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3 Group's response to BEREC's public consultation on:

- **Differentiation practices and related competition issues in the scope of Net Neutrality**
- **Guidelines for Quality of Service in the scope of Net Neutrality**
- **An assessment of IP-interconnection in the context of Net Neutrality**

27 July 2012

3 Group's response to BEREC's public consultation on:

1) **Differentiation practices and related competition issues in the scope of Net Neutrality (BoR (12) 31)**

2) **Guidelines for Quality of Service in the scope of Net Neutrality (BoR (12) 32)**

3) **An assessment of IP-interconnection in the context of Net Neutrality (BoR (12) 33)**

This paper contains the response of the **3** Group in Europe to BEREC's consultation dated 29 May 2012.

The **3** Group is part of Hutchison Whampoa Limited's telecommunications division and includes the following operating companies in the EU: Hutchison 3G Austria GmbH, Hi3G Denmark ApS, Hutchison 3G Ireland Limited, H3G Spa (Italy), Hi3G Access AB (Sweden) and Hutchison 3G UK Limited.

The HWL telecommunications division, comprising the **3** Group, Hutchison Asia Telecommunications and Hutchison Telecommunications Hong Kong, was the first global 3G operator, with operations in 12 countries[1]. Our 3G services were first rolled out in March 2003. As of May 2012 the **3** Group had over 31.6 million customers worldwide, of which 21.9 million were in Europe.

Summary

Consumers have benefited greatly in recent years from the increased availability and improved quality of mobile data services. The huge growth in demand for mobile data services is a reflection of that. Mobile network operators are responding to the growth in demand by investing to increase the coverage, capacity and speed of their data networks. Recognizing that network and spectrum resources are finite and that it is uneconomic, and potentially unfeasible, to meet every peak in demand in every location at all times of day, operators are looking at how they can manage their network resources to provide the best quality of service to their customers.

- The **3** Group agrees that competition between Internet Service Providers (ISPs) is the best guarantor that customers will have access to the applications, content and services they want. Together with effective competition, transparency and ease of switching are key elements that provide a competitive constraint on ISPs. National Regulatory Authorities (NRAs) should be concerned with facilitating a competitive market and dealing with the causes and market distortions that arise in the presence of Significant Market Power (SMP).

- The best efforts Internet has promoted ubiquity of the Internet among content creators and content users but it is insufficient alone to provide the level of connectivity and bandwidth that is required on the Internet today. Third party intermediaries - such as Content Distribution Networks (CDNs) - and large Content and Application Providers (CAPs) with their own infrastructure are fast becoming the dominant users of the available bandwidth as well as increasingly important elements in meeting these demands. The net neutrality debate is therefore wrong to identify ISPs as responsible for the move away from the best efforts Internet. Indeed, the wider Internet ecosystem has already moved away from the best efforts Internet.

[1] Australia, Austria, Denmark, Hong Kong, Indonesia, Ireland, Italy, Macau, Sri Lanka, Sweden, the UK and Vietnam.

- BEREC is wrong to say that traffic management is only required to deal with congestion because of a "*failure to deploy adequate network resources*"[2]. This is particularly erroneous in the case of mobile networks, where deploying additional network resources can be prohibitively costly or unfeasible, and BEREC does not make an adequate distinction between fixed and mobile networks. BEREC understates the difficulties faced by Mobile Network Operators (MNOs) in meeting the growth in demand for mobile data services.

- Traffic management allows differentiation, which should be seen as a positive feature that enables experimentation and innovation and provides customer choice. It opens the possibility for operators to provide different levels of service to suit consumers' tastes. Subject to the above points about adequate competition, transparency and ease of switching, BEREC should have no concerns with traffic management.

- Quality of Service (QoS) on the best efforts Internet depends on multiple interconnected networks and cannot easily be guaranteed today. This is why large CAPs and CDNs increasingly provide direct connections to ISPs. In any event, most users, both CAPs and Content and Application Users (CAUs), are aware of the limitations of the best efforts Internet.

- Similarly, QoS on mobile networks cannot be guaranteed with current technology. In the near future, with the deployment of Long Term Evolution (LTE) & IP Multimedia System (IMS), mobile operators will be able to offer differential QoS, always subject of course to the limitations of spectrum.

- BEREC fails to recognize that QoS is intimately linked with the available network resources and the nature of the application, content or services being provided. For this reason, BEREC's suggestion that traffic management should be application agnostic is likely to make all Internet users worse off.

- There is already widespread monitoring of the performance of ISPs making regulatory monitoring unnecessary.

- The IP interconnection market is generally working well. Importantly, transit is competitive and there have been no market failures requiring regulatory intervention.

In conclusion, the **3** Group does not see a case for regulatory intervention to limit the way mobile operators manage their networks, to define minimum QoS or to regulate the market for IP interconnection. The markets that underpin the provision of Internet services function well and BEREC has not identified any instances of where the market has failed. NRAs should continue to focus on facilitating competition and dealing with instances of SMP. In this respect, the **3** Group agrees that ensuring competition, ease of switching and transparency should be the primary focus of NRAs.

[2] BoR (12) 31; Pag. 25; Para. 99.

Context

- ***Growth in mobile data services***

Since the launch of 3G services in 2003, the **3** Group has been at the forefront in promoting mobile Internet and mobile broadband services. Early versions of mobile web browsers were not optimized for viewing Internet pages, which meant that, although it was technically possible to browse the Internet there were few mobile enabled web sites and it was often a poor user experience. As the number of mobile enabled websites on the Internet increased, it became apparent that there was demand amongst mobile users for full Internet access. The **3** Group responded to this by launching, at the start of 2006, a service that allowed open access to the Internet. To enable simple access to the most popular services, the **3** Group worked with, amongst others, Yahoo!, Skype, Google, Microsoft and eBay to optimize their services for use on a mobile handset.

The huge growth in demand for mobile data and mobile Internet services started in 2007, driven by (i) improvements in handsets and the availability of low cost mobile broadband modems; (ii) the upgrade of 3G networks to High Speed Packet Access (HSPA) technology, thus allowing faster download speeds; (iii) the increasing number of applications optimized for mobile use; and (iv) attractive pricing. Since then data traffic has been growing faster than operators can install new capacity. In the case of **3**UK, for example, data traffic now accounts for 98% of capacity use on its network, with voice making up 2%. A further difficulty for mobile operators trying to manage the demand for capacity is that the traffic is not evenly distributed by time or location. Certain cell sites in certain areas and at certain times of day experience much more demand than others. In the face of this growth in demand, operators are looking at ways of ensuring their customers continue to experience a good quality of service.

- ***Role of traffic management***

One aspect of meeting the growth in demand is to increase network capacity. This is something the **3** Group, in common with many mobile operators, is engaged in, through adding new cell sites, acquiring and deploying more spectrum and upgrading the networks with the latest technology releases (HSPA and LTE, for example). However, even if it was possible to meet all demands for capacity at all times, this is unlikely to be financially viable. Customers would not be prepared to pay for a network that has sufficient capacity to meet demand on every cell site at all times of day. Just like the road or rail networks, consumers understand and accept that there is a trade-off between capacity and price and accept that at peak times demand is likely to exceed available capacity and there may be congestion. The question then becomes how to deal with that congestion.

One option would be to leave traffic unmanaged and accept whatever customer experience resulted from that. It would mean an important voice call could be disrupted by the background software update of another user. The development of traffic management technologies has provided an alternative. Traffic management allows operators to improve the functioning of the Internet and customers' overall experience. Thus, traffic management should be seen as a positive development, since it allows operators to give their customers a better quality of services and more efficient use of scarce resources. Providing customers with a high quality service is a key parameter of competition that BEREC ought to encourage. Operators investing in the capability to manage their networks more efficiently and effectively and provide a better overall QoS to their customers will be at a competitive advantage.

At the same time, the **3** Group recognizes the importance of the Internet to modern society and accepts that there is a legitimate expectation for operators to provide unrestricted Internet access, subject to lawful content and use. Equally, mobile operators must be allowed to manage their networks so as to provide their customers with a good Internet service.

As long as the market for Internet access services is functioning well and consumers are able to exert pressure on ISPs, there should be no need for NRAs to intervene. For this to happen there needs to be effective competition between ISPs and consumers must be able to make informed choices.

1. Differentiation practices and related competition issues in the scope of Net Neutrality

BEREC's consultation on differentiation practices and related competition issues does not ask any specific questions. The **3** Group, nevertheless, makes the following observations.

- ***The existence of competition in the market, the reduction of barriers to switching and transparency are key factors.***

Fundamentally, competition between ISPs will be the best guarantor that customers have access to the applications, content and service they want. For competition to be effective at constraining the behaviour of ISPs, consumers must be able to make informed choices. This requires transparency about the services ISPs provide and any restrictions and limitations in those services, and the ability to exercise choice, which, in turn, requires easy switching processes.

As long as the market for Internet access services is functioning well and consumers are able to exert pressure on ISPs, there should be no need for NRAs to intervene.

Should BEREC conclude that regulatory intervention is required, then fostering competition, transparency and ease of switching are likely to be the most appropriate responses.

- ***BEREC is incorrect to suggest that the growth of Internet connectivity and content has so far largely relied on the best efforts Internet.***

BEREC argues that: *"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* [and that] *this growth has, so far, largely relied on the so called best effort Internet."* [3]

While the best efforts Internet has promoted the ubiquity of the Internet among both CAPs and CAUs, on its own, the best efforts Internet has been insufficient to support the level of Internet connectivity, content and applications that we experience today. This is because:

- the best efforts Internet has fundamental and inherent limitations, in particular, limited capacity, reliability, latency, resilience, security and other measures that are important to both CAUs and CAPs;

- CAUs have come to expect a level of capacity, reliability, latency and resilience that the best efforts Internet alone cannot provide;

[3] BoR (12) 31; Pag. 4; Para. 1.

- correspondingly, CAPs have demanded a level of capacity, reliability, latency and resilience that the best efforts Internet alone cannot provide; and

- third-party intermediaries such as CDNs, and some larger CAPs, have responded to the limitations of the best efforts Internet by developing new infrastructures to complement the best efforts Internet.

For these reasons, it is incorrect to suggest that a move away from best efforts Internet is mainly a result of ISPs introducing traffic management (for example, prioritising or blocking of certain services). Likewise, the net neutrality debate has often wrongly characterised ISPs as having sole responsibility for a move away from the best efforts Internet. According to BEREC, the net neutrality debate has identified apparent concerns with developments resulting from a move away from the best efforts Internet. However, the move away from best efforts Internet has been driven by CAUs' demand for a level of connectivity and content that the best efforts Internet alone cannot provide, and by CAPs and third-party intermediaries competing to meet this demand.

This is fundamentally because the Internet is a "two-sided" market, which BEREC appears to recognise, namely, the Internet serves the mutual needs of both CAUs and CAPs. Indeed, BEREC states that: *"according to the two-sided market theory, charging content providers is not necessarily inefficient. If this practice is non-discriminatorily open to all contents, it could be argued that it could have a positive effect …".*[4] BEREC nevertheless does not recognise that a two-sided market inevitably means a move away from the best efforts Internet in order to satisfy the needs of both sides of the market that best efforts may be unable alone to provide.

In short, the best efforts Internet alone is not sustainable as a model for meeting the demands of CAUs and CAPs. Seeking to prevent moves away from the pure best efforts Internet would, at minimum, prevent the ongoing development of the Internet and, at worse, result in an end to the Internet in its present form.

The net neutrality debate nevertheless raises some legitimate concerns, particularly around transparency to users, openness of access and potential restrictions of competition. However, the concerns raised by the net neutrality debate often conflate a move away from the best efforts Internet with concerns about SMP among individual firms that results in restrictions or distortions of competition and reductions in transparency or openness of access.

BEREC also appears to conflate an assessment of whether firms have (i) SMP and/or (ii) are vertically integrated with a move away from best efforts Internet and that even if firms are not found to have SMP, there may still be scope for regulatory intervention if there is degradation of best efforts Internet.[5]

The **3** Group, therefore, believes that BEREC is wrong to be focusing on the shift of the Internet away from the best efforts concept and should instead focus on the incidence, causes and remedies to problems of SMP among participants in the Internet to the extent that they exist. In this context, BEREC and national regulators should be alert to the existence of SMP wherever it might lie in the value-chain and should monitor the market power of large CAPs and CDNs as well as access networks.

[4] BoR (12) 31; Pag. 59; Para. 298.
[5] BoR (12) 31; Section 4.3; Pags. 37-43.

- ***BEREC does not make any adequate distinction between fixed and mobile networks and, consequently, is incorrect to conclude that traffic management is only necessary because of a failure to deploy adequate capacity.***

While BEREC recognises the existence of fixed network operators (FNOs) and mobile network operators, it does not make any relevant distinctions between them. For example:

"Within the [end-user connectivity provider (ECP)] *category, access network operators (FNOs and MNOs) have traditionally borne the entire high cost of local access infrastructure deployment to provide broadband connectivity services and have passed this on to end-users through access and usage charges. Similarly, once the access network has been installed, the ECPs upgrade capacity transmission to cope with new customer connections and new traffic requirements arising from new services and applications, and they pass this cost to their customers."*[6]

Based on this, the consultation makes the assumption that if an ECP experiences congestion and resorts to traffic management, this is because of its *"failure to deploy adequate capacity"*[7]. This view fails to take account of the constraints on the ability of ECPs to deploy or add capacity to the mobile access infrastructure.

First, MNOs can be considerably capacity constrained, owing to a combination of:

a) available spectrum: even with new mobile spectrum becoming available, spectrum that is available and suitable for mobile broadband is fundamentally a finite and scarce resource;

b) technological constraints: current mobile communications technology (3G and 4G) is rapidly approaching the physical limits of maximum possible throughput (Mbps) per available spectrum bandwidth (Hz) per mobile cell sector site; and

c) available network sites: planning constraints and other practical considerations are limiting the potential availability of new mobile radio network sites in high demand locations that would be needed to increase mobile network capacity.

Second, even when options to increase mobile network capacity are available, if neither CAUs nor CAPs are willing to pay for such additional capacity, then it would clearly be uneconomic to build and it will be necessary to ration existing capacity in some way.

Accordingly, BEREC's conclusion that network congestion and the need to resort to traffic management is simply a result of failure to deploy adequate capacity is unjustified and could lead to erroneous policy conclusions.

- ***Traffic management should be seen as a positive development that improves QoS, allows innovation and provides customers with choice.***

As acknowledged by BEREC, differentiation practices *"are commonly seen as a positive outcome of the functioning of a market, as they tend to increase the diversity of offers on the market and the adequacy of the supply to the demand of the end-users, resulting in higher welfare for end-users"*.[8] While appreciating the analytical framework put forward by BEREC for assessing the possible impact on end-

[6] BoR (12) 31; Pag. 17; Para. 57.
[7] BoR (12) 31; Pag. 25; Para. 99.
[8] BoR (12) 31; Pag. 27; Para. 112.

users of various differentiation practices, the **3** Group believes some of the conclusions presented are flawed.
Traffic management allows operators to differentiate their services in an attempt to gain competitive advantage. Different operators may use different techniques and prioritise different services depending on the services they want to promote (for example, the **3** Group wants to ensure customers have a good web browsing experience) and their customer base (for example, business users or consumers). This experimentation with different offerings is part of the competitive process and gives customers greater choice as well as leading to innovative new services. Differentiation benefits customers by giving them choice and is a normal part of any competitive process.

Traffic management also allows operators to offer different levels of Internet access. One possibility would be for an operator to offer a service that allows Internet access only outside peak times, or only allows access to low bandwidth services. Some customers, for example low income customers, may be happy to take a cheaper service that has some restrictions on use. This is quite common in other service sectors, such as rail, where customers can buy cheaper "off-peak" tickets accepting that there is less flexibility in their use. Achieving ubiquitous broadband access is likely to require innovative and differentiated services like these.

The **3** Group therefore sees the ability to offer managed services and to be allowed to differentiate in quality and price within those managed services as important elements for mobile data services. Traffic management is a valuable tool that can enhance the quality of the customer experience, allow competitive differentiation and increase customer choice.

- ***BEREC's suggestion that traffic management should be application agnostic could make all Internet users worse off.***

BEREC notes that ISPs providing end-users with connectivity should have the opportunity, on a non-discriminatory basis, to manage their networks to increase efficiency, minimize the resources needed to provide the service and assure the best deal to all end-users. In several places, BEREC suggests that if traffic management is needed for congestion reasons, it should be done on an application agnostic basis.

Mandating that traffic management should be application agnostic could place a considerable undue restriction on the operation and development of the Internet and would likely make all Internet users worse off. For example, some applications are highly delay sensitive (e.g. voice, live television), while others are not (e.g. software updates, file sharing). Managing traffic on an application agnostic basis is likely to prevent some applications from working at all, while making little difference to others. In contrast, slowing down applications that are not delay sensitive is more likely to improve the overall experience of consumers.

2. Guidelines for Quality of Service in the scope of Net Neutrality

As BEREC points out, the 2009 revision to the regulatory framework gave NRAs the competence to set minimum QoS requirements in relation to electronic communications services. Nevertheless, it acknowledges that the actual definition of quality of the Internet communication service is *"rather challenging".*[9]

[9] BoR (12) 32; Pag. 14.

The **3** Group agrees with BEREC that, before deciding whether to use their power to impose minimum QoS requirements, NRAs should consider whether the transparency obligations in the EU's regulatory framework are being effectively observed by ISPs. However, it is important to note the process of implementing BEREC's Transparency Guidelines is still at an early stage - at the time of this consultation, some Member States are working on implementation measures or developing secondary legislation.

In addition to transparency, NRAs should also look to foster competition and ease of switching before seeking to impose minimum QoS requirements.

- ***The nature of the best efforts public Internet means that it is not possible to specify or guarantee the full terms of the services offered.***

BEREC appears to misunderstand the nature of the best efforts public Internet and the technical and commercial challenges of imposing QoS requirements on public Internet services involving multiple interconnecting networks and infrastructures.

Network performance on the best efforts Internet is a function of the performance of multiple interconnecting networks and other parties that are necessary for the transmission of any given content or applications from CAPs to CAUs. End-to-end network performance in such a network usually depends on the "weakest link" in the chain. Accordingly, it is difficult to identify the cause of end-to-end network degradation on the best efforts Internet and, therefore, almost impossible to specify or impose (QoS) requirements on individual parties or on the best efforts Internet as a whole.

BEREC's consultation states that: *"a precondition for a competitive and transparent market is that end users are fully aware of the actual terms of the services offered. They therefore need appropriate means or tools to monitor the Internet access services, enabling them to know the quality of their services and also to detect potential degradations".*[10]

While it is important for a retail ISP to specify the terms of the services offered to retail customers, either CAUs or CAPs, for the services for which they are responsible, this does mean that a retail ISP can specify the terms for access to content and applications on the Internet. For the above reasons, this is simply not possible with the best efforts Internet.

Most CAUs understand that the lack of availability or reliability of a given website or other Internet content or application could be due to large number of factors, many of which are beyond their immediate ISP's control.

- ***The nature of mobile networks also means that it is not possible to guarantee a certain QoE.***

In this response, the **3** Group has already explained the differences between fixed and mobile networks when meeting demand for capacity. Even if operators were to put in place capacity to meet forecast demand for mobile data services, they would be unable to guarantee a certain minimum QoS. Mobile network operators will design their networks with the aim of ensuring users have a certain minimum Quality of Experience (QoE) most of the time. Typically the constraints are at the radio layer and operators will normally have QoE or other criteria to identify when a cell is congested and more capacity is required. However, the nature of demand, together with topography, propagation

[10] BoR (12) 32; Pag. 4.

characteristics, attenuation and even atmospheric conditions all mean that mobile networks cannot guarantee the QoE, especially with currently deployed 3G mobile data technology.
Furthermore, BEREC understates the difficulties faced by MNOs in meeting the demand for capacity. BEREC states that: *"The increasing take-up of powerful mobile devices, the availability of fast mobile networks and the ever-growing availability of Internet content and applications (many of which are mobile-specific) means that consumers are downloading and uploading an increasing quantity of data."*

"One should however refrain from drawing hasty conclusions from mobile data growth forecasts, which may often be exaggerated and may be compensated, to a certain extent, by larger customer bases and lowering bandwidth costs. Especially when considering that although the overall data traffic is increasing, the growth rate of traffic is declining over time for fixed and mobile networks. Furthermore, prices for transit and content delivery network services have decreased on a per unit basis as a result of decreases in equipment costs."[11]

The **3** Group agrees that many mobile data growth forecasts are exaggerated. However, even without further growth, current levels of data traffic on mobile networks are placing considerable constraints on available capacity. While fixed networks may be characterised by lowering bandwidth costs and decreasing unit costs of transit and content delivery, the opposite is true for mobile networks. Mobile networks are facing greatly increasing, and in some cases, prohibitive, additional bandwidth costs, reflecting the scarcity of radio spectrum suitable for mobile data and the difficulty of acquiring additional radio network sites in congested locations. These difficulties are explained above.

- ***BEREC wrongly seeks to attribute network congestion merely to the "failure of operators to provide sufficient capacity".***

BEREC argues that: *"congestion may occur in two different ways, either related to unpredictable situations occurring on an irregular basis, or relatively frequently caused by an operator's failure to meet increased traffic load with sufficient capacity enhancement."* [12]

As explained above, this view fails to take into account that it may be either physically impossible or uneconomic to provide the level of capacity in Internet networks necessary to meet all levels of demand, and therefore, it is necessary to use traffic management in order to avoid complete network failure that could result from high traffic levels.

Moreover, BEREC's consultation fails to recognize that a large number of industries, in particular, service industries, often face demand that is greater than available capacity, and therefore must deploy a range of "traffic management" measures to balance demand with available capacity. These necessarily involve rationing of available capacity between different users and invariably involve forms of "price discrimination" between different users to achieve this objective.

Indeed, economic theory strongly establishes that price, quantity or quality discrimination between different users, content or applications can be a more efficient means of balancing demand with available capacity than not discriminating, provided there is an absence of SMP.

- ***BEREC disregards the dependency of the application/ content layer on the network layer.***

BEREC's characterisation of net neutrality disregards the dependency of the application/content layer on the network layer of the Internet. BEREC states: *"the net neutrality debate is fundamentally a question of whether transactions which take place at the application layer are independent from the*

[11] BoR (12) 32; Pag. 17.
[12] BoR (12) 32; Pag. 15.

underlying communication function at the network layer of the Internet. Of the two layers, net neutrality relates to the network layer. The electronic communications function should transfer the traffic independent of content and applications. This means that data received from the application layer should be forwarded in a neutral manner by the network layer."[13]

This characterisation of the way the Internet operates does not take into account that transactions that take place at the application layer can be highly dependent on the level of bandwidth, reliability, latency, resilience and other characteristics of the underlying network layer. For example, the speed of upload of a web page or the reliability and quality of a video stream depend entirely on the available resources at the network layer of the Internet. Just as there are application aware networks, there are also network aware applications that vary their bandwidth requirements depending on the nature of the customer's access connection.

Some Internet content and applications impose minimal burden on the underlying network layer of the Internet, for example, email traffic. In contrast, other Internet content and applications, such as complex e-commerce websites or live video streaming of major sporting events, impose a considerable burden on available resources at the network layer of the Internet, in many cases exceeding the available capacity, latency or reliability that is needed to deliver such content or applications.

Accordingly, the suggestion that the electronic communications function of the Internet should transfer all traffic independently of content and applications, and independently of the load imposed on the Internet by certain content and applications is unrealistic.

This would be equivalent to requiring a ferry operator to carry all traffic in a "neutral manner" regardless of the size of load transported, whether a passenger on foot or a heavy goods vehicle. Just like a ferry, the Internet has finite capacity. Some form of Internet traffic management is necessary to ensure that it can operate within its available capacity and provide an acceptable minimum QoS to all traffic. Similarly, additional capacity should be funded by those parties imposing additional traffic burdens.

As BEREC recognises, *"to overcome the problem of effective data distribution, a commercial strategy of large content providers can be to offer their content with better quality by bringing content servers closer to the end users* [and] *this materialises in a comprehensive increase in the use of CDNs."*[14] Indeed, large content providers have already bypassed much of the network layer of the public Internet to accommodate their much greater traffic levels and other requirements that the public Internet is unable to provide.

- ***BEREC's distinction between Internet access services and specialised services is arbitrary.***

BEREC makes an arbitrary distinction between "Internet access services" and "specialised services", namely: *"Regarding use of the transmission capacity over the end user's broadband connection, two kinds of services are provided: Internet access services and specialised services. Internet access services provide connection to the public Internet and thereby connectivity between end points connected to the Internet. Specialised services typically rely on access restrictions and extensive use of traffic management techniques."* [15]

This view disregards that many so-called Internet access services are not in fact provided via access to the public Internet, but by direct connection to CAPs or third-party intermediaries that are able to

[13] BoR (12) 32; Pag. 16.
[14] BoR (12) 32; Pag. 19.
[15] BoR (12) 32; Pag. 3.

provide a guaranteed level of connectivity, bandwidth, latency, resilience and other desired characteristics that the public best efforts Internet may be unable to offer.

Furthermore, as most "specialised services" are provided by direct connection to CAPs or third-party intermediaries, the prioritisation or restriction of specialised services will not necessarily have any impact on the provision of other "Internet access" services either from the public Internet or other means.

Questions for the public consultation of the guidelines

In addition to the comments above, the following sections provide the **3** Group's responses to the specific questions raised by BEREC in its consultation.

- ***The criteria proposed for the assessment of degradation of Internet access service as a whole (Chapter 4).***

There is already widespread monitoring of the quality of Internet access services, both at a country level, for example, the annual European Commission Digital Agenda reports, and at an operator level, such as Arcchart's recent "European Carrier Mobile Broadband Network Performance" report and the regular YouGov "Smartphone, Mobile Internet, eXperience (SMIX)" reports.

The existence of these reports reflects the existing widespread consumer, industry and public policy interest in monitoring the quality of Internet access services in different countries and between different providers. It also reflects the high level of competition in many Member States between alternative network providers.

The **3** Group believes that no additional regulatory intervention is needed at the current time. This is especially so in the countries in which the **3** Group operates (Austria, Denmark, Ireland, Italy, Sweden and the UK), as these countries are all characterised by some of the highest levels of availability and quality of Internet access services, lowest prices and greatest ease of switching, as confirmed by the European Commission's latest Digital Agenda reports, among other studies.

- ***The criteria proposed for the assessment of issues regarding individual applications run over the Internet access service (Chapter 5).***

The **3** Group makes several observations regarding BEREC's proposed criteria.

First, the **3** Group agrees that, even if no single operator has SMP, network effects could in principle reduce the usefulness of applications dependent on the number of users of that application.

BEREC's example of this is Voice over Internet Protocol (VoIP) services. The **3** Group acknowledge that VoIP blocking is a relevant example, but it is typically not a problem in countries with competitive markets, easy switching and transparency. In some of the **3** Group countries, some mobile operators place restrictions on VoIP use, such as only allowing it with certain tariffs, but in all cases, customers have the option to switch to the **3** Group operator, which does not block VoIP, and in many cases other operators also. In any event, pure VoIP services typically do not work with adequate quality on current (3G) best efforts mobile networks, due to high latency, and will only work to the same quality as a normal voice call with some form of prioritisation and commercial arrangement between the VoIP provider and MNO. In the future, with LTE and IMS, mobile networks will be able to deliver VoIP with adequate QoS.

Second, as highlighted above, BEREC makes an artificial distinction between "Internet access services" and "specialised services", given that much Internet content and applications within so-called Internet access services is already carried on alternative networks, such as CDNs, which guarantee greater bandwidth, reliability, latency and security than transmission of content and applications over the best efforts public Internet.

Third, in some countries, such the UK, FNOs and MNOs have signed up to an industry code on traffic management, committing, in particular, to complete transparency as to traffic management practices, such as throttling of specific application or content categories at certain times (for example, P2P or software update during peak hours), blocking of any specific categories of applications or content, and use of "managed services" for prioritisation of any specific content or applications.

The **3** Group believes that such codes are highly effective at reassuring both CAUs and CAPs and at promoting effective competition between network operators, and accordingly, that further regulatory intervention is unnecessary.

Fourth, positive prioritisation of some traffic need not result in degradation of the performance of the remaining traffic, especially when revenues from positive prioritisation supports investment in capacity enhancement that would otherwise be uneconomic. Indeed, without such additional revenues to fund capacity enhancement, then increased network traffic is likely to lead to greater congestion and degradation of services for all traffic.

- ***The aspects proposed regarding the conditions and process for regulatory intervention (Chapter 6).***

The **3** Group broadly agrees with the proposed conditions and process for regulatory intervention outlined in the consultation.

- ***To what extent are the scenarios described in these guidelines relevant with respect to your concerns/ experience? Are there additional scenarios that you would suggest to be considered?***

BEREC's report observes that networks could discriminate between their own services and those of interconnection competitors and concludes that the appropriate regulatory response would be to set minimum levels of QoS. Setting aside the problems of networks guaranteeing a minimum QoS, this is treating the symptoms rather than the underlying cause.

If the concern is to enable customers to experience an adequate end-user service quality, then regulators should be seeking to facilitate a competitive market in which competitive pressure is exerted on networks not providing a sufficient QoS by customer switching to other networks. If the concern is that the network is able to use market power to distort competition in favour of its own services that is anti-competitive behaviour that should be dealt with through competition law.

3. An assessment of IP-interconnection in the context of Net Neutrality

The **3** Group responds in the following sections to the list of 24 questions in BEREC's consultation.

- ***Classification of players in the interconnection market (Questions 1 to 5)***

The **3** Group believes the relevant players and/or relationships have been captured and, in general, agrees with the classification of CAPs, CAUs, ISPs and CDNs outlined in the consultation document.

The **3** Group would only note that the distinction between CAPs and CAUs is not as clear as the consultation portrays. There will be some players that are pure CAPs and some players that are pure CAUs, but there will be a large spectrum in between. The key feature of Web 2.0 is that all CAUs, even individuals, can also be CAPs. In the future, many mobile phones will include a mini web-browser for, *inter alia*, mCommerce services. Similarly, in the Internet of things, there will be many devices that create content.

- ***Peering (Questions 6 to 10)***

The **3** Group believes that the possibility for paid peering is important. Peering is basically a decision about the costs of directly interconnecting compared to paid transit. Where one party in the peering relationship gets more benefit from the peering because of a traffic imbalance, it is only natural that there would be discussion between the parties about the possibility for paid peering. This is in the nature of commercial discussions and should not be a matter for concern. In fact, paid peering can enable a small ISP to grow and move up the interconnection pyramid.

Q6: Provided that there is a mutual benefit to both peering parties, then traffic ratios are of less significance. However, if the benefits of a pure peering arrangement were not balanced between the parties, then traffic ratios can be used to apportion costs or to share the respective benefits of the peering arrangement.

Q7: The functioning of the peering market depends considerably on the competitiveness of the transit market, as the peering and transit markets are greatly interlinked. An increase in the cost of transit would increase the incentive to make peering arrangements. There are also other significant benefits of peering arrangements with other large ISPs or directly with large CAPs and CDNs, in particular, greater reliability of content delivery and associated improvement in CAU experience.

Q8: Paid peering could be considered as a viable commercial model, including when there are traffic imbalances.

In the past, Internet peering arrangements did not attract payment on the understanding the traffic flows were evenly balanced, for example, traffic between large ISPs. Since then traffic flows have shifted and dramatically increased in the direction from CAPs towards edge of network providers, such that flows are no longer evenly balanced. In such circumstances, paid peering may be a commercial model that merits consideration.

Q9: Commercial arrangements between CAPs and CDNs represent a form of paid peering. Namely CAPs pay CDNs to carry their traffic in the direction of CAUs.

- ***Internet Exchange Points (IXPs) (questions 11 to 13)***

The **3** Group believes BEREC's consultation captures the important services provided by IXPs and is not aware of any further developments regarding IXPs to be considered at this stage.

Q13: Europe already has some of the world's major IXPs. This combined with the short geographic distances between large population centres means that Europe is quite well served. For example, in the UK, LINX now has presence in Equinix's Datacenter in Slough, providing geographical diversity. The decentralisation of IXPs may have an effect on their ability to interconnect a large number of the main Internet players. It may also impact one of the main advantages of IXPs, which is cost-effectiveness.

- ***Differentiated QoS (questions 14 to 16)***

Q14: Until now, attempts to charge for higher Qos at the transit level have largely failed. The reasons for this are that CDNs have emerged to provide a higher level of end-to-end QoS, and that, for other services, best efforts has generally offered an adequate quality and the premium for a 'guaranteed' QoS has been too large. However, differentiated QoS is likely to emerge in the future, particularly with next generation networks. In the case of voice services, there may be the possibility to label packets and give priority through the transit networks to support High Definition Voice. Traffic classes are likely to emerge initially at a national level with the potential to expand internationally.

Q15: The **3** Group believes that interconnection for specialised services may be provided across networks. A provider of specialised services such as corporate VPN or IPTV may want to negotiate minimum 'guaranteed' QoS with a network operator to provide services to that operator's customers. We see no reason why such services would not emerge.

Within the transit layer, because of the number of points of interconnection, interconnection for specialised services is difficult to provision, monitor and enforce. The likely solution is that specialised services that require guaranteed QoS will use dedicated infrastructure, as is already happening.

Within the access network best efforts has, until now, tended to be sufficient and, therefore, there has not been a need to develop differentiated or 'guaranteed' QoS. However, in the future, this may change if access networks become so congested that they can no longer provide adequate QoS on a best efforts basis. Negotiated QoS between application/ content providers and access networks may become more prevalent and important.

Restrictions on specialised services would limit the commercial freedom of operators and their ability to earn a return on their investments. Consumers of services, even those consuming the best efforts services, would benefit from operators having the resources to invest in improving their networks.

Q16: The **3** Group tends to agree that other solutions for improving QoE like CDNs will become more prevalent than traffic classes. In fact, there has already been a large migration of Internet traffic to CDNs away from the public Internet. All the world's major e-commerce, media, banking and entertainment sites could not function without the services of third-party or in-house CDNs. This trend will increase, reflecting the importance of reliability, speed, security and other characteristics to many CAPs, features that the public Internet cannot adequately deliver.

In summary, the **3** Group sees the growth of large CAPs as a driver for a greater QoS differentiation and the deployment of CDNs as being part of the solution to QoS interconnection across networks. Within networks, and especially the eyeball ISP's network, traffic classes may be used either to support specialised services or in response to increased congestion. Traffic classes across networks will be more available in the future and will emerge initially at the national level with the possibility to expand internationally.

- ***Recent developments (questions 17 to 23)***

Q17: The growth of CDNs is certainly a factor in the regionalisation of traffic, since they operate regional distributed caching servers to avoid global transit. This is driven by the demand for reliability and speed of Internet content and applications, along with the dramatic growth in traffic. The other main factor is language and culture, because that is a determining factor on the flow of traffic. Peering relationships are established in response to traffic flows so are a symptom rather than a cause of the regionalisation of traffic.

Q19: The **3** Group does not agree with the assumption of falling costs underlying BEREC's question.

First, network operators have invested huge amounts in building advanced data networks, 3G and more recently LTE in the case of mobile operators. These investments are made with the intention of earning a positive return but, at least in the case of the **3** Group, have yet to show a positive return. The length of these investments means that a life cycle approach must be taken to the network costs and operators' pricing decisions. The falling cost of network assets should not be a reason to deny an economic return to operators that built their networks in the past when equipment was more expensive. Equally, the revenues that will allow that return to be made cannot be looked at year by year. There is no reason why there should be a linear relationship between prices and costs. Prices could fall as costs rise, and vice versa, depending on competition and the needs of operators to achieve a life cycle return.

Second, in contrast to fixed networks, the costs of mobile networks are sensitive to increases in volumes consumed be individual users. A further feature is that the increase in traffic is typically not evenly spread over the network or over the day. Mobile operators may face congestion on certain cell sites at certain times of day, which require new capacity to be deployed. Therefore, the increase in mobile data volumes understates the congestion and cost pressures that arise.

Third, BEREC argues that mobile operators have managed to avoid an increase in absolute costs that would arise from traffic growth outweighing unit cost reductions, by limiting subscribers' use through capped tariffs. However, this is quite evidently not the case. An average subscriber today consumes significantly more data than a few years ago and this trend is forecast to continue. The reason for this is simply a function of consumers' preferences and competition between networks. Consumers value 'all-you-can-eat' tariffs because of the certainty they provide. This is especially so with data because, unlike a minute of voice, consumers often do not understand what a megabyte of data is and what they get for that. Increasingly consumers have less control over the data they consume. Many applications frequently refresh their content, leading to significant data downloads without the knowledge or control of the user. It is essential to offer data tariffs that allow customers to use their smartphones with the confidence and certainty of knowing what they will be paying.

The growth in mobile data subscribers and the growth in usage per subscriber has meant that the **3** Group has experienced a significant increase in data traffic on its networks, outweighing any reductions in unit costs.

Therefore, the **3** Group believes BEREC's question 19 is not the correct one to ask. BEREC should first ascertain to what extent cost reductions and economies of scale are offsetting the growth in traffic and enabling operators to either benefit from falling absolute costs or earn greater revenues to cover any increase in absolute costs.

Further, in a two-sided-market there is no reason why the revenues should come exclusively from one side of the market. It may be economically efficient for both sides of the market to make a contribution to the platform's costs.

An important requirement for operators is having the right economic signals on all parties to the value chain to use network resources efficiently for the benefit of consumers. As an example, one mobile operating system uses significantly more network resources than another because of background updates and advertising refreshes. Neither the network operator, nor arguably, in many cases, the subscriber, gets any benefit from those updates but they do have to pay the consequences – for the network, in terms of providing greater capacity and for the subscriber, potentially higher bills (especially when roaming).

The **3** Group believes that regulators should not restrict network operators engaging in commercial discussions with other parties in the value chain to agree on interconnection terms. Those commercial discussions could, for example, lead to appropriate economic signals on CAPs to use network resources efficiently. The Internet has developed interconnection arrangements free from regulatory interference and it is important that is allowed to continue.

Q20: The **3** Group agrees that CDNs lead to improvement of QoS without violating the best effort principle. CDNs facilitate a large increase in overall Internet capacity, thereby diverting traffic from the best efforts public Internet. Without CDNs, the best effort principle, and moreover the current Internet, would be unsustainable, as the best efforts Internet is unable to support the volume, speed and reliability of traffic that CAUs and CAPs demand.

Q21: CDNs rely on a combination of third-party and in-house providers for their transport and content storage networks. Large CAPs are increasingly developing their own CDN networks to replace or in addition to third-party CDN providers, for example, Google, Amazon and Netflix.

Q22: Currently the unit price of transit is falling and therefore the business case for building transit capabilities and long distance networks is difficult to justify. However, in the future there will be a huge growth in data traffic driven by increasingly rich content, machine-to-machine applications and the Internet of things. It may not always be the case that the unit cost of transit will fall. In which case, the business case for eyeball ISPs developing their own transit and long distance networks may be greater. There are, already, some examples of eyeball ISPs developing their own CDN networks, for example, BT in the UK and Verizon in the US.

Q23: An eyeball ISP becoming a Tier-1 provider does, potentially, increase its market power on the interconnection market. With mobile networks, where there is competition for consumers, this is less likely to be a concern because any one consumer may have several means of accessing the Internet with a single device, such as the home mobile network, other mobile networks and Wi-Fi networks. The eyeball ISP may not, therefore, have exclusive access to the consumer.

- ***Article 5 Access Directive (question 24)***

Q24: In principle, the **3** Group does not foresee the need for regulators to use their powers under article 5 Access Directive to impose interconnection. The Internet has developed without the need for such intervention and we anticipate that will continue.