

**Telecom Italia response to
BEREC Consultation
on
“An assessment of IP-interconnection in the context
of Net Neutrality”**

31st July 2012

Executive summary

Today's Internet is mainly based on "best-effort" with every service delivered via IP-based networks treated equally on the transport layer independently from service requirements. As a matter of fact, we may share the idea that the *"best-effort Internet in most cases results in a (relatively) high quality of experience for users, even for delay-sensitive applications such as VoIP"* (p. 28 of the BEREC document in consultation). Anyhow, we deem that the BEREC draft report *"An assessment of IP-interconnection in the context of Net Neutrality"* rather than simply taking the picture of the present situation, should focus more in depth on framing the Internet of the future identifying its features, characteristics and requirements.

Future Internet will be undoubtedly characterized by more sophisticated services and a huger amount of data exchanged on networks (previous as well as new generation access networks). The future of the Internet may therefore not be considered the mere transposition of the present situation but requires new paradigm from both economic and regulatory points of view.

As a matter of fact, IP traffic is increasingly growing mainly due to services originated from Over the Top (OTTs)/Content and Application Providers (CAPs): such increasing traffic requires an increase in the capacity of all the network's segments and therefore investments on the network operators' side. Also due to business models based on flat tariffs to end-users, today there is no clear correspondence between the increasing data traffic and revenues.

As per today, telecom operators' revenues are not increasing but are stagnating (or even decreasing due to the competitive pressure). Actually OTTs/CAPs are the subjects which benefit the most from the increased traffic and which enjoy the benefits (positive externalities) of the investments made by telecom operators which bear - on the contrary - all the costs of the traffic increase (negative externalities).

On these bases it is quite hard to imagine the possibility for telecom operators to bear the burden of the investments absolutely needed to build new networks (or improve the existing ones) in order to cope with the increasing levels of traffic. Lacking investments, the present networks (even though well performing for the present level of data traffic) will soon collapse. Should the actual trends be confirmed, the networks will actually face a congestion status and the best-effort principle will crowd out "quality sensitive" applications. In such a situation, simple services (such as e-mail, web browsing, ...) will still be granted with a sufficient service quality while more complex services (requiring quality, high bandwidth or real time end-to-end communications such as Telephony over NGN or Video HD) will seriously risk to fail. Indeed, disappointed by the low level of quality of the best-effort delivery, customers will soon quit these more complex and innovative applications. As a consequence, should the best-effort principle be applied, it will be the congestion status of the network making the difference amongst services; this "natural selection" will be won by the more elementary services (besides the fact that possible situations of network congestions may occur to the detriment of all services and single end-to-end communications). It goes without saying that such a scenario would limit the benefits for all end-users, for content application providers, and for the whole society.

Neither can we say that the solution to this dilemma (raising investments to improve network capacity and/or efficiency in absence of a fair return) may be solved by simplistically invoking decreasing costs for infrastructures or economies of scale and scope. As a matter of fact, telecom operators – due to the tough competition in the market which is leading to decreasing prices (according to Eurostat figure the EU level telecommunications prices¹- are already making use of every opportunity provided by technological innovation to decrease their costs and to cope with their strict efficiency objectives.

Furthermore, it is actually debatable whether cost reductions will compensate the costs that telecom operators will need to bear for the increased need of capacity. As a matter of fact, the differential amongst volumes and the decreasing unit costs, as calculated by BEREC in the consultation document, may be susceptible to errors and may lead to different (and even diverging) conclusions. Furthermore, even giving for granted the costs reduction in infrastructures, it shall be highlighted that the transport and the delivery of an increasing amount of data traffic and the presence of different and an increasing plurality of services and applications does not simply lie on routers and/or transport resources.

This dilemma may be efficiently solved by incentivizing telecom operators' investments by allowing them to enrich their offer adding a QoS (quality of services) model which can also include the control of each communication at service and application levels to the current best-effort model. Granting the possibility to choose – on top of a best-effort delivery - different classes of quality provides a freedom of choice to OTTs: the freedom to receive higher performances rather than leaving the network to decide the quality (and, therefore, the type) of the service provided. As a matter of fact, many CAPs such as major film studios, gaming providers, etc. are lately showing huge interest in QoS solutions in order to provide adequate support to the value added services. These operators as well as their clients are showing a willingness to pay for higher level of QoS. It should, anyway, be the market itself confirming the success of those QoS services as well as the sustainability of the investments needed in order to deploy them..

The CAPs paying for QoS (being it a scarce resource), would be able to differentiate their service and be incentivized in optimizing them. Such an optimization will, therefore, lead to innovation and higher welfare for the whole community.

Such an approach has a clear economic ground. BEREC itself recognizes the Internet market to be two-sided having two distinct user groups: OTTs on one side and final users on the other. The two groups therefore provide each other with network benefits (externalities) which make the value of a network to be dependent on the number of subjects using it. On the other side, the costs for the creation and the growth of these externalities are mainly borne by the telecom operators while the economic benefits are mostly enjoyed by OTTs. These network effects are simply transferred from the network operator to OTTs.

¹ According to Eurostat figures, The EU 27 telecommunication prices decreased – on average - by more than 27% between 1996 and 2011 while the prices for other utilities, in the same period increased.

The introduction of differentiated QoS services will not distort the market. Should telecom operators limit the best-effort quality of the service decreasing customers quality of experience, clients would migrate to other providers. It is, actually, the competitiveness of the broadband access market which protects the final users. On the other side, the application of competition rules will grant content providers against possible unfair behaviours put in place by network operators.

Finally, Telecom Italia would like to highlight how new business models enabled by the Internet are creating (and empowering) new actors on the market. However, in the global environment, all players need a level playing field.

As a matter of fact, failing to apply the same rules to all the actors in the value chain would, actually, distort the market dynamics and runs the risk of creating some islands of monopoly which will hamper final users and jeopardize the achievement of the goals set up by the Digital Agenda.

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General comments

Telecom Italia welcomes the opportunity to contribute to the BEREC public consultation on “*An assessment of IP-interconnection in the context of Net Neutrality*” deeming the issue of IP-interconnection nowadays topical. We strongly believe that we are rapidly approaching the moment in which we will need to shape next generation networks and services from regulatory, technological and economic points of views. By doing so, we will define the future of the Internet as well as of our lives.

Framing the picture

The development of the Internet Economy has recently grabbed a lot of attention. The rapid evolution of the Internet from being a newly commercialized resource in 1995 to a network with over 2 billion users today drew attention on a critical infrastructure for our economic and social lives. New services enabled by the Internet and by broadband access (and in perspective offered through Next Generation Networks as defined in pp. 6 and 7 of the document in consultation and by the relevant documents delivered by ERG on this issue and recalled in the draft report) are changing the economic landscape and the nature of the telecommunication industry. As a matter of fact, all telecommunication traffic is today migrating to Internet-protocol (IP) – based networks.

Actually, the raise of a new IP-based economy (implying new sources of revenues as well as new investments) leads to a new market which is characterized by new services different in scope and scale i.e., no longer taking place on a national scale. Competition itself – as a consequence - is actually becoming wider in scale and scope: the competitive arena has nowadays become the world.

Those evolutions made telecommunications services’ market far more competitive. The change experienced by the telecommunications’ industry is even more evident if we think that the “core” telecommunications service, the voice service that gave birth to the telecommunications industry as we know it today, has now become an “add on” service. Voice telephony tends now to be considered as an ancillary service provided within a bundle offer to supplement more valuable services such as cable TV or broadband Internet access. Internet and the present bandwidth availability are emptying voice telephony of its value.

Moreover, such a new economy is encompassed by new players: in particular Application and Content Providers (CAPs)/Over the Top (OTT) and Content Delivery Networks (CDNs)². These new players - often located outside the European Union and, therefore, acting outside the rules of the European regulatory framework - have grabbed an important share of the value of the industry by

² Please note that all Telecom Italia’s contribution we make to reference to CDNs as the operators defined in the BEREC document in consultation , i.e. as specific players that “[...] serve as aggregators of content usually on behalf of Content and Application Providers. They deliver content close to the terminating segment” (p. 14 of the BEREC document in consultation).

offering services and applications to end-user. Therefore a regulatory and economic imbalance is nowadays in place at the expense of authorized electronic communication networks and services providers.

From the regulatory point of view, OTTs do not comply with any obligations related to user protection and security, integrity, quality and continuity of the services whilst publicly available electronic communication networks and services providers have to comply with heavy obligations requiring significant investments. Such a situation not only does not grant a level playing field in a highly competitive arena but also – as we will better detail further on – involves the risk of hampering final users (due to the lack of interoperability of their applications) limiting the benefits of the Internet economy enjoyed by the society.

From an economic point of view it is important to understand how to combine the decreasing telecommunications' operators revenues with the investments needed to build future proof networks (i.e. networks able to cope with the increase in data traffic granting quality of service and of experience to the final user) considering that OTTs use the operators' networks substantially without contributing to the remuneration of the investments on the Internet value chain.

Both the economic and regulatory aspects highlighted above become relevant when addressing the issue of net neutrality in the field of IP-interconnection.

Net neutrality in the domain of IP-interconnection

The net neutrality principle – as stated in the BEREC public document in consultation – seems to be definitely strict. As stated in the Introduction (p.4 of the draft report) “network Neutrality, for working purposes, is the principle that all electronic communication passing through a network is treated equally. That all communication is treated equally means that it is treated independent of (i) content, (ii) application, (iii) service, (iv) device, (v) sender address, and (vi) receiver address. Sender and receiver address implies that the treatment is independent of end-user and content/application/service provider”.

Anyhow, BEREC strict approach to the network neutrality principle (and its link to the best-effort methodology of service provision) can hardly be shared.

As a matter of fact, BEREC seems – at least in the document in consultation - not drawing any difference between specialized services and Internet best-effort services; such a difference is definitely important due to the intrinsic characteristics and regulatory obligations linked to the different services. Specialized services are publicly available communication services that have to comply with a set of obligations related to quality, security, integrity, availability and continuity of the services and networks. Those services guarantee predefined end-to-end quality levels and therefore are not compatible with a best-effort Internet network. They require appropriate architectural models (the so-called Next Generation Network) that can be based on the Internet Protocol but which are completely different from the best-effort global Internet Network providing,

within the network, service and transport resources in order to guarantee predefined quality levels for the provision of end-to-end services to the final users.

As a matter of fact, when providing specialized services, operators are already obliged to provide certain level of quality of service. Granting these levels of services implies an effort which goes beyond the “best-effort”. Operators therefore need – in order to fulfil regulatory requirements – an appropriate network control and management in order to guarantee the provision of the service subscribed by the user. Such an approach could not be considered by BEREC as a lawful breach of the network neutrality principle. On the contrary, it represents the only way to guarantee network integrity and security requirements and all the obligations laid down in the European regulatory framework. As already stated above, considering regulatory requirements and intrinsic characteristics of specialized service, network neutrality – in the strict definition provided by BEREC in the document in consultation- cannot apply to them, while the regulatory principle of non-discrimination amongst services and amongst users continues to apply.

Therefore, once recognised the difference between specialized and Internet best-effort services, BEREC should consider that IP-based networks are not necessarily best-effort. In fact Next Generation Networks, although based on Internet Protocol, allow an end-to-end control of each single communication guaranteeing specific predefined quality levels. As a consequence the specialized services’ provision among different networks needs an interconnection at service level in order to guarantee the needed requirements on each end-to-end communication.

BEREC should recognise those differences in services and networks concluding that net neutrality issue does not apply to specialized services as they are characterized by specific features and regulatory obligations requiring specific network handlings also at interconnection.

Focusing on the issue of IP interconnection it is of utmost importance, also basing on previous ERG activities³, distinguishing between Connectivity Oriented Interconnection (CoIx)⁴ and Service Oriented Interconnection (Solx)⁵. This distinction is not properly highlighted in the document in consultation.

Connectivity Oriented Interconnection is at the level of transport resources and does not allow end-to-end communications control with a specific allocation of resources depending on the specific service provided among interconnected operators while Service Oriented Interconnection is at the level of service and transport resources and allows carriers and service providers to offer

³ See ERG Common Statement on Regulatory Principles of IP-IC/NGN core 08 (26) final.

⁴ CoIx may be defined as the physical and logical linking of carriers and service providers based on simple IP connectivity irrespective of the levels of interoperability. It is characterized by the absence of the service-related signaling, implying that there is no end-to-end service awareness.

⁵ Solx may be defined as the physical and logical linking of NGN domains that allows carriers and service providers to offer services over NGN (e.g. IMS) platforms with signaling control (i.e. session-based services related signaling).

services over NGN (e.g. IMS) platforms with signalling control enabling the allocation of the appropriate network resources for each session-based service.

As better explained in the general comments to chapter 3, BEREC should identify the two different type of interconnection focusing on CoIX for the context of Internet services and net neutrality issues.

As a matter of fact, different services require a different quality of service in order to be fully “appreciated” by users. Let us think of web browsing, of cloud computing, of e-health, of high quality voice and of IP-TV. Admitting that all these service could rely on a best-effort delivery in order to satisfy the strict network neutrality principle stated by the BEREC in the document in consultation is unrealistic especially in a forward looking approach. As we will demonstrate in the next paragraph, pushing forwards this argumentation will lead – as soon as the capacity of the network will reach its limits – to a discrimination against the high bandwidth consuming services or to situations of network congestion to the detriment of all the services provided. Actually, innovative services (especially those requiring certain level of reliability) such as e-health, smart cities etc. cannot actually rely indefinitely on best-effort Internet. If advanced services are a priority on the international policy agenda, therefore they need to be delivered over networks capable of guaranteeing superior service levels and a high level of interoperability.

Such a situation does not imply the change in best-effort parameters of quality of service but requires best-effort delivery to be joined by different (higher to cope with specific needs) levels of quality of service (QoS) and new network infrastructures (i.e. Next Generation Networks) in order to promote better quality of service.

Actually, as we will demonstrate in the next paragraph, best-effort may be detrimental to the deployment of more sophisticated services making the achievement of certain levels of quality of services by means of network management a “must” (at least for some services).

Telecom Italia therefore deems absolutely dangerous and misleading a strict interpretation of the network neutrality principle which enables, to some extent, the equation (emerging in the document in consultation): *network neutrality = best-effort* and which gives to QoS a negative connotation.

The economic issues: towards new business models

Telecom Italia actually agrees with the BEREC observation that today's Internet is based on best-effort with every service transported via IP-based networks treated equally on the transport layer independently from service requirements. Nevertheless, we also strongly believe that best-effort Internet does not guarantee any pre-determined delivery of offered services and situations of delivery delays and loss or network congestions can occur. The issue we would like to raise, therefore, is if such a best-effort model is future proof for the Internet.

The proliferation of new services will certainly work as a flywheel increasing the welfare of the community, the economic growth and the bandwidth occupation. This phenomenon is already

occurring: as observed by the BEREC (p. 30 of the document in consultation), traffic over the networks is constantly increasing although at decreasing growth rates. Such a decreasing trend is anyhow normal when the basis of calculation – i.e. the traffic flow – increases. As a mere example, and limiting our evidence to mobile industry, Cisco recently noted that data traffic has doubled in each of the past four years and is expected to grow by 78% CAGR between 2011 and 2016 while, between 2010 and 2012, average revenue per mobile user (ARPU) declined by 13% worldwide and average EBITDA margins have fallen from 35% to 31% according to Wireless Intelligence data⁶.

Such a situation will lead to a moment - near in time - in which the available bandwidth and available network resources will not be sufficient for the provision of services/applications with an acceptable quality and availability. The consequent network congestion will determine a “natural selection” of the services of the IP-based networks.

In few words, not discriminating on services through the use of QoS will lead to the network congestion itself to operate such a discrimination, in an unpredictable way. Under congestion conditions, every data flow will suffer from packets delay and loss especially damaging real time communications. Only introducing QoS and guaranteed delivery it may be possible to preserve more valuable services (i.e., more sophisticated services requiring higher QoS levels) also when temporary overload conditions occur.

Furthermore, network management will enable new business models based not only on the volume of packets but also on the value of packets and the related use of network resources both at transport and service levels. Focusing only on the volume does not take into consideration the specific service provided as well as the role and the value on the market for the final user. Furthermore, it does not provide any incentive to content providers towards the optimization of their applications.

Such an evaluation was already made by ERG in previous documents but no trace seems to be in the document in consultation.

When certain predefined quality levels of service have to be assured, interconnected operators have to define appropriate wholesale agreements based on the bandwidth occupancy and the type of service so that an adequate remuneration of all the service provision chain is assured.

When this different approach is implemented, the market will be able to “vote” for certain services (rather than others) and therefore to push for certain levels of QoS. This will provide telecom operators with the needed guidance on the direction in which to invest in the improvement of their networks and will (directly) tie the value (and revenues) to investments.

As a matter of fact, providing network operators with the possibility to manage their networks will incentivize them to invest granting them new source of revenues by increasing the portfolio of services provided adding to a best-effort delivery service an end-to-end quality of service delivery.

⁶ http://www.cisco.com/web/solutions/sp/vni/vni_forecast_highlights/index.html. Last retrieved July 30, 2012.

On the contrary, not enabling telecommunication operators to manage their networks may jeopardize the possibility to guarantee the provision of the services subscribed by end-users. Furthermore, as we will see more in details in the answer to question 19, the lack of a remunerated QoS will finally lead to a situation of inefficiency since it:

- Will not provide service providers with the adequate incentives to promote the efficiency of their services;
- Will run the risk of hampering new (and more valuable) service to the prejudice of final users as well as of the economic system in general;
- Will deprive operators of the resources needed to invest in new (and more performing networks).

To conclude, network management should not be impeded in order to promote a) investments in next generation networks; b) business models based on the value of packets and not only on their volume; c) new (and more sophisticated) services; d) efficiencies in the management of the bandwidth.

Are the risks of network management actual?

An approach aimed at promoting a richer offer in terms of different levels of quality of service does not hamper the normal market dynamics, as BEREC seems to fear.

First of all, traffic management techniques used by telecom operators, as recognized by 2009 European regulatory framework, as physiologic. They actually aim at ensuring the provision of specialized services (guaranteeing the needed predefined levels of quality) and, in case of Internet access provision and related applications, at ensuring average levels of quality for all the customers.

Furthermore, we may say that the fear that telecom operators may (ab)use (of) the tools aimed at managing traffic in order to damage service providers does not seem to have ground from both a factual and a legal point of view.

From a factual point of view, the possibility for telecom operators to reduce the best-effort quality of service in order to promote (the sale of) higher “classes” of quality of services is not feasible. Deteriorating customers quality of experience (QoE) will certainly hamper network operators downstream market leading customers – in a competitive market such as that of Internet connectivity – to leave the provider “buying” access services from a different provider. Such a situation will further decrease – upwards – the market towards service providers which will have a limited need of connectivity from such a telecom operator due to the decrease in its customer base. It is therefore the market itself the best watchdog of a virtuous behaviour by telecom operators.

Should, anyway, a telecom operator decide for the “suicide” strategy of downgrading the best-effort quality of service, the EU legal framework in place, and primarily the competition rules,

would certainly protect service providers from any discrimination perpetrated by telecom operators. As a matter of fact, EU Commission has – as demonstrated in many circumstances - all the powers to investigate, *ex post*, telecom operators behaviours and re-establish the situation *quo ante* in cases of abuses.

Telecom Italia deems that network management does not raise any concern. On the one side, the competitiveness of the broadband access market protects the final users. On the other side, the application of competition rules will grant content providers against possible unfair behaviour by network operators.

The regulatory issues and the separation between network and application

In the document in consultation BEREC raises the issue of the separation of network and application layers as the enabler of competition and service innovation.

Telecom Italia actually deems that the focus of such a separation should be put on the service rather than on the applications. As a matter of fact, the European Commission in its directives (namely in the Universal Service Directive: Directive 22/2009/EC as amended by the Citizens' Rights Directive: Directive 136/2009/EC) has long advocated for the network-services separation.

Defining the borders of the network is not trivial: it implies – as we will further detail in the next questions - the application of the electronic communication regulatory framework in terms of interconnection and interoperability.

Stating – as the latest BEREC document seems to declare – that the separation is amongst network and applications, implies putting applications (hardware and software) outside the scope of the regulatory framework.

As a consequence, both network and application providers should be subject to the general authorization regime which is needed to grant not only a level playing field but also the consumers' benefit.

Failing to apply the same rules to all the actors in the value chain would, actually, not only distort the market dynamics but would also create some islands of monopoly which would hamper final users and jeopardize the achievement of the goals set up by the Digital Agenda for Europe.

As a matter of fact, players such as OTTs have created vertical model-based services: they have grown developing vertically-closed systems, where services (and sometimes devices) are linked and tied each other. As a result, once customers enter the "ecosystem", they can hardly leave it being tied to proprietary and non-interoperable applications.

Concluding remarks

In conclusion, Telecom Italia strongly believes that the issue of IP interconnection is of utmost importance in order to shape the Internet of the future. Present assets actually grant the Internet ecosystem as we know it now. Anyhow, in order to enable a future proof Internet new balances need to be found.

The present network may not be able to support the traffic due to new and innovative service in the next few years. The increase in traffic (in an best-effort environment) may, therefore, discriminate services in an unpredictable way hugely damaging value added service which require more predictability (and quality) for their delivery.

In order to avoid the crowding out of more sophisticated services, different path are foreseeable implying new investments in faster networks and a better (and more efficient) management of the networks.

Investing in new networks requires huge economic resources with no guarantee of a return in terms of revenues under the situation described above. This situation is not financially sustainable.

As a matter of fact, network operators will be incentivized in investing if they are allowed to manage their networks, increasing their portfolio of services adding an end-to-end quality of service delivery to a best-effort delivery.

In order to enable the Internet of the future a network management aimed at granting QoS is, therefore, a must. Such a solution – absolutely coherent with the EU regulatory framework - would not affect best-effort delivery and would enable new business models.

The European framework should, therefore, promote rather than forbidding encourage network management, incentivize investments and support value added services. No regulatory intervention is needed to achieve such a result while the threat of the application of (*ex post*) competition tools and the competitiveness of the Internet market will prevent telecom operators from adopting discriminatory behaviours.

Chapter 2: players and business models in the Internet ecosystem – General comments

Chapter 2 of the BEREC draft report examines players and business models in the Internet ecosystem. Such recognition is certainly of utmost importance in assessing the framework.

Telecom Italia, however, would like to point out as the roles of Content and Application Providers (CAPs), Content and Application Users (CAUs), Internet Service Providers (ISPs) and Content Distribution Networks (CDNs) are essentially considered by BEREC – in such a context – as mainly commercial roles notwithstanding the aim of the evaluation made by BEREC in the document in consultation is – generally speaking – regulatory. Telecom Italia, actually deems that BEREC should re-define its approach to the definition of roles and responsibilities of the players in the market by identifying not only their precise commercial but also their regulatory “position” coherently with the definitions set by the European regulatory framework.

As a matter of facts, in an EU framework informed by the concept of net neutrality, every commercial entity providing electronic communication networks and services should be authorized.

Such a conclusion can be drawn from art. 3 of the Authorization Directive (Directive 20/2002/EC as amended by the Better Regulation Directive: Directive 140/2009/EC) which subjects the supply of electronic communication networks and the provision of electronic communication services to a general authorization regime. Furthermore, as testified by art. 2 of the Framework Directive (Directive 19/2002/EC as amended by the Better Regulation Directive: Directive 140/2009/EC) which defines “operator” as every “undertaking providing or authorised to provide a public communications network or an associated facility” and “associated facilities” as “associated services, physical infrastructures and other facilities or elements associated with an electronic communications network and/or an electronic communications service which enable and/or support the provision of services via that network and/or service or have the potential to do so, and include, inter alia, buildings or entries to buildings, building wiring, antennae, towers and other supporting constructions, ducts, conduits, masts, manholes, and cabinets”, the concept of network and services providers includes not only operators providing hardware component dedicated to the mere transmission but also software (and applicative software, as well) providing all a set of network services such as routing management, billing, provisioning, assurance, etc..

Therefore, in light of the 2009 Telecom Package, not only CDN providers should be considered operators providing electronic communication networks and services (installing and managing network facilities) but so should be the CAPs which provide associated (software) facilities.

Not considering CDN providers and CAPs as operators providing electronic communication networks and services (and therefore subject to the general authorization regime) would imply

that rights and obligations stated respectively in articles 4 and 6 of the Authorization Directive should not apply to them.

In a converging market (in which operators are increasingly vertically integrating) such a situation would distort market dynamics jeopardizing the level playing field by leaving the burden obligations deriving from the regulatory framework on telecom operators while granting to the other side (CAPs and CDNs) all the rights (i.e. the rights corresponding to telecom operators' obligations). Such a situation will not promote investments (bounded by regulation) by telecom operators but will also leave CDNs and CAPs free to monopolize their market (by means of proprietary solutions/applications) due to the fact that no interoperability obligation may be applied to them.

As a matter of fact, this interpretation seems to be not coherent with the principle of net neutrality granting to all customers access the content, applications and services of their choice, irrespective of the technology used, be it fixed or mobile, in ways that provide all of them with the best possible experiences and services.

If the rules set by the European framework and – amongst those - interoperability obligations were not applied to CDNs and CAPs, customers would not be free to access content unless they “buy” proprietary applications. In this case, these applications “downloaded” on customers’ terminals – such as VoIP applications – would not be interoperable , in clear conflict with the principle of net neutrality.

Question 1: Are any other important players and/or relationships missing?

Telecom Italia deems that no other important players and/or relationships are missing in BEREC analysis.

Question 2: Do you agree with the classifications of CAPs as outlined above?

As anticipated in the general comments to chapter 2, Telecom Italia deems that CAPs should be actually subject – on the basis of art. 2 of the Framework Directive and in coherence with art. 3 of the Authorization Directive – to the general authorization regime.

As a matter of fact, CAPS (providing, for instance, video streaming or TV channels by means of their web portal as well as by means of applications which users need to download on their personal computers) cannot be simply considered mere applications' producers or content aggregators. On the contrary, since arranging (also from a technical point of view) content for their delivery through the Internet, they should be considered as provider of electronic communication services.

Actually, CAPS adopt proprietary solutions which are not interoperable giving rise to a closed environment. Users willing to take advantage of the content delivered on the Internet need,

therefore, to make use of different (generally speaking, proprietary) applications and technical means. Such a situation is not in line with the European regulatory framework and runs the risk of jeopardizing the achievement of the goals set by the Digital Agenda for Europe.

When an operator provides a publicly available electronic communication service with specific features the interconnection should be at the service level (rather than limited to the transport level). Not supporting such a consideration would imply proposing a model for the provision of content which is not in line with the obligations of interoperability and interconnection.

Should a CAP use its own infrastructure it should be considered as a network operator with all the consequences deriving from such a definition.

Should, on the other side, the CAP operate without any network infrastructure, the latter should be considered as a provider of service connected to a public network and, therefore, substantially different – in its role and responsibilities - from final users. Drawing such a distinction between CAPs and final users is of utmost importance since it leads to different, specific agreements (retail contracts for final users and wholesale agreements for CAPs) with network operators which *de facto* provide the Internet.

Question 3: Do you agree with the classifications of CAUs as outlined above?

Telecom Italia deems the definition of Content and Applications Users (CAUs) in the document in consultation to be deceptive and source of possible confusion.

The inappropriateness of such a definition emerges clearly when the document fails to distinguish between “final user” and “content provider” in the case of P2P services. As a matter of fact, also in an Internet environment it is possible to distinguish (role and responsibility of) operators providing services (even in the case of innovative service enabled by IP technologies) as opposed to the subjects making use of those services. P2P services are actually based on clearly defined providers of services for the sharing and downloading of content by means of applications working as “client” and “server”. Those applications represent the technical vehicles for the provision of the service through the Internet and are clearly neither set up nor released by end-users.

It is, therefore, relevant a clear distinction between end-users and service providers. To this purpose, BEREC should make use of the definition already provided by the European regulatory framework which defines users as “a legal entity or natural person using or requesting a publicly available electronic communications service” (art. 2 of the Framework Directive).

Making use of a different definition is incorrect and would, further, hamper regulatory certainty.

Question 4: Do you agree with the classifications of ISPs as outlined above?

Question 5: Do you agree with the classifications of CDNs as outlined above?

As already stated in the paragraph dealing with “The regulatory issues and the separation between network and application”, the clear cut separation drafted by the document in consultation between network and applications seems confusing also taking into consideration previous ERG reports and its positioning in matter of service interconnection of IP-based NGN networks (see e.g. ERG Common Statement on Regulatory Principles of IP-IC/NGN core 08 (26) final).

It can actually be debated if CDNs’ facilities should be considered as part of the network itself (as it seems to be, according to the abovementioned definition set up in art. 2 of the Framework Directive) or at the border of the network itself. Anyhow, since CDNs install and manage network facilities they should absolutely be considered as network operators for the purpose of the application of right and obligations set by article 4 and 6 of the Authorization Directive.

As a matter of fact, the regulatory definition of “network” is based on a technological and network neutrality principle and, therefore, the type of hardware or software technology used is not at all relevant such as it is not relevant the presence in such facilities of software applications. In the specific, the following network operators may be identified in the Internet value chain:

- Internet Service Providers (ISPs): operator who supplies networks and provides services for Internet access having network facilities aimed at the provision of IAS (Internet Access Service) and at the interconnection with public networks’ operators physically providing the possibility to reach the Internet. As a matter of fact, ISPs provide a retail access to the Internet to the benefit of end-users and generally do not install and manage nationwide public networks. The latter role is generally performed by public network operators who – as carriers – provide transit and/or peering from national and international origins and destinations of the Internet by means of IXP or, directly, through national and international interconnection agreement at IP level.
- Content Distribution Networks (CDNs): specific network infrastructures implying the installation and the management of network facilities. The latter need to be provided by network operators who should be authorized accordingly to the European regulatory framework.

Chapter 3: types of IP-Interconnection – General comments

Telecom Italia would like – commenting on chapter 3 of the BEREC document in consultation which looks at the different types of IP-interconnection - to pinpoint, as already anticipated in the paragraph “Net neutrality in the domain of IP-interconnection”, the need to differentiate (and differently consider) the pure connectivity interconnection (CoIX) and the IP service interconnection (SoIX) which is generally applicable to the session based services such as telephony (but also to text messages, multimedia services, ...).

Such a differentiation is not new and has been “codified” by many standardization bodies such as ITU and ETSI i.e., the only normative bodies recognized by the EU regulatory framework.

As a matter of fact CoIX is the only interconnection type which may be considered in the context of national and international Internet.

Telecom Italia therefore deems, in particular for the purpose of the following questions referring to chapter 3, the BEREC document in consultation to refer exclusively to the CoIX.

Should BEREC document be referred to both types of interconnection, the two needs to be kept strictly distinct and it should be clearly stated that network neutrality issues may apply simply to CoIX. As a matter of fact, SoIX implies a proper architecture distinct from the Internet in order to provide specific end-to-end electronic communication services available to the public with certain predefined levels of quality, reliability and continuity of the service as well as global interoperability. A typical example is given by IP NGN interconnection for PATS.

Question 6: To what extent are requirements regarding traffic ratios still important in free peering arrangements?

Telecom Italia deems requirement regarding traffic ratios of utmost importance in free peering arrangements in order to avoid free riding problems.

As a matter of fact, the growth in the market for contents distributed through the Internet substantially changed the nature of ISPs. While ISPs used to provide access and support services to clients, nowadays they are focusing on providing support and services to content owners when Content Providers are not the subject managing their distribution infrastructures. The market is therefore split amongst traditional telecommunications’ operators (owning the so-called “eyeballs ISPs”) and content owners, content providers or content aggregators of content mainly provided by content producers. Such a new market structure provokes a strong asymmetry in traffic flows leading to a different use of the transport infrastructure which is generally owned by traditional telecommunications’ operators. Such a situation, if reflected in the rules for the peering service,

may lead to a free (and unbalanced) use of telecom operators' networks by ISP and content producers.

In order to face those imbalances which may lead to free riding issues and which lately occurred frequently, Telecom Italia adopted in Italy a "Selective Peering Policy" aiming at defining new policies for new peering agreements as well as for the modification of present peering relationships. Consequently, Telecom Italia's aim is to rationalize the future peering relationships backing to the basic meanings of the peering: an exchange of traffic among "Peers".

In this direction, if traffic ratios are certainly relevant, it is also of paramount importance to promote the overall ecosystem, by paving the way to new interconnection policies based on the "value" of the traffic (and not only on the "volume"). Those policies may enable new business models and implement an ecosystem where operators' revenues will not be unrelated to the investment needs required by the rapid growth of Internet traffic.

With a widespread adoption of "value based interconnection" policies, it will be possible for operators, in order to ensure an adequate return on investment in high bandwidth infrastructures, to negotiate commercial agreements (based on the value of the traffic delivered, in addition to the simple volume). This scenario will lead to a sustainable system of fair compensation for telecommunications services.

In Telecom Italia's view, the new IP interconnection ecosystem shall therefore provide quality of service (QoS) delivery, in addition to best-effort delivery, enabling the provision of value-added network services, to end-users as well as to Over the Top (OTT) players and content providers.

Question 7: To what extent does the functioning of the peering market hinge on the competitiveness of the transit market?

For all the Internet network operators in the value chain, peering or transit is a "make or buy" choice, driven by a pure economic assessment. The larger the peering relationships an Internet network operator wants to establish, the more it needs to invest and spend in its network.

On the contrary, the operator needs to buy IP bandwidth or pay for traffic volumes. Transit is, actually, the way an Internet network operator complements its peering relationships in order to reach the global Internet. The transit market is generally extremely competitive and gives the Internet networks operator full scale of choice.

Question 8: Does an imbalance of traffic flows justify paid peering?

Telecom Italia fully shares the definition of "peering" stated in the BEREC document in consultation as a "bilateral agreement between ISPs to carry traffic for each other and for their respective customers. Peering does not include the obligation to carry traffic to third parties. The exchange of traffic typically occurs settlement free" (p. 19 of BEREC draft report). Furthermore, Telecom Italia

strongly supports the gratuity of peering relationships should the conditions stated in the answer to question 6 be satisfied. On the other side, when there is a payment amongst the parties, the definition of “paid peering” should apply.

The imbalance in traffic flows is actually only one of the conditions justifying the payment of a “IP data service”. As a matter of fact, there is - as well - an issue of Internet sustainability which cannot be limited to a traffic flow issue.

The whole competitive structure of the sector should be revised by introducing symmetrical rules along all the value chain.

Actually, Internet value chain lately underwent a Copernican revolution: it is not any longer an access network but a content network. Since Internet traffic was essentially balanced and characterized by the exchange of contents amongst final users, access network was the enabling part of the business. As a consequence, competition focused on this part of the business leading to the squeeze of (essentially cost oriented) prices. Eyeball ISPs therefore consider such an access network as a commodity with limited value.

On the other side, contents became more and more important and “heavy” (in terms of bandwidth occupation) generating - together with the fact eyeball ISPs link to these “products” the real value of the Internet – the (fortune of the) content providers’ business model.

In such a scenario in which value is concentrated on contents, access providers’ business would be not sustainable leading to decreasing margins: in order for the market dynamics to be virtuous content owners should, therefore, have to share some infrastructure costs with telecom operators.

More details will, anyway, be provided on this issue in the answer to question 19.

Question 9: Does paid peering increase (number of contracts and volume handled under such contracts)?

Telecom Italia observes a limited thus growing use of “paid peering”, which is a valuable means of direct interconnection amongst Internet networks.

Up to now, Telecom Italia did not reach any “paid peering” agreements in the domestic market. In the near future (and as a consequence of the entry in force of the above mentioned “Selective Peering Policy”), we expect some of national ISPs to adhere to “paid peering” agreements.

Question 10: To what extent does regional peering increase in relevance and affect transit services?

The market shows a strong development of domestic and regional IXPs.

The principles guiding Internet network operators in deciding whether to develop local or regional capacities (i.e. make or buy choice) and the associated implications on the transit market are

already stated in the answer to question 7: as highlighted here above, transit complements peering relationships in order to allow Internet operators to reach the global Internet.

Question 11: Are any important services missing from the list of services provided by IXPs?

Telecom Italia deems no important services to be missing from the list of services provided by IXPs. As a matter of fact, the list of services provided by IXPs as stated in the BEREC document in consultation seems to be complete to the extent that they grant the possibility to provide both a best-effort and an end-to-end QoS delivery.

In fact, as already stated above, in Telecom Italia's view, to accommodate the Internet of the future a new IP interconnection ecosystem must be shaped, enabling in addition to best-effort delivery provide an end-to-end quality of service deliver. As a matter of fact, such a model will enable the provision of value-added network services, to the benefit of end-users as well as of Over the Top (OTTs) players and content providers, reflecting the actual value of traffic delivery over network infrastructures.

Question 12: Are there any further developments regarding IXPs to be considered?

IXPs are starting to form *consortia* amongst them and to interconnect each other. They are, actually, beginning to offer their customers the possibility to interconnect ISPs that are on different IXPs; as a consequence they are expanding the focus of their activity from the domestic to regional domain.

Question 13: Should in future Europe evolve to have more decentralised IXPs closer to CAUs?

IXPs decentralization to move closer to CAUs is a process which is already on going. In several countries there are several IXPs that are collecting local ISPs. At the Italian level, this trend was first noticed in Milan (MIX), Turin (Topix) and Rome (NameX) and more recently in Florence and Verona.

Question 14: Will traffic classes ever become available in practice on a wide scale?

Telecom Italia strongly believes that – in the near future - traffic classes will rule data interconnection. Traffic classes will, actually allow quality of service (QoS) and dedicated services

to be offered on the market in order to respond to the needs of those customers and market players requiring different levels of service, e.g. background or higher QoS.

The surge of traffic classes (on a wide scale) will imply the definition of a basic set of quality classes. The definition and implementation of a roadmap for their wide scale adoption enabling new Internet business models which will guarantee the security and quality of service delivery is still, for the time being, an open issue on which players in the telecom sector are working.

Question 15: Will interconnection for specialised services be provided across networks?

The provision of interconnection for specialized services across networks depends on the type, number and diffusion of specialised services; some specialised services such as federated CDN, VoIP, Cloud Services Enterprise/ Cloud Services Health etc. need to be supported across networks.

It is well known that the future of IP and of the Internet will be characterized by a multi-carrier and multi-technology environment and this will result in much heavier interworking of networks, platforms, terminal devices and B2B processes as well as in the availability of end-to-end services. In order to foster investments and innovation in the IP world and in the Internet ecosystem, it is, therefore, undoubtedly necessary to achieve sufficient levels of interoperability and standardisation across network.

As already said in the section “Net neutrality in the domain of IP-interconnection” specialized services, due to their characteristics and regulatory requirements, need specific NGN architectures based on Internet Protocol, but different from the global Internet network (the so called Big Internet) and with specific control and management of service and network resources. In order to guarantee predefined quality levels for each end-to-end communication an IP-based interconnection at service level is needed (the so-called SoIX – Service oriented Interconnection)

Such a consideration leads us (as already done in the general comments to Chapter 2, on page 15) to re-affirm the need of a regulatory definition of the players in the Internet ecosystem as operators providing electronic communication networks and services coherently with art. 3 of the Authorization Directive. Framing these operators within the framework of a general authorization regime would, actually, promote the deployment of interoperable services to the benefit of consumers.

Should this not occur , spreading the offering of specialised services (not standardised nor interoperable) will run the risk – as already anticipated - of creating islands of not fully interoperable services and monopolies.

Question 16: Will other solutions for improving QoE like CDNs become more successful rather than traffic classes?

CDNs may be considered as one of the possible means to improve quality of experience (QoE) on data interconnection for particular non- real time services.

On the contrary real time services, such as voice or video calls require QoS/traffic classes to be implemented on IP interconnection in order to ensure proper QoE.

Beside, for session based services (such as telephony) the control and management of the service and network resources for each single end-to-end communication is needed in order to guarantee the characteristics and quality requirement. In such a case, a Next Generation Network architecture should be implemented.

Chapter 4: Recent Changes – General comments

Telecom Italia deems that the increasing role of CDNs – highlighted in Chapter 4 of the BEREC document in consultation (“Recent Changes”) - should not be considered as a structural change in the Internet model. As a matter of fact, the latter is always the same not having Internet any architectural governance.

The increasing role of CDNs is, on the contrary, a necessary evolution of the Internet due to the impossibility of the current business models based on best-effort to cope with data traffic growth and with the increase in the number of multimedia and content delivery applications.

Indeed CDNs usually locate a set of multimedia servers, connected to public networks, closer to national end-users significantly improving both applications and services provisions and user experience. From the operators’ point of view, the whole network and service/application platforms will be much more manageable with respect to the unforeseeable increasing of the plurality of multimedia services and applications.

Such a consideration leads us to re-affirm the need to give CAPs and CDN providers the connotation of electronic communication network and service operators as already stated in the answer to question 2.

Question 17: Which of the factors impacting on the regionalisation of traffic is most important: language, CDNs, direct peering?

Telecom Italia deems language and content to be the most important factors in the regionalization of traffic. As a matter of fact, CDN and direct peering are enabling factors aiming at developing local content and localizing it.

Question 18: Are any further issues missing?

No further issues seem to be missing from analysis conducted in the BEREC document in consultation.

Question 19: Given the cost reductions and the economies of scale and scope observable in practice, why do network operators call for compensation

As stated by the BEREC draft document, today's Internet is certainly based on a best-effort approach with every service transported via IP-based networks treated equally on the transport layer independently from service requirements.

Anyhow, Telecom Italia thinks that the document in consultation should be forward looking trying to imagine (and to frame) the Internet of the future rather than simply taking the picture of the present situation.

While performing this task we need to understand - in a forward looking perspective - which are the reasons leading telecom operators ask for compensation.

As a matter of fact (and as observed by BEREC on p. 30 of the document in consultation), IP traffic is increasingly growing and this increase is mainly due to services originated from OTTs/CAPs. Such an increase in data traffic requires telecom operators to improve the capacity of all the network's segments and therefore investments on the network operators' side. Also due to business models based on flat tariffs, there is no correspondence between increasing traffic data and revenues. Actually while the former implies the need to improve the network capacity and/or operational efficiency and, therefore reflects an increase in costs (investments), the latter are not increasing but are stagnating (or even decreasing due to the competitive pressure) as a consequence of the limited growth in the number of users; as pointed out by BEREC itself in its draft report – "the growth of total IP traffic is particularly driven by the traffic growth per subscriber while the subscriber rate of growth plays a smaller role" (p. 30 of the draft report). This means that revenues for telecom operators are steady when not decreasing as a consequence of the increased competition in a highly competitive market.

This does not mean that the Internet cake is becoming bigger: it simply means that the shares of the cake are differently divided. Actually only OTTs/CAPs are today benefitting from the increased traffic and are enjoying the benefits (positive externalities) of the investments made by telecom operators while the latter bear all the costs (negative externalities).

It is quite clear that the future Internet will need to rely on a new (economic) paradigm promoting more performing networks to enable new and innovative services. The best-effort model (on which today's Internet is based) has worked well up to now: the increase in data traffic will soon make this model obsolete leading to congestion and crowding out some services. In order to avoid those issues new investments are needed to the consumers' benefit and the whole community's welfare. An adequate "compensation" for these investments (based on a different paradigm) is also needed to incentivize operators in promoting innovation.

Unfortunately, if the assessment of the problem is clear the solution on how to solve the dilemma (raising the investments needed to cope with the increasing amounts of data traffic granting telecom operators an adequate return on them) is more difficult and various solutions may be envisaged:

- a) Increasing the capacity of the present or future networks and/or managing the traffic on the network in order to prioritize the services needing a higher QoS and occupying more bandwidth.
- b) Introducing capped flat rate offers.

As pointed out by BEREC (p. 34 of the document in consultation), the latter solution is currently used by mobile operators to cope with the huge increment of the traffic volume of the mobile access network which is not compensated by additional revenues. Anyhow this solution does not seem to be the optimal one taking into consideration the Digital Agenda broadband targets fixed by the European Commission and the net neutrality principle. As a matter of fact, the broadband targets set by the Digital Agenda (interpreted in light of the net neutrality principle) aim at allowing all European citizens to have high speed open access to all the content, applications and services of their choice, irrespective of the technology used, be it fixed or mobile, in ways that provide all of them with the best possible experiences and services. The capped offers seem to match neither the spirit nor the word of the Digital Agenda for Europe.

Moving to the other hypothesis (market with letter a)), investments in the networks require an adequate return (in term of earnings). However, revenues today are limited due to flat fees and to the limited willingness to pay for the Internet connectivity by final users. Anyhow, telecom operators would not be in the position to raise the price of connectivity due to the highly competitive structure of the market. As a matter of fact, the first operator raising the price for connectivity will see its market share dramatically dropping to the advantage of competitors. Bound by the so called prisoner dilemma, no operator will, therefore, be the first mover in such a direction.

The draft report's points out that the return on these investments may be granted – rather than by more revenues - by cost reductions in infrastructure facilities due to technological innovation which should, in BEREC opinion, compensate for the costs of additional capacity (chapter 4.2 of the document in consultation). Telecom Italia actually deems that BEREC draws the wrong conclusion from (partially) acceptable assumptions.

As a matter of fact, telecom operator are already leveraging technology in order to decrease costs. It is the competitiveness of the market as well as the activity of regulators which calls for a stricter efficiency: as a consequence of the two combined causes, telecom tariffs decreased in Europe by more than 27% from 1996 to 2011 (EU 27 average, Eurostat data) *versus* an increase in the tariffs of all the other utilities. As a mere example, in Italy – according to Istat figures – the prices for telecommunication services decreased by more than 17% between 1996 and 2010 *vis-à-vis* an increase of water prices by 104%, railway tickets by 59%, gas tariffs by 53%, public transportation by 45% with the general index increasing by almost 35%.

It may, therefore, be debatable if there are more efficiency gains to be extracted from technological innovation; it is true that Moore's law⁷ "provides an interesting illustration that technological progress leads to significant performance improvements" as stated on p. 33 of the BEREC document in consultation. It is also true that Moore himself stated in a 2005 interview that the law cannot be sustained indefinitely: "It can't continue forever. The nature of exponentials is that you push them out and eventually disaster happens."⁸ We do not want to say that we are near to the disaster, but certainly there are evidence that the costs decrease will not last for long: many scientists – and Mikio KAKU⁹, professor at the City University of New York amongst them - share this position. If BEREC position is true today, it does not provide any (forward looking) insight on the near future.

Moreover, should we focus on today's framework, the assumption that the costs for the routers are – for the time being - declining over time and that the economies of scale in the transit market cause a reduction of unit cost may be debateable. It would be, actually, easy to counter argue that:

- it is questionable whether cost reductions as well as economies of scale and scope will compensate the costs telecom operators will need to bear for the increased need of capacity;
- the costs for transportation of increasing amount of data traffic does not simply lie on routers and/or transit.

As per the first issue (i.e. whether costs reduction compensates costs for increased capacity), we would like to point out how the relation outlined by BEREC draft report between volume increase and unit cost decrease is absolutely questionable. As a matter of fact, the differential amongst volume increase (30% to 40% for fixed traffic and 100% for mobile traffic) and the decrease in unit cost (20% in the fixed and 50% in the mobile) may lead to a high risk of errors and justifies many different (and even diverging) conclusions.

Moving to the second issue, BEREC document (paragraph 4.5 "Flattening of network hierarchies") points out that the traditional interconnection scheme among different layers of the network is going to be replaced by the IXPs, providing interconnection among local access providers. The relevance of the access network in economic terms is thus growing and the majority of costs of a NGN actually lies in the access.

To conclude, investing to increase the bandwidth capacity of telecom network seems, up to now, not a stand-alone solution since it has neither economic nor financial ground: in few words it does not seem to be sustainable due to the lack of return on the investment. Furthermore such a solution would not be efficient: it would actually increase the capacity of the network with no cost

⁷ In 1965 Gordon Moore stated that the number of integrated circuits on a computer chip was doubling every 18-24 month.

⁸ Manek Dubash (April 13, 2005). "Moore's Law is dead, says Gordon Moore". Techworld. <http://www.techworld.com/opsys/news/index.cfm?NewsID=3477> last retrieved July 30, 2012.

⁹ http://www.youtube.com/watch?v=bm6ScvNygUU&feature=player_embedded last retrieved July 30, 2012.

for content providers. Not having the latter to pay for such an increase, they will not have any incentive in rationalizing their service making them more efficient and, therefore, occupying the less bandwidth possible. The fact that the bandwidth does actually not have a “price” may, actually lead to deprive it of its value and be source of possible misuses.

As a matter of fact, to be incentivized in investing in future proof networks, operators should be allowed to manage their networks increasing the portfolio of services provided by adding an end-to-end quality of service delivery to a best-effort delivery. Granting the possibility to choose – on top of a best-effort delivery, which would still be the default approach - different classes of service would actually be a win-win solution:

- giving to telecom operators new services to leverage in order to increase their revenues therefore – by means of new business models – granting the sustainability of new investments. Going back to the “Internet cake”, such a solution would not allow telecom operators to divide the cake differently (sharing differently the same market amongst different operators) but to “bake” a completely new cake;
- enhancing end-users thanks to a better quality of service as well as to an array of new (and innovative) services enabled by telecom operators’ investment in quality. Actually in case of congestion of the network (which would be the natural consequence of the increasing traffic on the present network with no incentive to innovate them or build new networks), it would be the network itself choosing the service available to the public. Such a “natural selection” would harm more intensively the more sophisticated services (requiring a more reliability and quality). It would actually be the dinosaurs surviving this natural selection at the expenses of more sophisticated animal such as mammals;
- providing OTTs with a huger freedom of choice: the freedom of receiving higher performances to feed most innovative services rather than leaving the network to decide the quality of the service provided.

It should be the market confirming the success of this initiative as well as the sustainability of the investments needed in order to provide different classes of service quality.

Furthermore, such an approach does not only have an economic sense but seem to us to be somehow “ethical”. One of the most important aspects linked to fast Internet is, actually, the positive externalities it brings along i.e., the effects (benefits) for the economy as well as the whole society overcoming the underlying cost.

As a matter of fact, BEREC itself recognizes such a market as a two-sided market. A two-sided market is an economic platform having two distinct user groups: OTTs (content providers gathering the revenues from the advertising or from the sale of valuable information to final users) on one side and final users on the other. The two groups therefore provide each other with network benefits (network externalities) which make the value of a network to be dependent on the number of others using it. As a matter of fact:

- the more users are in the network the more will be OTTs revenues;

- the more OTTs will “populate” the network, the more final users will have benefits. The latter are the so-called network externalities.

The costs for the creation and the growth of these externalities are borne completely by the telecom operators while the benefits are directly enjoyed by OTTs and indirectly by the whole society. Telecom operators are certainly happy to participate to the improvement of society's welfare but do not share the fact that the main benefits of these investments should be enjoyed by OTTs who are – more and more nowadays – becoming competitors in the enlarged electronic communication markets.

These network effects, with the regulation in force today, are simply transferred from the network operator to the OTTs.

As a conclusion the rules of traffic management are the best suited tools to incentivize investments giving rise to a win-win solution between operators and OTTs receiving a higher quality of connections for a charge. Even this exchange of value alone (i.e. without any – above mentioned - considerations related to the sustainability of investment enabling the Internet of the future) would justify a compensation for the telecommunication operators.

Question 20: Do you subscribe to the view that CDNs lead to improvement of QoS without violating the best effort principle?

Although doubting whether there actually exists a best-effort principle in the EU regulatory framework, Telecom Italia does not share the double assumptions underlying the question in object i.e., that:

- the best-effort principle is the watchdog of network neutrality; and
- different classes of QoS are, by definition, incompatible with a best-effort approach.

We already touched upon the first issue in our general comments. There is not any specific equivalence between “best effort” and “network neutrality” and, as a consequence, it is not true that “network management” is incompatible with “network neutrality”.

It is actually the European regulatory framework – as discussed above - proving these assumptions wrong when requiring from operators a certain quality of service for certain services. For instance art. 22 of the Universal Service Directive provides NRAs with the power to impose minimum level of quality to all operators in case of degradation of the service. In this perspective, traffic management becomes the tool providing OTTs with a higher speed for the connections without decreasing the overall performances of the network for the other information providers. In other words, traffic management grants higher quality connections in a non-discriminatory manner.

Furthermore (and coming to the second assumption), Telecom Italia deems QoS and best-effort delivery not to be incompatible. We actually think that they may easily go together as two different

sides of a more complete offer aimed at coping with the different (and more specialized) needs of the future Internet.

Actually, there is no reason why an operator should not offer a best-effort delivery as basic offer and different (premium) quality of services based on the specific characteristics of the services delivered. Such a situation would improve both the operations of service providers (having the chance to choose the level of quality of their service) as well as the final users' quality of experience.

No risks of different QoS classes jeopardizing the best-effort delivery could be foreseen for the reasons already touched upon in the general comments to the overall document: the market is highly competitive and, should an operator downgrade best-effort services (in order to "sell" to OTTs higher QoS), the "retaliation" would come directly from its customers who will leave the ISP to "join" another operator. Should the retaliation by final user not be strong enough, such a behaviour would be punished by antitrust authorities making use of their extensive powers the European framework provides them with in order to safeguard the dynamics of the market.

As a conclusion we may say that CDNs certainly are one of the means to enhance the quality of service without impacting on the best-effort principle and violating the network neutrality one. Anyway, we would like – at the same time - to point out that they are far from being the only mean available.

Question 21: Is there a trend for CDNs to provide their own networks (i.e. integrating backwards)?

Telecom Italia observes a trend towards some CDNs building network capacity. We do not, however, see any CDN becoming network access provider.

Question 22: Is there a general tendency for eyeball (CAU) ISPs to deploy their own transit capacities and long distance networks or even to become Tier-1 backbones?

Telecom Italia deems there is not a general tendency for eyeball ISPs to deploy their own transit capacities and long distance networks or even to become Tier-1 backbones.

As a matter of fact, telecom operators having an international span may be interested in developing their own network and evolving by changing their nature of local ISP to become more global players.

Anyway building a backbone is more expensive than purchasing IP transit so that there are fewer incentives to go global unless there is the opportunity to achieve economies of scale by reaching a substantial number of customers that could benefit from this development.

This is actually the case of large telecom operators owning companies or having partnerships worldwide and counting on affiliates to reach the scale to make this evolution sustainable.

Question 23: If an eyeball ISP becomes Tier-1 provider, does this increase the eyeball's market power on the interconnection market because there are no alternative Tier-1 providers to reach the customers of this eyeball ISP?

An eyeball ISP becoming a large transit backbone or Tier-1 peers with all other (quite numerous, indeed) Tier-1 networks: these peering agreements enable them to access to the respective eyeball customers.

All other Internet network operators can access to this eyeball ISP's customers through direct interconnection ("paid peering" or transit) or indirectly being a transit customer of another Tier-1 network.

Chapter 5: What is the regulatory context for IP interconnection – General comments

As to the regulatory context of the IP interconnection (Chapter 5 of the BEREC document in consultation), Telecom Italia fully supports BEREC statement that “interconnection agreements have developed with little regulatory intervention by Member States” (p. 44 of the document in consultation) and that “any measure could potentially be harmful, so that it should be carefully considered” (p. 50).

Quality of service classes, increasing – as already stated above, lastly in the answer to question 19 – the variety of offers for both OTTs and customers, improving final users quality of experience and, as a consequence, welfare for the whole society, do not imply the introduction of any new regulatory measure.

Actually, the present EU regulatory framework, granting the possibility for QoS classes to be implemented in an open and non-discriminatory manner, enables OTTs to choose how their services are to be carried and the final users to decide how the chosen services is to be delivered.

In order to safeguard the principles of openness, interoperability and non-discrimination, Telecom Italia deems it necessary – as already stated in the general comments opening our contribution – that these rules should be symmetrically applied to all the operators in the market being them ISPs, CDNs or CAPs.

Failing to apply the same rules to all the market players in the value chain would not only distort the market dynamics but would create some islands of monopoly which would hamper final users and jeopardize the achievement of the goals set up by the Digital Agenda for Europe.

Question 24: Will Art. 5 become more relevant as some large Eyeballs have equally qualified as Tier 1 providers not having to rely on transit any more?

Art. 5 of the Access Directive states that NRAs shall “encourage and where appropriate ensure [...] adequate access and interconnection, and the interoperability of services [...] in way that promotes efficiency, sustainable competition, efficient investments and innovation, and gives the maximum benefit to end-users”.

The aim of the article is to avoid denial of interconnection or unreasonable differentiation which may limit the choice of the supplier at the detriment of end-users.

Telecom Italia actually deems that such an article may not become more relevant when eyeballs ISPs qualify as Tier 1 providers since the latter are actually operating in highly competitive markets which makes it impossible for them to limit the choice of suppliers.

As a matter of fact, such an issue may be definitely more relevant if applied to service providers. As already pointed out, service providers are deploying proprietary solutions (applications) which shall be installed on end-users devices. The lack of interoperability of these services may limit the benefit to end-users in name of the only benefits of OTTs. We, therefore, strongly call for the application of the principle of interoperable service also on CAPs coherently - as already stated in the general comments to chapter 2 (p. 15) - with the EU regulatory framework in order to maximize end-users benefit shifting the monopolistic profit to the benefit of the whole society. In order to do so we, therefore, once promote the qualification of both CAPs and CDNs as service and network operators subject to the general authorization regime.

This would actually be in line with the words of the EU regulatory framework as well as with its spirit aiming at maximizing end-users benefit.