutions cannot be considered as straightforward tools for developing a

[12] Likewise, the definition of access contained in the Access Directive has been extended to cover the making available of facilities and/or services to another undertaking for the purpose of providing electronic communications services, including when they are used for the delivery of information society services or broadcast content services.

regulatory policy, but they do provide the option to address some specific (maybe urgent) situations.' BEREC noted in particular that: 'The potential outcome of disputes based on the transparency obligations can provide a "credible threat" for undertakings to behave in line with (their) obligations'.

The use of this power, in conjunction with or instead of other regulatory tools, to address certain issues related to TM practices, will in part be determined by the specific settings of national frameworks. Indeed, each national regulator is entitled with powers which may depend on its national law, inside the scope of transposition of European directives. Furthermore, whether or not dispute settlement is applied also depends on the undertakings actually asking the NRA to solve their dispute. Consequently, the set of powers available to regulators (including dispute resolution power), and their modalities of application, may vary in different Member States.

Scope of the provision

As regards more specifically the scope and application of the dispute resolution provision, the possibility for NRAs to handle disputes between network operators and undertakings not falling into this category (possibly CAPs) must be examined in the light of the broader evolution of the directives. In its *Guidelines on Quality of Service in the Scope of Net Neutrality*, BEREC has provided a thorough review of the powers and tools to address market failures and ensure that competition thrives and consumers are protected. Considering first the wider background of the revised directives helps to better understand the relevant objectives, particularly Article 8.4.g, which 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 also acknowledges that one of the NRAs' policy objectives is to ensure 'that there is no distortion or restriction of competition in the electronic communications sector, including the transmission of content' (see Article 8.2.b FWD). Whereas this does not constitute a direct ground for intervention, or an absolute concept which could be read independently from other objectives, it provides valuable guidance for regulation in the scope of net neutrality.

In this respect, the Guidelines note that:

Net neutrality is a subject in which content and carrier are inherently linked to each other. But as mentioned by the European legislator, the framework covering transmission does not cover the content of services delivered over electronic communication networks using electronic communication services[13]. So, in principle, both areas have their separate regulatory basis. However, this does not mean that the legislator rejects the idea that carrier and content are indeed connected: 'The separation between the regulation of transmission and the regulation of content does not prejudice the taking into account of the links existing between them, in particular in order to guarantee media pluralism, cultural diversity and consumer protection.'

[13] Framework Directive, recital (5), more specifically: 'This framework does not therefore cover the content of services delivered over electronic communications networks using electronic communications services, such as broadcasting content, financial services and certain information society services, and is therefore without prejudice to measures taken at Community or national level in respect of such services, in compliance with Community law, in order to promote cultural and linguistic diversity and to ensure the defence of media pluralism'.

This reference helps reading the policy objectives in the Framework Directive, which in turn play a role in how NRAs approach their discretionary powers. The guidelines note that 'the objectives pursued by content regulation are of a general interest nature, such as: "freedom of expression, media pluralism, impartiality, cultural and linguistic diversity, social inclusion, consumer protection and the protection of minors"[14].' Acknowledging that this does not constitute a direct ground for intervention, BEREC emphasises, however, that: 'access to content is an objective which is interlinked with relevant parts of the electronic communications regulatory framework. As content is being made available through networks […] the ability to regulate content is also contingent on it being accessible'.

The update of Article 2 of the Access Directive (definition of 'access') can, therefore, be understood as explicitly recognising the impact of electronic communication network and services (ECNS) on the access to content. Similarly, the modification of Article 20 takes into account that 'the delivery of information society services or broadcast content services' relies on the making available of certain facilities or services offered by ECNS operators in the scope of their activity, particularly their provision of access and interconnection. In other words, the provision of information society services depends to some extent on access obligations of networks operators, as provided for in the Directives. To this extent, and depending on national implementations, CAPs could, therefore, be parties to a dispute resolution in the scope of Article 20 FWD, concerning the conditions in which this content is transported.

A power among others

At the same time, the revised framework has equipped NRAs with other new competences, now mostly transposed in national legislations. BEREC considers that the resulting framework, including new provisions in relation to the transparency and the minimum quality requirements, can address many of the concerns that have been expressed in the context of net neutrality to date.

BEREC has, in particular, emphasised the key role of transparency, enabling consumers to choose the quality of the service that best fits their needs, and reducing the asymmetry of information existing between providers and end users. However, as BEREC has stressed in its *Guidelines for Transparency in the Scope of Net Neutrality*: 'transparency alone is probably insufficient to achieve net neutrality, firstly because it requires other factors in order to produce results – the existence of competition in the market, the reduction of barriers to switching are, among others, important factors that, alongside transparency, can contribute to achieving the objective of net neutrality set out in the Framework Directive'. Other limitations of transparency with regards to net neutrality are described in the different documents on net neutrality, and conditions are described in which further intervention by regulators may be required. Both symmetric and asymmetric regulatory tools are considered in this respect.

BEREC has notably focused on the new ability of regulators to impose minimum quality requirements on operators, according to Article 22(3) USD, in order to prevent the degradation of service, either of individual applications using the IAS or for this service as a whole. While providing guidance on how this competence may be applied, BEREC has recommended considering it with utmost precaution, mostly as a 'last resort tool'. Such a

[14] Framework Directive, recital (6).

careful approach is advocated in the *Guidelines on Quality of Service in the Scope of Net Neutrality*:

When considering whether to use the minimum QoS powers, NRAs must also consider whether it would be more appropriate and proportionate to use alternative regulatory tools. If traditional competition tools, the enhanced transparency requirements and other relevant tools of the regulatory framework are insufficient to address degradation of service, NRAs may however impose minimum QoS requirements on ISPs.

In its description of the provision, BEREC explains that NRAs will be able to impose minimum QoS requirements after having identified an instance or a risk of degradation of service, or hindering or slowing down of traffic. Although the main focus is on situations where an instance of degradation has already occurred, risk-based considerations are also deemed relevant, but would particularly call for a proportionality analysis.

Indeed, the principle of proportionality has to be borne in mind by NRAs in order to determine the most appropriate combination of actions. As BEREC's guidelines stress: 'In this respect, the imposition of QoS requirements can be considered as an intrusive remedy, and applying these kind of measures pre-emptively would require proving the seriousness of such problem or threat'. One aspect illustrated in the guidelines is the difficulty of defining appropriate minimum levels that would fit the variety of situations (technological constraints etc.) in a market.

In comparison, the dispute settlement provision may present some advantages (it would be targeted at a specific problem or demand), along with some limitations (consumers could not call upon such remedy if an ISP's practice means harm to end users in a market). Besides, as BEREC outlined in its recent reports, TM and other differentiation practices are better assessed in a case-by-case analysis. In this context, when applicable on the basis of national law implementing the European Directives, dispute settlement can prove to be an appropriate tool, as it allows for such an ex-post, case-by-case analysis.

In conclusion, this power can be included in the set of measures available to NRAs[15], while its effective use depends on undertakings actually asking the NRA to solve their dispute. The selection of measures must be based on a fair assessment balancing the relevant interests. Such assessment includes taking into account of reasonable alternatives, while the guidelines on QoS underline: 'The different regulatory tools may act independently or complementary to each other'.

Question 28

Do you consider that regulators should monitor interconnection agreements between providers?

Depending on Member States' respective situations, NRAs may take different approaches. Some countries may consider data-gathering exercises useful whereas most do not consider them appropriate unless concrete problems or requests occur.

[15] Together with Articles 4 and 5 Access Directive (interconnection regime and end-to-end connectivity), Article 22.3 USD (minimum QoS requirements) and SMP tools.

Question 29

Under article 22(3) USD NRAs have the power to set minimum quality of service requirements on undertakings providing public communications networks. In a scenario where in a given Member State no unrestricted offer is available (for instance because all operators actually block VoIP), do you consider that the "minimum quality of service tool" should be applied by the NRA to require operators to provide certain unrestricted offers?

This type of situation would definitely require the attention of public authorities, in particular NRAs. They would need to carefully assess whether traditional regulatory tools (such as pro-competitive actions, promotion ease of switching and enhanced transparency) would be able (sufficiently) to ensure a satisfactory answer by the market. If this is not the case, then NRAs may need to impose minimum QoS requirements, based on the approach described in the BEREC NN QoS Guidelines and summarised hereunder.

Based on the criteria set out in the guidelines, a TM practice blocking VoIP in the whole national market would be considered a situation of 'degradation of service' (whether the restrictions are technically implemented or not). When assessing the practice itself (independently of the number of affected end users), it would probably not be justified based on any of the criteria related to the motivation of the practice: legal justification, end user control, congestion management, network security and integrity. It would also probably breach the criteria related to implementation and effects: discrimination and intensity. In particular, if the market situation described in the question should occur, the availability of unrestricted IAS offers would be zero, which would be considered a severe situation. (Refer also to our answer to question 5 regarding the assessment criteria.)

In general, independently of which exact application would be blocked on the IAS, a complete unavailability of unrestricted service offers would definitely be considered a situation of 'degradation of service' according the the BEREC NN QoS Guidelines. In that case, there would be a clear need to assess whether appropriate justifications can be found for such a situation. Otherwise, there would certainly be sufficient ground for public authorities to intervene. The most suitable approach would then have to be decided, in order to select the most appropriate tool(s), in the same way as described above.

Regarding what kind of requirement to impose, the guidelines describe, as a possible basic approach, that the requirements should be designed with the objective of eliminating the degradation situation. In this case, an appropriate requirement could be to remove the blocking practice. It is uncertain whether it would be sufficient to require the providers to provide certain unrestricted offers in addition to the restricted offers. This would depend in particular on the ability (e.g. regarding the price) of end users to switch to unrestricted packages. If the end users did not respond sufficiently by switching to unrestricted offers, the penetration would remain low. This situation may still be considered as not satisfactory, in particular when taking the network effect into account. For instance, if only a few end users were able to use an application, they would still not be able to use the application to reach other users that had not switched from restricted service offers. NRAs could, hence, still regard this situation as 'degradation of service', which is causing harm to the end user.