



**Comments of Deutsche Telekom AG
on the ERG consultation on
Regulatory Principles of IP-IC/NGN-Core**

11th July 2008



Executive Summary

- The consultation document contains primarily a general and theoretical description. Actual market aspects as well as detailed technical specifications of NGNs are not adequately taken into account.
- The analysis about charging mechanisms is still insufficient and is only focused on two aspects: solving the so-called “termination monopoly” with alleged deregulation as well as decreasing transaction costs only for NRAs. Other aspects like incentives for investments, regulatory induced arbitrage, intensifying sustainable competition are not sufficiently considered.
- Instead of deregulation the consultation document proposes several new regulatory interventions like setting a minimum quality of service or determining the amount and location of the Point of Interconnections. However the former is already the subject of today’s well established standardisation process and has to be left to the market. The latter proposal would massively intervene into network structure and topology which is the origin task of the network operator. Both proposals would otherwise lead to massive market distortions.
- The consultation document demands for quality of service but has a strong tendency towards Bill & Keep as long term interconnection regime. Due to free riding problems Bill & Keep gives disincentives to invest in quality of service and infrastructure. The claim to set a minimum quality of service as well as the introduction of quality of service classes is contradictory to the proposal that Bill & Keep should be the aspired as the long term interconnection regime.
- Aspects of the migration period and their consequences aren’t sufficiently analysed. Thus, the consultation document proposes to apply the costs on the alleged low-cost IP-based technology to the migration period as well. Stranded legacy assets, while NGNs are introduced, are said not to be relevant for regulatory accounting. ERG does also not take account of the fact that sub-optimal use of capacity in the migration period would lead to higher costs. Moreover, special characteristics of today’s different network types are not considered (e.g. fixed vs. mobile networks). The negative impacts and massive disruption of such approaches on the market are not analysed. The proposal of the former ERG consultation to determine a gliding path for interconnection prices during the migration period to avoid massive disruptive effects is only mentioned in the Chapter “Conclusions”, but not analysed in detail.
- The separation of service and transport layer as well as the differentiation of independent service and transport interconnection is counterproductive for the advantages of a managed NGN. Without an interaction between service and transport level neither service specific quality of services nor security or network integrity could be assured to the customers.
- Due to the incentive to increase the utilisation of the NGN, a network operator will provide access to his NGN via adequate wholesale products with open and standardized interfaces to independent service providers. Therefore service competition is also fostered in a NGN environment.



Deutsche Telekom welcomes the opportunity to comment on the ERG consultation on Regulatory Principles of IP-IC/NGN-Core. With the development and implementation of IP-based Next Generation Networks (NGNs), NGN-interconnection becomes an increasingly important issue.

Basically, Deutsche Telekom is of the opinion that NGNs will significantly reduce barriers to entry and thus will further enhance competitive pressures, especially on already competitive core network markets. Therefore, we are deeply worried about regulator's tendencies to extend regulation towards future NGN environments without any prior assessment whether the Three-Criteria-Test will be fulfilled and whether regulation will be justified altogether.

The implementation of IP-based NGNs is still at the beginning and the pace of roll-out varies amongst EU Member States as well as outside the EU. The build-up of NGN is driven by commercial, technical and market circumstances and the final network architecture is still uncertain today. Due to this uncertainty any regulatory intervention would risk to hamper innovation and investment in these new technologies.

I. General comments

1. The consultation document contains primarily a general and theoretical description

The ERG consultation is based primarily only on theoretical aspects. Actual market aspects as well as detailed technical specifications are not taken into account.

It is mentioned in the summary, that the paper will look at IP interconnection in general, and that it is not confined to voice interconnection. But the following chapters concentrate on voice and less account is taken to other services. Particularly for the charging mechanisms specific characteristics of the different services should be kept in mind, because dependent on the special service other charging mechanisms could be optimal. Thus, further study seems to be necessary.

Furthermore the special characteristics of today's different network types aren't considered, e.g. fixed vs. mobile networks. However, this is particularly necessary in the context of costing and pricing aspects because different network technologies lead to different network costs which have to be considered.

Moreover it seems that the technical aspects of the NGNs are sometimes mixed with those of the public Internet. Particularly the claim to separate transport and service layers shows that the special characteristics of a NGN are ignored. One of those special characteristics is to guarantee a service specific quality of service. The ERG itself claims that a minimum of quality of service should be met. (See also Art. 22 UD). However, precondition for the assurance of a specific quality of service level is the existence of a linkage between service and transport layer to coordinate the special service requirements which have to be realised also on the transport layer. In contrast to that, the public Internet couldn't assure specific quality of service, because service and transport layer are independent of each other. Therefore the public Internet only could provide quality of service in a best-effort-manner.



The same problem that the special characteristics of a NGN on the one hand and the public Internet on the other are not analyzed thoroughly enough holds also true e.g. for the new section on security and integrity of networks and services which has been introduced as Art. 13a and 13b Framework Directive. Only a managed NGN could assure specific security and integrity of networks and services. In contrast the unmanaged public Internet could not fulfil these requirements.

2. Charging mechanism: still insufficiently analyzed

As the implementation of IP-based NGNs is still at the beginning and the final network architecture is still uncertain, it is too early to determine *the one* future charging principle for NGN-interconnection. Due to this uncertainty any regulatory intervention would risk to hamper innovation and investment in these new technologies.

The discussion on NGN-interconnection shows that NGNs and the Internet will most likely coexist in the future. Hence there are going to be two kinds of parallel interconnection schemes between IP-based networks: interconnection between managed NGNs and interconnection between the unmanaged public Internet.

Any NGN-interconnection arrangement has to meet the following objectives:

- to give incentives for investments,
- to foster competition,
- to give incentives for efficient network usage,
- to minimize transaction costs,
- to avoid regulatory induced arbitrage.

These objectives would be best achieved by market negotiations. Today's well-established CPNP-interconnection approach and CPP-principle on the retail market in the PSTN and the mobile networks also accomplish these objectives.

Besides, Bill & Keep, which is always mentioned as one of today's charging principles for interconnection in the Internet, particularly for the peering arrangements is the efficient outcome of private negotiations without any regulatory intervention of two network operators when they regard each other as symmetric. As a market outcome, Bill & Keep will also meet these objectives.

In contrast a regulatory obliged Bill & Keep-regime would have a lot of shortcomings. It induces market distortions, inefficient investments as well as technical inefficiencies. Bill & Keep would not automatically minimize transaction costs. On the contrary a regulatory obliged hybrid Bill & Keep approach like the former proposed Dual Regime will actually induce higher transaction costs as today's CPNP-principle. Such a Bill & Keep-regime will also lead to a great arbitrage problem with distortion of competition especially if it is adapted only in few countries world wide. Furthermore it induces an adverse selection problem in context of quality of service and fosters the SPAM- and SPIT-problem.



It can be summarized that Bill & Keep could be an efficient outcome of market negotiations under certain circumstances. However, as regulatory obliged interconnection principle it would induce inefficient distortions.

Unfortunately the consultation document fails to make a stringent and detailed analysis of the charging mechanisms. There is still a very strong bias towards only two aspects: solving the so-called “termination monopoly” with alleged deregulation and in this context decreasing the transaction costs of NRAs. Transaction costs of the companies as well as a detailed analysis of the self mentioned objectives, e.g. to intensify sustainable competition, to encourage efficient investment or to avoid potentials for regulatory induced arbitrage¹, are not at all or not sufficiently considered.

Also the EU-Commission mentions in their Explanatory note to the Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU that

“Nevertheless, one should note that setting the price of any service at zero may cause distortionary behaviour, bring arbitrage opportunities, lead to inefficient traffic routing and inefficient network utilisation. For instance, a potentially problematic issue might be inefficient routing of traffic from operators not participating in the Bill and Keep scheme.

When assessing the possible introduction of the Bill and Keep system, potential merits and drawbacks of such an approach would have to be carefully considered.”²

There is still a strong tendency towards Bill & Keep in the consultation document and the ERG still tries to justify Bill & Keep particularly with alleged deregulation. But quite the contrary is the case. The ERG actually proposes regulatory intervention in the context with Bill & Keep. Additional regulatory intervention is claimed which even refers to company and market specific decisions, e.g. the definition of the amount and location of Points of Interconnections as well as the determination of a minimum quality of service. So, the ERG is far away from real deregulation as the consultation document claims.

Furthermore Bill & Keep violates Art 8 (2) of the Framework Directive which requires NRAs to promote competition by, amongst other things, ensuring that all users derive maximum benefit in terms of choice, price and quality of service, that there is no distortion or restriction of competition, and that efficient investment in infrastructure is encouraged.

The actual consultation document does not consider the multitude of comments on the former ERG consultation which stated that the Receiving-Party-Pays-regime on

¹ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 83. The document mentions the following objectives and economic criteria which should be adhered to when NRAs evaluate different charging mechanisms: Sustainable competition should be intensified, efficient investment should be encouraged, incentives for efficient network use should be given, transaction cost of market players as well as for NRAs implied by a particular interconnection regime should be minimized, interconnection regimes should avoid potentials for regulatory induced arbitrage, network externalities should be internalised.

² Commission of the European Communities (2008), Draft Commission Staff Working Document, Explanatory Note. Accompanying document to the Commission Recommendation on the Regulatory Treatment of Fixed and Mobile Termination Rates in the EU, p. 25.



the retail market coming along with Bill & Keep would not be accepted by the customers. The well known charging principle in Europe is the Calling-Party-Pays-principle. Furthermore as also already mentioned in the comments to the former consultation Bill & Keep leads to disincentives to invest in quality of service, which is mentioned in detail below, as well as to invest in infrastructure because of massive free riding problems. So the actual consultation document fails to focus on the customer needs and the needs of the market as a whole.

3. Demand for quality of service and the support of Bill & Keep is a contradiction in terms

The consultation document contains a conflict: On the one hand quality of service is claimed – particularly a minimum QoS as regulatory obligation is proposed and different quality of service classes are recommended. On the other hand Bill & Keep is described as the optimal long term charging model, which should be aspired. However, Bill & Keep destroys incentives to invest in quality of service. When the higher costs for higher quality could not be covered and even free riding incentives are given, no network operator will have the incentive to invest in higher quality of service.

However, the provision of different quality of service level is one of the characteristics of an NGN as also mentioned in the consultation paper³. Different quality of service levels again mean different products with different pricing levels which are economical welfare enhancing.⁴ Unfortunately the consultation document fails to consider this.

Because of the strong tendency for the application of Bill & Keep one could conclude that the ERG does not want to promote the development of NGNs but rather of the public Internet. So the ERG and the NRAs have generally to decide for the future if they want to support managed NGN or only best-effort-networks like the public Internet with all consequences.

4. Aspects of the migration period aren't sufficiently analysed

The migration period towards an All-IP-world raises a lot of questions in the context of interconnection for the telecommunication companies. But unfortunately the consultation document fails to shed light on this important topic.

In fact the chapter "costing and pricing" even proposes to apply the costs of the alleged low-cost IP-based technology also for the migration period. According to ERG, stranded legacy assets, while NGNs are introduced, should not be relevant for regulatory accounting. Furthermore the aspect is also neglected that sub-optimal use of capacity in the migration period (due to running in parallel the legacy and the next generation network) would lead to higher costs. Moreover the gliding path proposed

³ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 33.

⁴ See e.g. for this purpose the presentation of Ingo Vogelsang, Boston University, on the topic "The economic Issues of Network Neutrality: overview", held on the WIK conference on Net Neutrality – Implications for Europe, Bonn, December 3/4, 2007.



in the former ERG consultation is not mentioned in this chapter of the actual document. So it seems that the ERG would not take into account the negative impacts and massive disruption of such a scheme on the market.

The gliding path concept proposed in the last ERG consultation as solution against the massive problems with costing and pricing in the migration period is solely mentioned in the chapter "Conclusions". However, it would be necessary for the market to have stable conditions and planning assurance particularly for the migration period, so more analysis on this topic is needed.

5. Competition on service level is well assured in a NGN – in contrast, separation of service and transport layer would be counterproductive for the NGN advantages

The main reason for the claim to separate service and transport layer mentioned in the consultation document is to foster competition on service level.⁵ Furthermore it is mentioned that service interconnection and transport interconnection has to be differentiated.⁶

But on the one hand with the strictly separation of service and transport layer, respectively the differentiation between service and transport interconnection, the advantages of a managed NGN get lost as mentioned in detail below (e.g. assured quality of service, security). On the other hand it has to emphasise that also in a NGN, service competition is fostered.

Due to efficient utilisation of the NGN the network operator will have the incentive to provide access to its NGN-platform via adequate wholesale products to independent service providers. Hence the service providers get the opportunity to serve their own customers with the managed NGN functionalities (e.g. assured quality of service, security, special features) via corresponding wholesale products which will be based on standardized and open interfaces.

So the relationship between the service provider and the NGN operator is then a vertical contractual relationship which has to be differentiated from the horizontal interconnection between two NGNs.

Again, the ERG and the NRAs have generally to decide for the future if they want to support managed NGN or only best-effort-networks like the public Internet with all negative impacts.

⁵ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 31.

⁶ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 31.



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 ERG document, transport interconnection is defined as “physical and logical linking of networks based on simple IP connectivity irrespective of the levels of interoperability. It is characterised by the absence of the service-related signalling, implying that there is no end-to-end-service awareness”.⁷

Service interconnection is seen as strictly separated from the transport layer and is defined as “including solely service-specific aspects. It consists of logical linking of network domains, having access and control of resources including the control of signalling (i.e. session based service-related signalling).” 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.⁸

The document proposes that NRAs should have to ensure that interconnection is possible at specific functional levels in a reasonable manner.

However, if it is the objective to assure and guarantee service specific quality of service and security to the customer especially to offer a substitute for PSTN services (in particular voice services) such a separation of transport and service layer is counterproductive. As the document states itself “consequently, service specific quality of service and security requirements are not necessarily assured”.⁹

Certainly, today’s Internet functions in such a way and a lot of services have been created on it. But these are services which do not need a higher than the average transport quality of the Internet. Examples for such services are web-browsing or e-mail which are so-called elastic services. If there is not enough bandwidth on the network, these services are only delayed, without creating problems for users of such kind of service.

But for other, especially time critical services (so called inelastic services) this mechanism does not assure quality of service.¹⁰ The ERG consultation document suggests, that in this case “one has to modify and adapt the IP transport technology in a way that connections with reliable and fixed transmission characteristics (transport classes) are possible”.¹¹

⁷ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 3.

⁸ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 4.

⁹ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 3.

¹⁰ See also ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 57.

¹¹ ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 57.



But transport classes are not enough to guarantee high quality for such services. In fact coordination between service and transport layer with regard to the specific transport class and the available bandwidth in this transport class is needed. For that reason 3 GPP is standardizing a so called Resource Admission Control Subsystem (RACS) in the context of IMS (IP Multimedia Subsystem). ETSI TISPAN has integrated this IMS-specification in their NGN-standardization also for fixed networks.

As the consultation paper states the ERG definition of transport and service interconnection differs from the ETSI TISPAN definition of “service oriented interconnection” which also includes transport related information.¹² This is remarkable because the WIK study for the EU-Commission stated that the IMS-specification is also implemented in the latest ITU-recommendation for NGN analogue to the ETSI TISPAN-specification.¹³ The same is described in Annex 3 “technical background” of the ERG consultation document.¹⁴

The WIK study also describes that it is possible to implement a basic voice service easily by just implementing servers on the service level. But if it is the objective to guarantee the service specific high quality for voice services this could only be offered if the transport layer could assure the necessary bandwidth. These mechanisms are not available in the public Internet because the service layer is completely independent of the transport layer as it is also claimed in the ERG consultation. Therefore the WIK study concludes that the public Internet and therefore such a complete separation of service and transport layer is fully inappropriate for the realization of high quality voice service.¹⁵

By the way, the ERG consultation itself states that “in principle any service can be realised with a specified quality level, if the performance objectives of the service can be met by the network”.¹⁶ This however implies that there is a linkage between service and transport layer. The ERG additionally describes the additional NGN-functions in comparison to a simple IP-Network in chapter B.3.2 in more detail and mentions itself that¹⁷

- the access to the NGN is controlled, i.e. there is an admission control, user profile management and dedicated bandwidth allocation for different services;
- the transmission of data is service-specific and managed through bandwidth allocation by specific NGN-protocols and policies;
- there are standardized interfaces at the transport and service layer that allow third parties to connect to NGNs, use its resources and offer their own services;
- through the implementation of stringent policies and signalling mechanisms, end-to-end services are controlled and the necessary network resources are allocated and maintained during the use of service.

¹² See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 4, footnote 46.

¹³ See WIK Consult (2008), The Future of IP Interconnection: Technical, Economic, and Public Policy Aspects, Study for the European Commission, p. 118.

¹⁴ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 145.

¹⁵ See WIK Consult (2008), The Future of IP Interconnection: Technical, Economic, and Public Policy Aspects, Study for the European Commission, p. 116.

¹⁶ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 49.

¹⁷ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 49f.

ERG also mentions, that “interconnection agreements for NGNs can be more complex and NGN-specific aspects have to be considered.” Thus, NGN-interconnection has to compass a linkage between service and transport layer. Furthermore every network operator who wants to offer high quality services has a strong incentive to ensure high quality also over network boundaries. As claimed by the ERG the network operators will have the incentive to agree and support such quality of service classes between the involved interconnection partners allowing effective and efficient high quality any-to-any interconnection.

Moreover ERG asserts itself that their definition of separated and independent transport and service interconnection could violate the definition of Art. 2 (a) Access Directive.¹⁸ But it could not only violate Art. 2 (a) but also Art. 2 (b) “interconnection”. Interconnection is defined in Article 2 (b): “interconnection means the physical and logical linking of public communications networks used by the same or a different undertaking in order to allow the users of one undertaking to communicate with users of the same or another undertaking, or to access services provided by another undertaking. Services may be provided by the parties involved or other parties who have access to the network. Interconnection is a specific type of access implemented between public network operators.”¹⁹ Already the definition of interconnection sees a linkage between service and network (or transport) layer.

Furthermore with separated transport and service layers the fulfilment of other regulatory obligations like legal interception or correctness of billing as well as the assurance of security could not be realized.

ERG claims that NRAs have to ensure the possibility of interconnection at specific functional levels in a reasonable manner to foster competition also on service level. But this only holds true for the case that the ETSI TISPAN specification of NGN is implemented with the linkage between service and transport layer. Independent service providers could also use the service specific transport for the assurance of service specific quality of service and features by appropriate wholesale products. Every network operator will have the incentive to open up and standardize the interfaces on his platforms via such wholesale products to generate additional traffic. So, the ETSI TISPAN specification of NGN will also foster competition on service level and will provide incentives to open up interfaces. Therefore no special regulatory intervention would be needed.

Generally the ERG and the NRAs has to decide for the future if they support managed NGN or only Best-Effort-networks like the public Internet with all negative impacts.

¹⁸ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 4, footnote 47.

¹⁹ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 61, footnote 126.

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?

The discussion about the optimal interconnection regime does not sufficiently take the aspect of investment incentives into account which is an objective of Article 8 (2) (c)) Framework Directive. In this context it has to be stated that the analysis of Bill & Keep is very unilaterally focussed on the elimination of the “termination monopoly” and the decrease of transaction costs for the NRAs. In contrast, the analysis of other aspects, particularly of the mentioned objectives, which should be adhered to when NRAs evaluate different charging mechanisms, is just insufficient.

Further analysis of the following aspects is needed:

- Analysis of how QoS-classes could be technically realized, when transport and service layer are separated
- Further analysis of investment incentives in QoS under Bill & Keep-Regime.
- Analysis of the effects of Bill & Keep for today’s business models (e.g. Call by Call and Preselection as well as Premium rate services).
- Deeper analysis of the gliding path in the migration period
- Analysis of the impact of different network technologies (e.g. fixed vs. mobile networks)

So far, it is a very theoretical discussion. The NRAs have to be cautious by analysing the topic and proposing regulatory interventions. There is a great risk to ignore the practical issues with the consequence that there could be a gap between the practical reality and the theoretical regulatory discussion what could lead to massive market distortions.

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

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

The final number of Pol in a NGN will depend on a variety of factors. First of all the development of NGN is still at the beginning in nearly all member states. Most network operators are still in the planning process, so no definite statement can be made today. Furthermore there are still a lot of uncertainties about factors which will influence the number of Pol, e.g. the amount of traffic which has to be handed over or the question, if the Pol could be used for all kind of services. The ERG document mentions e.g. streaming services like multicast services which relate to bit-stream services and which does not have a relationship to interconnection.

As mentioned above the transport and service layer should not be separated so it is questionable if there are separate Pol only for the transport layer and separate Pol only for service layer in a NGN.

As the ERG document asserts the traffic in an IP-network in general becomes less dependent on distance and bigger interconnection pipes are more efficient than



smaller ones as well as more centralised interconnection points.²⁰ Thus, the efficient amount of Pol in a NGN will generally be lower than in today's PSTN.

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 Pol offered be considered equivalent to local interconnection?**

As mentioned, the development of NGN is still at the beginning in nearly all member states, so neither the question about maximum number of Pol nor the question about local interconnection could be finally answered.

The NGN is a more centralized network and the influence of distance on cost is less relevant, so the today's network levels "local, regional, national" of the PSTN would not probably be applicable for the NGN as also mentioned in the consultation document. Additionally, if it holds true that the efficient amount of Pol could be very small particularly for voice, then there is no comparable local interconnection for voice in a NGN than in today's PSTN. In this case the mentioned BRAS would not be the efficient level for local interconnection because it would imply a number of Pol which could be too high.

As mentioned to question 3 it also has to be examined if the efficient amount of Pol varies with several services handed over to other networks.

5. C.1 Existing and proposed Framework

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

The new section on security and integrity of networks and services introduced as Art. 13 a and 13 b FD could only be fulfilled by managed NGN with the implementation of specific network elements like session border controller etc. To enhance the security e.g. only the IP-address of the Session border controller should be published to prevent misuse of the customers IP-address. In contrast to that it has to be emphasised that the public Internet could not assure security and integrity of networks and services.

In Art. 22 UD the new paragraph allows the Commission to adopt technical implementing measures concerning minimum quality of service requirements to be set by the NRA on undertakings providing public communications networks.

²⁰ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 51

This proposal bears the risk, that technical inefficient specifications are determined by the regulator. Moreover the definition of quality of service parameters is the primary task of the well established standardization bodies. They should further determine technical standards. Furthermore every NGN operator will have the natural incentive to agree upon the set of quality of service parameters to guarantee high quality service across network boundaries. Regulatory intervention in the context of technical implementation of minimum quality of service is not needed and could even harm the industry. Inefficient quality specifications could also lead to higher prices to the detriment of customers.

6. C.3.1 Interoperability issues

What type of interoperability requirement do you consider necessary?

As pointed out in the ERG document it could be differentiated between vendor and operator interoperability. Whereas vendor interoperability should lead to open and standardised interfaces implying the possibility for the operator to get the same equipment by different vendors. Thus, the operator maybe has the opportunity to chose the offer e.g. of the cheapest vendor. Regulatory intervention is not needed because each operator has the incentive to choose standardized network equipment specified by the worldwide standardization bodies. So every vendor will have the incentive to produce their products in line with the standardization process.

Concerning operator interoperability it also has to mention that every operator has the incentive to interconnect with other networks to enable any-to-any-communication. Due to strong competition on the telecommunications market no operator is in the position to deny interconnection with other networks, because otherwise customers will change their network operator. Thus, every network operator will have the incentive to realize the interconnection by open and standardized interfaces. Otherwise interconnection and as consequence the any-to-any-communication fails. Furthermore standardized interfaces lead to lower costs for the operator.

Moreover the network operators will also have the incentive to provide open and standardized interfaces to independent service providers to generate traffic on their network and to increase and optimize network utilization.

Due to the incentive for interconnection with other networks as well as due to the incentive to provide network resources to service operators no regulatory intervention is needed, particularly no ex ante regulatory intervention.

7. C. 3.2 Impact of charging mechanisms on transport bottlenecks

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

If CPNP leads to termination bottleneck which has to be ex ante regulated and if IP-Peering and Transit are the market driven charging mechanism of the internet which



would prevent such a bottleneck problem, the NRAs should not intervene and oblige a specific charging mechanism. Rather it has to be left to the market process to find the optimal charging mechanism for NGN-interconnection. Every regulatory intervention would lead to market distortions.

8. C.3 Bottlenecks and SMP positions

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

Due to strong competition network operators have no incentive to worsen QoS or discriminate customers concerning QoS, because otherwise they would switch to competitors. The same holds true for service providers. The network operators will have the incentive to open up their networks for service providers to increase traffic on their network to decrease average costs. So there will be an incentive for network operators to open up standardized interfaces for third party service providers and to offer adequate wholesale products.

Moreover, network operators will benefit from standardized interfaces and network elements offered by different vendors. So network costs could be reduced and interoperability between NGNs could be assured. Furthermore third party service providers are enabled to offer their services in more than one NGN.

Due to those strong incentives for standardized interfaces and network elements as well as the non-discriminating QoS-provision there aren't new bottlenecks in a NGN-environment that would justify regulatory intervention.

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?**
- 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?**

As mentioned before, network operators will have an incentive to use standardized interfaces and network elements to assure interoperability between NGNs to reduce network costs. The same holds true for the assurance of QoS parameters in each NGN but also across network boundaries. As today, the QoS parameters should be set by today's well established standardization bodies and be mutually agreed upon between the interconnection partners. So no regulatory intervention at wholesale level will be needed to assure a specific QoS-level. Moreover, setting a minimum quality by regulatory intervention would bear the risk of technical inefficiencies.



10. C.5 Costing and Pricing

- a.) Do you agree with the description of the relevant change regarding to 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?**

a.) As mentioned the development of NGN is still at the beginning in nearly all member states, so the telecommunication companies are still at the beginning of the analysis of the cost drivers and cost structure of a NGN.

It is also still an assumption that NGN will lead to lower costs than today's PSTN. First, there are high investment costs to build up the NGN with low traffic volume. Both lead to higher average costs and have to be taken into account at least in the migration period. Second, specific circumstances in each member state as well as specific technological aspects (e.g. mobile vs. fixed network) have to be considered. Third, former investments and stranded assets have to be taken into account. Otherwise no incentives for investments in NGN are given.

b.) In most member states there hasn't been any decision about the precise pricing regime yet because NGN-interconnection hasn't been offered until now. But some general remarks could be made today:

In general the pricing regime should cover costs and give incentives for investments. Otherwise no investment incentives in NGN and even in NGA are given.

In the migration period the pricing regime for NGN-interconnection has to be set in a way that arbitrage potential between NGN-Interconnection and PSTN-interconnection is avoided. Furthermore, a gliding path in the migration period is needed as it was proposed in the former ERG consultation to avoid negative market effects due to the migration to NGN-technology. Therefore, the proposal of strictly applying the costs of the alleged low-cost IP-based technology in the migration period for circuit-switched networks as well as for packet-based-networks as proposed in Chapter C.5 has to be reviewed.

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 infrastructure 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?

NGN-interconnection should meet several objectives

Any NGN-interconnection arrangement has to meet the following objectives:

- to give incentives for investments
- to foster competition
- to give incentives for efficient network usage
- to minimize transaction costs
- to avoid regulatory induced arbitrage

These objectives would best be achieved by market negotiations.

Any discussion on NGN-interconnection should also differentiate between NGN-Interconnection in an All-IP-World and NGN-interconnection in a migration period with parallel existing networks (e.g. PSTN and NGN).

Charging principles for NGN-interconnection

Within the discussion on NGN-interconnection and as mentioned in the consultation paper two principles are mainly discussed: the Calling Party's Network Pays-principle as today's PSTN interconnection approach and Bill & Keep.

Calling Party's Network Pays – today's well-established interconnection approach

Calling Party's Network Pays (CPNP) means that the network operator of the caller pays for the whole interconnection service or for the network usage in the other networks respectively. On the retail market the corresponding Calling Party Pays-principle (CPP) means that the calling party fully pays the costs of the call.

In the economic literature, CPP is seen as being economically efficient since the caller usually has the greater benefit from the call.²¹ He takes the initiative to speak to a special person at a special point of time whereas the called party has not the same freedom of choice. In the literature it is also stated that the called party benefits from the call, too, but to a lower extend than the caller. Following the efficient Ramsey-pricing-principle it is economically efficient that the caller bears the whole costs of the call. Moreover the caller also causes the costs as he can avoid those costs by choosing not to call. If the called party also had to pay when he is called analogue to the Receiving Party Pays-principle (RPP), the called party only could avoid these costs by not accepting the call. The question then arises what is the value of a telephone access if the caller is worried accepting a call to avoid costs.

²¹ See e.g. Wright, Julian (2003), „Bill and Keep as the Efficient Interconnection Regime?“, Review of Network Economics, Vol. 1, Issue 1, March 2002.



Moreover, it is very hard to determine the utility of the called party, so the determination of the right price will be very hard. When it holds true, that the called party has a specific utility out of the call then it has to be stated, that the contrary is true for SPIT calls. He has not only no utility, the utility of the called party will be negative for a SPIT call. The economic theory concludes in this case, that the called party should be compensated for that negative benefit. This means that the called party actually should be paid for that negative effect. The ERG argument that the called party could simply hang up²², is a little bit too simple, because nevertheless the called party has to pay for the acceptance of the call. The popular argument in this case is that the first minute should be for free. But this also does not help against the SPIT problem, because the disturbance of the customer is caused by the ringing to every day and night time.

Due to the fact that network usage is always paid for, the CPNP-principle has the advantage, that network operators can recoup their costs. This gives the necessary incentives for investments especially in higher network quality. Furthermore the transaction costs of implementation are low because it is well known and the billing systems already exist. Moreover CPNP induces efficient network usage as every network operator has the incentive to route the traffic in his own network as long as possible. CPNP also minimizes the SPIT-problem (SPIT = Spam over internet telephony) as the diffusion of SPIT would be very expensive.

Bill & Keep: an optimal principle for NGN-Interconnection?

Bill & Keep, when obliged by the regulator, has a lot of shortcomings. First of all, it is important to keep in mind that today's Peering and transit arrangements in the Internet are the result of private negotiations without any regulatory intervention.

If the objective is to reduce regulatory intervention as stated in the consultation document²³, then Bill & Keep must not be regulatory obliged, in fact the optimal interconnection regime has to be exclusively market driven and found on a global basis. By the way necessary questions in the context of a Bill & Keep regime are not finally discussed as mentioned in the consultation document.²⁴

- **Bill & Keep in the Internet does not mean interconnection for free**

The often mentioned link between Bill & Keep and the public Internet is not appropriate. Bill & Keep is only one of several forms of interconnection billing schemes used by Internet providers. Even today, internet interconnection arrangements and net-

²² See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 87.

²³ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 89

²⁴ See e.g. ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 87, where it is mentioned that it has to be discussed how calls to service numbers should be treated under Bill&Keep. Another unanswered question is how to treat the traffic of those interconnection partners who would not fulfil the conditions for participating in the Bill & Keep-Regime. See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 91. Also unsolved is the treatment of Call-by-Call- and Preselection-operators. It would lead to massive market distortions if they also could participate in a Bill & Keep-Regime. See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 92.



work usage are not for free but interconnection and network utilization is generally being paid for by the respective network operators.

In so-called peering arrangements, Bill & Keep is the efficient result of the negotiations of two network operators which regard each others traffic as symmetric. Hence, Bill & Keep is more akin to a barter arrangement under equal partners. To the contrary, unequal or non-symmetric networks typically lead to an IP-Transit arrangement.

If companies do not peer, they usually enter provider-customer relationships and pay for traffic on a monthly basis, using capacity based charging, similar to standard leased line pricing. As an alternative, carriers can connect to internet exchanges, in which payment relates to the number of ports used (and therefore is also capacity based). Payment then is not made to an interconnected party, but to the internet exchange instead. Other companies prefer to negotiate interconnection agreements bilaterally rather than connect to such a multilateral platform. Multiple interconnection schemes have suited the internet well, without any obligation to interconnect. Interconnection schemes continue to evolve as the internet develops.

Hence, the interconnection arrangements of the Internet do not automatically imply free Bill & Keep interconnections. Only between two symmetric or equal networks Bill & Keep as a barter arrangement can be the voluntarily negotiated result.

In contrast to that, it is very confusing that the ERG document states, that Bill & Keep-regime is widely applied for in the Internet traffic worldwide and that it is applied in the sense that at the retail level “the end-user’s Internet access rates include payment for connectivity and the option to receive and transmit data”.²⁵ So it seems that the ERG defines Bill & Keep only via the retail pricing mechanism. This meaning of Bill & Keep conflicts with the explanations of the ERG in Chapter C.6.2 where the ERG concludes that “Bill & Keep would not necessarily lead to RPP” or preclude a special retail pricing regime.²⁶

- **Regulatory obliged Bill & Keep would induce market distortions**

A regulatory obliged Bill & Keep-approach would inevitably induce market distortions especially in the case of asymmetries as proposed by the ERG.²⁷ If symmetry is not fulfilled in a Bill & Keep-relationship, larger networks are disadvantaged because they bear higher network costs than small networks, which is the case if the market structure – for example in the fixed telephone sector – is very heterogeneous. There are various network operators with different network sizes and network costs. The same holds true for the mobile sector. Regulatory obliged Bill & Keep would therefore lead to massive market distortions.

Some proponents of Bill & Keep argue that the costs could be recovered by the implementation of the Receiving-Party-Pays-principle on the retail market by charging the own end-customers. However, the CPP-principle is well known by European consumers and it seems unrealistic to force them into a new and unfamiliar pricing principle.

²⁵ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 45.

²⁶ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 86.

²⁷ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 84.



- **Regulatory obliged Bill & Keep would induce technical inefficiencies and leads to free riding problems instead of efficient network usage.**

The consultation document states that Bill & Keep circumvents a non-optimal level of network usage whereas CPNP especially with an EBC system leads to a less likely efficient network usage. This statement is justified only in the case that under Bill & Keep efficient termination costs have not to be determined. The coherence of the determination of termination costs and an efficient network usage is not explained.

Efficient network usage depends only on the price for network usage. If it is too high, the network usage is too low. But if the price is too low, or even zero as in the case of Bill & Keep free riding problems are the unavoidable consequence.

Moreover, Bill & Keep leads to routing inefficiencies, the so-called hot potato-routing. Bill & Keep results in incentives for network operators to hand over the traffic to another network as soon as possible because usage of the other network is for free and transport over distance is not compensated. This leads to a classical free rider problem. Thus, it is not comprehensible why it is stated in the consultation document, that “hot potato routing applies on those parts of the network, that are excluded from the application of Bill & Keep, but where transit and peering agreement apply”.²⁸

As mentioned in the former ERG consultation document, it is thought that this problem could be solved by network enlargement of smaller network operators. But as also mentioned in the actual consultation document the network enlargement of smaller networks would however lead to inefficient investments²⁹ which in turn induce economic inefficiencies due to the need to recoup these costs by higher retail prices.

To avoid such inefficient investments the consultation document proposes to raise the amount of points of interconnection.³⁰ Besides the fact that in no country the final NGN network architecture is known today, regulatory determined and obliged amount and location of the points of interconnection would lead to an artificial network structure which – especially in the context of NGN – definitely does not mean to be a technical or economical efficient network structure. Rather this would lead to higher costs and thus to higher retail prices.

- **Regulatory obliged Bill & Keep will not minimize transaction costs**

Bill & Keep would not lead to a significant minimization of transaction costs. The existing billing systems will further be necessary for billing the traffic to specific service numbers (e.g. freephone numbers or premium rate services). Additionally, the traffic amount which is exchanged between the networks within a Bill & Keep-arrangement needs to be measured and monitored.

The main argument of the proponents of Bill & Keep is that Bill & Keep would solve an alleged “termination monopoly” problem and would therefore minimize transaction

²⁸ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 91.

²⁹ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 91, footnote 189.

³⁰ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 91.



costs in the context of the regulatory process. However, that would only be true when the interconnection approach is market driven and set solely by negotiations between market players. Otherwise, high transaction costs arise in the context of the regulatory process, e.g. to determine the amount and location of the points of interconnection.

In the consultation document it is stated that transit networks have been excluded from the applicability of Bill & Keep³¹. However, in doing so, the transaction costs would massively increase: besides monitoring traffic volume and billing the traffic to special service numbers where transit networks are used, the traffic has to be additionally separated into traffic which is only terminated on another network and traffic which needs to be transported via a transit network. Further it has to be classified whether the interconnected network operators fulfil the Bill & Keep-preconditions.

- **Regulatory obliged Bill & Keep would lead to an arbitrage problem**

From an international perspective the aforementioned problems will even increase, leading to great arbitrage problems and further distorting competition. The same holds true when only the European countries will adapt Bill & Keep and other countries in the world will continue CPNP as IP-interconnection approach.

- **Regulatory obliged Bill & Keep would destroy investment incentives and would lead to adverse selection problem**

Bill & Keep in the meaning of the consultation document means network usage for free. As mentioned above, this would lead to a massive free riding-problem in the context of utilizing other networks. Under such circumstance no network operator has the incentive to invest in infrastructure particularly when symmetry of interconnection partners play no role as stated in the consultation document.³² As correctly mentioned in the consultation document, under investment has not occurred when transit or peering-agreements are applied. The reason is that transit and peering-agreements are basically paid interconnection regimes which will give an incentive to invest in infrastructure to fulfil the peering conditions.

But Bill & Keep in the meaning of the consultation document with no payment on wholesale-level irrespective of symmetry of the interconnection partners would destroy investment incentives. The argument that the cost could be covered by the own customers does not hold because of strong competition in the retail market, retail prices will be competed to a low level. Further there are multiple large network operators which simply do not have end-customers other than interconnection partners. So no network operator will have an incentive to increase his costs by own network investments when he could use the networks of the interconnection partners with Bill & Keep for free (see the above mentioned hot potato routing and free riding problem).

³¹ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 84, 91.

³² See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 84.



To solve this free riding problem the consultation document proposes the set of a maximum number of interconnection points.³³ But this proposal would lead to an inefficient network structure and so inefficient investments in point of interconnections.

Regulatory obliged Bill & Keep would also lead to adverse selection in the context of quality of service. As network operators would not get paid for the network usage, higher costs for better quality of service could not be recovered. Hence, the incentive to invest in better quality declines.

- **Bill & Keep would foster the SPIT-Problem**

Bill & Keep fosters the problem of SPIT (Spam over internet telephony) because the diffusion of a great amount of traffic would be nearly costless. Some argue that this problem could be solved by techniques like SPAM-filters, but in contrast to SPAM a SPIT-call cannot be filtered out by some key words in advance. SPAM-Filters would be hard to implement because the content of the call does not become known until the called party accepts the call. It is also no solution against SPIT that the user could just hang up the phone as mentioned in the consultation document. In fact, the main problem of SPIT is not only the content of the call but also the telephone ringing at every day and night time.

Principles for interconnection during migration

As the discussion about NGN-Interconnection shows, the NGN-Interconnection during the migration period has to meet the following principles in order to avoid arbitrage and to give incentives to invest in the network migration at all:

- Implementation of the same kind of interconnection regime in parallel networks (e.g. CPNP in both PSTN and NGN)
- Uniform pricing level of the interconnection services.

As CPNP is well-established for the PSTN and for the mobile networks, it would hardly be possible to change this scheme without massive transaction costs and implementation problems. Overall, it seems therefore to be the best solution to apply the CPNP logic to IP-based NGN-interconnection, at least for voice services.

Conclusions on the charging mechanisms

Due to this analysis it is remarkable why the ERG concludes that Bill & Keep is a promising interconnection regime. The ERG itself mentions in the consultation document that a lot of problems would arise with Bill & Keep which should be subject of further investigations.³⁴ Thus, the conclusion that Bill & Keep should be the aspired long term interconnection approach could not be drawn at such an early stage of analysis.

³³ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 91.

³⁴ See ERG (2008), Consultation Document on Regulatory Principles of IP-IC/NGN Core, p. 107ff.



Furthermore, the comment of the ERG that Bill & Keep would reduce the regulatory burden and would rely more on market forces has to be refused. First, as the analysis above shows a lot of other problems have to be accepted with Bill & Keep. Second, Bill & Keep would rely only on market forces when it is not obliged by the NRA but when it is rather driven solely by the market.

Moreover, Bill & Keep violates Art 8 (2) of the Framework Directive which requires NRAs to promote competition by, amongst other things, ensuring that all users derive maximum benefits in terms of choice, price and quality of service, that there is no distortion or restriction of competition, and that efficient investment in infrastructure is encouraged.