Response to the ERG Public Consultation on Regulatory Principles of IP-IC/NGN Core

July 2008

General Comments

Telecom Italia welcomes the opportunity to comment on the important NGN interconnection issues raised in the ERG consultation.

The ERG consultation poses eleven relevant questions on issues such as the separation between transport and services, the number of points of interconnection, the definition of local interconnection, interoperability, bottlenecks and SMP, quality of service, costing and pricing and charging mechanisms.

The consultation focuses on NGN core, a key aspect of the evolution and development of the telecommunications infrastructures; any regulation will certainly have a high impact on the operators business plans and Telecom Italia believes that the need of regulatory intervention shall be carefully assessed and regulation shall be introduced only where it is really necessary.

NGNs can be divided into access, core and services/applications. The deployment of next generation access equipment and fibre is aimed at increasing bandwidth and at the provision of innovative services. The service provision will be "network centric" (personal communication services, network centric multimedia, network centric IT services) and the signalling and control switching equipments will evolve to a common IP/NGN transport and a control/service platform.

The next generation core network towards where core networks are heading, consists, in essence, of a converged IP infrastructure capable of carrying voice, video and data services managed by appropriate control elements. Indeed the NGN will not be the Internet (as it is known today), since it is aimed at a managed network, characterized by customized quality of services, reliability, protection from undue traffic, security, session control, traceability and accountability of user activities, mobility control, roaming and ubiquity of services, service continuity across different technologies and providers.

The "one network – one service" model evolves towards a "one network – many services" model providing benefits for residential and business customers.

Multi-services convergence on a single network transport technology leads to an increased complexity; the role played by the network and control/service platforms is a challenging process. Moreover NGN interconnection should reflect requirements from both fixed and mobile operators and service providers and it should match the business of international carriers as well.

As a consequence, when ERG seems to consider NGN and Internet model as equivalent technical alternatives for public interoperable services provision, Telecom Italia believes that ERG should carefully take into account that Internet system, based on aggregation of different networks operated by different providers, assures just basic "best effort" end-to-end IP connectivity, and it is not appropriate for provision of globally interoperable QoS-enabled public communication services. This has lead to new applications (for instance Skype, etc.) and new "community" services (for instance Google applications, etc.), with a lack of global recognition of the interoperability features. In the case of Internet-based VoIP services, interoperability is provided through connection with traditional public telephone networks and access to emergency services, considered a basic feature of public telephony, is generally not provided.

These drawbacks of the Internet system and its intrinsic differences with NGN as defined by ITU and ETSI should be further examined in the ERG consultation. As described in detail in the answer to question A.4.1 **Internet model** just provides a generic "best effort" IP end-to-end connectivity without any QoS, reliability, availability, continuity of service management, while **NGN** defined by ITU and ETSI is based on a set of requirements and technical solutions aimed at enabling predictable QoS,

availability, reliability, continuity of service levels specific to the service provided and on single end-to-end communications (so called "sessions" in NGN terminology).

ERG analysis should be more focused on ETSI NGN work since, as stated in the European regulatory framework, ETSI is the only standardisation body (ESO i.e. European Standardization Organization) acknowledged by the European Union. Also IETF (Internet Engineering Task Force) works with ITU and ETSI, and 3GPP forum for mobile context, on the evolution of Internet towards NGN.

It is important to consider that ITU and ETSI have based NGN technical and standardization activities on existing IETF technical documentations (so called RFCs, Request For Comment), integrating them and producing unique global technical solutions. ITU and ETSI being recognized as the Standardisation Organisation respectively at a global and European level provide the only opportunity to reach interoperable global technical standards for NGN. In relation to NGN interconnection, ITU and ETSI are working on Network-to-Network Interfaces (NNI) and architectures standards, on one side, to reduce at minimum the implementation options included in original RFC IETF specifications, on the other side, to define unique NGN service "IP-based" interconnection.

Clearly early NGN solutions emerging in the market will be based on ITU and ETSI standards only to a certain degree and they will gradually adjust to the standardization progress. However these initiatives must converge towards NGN/IP service interconnection based on ETSI standards, as soon as they will be completed.

NGN exploits service, control and transport separation principle in the context of public services provision and related quality, availability, reliability requirements: service/control layer and transport layer are separated but they are not completely independent when predictable quality levels for services and single communications has to be assured by operators for the provision of public services.

NGN architecture thus requires a linkage between service and transport level: service/control layer communicates with transport "IP-based" layer to ensure the availability and allocate the transport resources needed for a specific communication service.

NGN evolution is still at an early stage and important technical development decisions are yet to be taken. The number of network nodes and interconnection points will presumably decrease. Any other statement on the most likely interconnection outcome is premature. Given demand uncertainties and business model instability, taking decision on the most suitable interconnection (charging) model is premature.

Telecom Italia is of the view that eventual regulatory interventions, in accordance with the objective of the regulation of the European regulatory framework, have to promote NGN investments and deployment.

- Finally, ERG in its consultation proposes an in depth analysis of the most suitable charging models for "IP-based" interconnection. When "all-IP" networks will have replaced existing circuit switched telephone networks interconnection charging models may then adjust to new business models, but this could happen in the very long term. To this regard Telecom Italia believes that:charging models are mainly influenced by services characteristics rather than by particular technologies. The coexistence of different charging systems rather than a "one size fits all" model is the most likely scenario in a multi-service NGN context;
- charging model has to remunerate each operator and service provider involved in the service provision. As a consequence in NGN context there is no reason why an operator or service provider should not be remunerated according to the service, control and network resources employed in the provision of a specific interconnection service;
- market driven charging models will emerge, also taking into account QoS, availability, reliability, etc. requirements of specific service;

- charging models will emerge in the market and thus interconnection charging regime should not be imposed by ex-ante regulation; NRAs could intervene, after a market analysis, only if market failures emerge.

With regard to the Bill&Keep topic, as recognized at international level and also in the WIK report referred in the ERG consultation, pure Bill&Keep model is considered just from a theoretical point of view, since, in the peering/transit agreements payments are likely not to be symmetric. Moreover Bill&Keep regime implies a set of negative consequences, analysed in the answer to question C.6, related to costs remuneration, the existing billing models (also related to premium rate services), quality of services and investments on quality, routing inefficiencies, spam.

Telecom Italia position is explained in more details in the answers to the specific questions raised by the ERGconsultation.

Answers to the specific consultation questions

1) A.4.1 Separation of transport and service

Considering that according to the ITU definition of NGNs where service-related functions are independent from underlying transport-related technologies, how do you evaluate the concepts of transport interconnection and service interconnection as defined in the document?

In the PSTN world interconnection between traditional circuit-switched networks reflects a focus on telephone services as transport and service are closely linked with each other.

Conversely, a packet-switched IP network provides a platform for the delivery of multimedia services. In principle, any service can be realised with a specific quality level if the performance objectives of the service can be met by the network.

In the ERG consultation, service interconnection is seen as strictly separated from the transport level and is defined as "including solely service-specific aspects". It is also stated that interconnection between services from different operators requires a minimum set of technical (e.g. defined by a SLA) and commercial conditions to be fulfilled by both operators.

However, if the objective of the consultation is to assure and guarantee service specific quality of service and security to the customer especially to offer a substitute for PSTN services (in particular telephone services) both service interconnection and transport interconnection are needed. In fact in NGN context service/control layer is separated by the transport one, but such layers are not completely independent when predictable quality levels for services and single communication have to be assured by operators for public service provisions.

As a consequence in NGN architecture and also at interconnection level a linkage between service and transport level is needed: service/control layer communicates with transport "IP-based" layer for appropriated transport resources availability check and their reservation for a specific communication.

In ITU and ETSI NGN architectures approach and objectives, independence between service-related functions and transport technologies is related to the possibility to provide services using potentially any suited underlying transport technologies: this is the technical definition of the general principle of technological neutrality of ITU/ETSI NGN.

In fact, proceeding in the analysis of ITU Recommendations and ETSI standards for NGN architecture, each specific service determines requirements of needed transport resource characteristics and performances but also of verifying, in the communication set up phase, real-time availability of appropriated transport resources: it *is one of the fundamental, innovative and unique ITU/ETSI NGN characteristics (so called NGN "call admission control" functionality) that intrinsically enables the availability, reliability and service continuity of current ongoing service communications, before accepting new communication request by users*.

As a consequence, *separation between service, control and transport layers is one of the main objectives of ITU/ETSI NGN* and it is technically realized identifying standards functionalities required inside each layers and dialog protocols between such functionalities to enable an appropriate provision of end-to-end services, also at service-oriented "IP-based" interconnection.

It is evident that any service provided between users requires an appropriate transport service and, in that sense, ETSI SoIX (Service oriented Interconnection) definition which also includes transport related information should be more considered and deepen in the ERG analysis.

- Consequently the interconnection used for the public Internet is not appropriate for services with predefined quality levels considering that it is only based on IP connectivity. More in detail: **Internet model** is strictly based on a complete independence of services from transport, since, as indicated in the ERG consultation, service applications are not embedded in the IP networks but in the users' terminal equipments or external SIP servers: actually Internet just provides a generic "best effort" IP

end-to-end connectivity. It is important to highlight that "best effort" characterization can not be considered a particular QoS class but rather the absence of any kind of predictable QoS, reliability, availability, continuity of service, etc.. ;

- **NGN** defined by ITU[1] and ETSI, in collaboration with 3GPP forum for mobile context, is based on a set of requirements and technical solutions that aim to enable predictable QoS, availability, reliability, continuity of service levels and on single end-to-end communications (so called "sessions" in NGN terminology). This means that NGN architecture, interfaces and protocols defined by standardization bodies should be coherent with public services provision. Of course NGN standardization is ongoing and a lot of work need to be done by operators, providers and manufacturers to make available fully NGN compliant products; however available ETSI standards for NGN Release 2 and ITU Recommendations for NGN are already excellent starting points for Next Generation "IP-based" networks development[2].

The NGN interconnection requires standards that are under development by ITU and ETSI, in collaboration with 3GPP for mobile aspects, at transport layer, service layer and other possible functionalities (e.g. names and numbers resolution systems, policy control, identity management, etc.).

Of course, also in a SoIX scenario, a Point of Interconnection between two operators will always require a physical connection between "border gateway" equipments provided by interconnected operators and, on that connection, operators will exchange control information for communications setup and, during end-to-end service provision, will exchange appropriated IP packets flow, in which are coded service information (for instance telephony). This is the base of the ETSI concept of SoIX interconnection.

Finally, NGN can also provide end-to-end pure IP connectivity transport services, also enabling more static QoS transport classes: this, in ETSI terminology, is CoIX interconnection concept. It is to be considered that, in this case, only transport layer is operated by interconnected operators without any technical possibility to manage specific end-to-end services (i.e. voice, multimedia, VoD, etc.) and single end-to-end communication provision (i.e. a telephony communication or a video download, etc.).

2) A.6 Structure of the document

Do you see other issues regarding regulatory principles of IP-interconnection/NGN core that should be dealt with?

Telecom Italia, out of the interconnection issues, underlines that NGN should also be dealt with aspects of investment incentives while the discussion on Bill&Keep regime is mainly focussed on the elimination of the termination monopoly. In our opinion, the structure of the document should also analyse the following topics:

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[1] *According to ITU-T Recommendation Y. 2001 a Next Generation Network (NGN) is defined as a packet based network able to provide telecommunication services and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies.*

[2] *In particular, in relation to the "IP-based" interconnection, ITU and ETSI are working hard on Network-to-Network Interfaces (NNI) and architectures standards for NGN, on one side, to reduce at minimum implementation options included in original RFC IETF specifications, on the other side, to define unique NGN service "IP-based" interconnection between NGN provided by different operators/providers.*
ITU and ETSI architectures and protocols standards assure that any relevant interface and functionality is recognized open standard, also between service/control and transport layers; that is not reachable with original RFC IETF specifications, since they do not define a clear and complete common architecture and interfaces, leaving great space to specific implementation choice.

- NGN investment incentives in QoS under Bill&Keep regime; in fact NGN will require huge investments by operators that should be encouraged by a favourable regulatory framework for the benefits of the European ICT industry and, moreover, of end users;
- implementation of QoS classes with separation of transport and service level;
- effects of Bill&Keep regime in relation to present business models (e.g. carrier selection, preselection, premium rate services);
- service "IP-based" interconnection as a mean to provide interoperable end-to-end services to users;
- the adoption of recognized ITU and ETSI standards solutions, thus discouraging proprietary solutions that could bring to market fragmentation and homogeneous service experience by end users;
- a better differentiation between pure IP connectivity transport service and end-to-end communication services provision, that requires predefined characteristics (common service profile, QoS, availability, reliability, specific transport resources, etc.) or, in NGN terminology, a "session" between calling and called users;
- a better identification of service interconnection scenarios that ERG consultation intends to deal with, considering the existing interconnection cases in NGN context;
- technological network specific issues (network topology, specific PoI number and location etc.) should not be considered for regulatory evaluation, since these are just emerging and evolve rapidly;
- functional architecture aspects should be evaluated to enable innovative interconnection scenarios in the market for interoperable end-to-end service provision;
- ERG believes that there would be a NGN for incumbents and some other type of NGN. In the consultation just one common NGN architecture for interconnection should be considered and evaluated from regulatory point of view, on the basis of ETSI and ITU activities aimed at standard solutions developed by all interested players;
- in principle, technology evolution should be left to market and commercial agreements and, as a consequence, such aspects should not be considered in this very initial phase as a point for regulation;
- the consideration of the E.164 number as a possible bottleneck in the future does not consider that numbering issue is one of the intrinsic provision of interconnection since it enables users identification and charging interconnection model application .

3) B.3.3.1 Number of network nodes and points of interconnection (PoI)

Can you make more precise statements on the number of network nodes and/or points of interconnection in NGNs?

4) B.3.3.2 Definition of local interconnection

a) Is there an equivalent in NGNs to the concept of local interconnection as known from PSTNs?

b) What do you consider to be the locations for the lowest level of interconnection (physical and/or service), e.g. the broadband remote access servers (BRAS)?

c) Could the maximum number of PoI offered be considered equivalent to local interconnection?

It is generally recognized that in a NGN environment the number and location of PoIs will change; the number of PoI in a NGN will depend on a variety of factors and it should be taken into account that most network operators are still at the planning process of their NGNs. At present, it is not possible to make precise statements about this issue.

We think that interconnection network arrangements are based on specific service characteristics rather than to be considered as a stand-alone issue, as it seems to emerge in ERG consultation.

In fact, in our view, the ERG analysis about existing Internet pure IP connectivity interconnection, PSTN interconnection and very initial service-oriented "IP-based" implementation, should be more focused to demonstrate that *interconnection is linked with services rather than with existing or innovative network technology*; consequently, service independent focus on network topology and number and location of PoI can not bring to any assumption in the NGN interconnection context.

On this subject Telecom Italia proposes the following approach:

- interconnection for pure IP connectivity transport service provision exists and is based on commercial agreements among operators and service providers and, in that sense, it is likely not to change also for the future; this type of interconnection does not enable the provision of any kind of end-to-end communication service requiring predefined QoS level;
- interconnection for specific end-to-end service provision requires an in depth analysis of different issues, among which the most important are the followings:
  - Control plane for signalling and user plane, for effective service depend data exchange, interconnection;
  - QoS , availability, reliability, etc. levels;
  - Network dimension and service specific traffic forecast;
  - Network protection and security;
  - Common service profile characteristics for interoperable end-to-end service;
  - Network dimension and geographical coverage;
  - Core and edge architecture internal operator choices and location of appropriated border gateway functionalities and equipments for interconnection;
  - Interworking functionality, in the case of not homogeneous networks;
  - The nature of the service provided (geographic, non geographic, nomadic).

The number of interconnection points will depend on a number of factors, in general, on traffic amount and routes, services provided, etc..

In the case of geographic nature services (for instance fixed telephony), independently by network technology, subdivision in telephony districts is a requirement also for the future, at least for countries that have to follow such geographic service characterization. This usually requires PoIs localized in each district. Mobile or not geographic services does not have such requirements and usually have determined the location of appropriated number of PoIs at core/transit network level. Moreover for international calls management there are other PoIs for interconnection towards foreign operators and international carriers.

Such approach is independent from technology and NGN evolution: differently localized PoIs are globally required to operators depending on local/regional (or metropolitan), national and international levels of offered services.

Considering that, in traditional telephone context, operators are interconnected following a hierarchical approach and legacy interconnection could be another point that should be considered in more detail in ERG analysis.

Evolution of technology, of course, will make available network equipment with more performance and capability, therefore, detailing such scenario for interconnection, number of network nodes to assure appropriate treatment of calls and services could decrease in the future; this aspect is leaded by technological evolution but requires relevant investments by operators and a guarantee of appropriate remuneration has to be assured, also by regulation evolution.

The analysis of hierarchical interconnection and number of network nodes seems, as already said, to be premature at present.

Regarding local interconnection and its possible evolution in the NGN context, Telecom Italia is of the view that is too early to approach this question, since NGN are not deployed in large scale and Next Generation Access deployment choices are not clear. In principle, in the short/medium term the current interconnection points used for legacy services will be maintained, then PoI and levels of national interconnection for NGN will evolve on the basis of technical and economical evaluations depending also on NGN coverage.

5) C.1 Existing and proposed Framework

How do you assess the proposed Framework in the light of the migration process towards NGNs, their technical characteristics and economic implications? Are the proposals suite to address the specific challenges that these present?

Core and access NGN developments, are likely to modify relevant markets definition, increasing concurrent technologies and services and improving competition and potential players in the market. In the revised EC Recommendation for relevant markets, the number of retail and wholesale relevant markets has been reduced and, taking into account NGN context, it focuses on infrastructural wholesale market definitions (i.e. LLU and bitstream); this seems to reduce the regulatory need at higher network level and, in particular, at service interconnection level, unless evident market failure exists. This leads, in our opinion, to the absence of bottlenecks at core level. It is important to underline that also the proposed regulatory framework revision and the recent amendments of EU Council and European Parliament support this view and mainly focus regulatory intervention on infrastructure access and on the promotion of infrastructure based competition.

Coherently, the revision of the European Directives as concern NGN evolution (at least considering the present available draft), is going to the right direction envisaging a more balanced regulation in respect to that applied to traditional network and services. In our opinion, to avoid to slow down the technology deployment, circuit-switched related regulatory obligations should be revised to fulfil the context of NGN "IP-based" characteristics, since NGN changes quality, reliability, availability, etc. and accordingly the paradigm in the networks.

Moreover, considering the attention posed in the Review to quality, service continuity, security and integrity of networks we deem that these issues should be addressed in more detail even within the ERG consultation. In fact it seems to Telecom Italia that "best effort" characterization of Internet-based services is intrinsically not compatible with such orientation to require quality and network integrity and security.

In addition, the criteria to render singularly and independently available to other providers the access to new associated facility of identity, location and presence are not clear in the new provision of Access Directive. Location identity is already provided to reach users in interconnection through block numbering configuration inside interconnected network; again, in the case of presence it is not clear technically what kind of service it refers to and in which context it should be provided.

Finally, the possibility to impose minimum quality levels should be considered in terms of symmetric prescription for all operators and service providers and compatible with intrinsic characteristics of new technologies. Telecom Italia believes that any possible minimum quality obligation, if it deals with services and networks aspects, will technically require to choice NGN architectural ITU and ETSI standards that, in principle, enable basic quality control and prediction in service and transport provisions.

As already said, in case of "best effort" IP-based networks and services requirement, also considered in ERG consultation, quality is not intrinsically predictable, therefore service and network minimum quality requirements could not be matched.

6) C.3.1 Interoperability issues

What type of interoperability requirement do you consider necessary?

Telecom Italia believes that great attention should be paid to interoperability definition and technical consequences. In fact interoperability issues are strictly related to service interconnection between different operators to provide common end-to-end services requiring common service profiles definition, service-dependent control information and user data coding and exchange. Pure transport interconnection, which is not strictly linked with any specific end-to-end services, usually does not present difficulties in terms of operability.

Interoperability is not an issue related to the choice of specific equipment or vendor: any operator or service provider will implement its technical solution evaluating market offers and commercial aspects. An operator could internally choice to acquire the whole network equipments also from one vendor. We do not see any issue regarding vendor interoperability at least relevant for regulation evaluation.

Service interconnection is the tool that has the objective to provide interoperability for a specific end-to-end service; usually common service profiles and specific Network-to-Network Interface, involving control and user functionalities and protocols, have to be agreed by operators to reach interoperability. Then each network internally will provide similar service characteristics and will solve possible incompatibility, for instance, with respect to terminal characteristics and assure common (interoperable) end-to-end service provision.

International standardisation bodies (ITU, in collaboration with 3GPP, at a global basis and ETSI in Europe) activities enable, especially for interconnection issues, wide common agreements among operators, service providers and manufacturers in order to reach general interoperability for specific common services.

Telephone service (and ISDN extension) is the main case that, following strictly normative ITU (and ETSI) standard solutions, has reached a global interoperability; that is a very particular case with few other examples in (tele)communication context.

Also in the case of service "IP-based" networks such path should be followed and ITU and ETSI are working on that matter producing recognized NGN standards; specifications, that are produced inside restricted fora and communities of operators, service providers and manufacturers, can speed up technical solution definitions, but, especially for interconnection matter, they can not have wider application and usually can not be recognized by national administrations. ITU and ETSI pick up also fora activity outputs and define common normative standards for interoperability.

Therefore, Telecom Italia considers ITU and ETSI standards, for architecture, functionalities and protocols, the only solution for service interconnection and interoperability.

7) C.3.2 Impact of charging mechanism on transport bottlenecks

How do you assess different wholesale charging mechanisms in the light of the transport-related bottlenecks?

8) C.3 Bottlenecks and SMP positions

Do you see other areas (potential bottlenecks) for regulatory intervention?

Telecom Italia is of the view that at this stage there is no evidence that the current interconnection charging mechanism leads to market failure or creates bottlenecks. Therefore a regulatory intervention aimed at mandating a new interconnection charging model is not justified. Moreover Telecom Italia believes that structural intervention on NGN interconnection issues (charging model included)

envisaged by ERG can not be enforced either on the basis of an SMP position or on the basis of a more general requirement of interconnection applicable to all telecommunication operators i.e. article 5 of the Access directive (see also answer to question 11).

In Telecom Italia's view NRA intervention on interconnection issues should be mainly aimed at guaranteeing service interoperability and intervene just in case of disputes among operators.
Telecom Italia is in fact firmly convinced that charging model to be applied to interconnection services in a NGN environment should be a market outcome. Moreover NRA intervention on interconnection charging model would not be appropriate since it would go in the opposite direction of the European Commission goal of reducing ex-ante regulation; negotiating the interconnection NGN could decrease regulator's action needs, since it should involve new actors in the markets and expand the market for innovative services.

Accordingly, we see no reason why operators should be forced to adopt a unique scheme for every service. In our view, operators are in principle free to adopt any model on a commercial agreement basis, unless specific non competitive market conditions do exist (subject to non-discrimination, price control, etc.). Regulators actions should be limited to supporting commercial agreements and monitoring the market.

Operators have incentives to reach interconnection agreements without regulatory intervention. ISPs already reached commercial interconnection agreements in competitive markets and regulators were not involved. Similarly, in the mobile market, operators reached agreements on the exchange of SMS voluntarily without the need of any regulation imposing it. Thirdly, providers of unmanaged VoIP applications such as Skype and Yahoo (which are highly relevant to this topic) can interoperate through proprietary and, therefore, not interoperable solution[3].
As already pointed out in the previous ERG consultation on IP based interconnection, Telecom Italia is of the view that there are no bottlenecks in the deployment and interconnection of NG core networks. Indeed major competitors of Telecom Italia in the fixed and mobile telephony (Albacom, Wind, Tiscali, Vodafone, H3G etc) have already been able to develop, deploy and manage their own core networks.

With regard to possible service-related bottleneck functionalities, pointed out in section C.3.3 of ERG consultation, that are part of service-oriented "IP-based" interconnection, like user identity, call session control, charging function, etc., these are considered critical factors: indeed service interconnection between operators provides all such functionalities inside a common service profile for the provision of interoperable end-to-end service. For the reasons illustrated previously, service interconnection can not be provided through Internet model (just a pure IP connectivity provision), and can not be compared with the one related to multi-service NGN.

Charging mechanisms should remain linked to the service provided at interconnection and the related service, control and transport resources used for single communication establishment; that derives from the evidence that each service and each single communication in general impose specific requirements on interconnected networks and use different dedicated resources to be remunerated.

In prospective vision charging mechanism could evolve following service and market evolution, but the discussion, proposed in ERG consultation document, between Bill&Keep and CPNP should focus on more concrete and real cases: in fact in real application pure Bill&Keep does not exist, since there is not usually an economic balancing between operators.

9) C.4.2 Measures based on USO directive

a) Do you consider sufficient to potentially regulate minimum quality (Art. 22 USD new para 3)?

b) Does this require additional regulation at the wholesale level?

3 In March Skype agreed to connect its VoIP service to that of competitor Yahoo. In August Skype signed a similar agreement with Google talk.

c) What is your opinion on ERG's consideration that the power to set minimum quality of service requirements (both, on end-user and network level) should be entrusted directly to NRAs?

Telecom Italia believes that, to express a position regarding possible minimum quality obligation in the interconnection context, it is necessary to better understand the service "IP-based" interconnection evolution.

In our view, to establish minimum QoS standards could complicate technological development; moreover, it has to be taken into account that for mobile services QoS levels are strongly dependent on the user terminals and the number of clients served by each cell which is variable over time.

It should be considered that in the interconnection scenarios the quality is the result of different interconnected networks and, therefore, a single operator can not be in charge of controlling the end-to-end service quality. In IP networks, such guarantees risk to be very costly leading to higher prices for clients.

In the Universal Service context, this requirement should only apply to the telephone service which involves real-time and quality constraints

It also should be considered that quality measures should be harmonized on EU basis, since different choices could impact internal market and completion between Member States.

Finally the imposition of minimum quality of service requirements risks to be more dire than favourable to increase consumer choice because it could act as a disincentive to innovation and diversity.

10) C.5 Costing and Pricing

a) Do you agree with the description of the relevant change regarding the cost level, the cost drivers and the cost structure?

b) For a pricing regime under CPNP, which of the wholesale pricing regimes (EBC or CBC) do you consider more appropriate for IP interconnection?

Specific comments to the ERG consultation document are reported below :

1) The consultation document states that:

> *"It is generally accepted that NGNs core will lead to a lower overall cost level due to increased economies of scale and that the cost structure will change with a higher proportion of common costs compared to legacy networks. The use of common platforms to deliver multiple services across one network exploits economies of scope allowing the opportunity to recover an overall lower cost base across a range of services"*

This statement can only partially be agreed with.
While it's likely that the NGNs Core's *"cost structure will change with a higher proportion of common costs compared to legacy networks"*, it's not given for granted that *"the opportunity to recover an overall lower cost base across a range of services"* will become a reality. We believe that the document should clearly put in evidence that:

- **i)** investments in NGN core are **only justified if coupled with investments in NG Access network;**
- **ii)** it's sure that the investment in a **NGN Access network will be significant** (and higher – when focussing on the fixed access subsystem- than the investment required e.g. to upgrade the existing copper access network through xDSL capabilities[4]). Likely the incurred costs will not be recovered through the line rental monthly fee , which implies **the need of additional revenues generated by core network innovative services ;**

[4] Significant investment will be also necessary in the mobile NGN access subsystems

iii) as a consequence there is no sense in evaluating the business case of a NGN Core network "per se" and can be meaningless to affirm that the NGN core will imply *"an overall lower cost base"*; on the contrary **cost evaluation must be made with reference to the overall NGN Network** (both access and Core);

iv) in any case the implementation of a NGN core network will not only imply investment in the backbone transport network, but also investment at the control and service/application levels, in order to implement a **range of services**;

v) there is no assurance that the investment in service/application capabilities will always give an adequate return, **due to uncertainties in the customers' reaction to these new services and in their willingness to pay.**

2) The consultation document also states that:

"The Opex and Capex of a NGN are forecast to be significantly lower in the long term than current legacy technologies as NGN core networks are generally seen as providing a more efficient network design and usage. The main reasons for this can be summarised as:

- *less physical layers (fewer network hierarchy levels);*
- *fewer network components and interfaces (rationalisation of network components), in particular fewer nodes per layer (depending on the technology adopted);*
- *higher capacity of NGN equipment, because of packet switching technology, resulting in lower per unit cost (€/bit).*

These three factors – simpler network structure with fewer levels and fewer nodes at each level plus more efficient equipment (packet switching technology) – lead to a reduction in the total per unit cost of NGN core networks."

Also this statement can only partially be agreed with.
While it's commonly expected that in the long term the Opex be significantly lower than current legacy technologies, the statement that **also the Capex will be significantly lower can be misleading**.
If on one side it's conceivable that at *"regime"* replacement capex at core level will be – *ceteris paribus* - lower than present replacement capex at the same level, it must be considered that:

- the "*ceteris paribus*" hypothesis is not likely to happen, due to the fact that services portfolio and services requirements will change (e.g. growth of IPTV applications and services), with relevant impact on the requirements in terms of core "capacity", and related investment;
- capex must be evaluated for the **overall NGN Network (both access and Core),** and not for only the core subsystem.

Furthermore, Telecom Italia (like any other Operator investing on NGN) is facing the problem of huge new investments in an uncertain regulatory framework. In this context, Telecom Italia wishes to have more concrete guidelines for example about the level of WACC which affects the return on NGN investment and which directly influence the level of costs, considering the high risk in the NGN investment.

3) The consultation document also states that there are **three factors for Opex and Capex of a NGN being forecasted to be significantly lower than current legacy technologies,** and that:

"These three factors – simpler network structure with fewer levels and fewer nodes at each level plus more efficient equipment (packet switching technology) – ***lead to a reduction in the total per unit cost of NGN core networks"***

This statement can be misleading when read with the other document statement which says that *"higher capacity of NGN equipment, because of packet switching technology*" will result in ***"lower per unit cost (€/bit)***".
As a matter of fact a (likely) **lower per bit cost (€/bit)** doesn't necessarily imply a **lower per unit cost.** This could be true if we talk of voice units (e.g. the cost of a unit of voice call services – e.g. a minute - on a NGN network can be expected to be lower than that on a PSTN network [but the impact of stringent QoS requirements has also to be taken into account]), but it is meaningless to say that because of packet switching technology there will be e.g. a lower IPTV unit cost. Lower than what? Than the cost of an IPTV unit on a legacy network? This is clearly a non sense.
What can only be said is that per unit costs of new services (e.g. IPTV) will tend to decrease over time if there will be a commercial wide acceptance of such services (which in turn will lead to traffic volume growth, economies of scale and technological improvements).
But nothing can be given for granted.

4) The consultation document also states that:

"The use of current cost accounting (CCA) together with LRIC or efficiently incurred FAC/FDC is a preferable framework for estimating efficient costs. CCA when used to inform pricing decisions sends economically sound signals to the market as it calculates the costs relevant for decision making in a competitive market. NGNs will become or are already the accepted modern equivalent asset (MEA) for core networks."

We agree with the fact that ***"CCA** when used to inform pricing decisions sends economically sound signals to the market as it calculates the costs relevant for decision making in a competitive market."* However the following issue arises: if NGN costs are to be evaluated for regulatory accounting purposes, **it should be analysed if HCA reported investments can be assimilated –at least for the first years- to CCA values, so reducing the implementation costs and times of the accounting process.**

Regarding the use of **LRIC or efficiently incurred FAC/FDC** we believe that **these terms should be better clarified**, due to the fact that in the context of the referred document ("ERG (05) 29 – ERG CP Guidelines for implementing the Commission Recommendation C(2005) 3480 on Accounting Separation & Cost Accounting Systems under the regulatory framework for electronic communications") the concept of **efficiently incurred FAC/FDC** seems to be related to a Top Down approach[5] which seems to have **no sense** when talking about next generation networks, due to the fact that is missing "the Top" of the proposed approach.
Therefore, in order to give the economically sound signals to the market, Telecom Italia supports the bottom up CCA/LRAIC approach.

5) The consultation document also states that:

"A key feature of a robust NGN model is likely to be the way in which it deals with the capabilities of the technology to deliver multiple services across a network with a high proportion of common costs.

[5] See page 19: "The top-down model to determine the efficiently incurred costs of the undertaking and the bottom–up model to check its efficiency.

This suggests that ***NRAs will need to understand the cost orientation and cost recovery (pricing) implications of both SMP and non-SMP services running across the NGN platform."***

We understand that this statement implicitly gives for granted that in a **NGN Core network there will be SMP services**[6]. We believe that the technological and market conditions that are at the basis of a NGN Core implementation will neither lead to bottleneck situations nor to SMP situations; in any case a Market Analysis should be performed in order to assess the existence of SMP; in doing so it will be necessary to pay attention to the definition of the concept "NGN Core services", because it cannot be assumed that these services will be the replica of the legacy transport network services.

6) The consultation document also states that:

"contended bandwidth (defined as the absolute bandwidth required for each service taking into account, delay, priority,QoS)"

We agree on the fact that delay, priority and QoS are relevant factors in dimensioning a NGN Core and that a correct approach in evaluating the cost of the services would be that of **contended bandwidth.**
Telecom Italia agrees with ERG about the need of the implementation of new cost drivers in an NGN environment: in an NGN context drivers like "minutes of voice" are no longer appropriate as allocation key, because they do not properly appreciate the differences among **traffic types,** each with its own **service quality requirements**, which are proper of an integrated packet network. It should be noticed that IP packets flowing over the same route at the same time will not be equal, but it will depend on how they traverse the IP network. Then, also the cost of transport will not be always the same but it will depend on its environment.

7) The consultation document also states that:

"There is a possibility that an operator may be left with stranded legacy assets as NGN's are introduced. However, following the technology neutral costing principles, these costs are not relevant for regulatory accounting and are not accepted. Any "double counting" should be avoided and legacy assets should not be costed. Also, the sub-optimal use of capacity in the migration period (due to running in parallel the legacy and the next generation network) may not lead to a cost increase as this would be inefficient while only the cost of an efficient operator should be taken into account."

We cannot agree on this approach, which basically **affirms that the necessity to run in parallel the legacy and the next generation network** (N.B.: a necessity which reflects also the requests coming from many NRAs not to switch off the legacy network before the competitors have recovered their interconnection costs!) is a **symptom of inefficiency**. This is clearly not true, and ERG should better analyse this aspect.

8) The consultation document also states that:

[6] See also the following statement which positively affirms that in a NGN context interconnection prices are to be regulated: "In general the cost of efficient service provision should be used as the cost standard for approval of interconnection rates."

"In a CBC regime the interconnection charge does not depend on the volume of traffic exchanged between the operators; it only depends on the traffic bandwidth (i.e. number of channels) that both parties have agreed on the contract."

This is not completely true; as better said in a following statement, under the CBC what matters is system bandwidth expressed in terms of "channels or bit/s". In other words what matters is not only the number of channel but also the bit/s.
We also believe that is necessary **to recall also in this context the concept of contended bandwidth** (and not simply the concept of bit/s).

9) The consultation document also states that:

"This leads to a change in risk sharing between incumbent and competitor as CBC requires competitors to plan the dimensioning of capacities more carefully. This may pose a problem in particular for smaller operators as they have a smaller customer base. Such a risk distribution between incumbent and competitors might lead to a higher degree of market concentration."

We believe that when investing in NGNs **all the risks should be equally shared by all stakeholders which want to get benefits from the investment made by another subject.**
In a context of reciprocal interconnection it is common interest to plan the interconnected networks on the basis of reciprocal agreements. This situation cannot be qualified as potentially leading to anticompetitive practices or to a concentration of the market.

Regarding interconnection charging regime, Telecom Italia believes that a mix of different pricing regime will apply, since it depends of services characteristics, business choices, etc.
Of course EBC and CBC, applied to a service-oriented NGN interconnection, in principle, will apply in CPNP or real Bill&Keep and peering/transit economic arrangements: in fact, when an economic balancing applies between operators, it can be based on capacity or resources use.

11) C.6 Charging mechanisms

a) How do you assess the arguments with regard to the properties of the charging mechanisms CPNP and Bill & Keep raised in the sections C.6.2 – C.6.10?

b) How can the migration process towards all-IP infrastructures be alleviated for the following options: 1) long term goal CPNP, 2) long term goal Bill & Keep? How do you evaluate the measures and options discussed here? Please also consider problems of practical implementation.

c) Assuming that different charging mechanisms would apply in different Member States: would this imply specific problems (e.g. arbitrage)? If so, how could they be addressed?

d) Do you consider that the issues mentioned here are comprehensive with regard to the application of Bill & Keep for IP-interconnection?

In general Telecom Italia wishes to underline that existing charging mechanisms between public operators strictly depends on the provided end-to-end services and, in any case, when an end-to-end service communication has been set up by subscribers of different interconnected operators, it has to follow the principle that operators have to be remunerated on the basis of service, control and network resources utilized. This principle remains valid irrespectively of the technology.

Besides the present charging mechanisms have demonstrated to work well since they allow the operators to recoup their costs. This gives the necessary incentives for investments especially in higher

network quality. Furthermore the transaction costs of implementation are low because they are well known and the billing systems already exist. Moreover they induce efficient network usage as every network operator has the incentive to route the traffic as long as possible in his own network. Present mechanisms also minimize the SPIT-problem (SPIT = Spam over internet telephony) as the diffusion of SPIT would be very expensive.

On the contrary Bill&keep presents a lot of shortcomings because it does not allow service differentiation, has implications on retail charging model in case of non symmetric conditions, could imply market distortions and routing inefficiencies (the so-called hot potato routing) and it does not foster investments in quality.

Commercial and market development could lead to innovative multimedia services in which voice will be just an element of the provided service. Audio, video, content-based messaging, telephone, may coexist and interconnection services shall be priced according to network resources required by the specific service (on the basis of predefined quality, availability, service continuity levels).

Moreover Telecom Italia would like to point out that charging models have to take into account the necessity to guarantee an appropriate return on investments, also considering relevant costs for operators of introducing NGN technology in own networks and, when appropriate, of migrating legacy services to the new platform. The necessity to guarantee an appropriate return on investment it becomes even more vital in NGN environment since in multi-services environment the value chain will be made by a higher number of players each of whom should be remunerated for the value it adds to the final service.

In conclusion Telecom Italia believes that the multi-service interconnection regime to be adopted has to allow the remuneration of the network resources employed to provide a service, as in the current interconnection mechanism.

In any case the most efficient interconnection model is the model that will be chosen by the market, therefore national and European regulators shall envisage an in depth and prolonged monitoring of the market developments before intervening and changing well established interconnection mechanisms.

In section C.6.2 of the consultation where ERG states “”nevertheless these structural similarities do not preclude flexibility in combining different wholesale and retail regime” it seems to suggest that the Bill & Keep charging mechanism at wholesale level would not necessarily lead to the introduction of the RPP (Receiving Party Pays) regime at retail level.

Telecom Italia instead believes that the introduction of Bill&Keep regime at wholesale level would necessarily imply switching from CPP (Calling Party Pays) to RPP. To this regard, Telecom Italia notes that in countries where mobile interconnection relies on Bill & Keep (or where the termination charges are set below the cost underlying the provision of the service) mobile operators charge customers to receive calls. This strongly suggests that Bill&Keep would inevitably lead to a RPP regime at least for mobile services. Regulators may then be tempted to preclude operators from charging their customers to receive calls. However such a regulatory intervention, in addition to being beyond the scope of the current regulatory framework (mobile services at retail level are not included in the list of the relevant market) would be a mistake since it would create disincentives to provide the service. Firms would not have any incentive to provide a good quality for services for which they are not rewarded.

The application of the Bill & Keep regime to call termination would preclude telecom operators from internalising any portion of the positive network externalities accrued by other operators’ subscribers. With the introduction of a Bill and Keep charging regime the telecommunication industry would thus loose all the positive effects deriving from a partial internalisation of network externalities allowed by the current interconnection regime. Positive network externalities have so far been explicitly accounted for

in the regulatory decisions taken by NRAs (among others see Ofcom decision to set mobile termination charges at LRIC + an externality surcharge).

Telecom Italia notes that internalisation of network externalities is explicitly mentioned within the ERG consultation as one of the economic criteria which should be adhered to by NRAs when assessing the pros and cons of different charging regimes.

The ERG also notes that flat rates are increasingly popular at retail level. Subsequently ERG affirms that "This flat fee can be thought of as covering the total cost of outgoing calls (corresponding to CPNP) or as covering a share of the costs for incoming calls and a share of the cost for outgoing calls (corresponding to Bill & Keep)". Telecom Italia does not agree with the second part of this statement i.e. "this flat fee can be thought as covering a share of the costs for incoming calls and a share of the cost for outgoing calls (corresponding to Bill & Keep)". In fact if this were the case i.e. the retail flat fee were to recover both the cost of outgoing and incoming calls, this would necessarily imply that telecom operators (especially SMP operators to whom pricing below cost would mean an infringement of the competition law principles on predatory pricing) would be forced to increase retail fees with the consequent impact on the demand side.

In section C.6.3 the ERG shows that in RPP countries mobile prices are higher and usage is lower than CPP countries. ERG maintains that this is corroborated by empirical findings on the relationship between the level of retail prices for mobile usage and the minutes of usage (MoU) (see Figure 3 of the ERG consultation).

Telecom Italia believes that end users do not necessarily benefit from the lower prices of outgoing calls of the RPP countries since, overall, end users may be better off in regimes with higher prices for outgoing calls and no payment for incoming calls than in regimes where the benefit of lower outgoing calls are outweighed by having to pay for incoming calls.

Usage data (shown in figure 3 of the ERG consultation) are biased by the fact that the mobile penetration of RPP countries is significantly lower than the mobile penetration of CPP countries.

In countries in which mobile penetration exceeds 100 %. the minutes of usage per customer exceeds the minutes of usage per SIM (shown in figure 3 of the ERG consultation) since on average each subscriber uses more than one SIM. Moreover countries with lower mobile penetration show higher minute of usage per subscriber since subscriber base includes exclusively individuals with higher spending propensity. The enlargement of the subscriber base to individuals with lower spending capability and willingness to pay for mobile services leads to lower average usage. This claim is supported by the evidence emerging from the comparison of the minutes of usage of early subscribers to mobile services (e.g. ETACS subscribers) with the minutes of usage of the individuals having subscribed to mobile services in more recent times.

In section C.6.5 ERG states that Bill & Keep would somehow overcome the need to set termination charge thus eliminating the perpetuation of the need of regulation at wholesale level.

In relation to this argument Telecom Italia would like to point out that in context where customers may subscribe to telephony services provided by application service providers such as Skype (e.g. Skype in service) and where alternative operators provide call termination services through bit-stream the termination monopoly problem seems to cause less concern.

In section C.6.10 ERG raises the issue of the enforceability of the Bill & Keep mechanism within the current European regulatory framework. To this regard Telecom Italia wishes to underline that article 13 of the Access Directive states: "When imposing obligations relating to cost recovery and price controls, including obligations for cost orientation of prices and obligations concerning cost accounting systems,….. national regulatory authorities shall take into account the investment made by the operator

and allow him a reasonable rate of return on adequate capital employed, taking into account the risks involved."

Imposing Bill & Keep (i.e no interpayment charging regime) which eliminates revenues from interconnection services goes beyond what it is currently enforceable under the current regulatory framework. NRAs can impose to SMP operators the provision of interconnection services at a cost-oriented price, but a zero interconnection charge is clearly below cost and thus cannot be set by regulators under the current framework.

In addition to regulation applicable to SMP operators ERG mentions article 5 of the Access Directive as a possible base to impose Bill & keep regimes to all interconnected operators. Telecom Italia is of the view that resorting to article 5 of the access directive as the basis to justify intervention on NGN interconnection issues is not appropriate mainly for two reasons. Firstly, the enforcement of charging models for interconnection services is out of the scope of article 5. Article 5 of the Access directive is aimed at ensuring interconnection among all telecommunications operators while does not cover charging issues. Secondly, in its proposal of review of the EU regulatory framework the Commission further limits the imposition of obligation to non – SMP operators (currently foreseen by article 5 of the directive) by extending both the prior notification requirement and its veto power to all obligations imposed on the basis of article 5. The European Commission proposes to introduce a procedure similar to that NRAs have to follow in case they want to impose remedies different from those explicitly included in the Access directive. By monitoring and reducing the flexibility and the autonomy with which NRAs can impose obligations on non-SMP operators the European Commission intends to limit the imposition of such obligations to exceptional cases guaranteeing a consistent approach across member states. Clearly the enforcement of charging model for interconnection services extends the scope of article 5 and thus it is not coherent with the aim of the European Commission proposal.

A significant part of the consultation document seems to suggest that in NGN environment existing interconnection charging models could be replaced by Bill and Keep.

The suggested superiority of the Bill and Keep regime seems to thrive from the characteristics of the NGN environment. The ERG does not clarify if the replacement of current interconnection regime under evaluation would concern all operators employing NGN technologies in their core networks (including both fixed and mobile operators) or if it would be confined to fixed networks. The ERG document does not discuss in detail interconnection with mobile operators and its particular characteristics.

There is currently a massive disparity in termination rates between fixed and mobile operators in most countries. The application of Bill & Keep regime to both fixed and mobile operators would artificially eliminate the asymmetry between fixed termination rates and mobile termination rates. Telecom Italia is of the view that this is not appropriate since the difference in prices is justified by the diverse transmission resources utilisation and the different costs of the equipment involved in the two termination services. Thus the mobile and fixed termination prices asymmetry reflects more the cost of resources employed and the pricing regime emerged at the retail level (fixed customers do pay a fixed monthly fee remunerating the dedicated access resources while mobile customers do not) rather than the technology adopted in the core network.