

Position Paper

Berlin, April 15th, 2007

Final report of the project group „Framework Conditions for Interconnecting IP-Based Networks“

The Association of German Internet Enterprises, eco e.V., would like to express appreciation for the opportunity to submit a position paper and presents its comments on the final report of the project group „Framework Conditions for Interconnecting IP-Based Networks“ set up by the Federal Network Agency.

We would first of all like to emphasize that eco looks favorably upon the Federal Agency's effort to discuss interconnection questions due to fact that they are especially relevant. With the technological developments in the background, the telecommunications industry is in a restructuring phase. This development process is defined by the telecommunications infrastructure expansion and transition to IP-based networks. The present migration phase is characterized by the fact that voice services can increasingly be transported and realized both through circuit-switched as well as packet-oriented networks. That is why the questions pertaining to interconnectivity and interoperability of services and networks and the associated implications for the different business models of providers carry special relevance.

That having been said, eco would like to first make some general comments on the final report, then discuss some aspects in detail and comment from the perspective of the Internet industry.

I. General Comments

As the Federal Network Agency knows, eco had already in the summer of 2005 admonished that the project group was not sufficiently representative. Especially due to the fact that the group of appointed experts did not include one single representative of the IP-world, or rather of a free, user- driven communication enterprise. This is even more so regrettable, since the questions arising from the interconnection of IP-based networks deal with an original problem of IP networking, a controversial issue that has been discussed by the operators of these networks for over 15 years. The upcoming challenge, as seen by the IP network operators, to integrate an additional service, that is by the way only average, into the existing IP-networks has been extensively discussed within the established advisory boards since the end of the 90ies by the network operators who participate in the international IP exchange.

eco has therefore ascertained that the result of the final report of the working group comes in no way as a surprise and it has regrettably turned out according to our expectations after analyzing the project group participant list.

One should mention at this point that the discussion on technology and implementation of „new“ networks and future telecommunications infrastructures has by no means ended in the circles of the market participants and within the companies represented by the project group participants. Unfortunately, this aspect was not mentioned in the final report of the project group.

Moreover, it must be mentioned, that all project group participants were appointed as „independent telecommunications experts“, however, as it has become apparent from progress reports and presentations, they predominantly and obviously represented the interests of their own companies. In this respect, it remains discretionary that the compromise for a recommendation on framework conditions for the interconnectivity of IP-based networks described in the report would represent for all intents and purposes an acceptable transition scenario for these companies, which may be what is wanted from the economic perspective. This final report, however, in no way fairly and neutrally represents the perspectives of the different market participants. It does not take all market positions and affected sub-markets into consideration.

Considering the market domination of the established provider in the area of infrastructure, eco believes that it is crucial first to receive detailed information about DTAG migration plans for the development of existing infrastructures to an IP-based NGN-architecture, so there is a basis on which an appropriate and sensible discussion on the interconnectivity of IP-based networks can happen. The present restructuring phase is significantly defined by the migration plans of the DTAG as market dominating provider and they have unfortunately so far been

unavailable. That is why it is necessary to receive a sufficiently detailed illustration of the the market dominating provider's goal structures before ascertaining and defining respective transition regulations. In this context, eco takes reference to open consultations that have already taken place in other EU-member states in regard to planned restructuring of telecommunications infrastructures (among others the „All IP“ consultation in the Netherlands and the „21CN“ consultation in the UK.

Before concrete considerations are taken in regard to a possible adjustment to the regulation framework for the voice service field on the basis of recommendations set forth in the final report of the project group, from the perspective of the Internet enterprises, what will have to be considered is if and to which extent such regulations are even necessary and if they can be applied in specific cases without significant effects on the transportation market or other Internet services such as web, video, online gaming etc.

To elaborate, as follows, we will take some aspects of the report and comment on them from the perspective of the Internet enterprises.

II. Market

Even though the project group was brought together to consult over a future telephony interconnection regime, it is eco's opinion that the group's results cannot be isolated and seen independently from the transport of other IP-based services. The way eco sees it, there is reason to believe that each regulatory intervention in the established accounting system between the existing IP-based networks for a single service will have the same effect on the exchange of all IP-data streams. In its final report, the project group should have given appropriate consideration to the interdependence due to its serious consequences.

It comes therefore as no surprise that all methods, systems and assumptions primarily driven by the IETF are dealt with at best marginally in the final paper. The same applies to the 3rd Generation Partnership Project's (3GPP) IP Multimedia Subsystem (IMS) concept to also be considered in the course of a comprehensive integration. The basic system as well as the underlying mechanisms of the open Internet, of a free IP-data exchange respectively, do not find appropriate mention.

This is rather regrettable, since the market structure of the Internet has evolved since the eighties into an independent, sufficiently stable system primarily organized by bilateral agreements. The elsewhere developed innovative strength of the Internet achieved by this free, unlimited provider choice independent of the transport network would be significantly impacted by the recommendations made

in the final report by the project group. The regulatory intervention pertaining to the mode and scale of network interconnection recommended in the final report has the single purpose of securing a single service –that being voice service- without consideration or regard for all the other network based services. Thus an economic differentiation of VoIP network components signaling and transport will not be maintained despite the present separate categorization into sub-segments.

In this context, eco would like to specifically point out that the significant cost advantages of packet oriented networks vs. circuit-switched networks are found especially in the standardized infrastructure, that means the joint operation of traffic streams of all services in one network. A division of the standardized transport level into service dependent traffic models with different economic bases would not only be a novelty but does not seem effective for the intended economic basis.

The present IP-data transport market does not differentiate between different services. What is considered, are exclusively band width or total amounts. Based on the numerous different services presently already carried at the same time, such a differentiation is not feasible.

The goal of different „service levels“ or „qualities“ such as guaranteed transport which is already an option with virtually any backbone operator and in business-to-business applications it is the norm and in no shape or form does it require additions to the product portfolio. Newly defining the IP transport market with the goal of defining abstract service levels which are already available today with slightly different specifications would mean a disproportionate and unwarranted intervention in the transport service market.

At this point eco would like to emphasize that under no circumstances can one assume a market failure in the IP transport service field. Few markets have gained a larger vitality in the last years. As it stands today, hundreds of companies from small and medium companies to multi-national corporations offer a broad lineup of products for end customers and business customers. We have been unaware of current complaints about the organization of the IP transport market coming from our members and so far there has not been a consultation on this issue at the Federal Network Agency. A regulatory intervention into a functioning market is therefore neither necessary nor warranted.

Basic economic questions pertaining to interconnection remain unanswered among providers. These questions pertain to the aspects that may need regulation and must be seen apart from the transport services. Further thought must be given to the regulation of the service specific market of signaling services. Considered should be the efficiency of the service, how market entrance obstacles can be avoided and how providers of differing technology can be interconnected.

III. Network operation considerations

The technology for transmitting voice over packet oriented networks has undergone an approximately 10 year development. Regular technical innovation in the field of coding as well as transport have lead to a reliable application. However, a steady improvement of the services, the end devices as well as the switching technology can still be seen. Likewise to the developments in many new technology fields in the last years, an increasingly standardized technology has brought a marked improvement in the area of user friendliness.

Depending on the used technology, there are very different demands on the transport layer in regard to band width, processing time and error rate, without this leading to a decreased service quality. New research shows that the service quality typical of the classic PSTN for voice services when using updated end devices can be reached even without special demands on the IP transport network if the service provider possesses the technology or has appropriate service level agreements (SLAs) with the network operator. Regularly posed quality demands on transport networks are already met and surpassed by respective applications. Examples would be video services in relation to absolute band width (approx. factor 10 opposite VoIP), Online-gaming in relation to the latency period (approx. Factor 4 opposite VoIP) or VPN-connections in relation to sensitivity to packet-loss (approx. Factor 3 opposite VoIP). This is based on using a classic ISDN codec for voice transmission. Furthermore, if voice transmission codecs are used that are adjusted to the special specifications of IP-based networks there would be a further significant requirement reduction.

Therefore, it is critical to scrutinize the question of the "verifiable quality parameters per connection" in packet-oriented networks, which was emphasized as elementary in the final report. Nevertheless, the present final report from the project group includes no systematic examination whatsoever with regard to required quality parameters and a basic definition of "voice quality".

At this point, only for the sake of completeness would we like to make reference to the different definitions and consumer experiences in the area of mobile telephone networks, for voice communication supported by satellite or for data reduction in international commerce, which are accepted implicitly in daily operations. Likewise, all of these definitions can be supported on ISDN, or even high-quality connections can also be accomplished and outperformed without problems by using suitable codecs for voice transmission in IP-based networks.

Regardless, the heavily modified allocation of functions also endures, which ensues for the provision of voice services in IP networks. Here, it is essential that the separation of signaling (until now SS7) and content (until now conducted via "interconnection ports"), which is already familiar from the network interconnection for the classic SDH network, is further abstracted in a packet-oriented network.

Thus, in principle a virtual "connection" is always provided between the source and destination of a call in a packet-oriented, direct end-to-end addressed network based on IPV4 or IPV6 technology. The provision of a "speech service" in the classic sense, which means the creation of a functional transport layer between the source and destination of a connection, is therefore entirely omitted in the course of service provision, and is provided as an integral component of the transport layer between the IP transport networks.

At the same time, it is not functionally remarkable whether it is created as a normal connection or as a separate, quality-assured connection. In each case, a request is made by the respective terminals in the context of the transport service.

The definition of a "voice service vendor" in the VoIP network model therefore primarily includes the services required for the provision of services in the context of signaling, such as the discovery of the desired receiver, the specific mapping between the ITU-E.164 number range and the assigned IP number range, holding the information regarding the availability of the receiver (for example, busy, forwarded, mailbox, etc.), for example, and currently through SIP servers at present. As before, added here are the classic "AAA" service (authorization, authentication, accounting), which means identification and financial and collections services in the field of billing for services, and thus the provision of the premium rate services to be billed for as well, for example.

As was already addressed in the introduction, from the perspective of the IP network operator, the determination made by the project group on the technological platform from the ETSI working group TISPAN is to be scrutinized. The current IP transport networks actually available are based on a number of different technological standards that make use of different processes to ensure the quality parameters typically stipulated by contract, depending on system design. However, these networks currently do not consistently follow the recommendations of the ETSI working group TISPAN. Apart from that, eco would like to point out that the TISPAN recommendations in the field of the IP backbone operators are in no way considered uncontroversial.

This follows even from the fact that, for lack of actual implementations, so far neither proof of its effectiveness in extensive IP networks nor proof of the efficiency of such an implementation compared to other system designs in particular was provided.

eco therefore makes emphatic reference to the fact that all standards and implementations currently used by IP networks actually correspond to the IETF environment and not even to the ITU/ETSI environment precisely. A definition of "new" IP networks on the basis of definitions from ETSI can therefore possibly be considered innovative, but in no way secured or "established".

Further developments such as the concept of an IP multimedia subsystem (IMS) from the 3rd Generation Partnership Project (3GPP), for example, are not considered in the present final report, even though an interconnection and complete integration of the mobile telephone field is also required.

In principle, which technology and which system is used for the required transport quality should therefore be left to each network operator. Settling on one technology or one standard - like TISPAN, IMS, NGI - should therefore not occur given the premise of technology neutrality and the competitive regulations in the EU directives and the Telecommunications Act in the field of telecommunications, which are intended to be binding.

The current migration phase is therefore affected by the fact that, with the deployment of voice over IP technology, increasing numbers of speech services are transported and implemented both via circuit-switched and via packet-oriented networks. In eco's opinion, the issues of interconnectivity and the interoperability of services and networks and the accompanying implications for the different vendor business models are of fundamental importance.

Against this background, eco considers the recommendation articulated in the final report of the project group, and the specification of the 73 broadband points of presence of DTAG for IP connectivity, as premature. A proper discussion of the fundamental questions of interconnectivity of IP-based networks would be anticipated for a determination of this type.

The recommendation for the specific IP interconnectivity for the networks presented in the final report also leaves out references to the technical conditions and disregards the intrinsic system separation of signaling and transport.

As such, the requirement of 73 interconnection points represents a problematic requirement from a technical network perspective for the interconnectivity of even the largest IP networks. In the specific implementation of the IP network design, current IP backbone networks typically maintain one or two (but no more than a handful) of interconnection points between the so-called autonomous systems (ASN) for network level 3, which means the network clouds controlled by a single responsible vendor, in one large geographic region (Europe, for example).

On the other hand, the network transitions taken from the concentrator locations for the input products for the DSL network of DTAG at the locations of the broadband PoPs basically represent a mere network transition to the network level 2. However, they implement no network transitions between autonomous systems in terms of IP routing and thus the transport networks. Rather, the individual channels assigned to these locations represent network enhancement within the address range and the controls for the respective transport vendor and at no point abandon their ASN in terms of IP routing.

For explanation: The routing and the flow control within a comprehensive IP subnet indeed represent highly complex problems for IP network operation that are nevertheless comparatively simple in comparison to ASN network transitions. Network transitions to external operators, and ensuring the availability of globally distributed, non-hierarchically organized network destinations in particular, also require a total count of network transitions on a global basis that is reasonable to manage in particular, in addition to careful planning.

Contrary to the implementation recommended in the final report, based on the current state of the art there is neither a functionality nor a protocol for effective regional routing of IP subnets between vendors, and they are not structured regionally in principle. The traffic streams also cannot be adequately differentiated in any way. For example, the problem of "hot potato" routing mentioned several times in the final report is manifested directly by a number of interconnection points for a lack of regional transfer criteria.

Finally, this problem is nevertheless always limited to the transport level in the context of an IP service, and is to be considered independently of the signaling level of the call setup. From the perspective of a VoIP service, the number and location of signaling servers required for locating the terminals and operated by a service provider is immaterial if they are effective, redundant and adequately connected to the transport network. Relevant in this respect is the ability to locate the responsible signaling server, and thus the cooperation of an appropriate "porting database" with the signaling server of the vendor. Only for this purpose is it sensible to have a location-bound signaling server interconnected at one location, or possibly multiple discrete locations for reasons of redundancy.

However, in no case is there a connection between the quality of service for the actual call connection and the number or the location of the signaling servers. On the contrary, increased problems in functional operation are to be expected in the case of a greatly inflated number of interconnection points before the backdrop of greatly increased complexity of the transport network without additional benefits.

For the reasons specified above, eco considers the recommendation articulated in the final report of the project group, and the specification of the 73 broadband

points of presence of DTAG for IP connectivity, as unsuitable. In any case, the specification of the specific number of interconnection points should likewise remain reserved for future discussion. Also to be scrutinized at this juncture is whether and to what extent a determination of the specific transfer-points is even economically sensible, and should not remain reserved for the context of bilateral agreements by the respective network partners. Incidentally, this would correspond to the current peering practice for transport networks. Irrespective of this, even at the present point in time it can be assumed that the number of future interconnection points will be less than that of the classic PSTN.

In eco's opinion, with regard to the transport network, the final report from the project group includes no solution approach for the isolated quality problems that exist for some vendors with today's VoIP offering, which is typically caused by network congestion (traffic jams/traffic disruptions) in the realm of the access layer, and thus in the exclusive sphere of influence of the respective transport vendor or its input products. In addition, only isolated problems in the transition between the networks are to be observed currently; indeed, these were primarily addressed by means of an implementation of the recommendation from the project group.

Currently, all networks in the backbone realm have de facto "over provisioning" for quality assurance, and a change is not to be expected in this area. The most frequent problem in consumer perception as well as in quality assurance, namely securing the upstream bandwidth in the access layer, is already today regularly requested by priority queuing or similar mechanisms, and appropriate methods are already available today for doing so. eco is of the opinion that, as an internal network problem of the respective vendor, this segment does not require regulation, nor should a determination be made at this point on the technological mechanism to be used, given the premise of technology neutrality. However, the availability of appropriate input products, which the network operator for the network level 2 must ensure and provide, independent of technology, would be subject to review in this context.

The applicable principle is that, given an appropriate technical implementation, there are no qualitative differences in new networks compared to the performance of classic PSTN networks. The assessment is documented by the change in technology already carried out in the core network of several vendors. The migration carried out, and the associated increasing transport of voice services via packet-oriented networks, is not even noticed by the consumers. As can be determined from experiences in other areas - we make reference to the mobile telephone networks once again - the acceptable and required voice quality is ultimately determined by the consumer - and thus the market - and not by abstract definitions.

From a technical perspective, it should also be noted that quality assurance for transmission in packet-oriented networks should always be implemented exclusively by means of over-provisioning the respective class of service, even when using reservation systems. In this respect, a direct separation (MPLS), or even a classification into traffic classes with assigned minimum bandwidths for the respective class of traffic, is the customary practice today in the backbone area. The use of implementations of this type can continue without problems both in the context of an NGI approach as well as in an IMS implementation, in contrast to the implementation approaches of NGN. It should therefore make it possible for the telecommunications companies to protect their investment by selecting an appropriate technology.

eco endorses the efforts of the project group to improve the current porting regime. A revision of the current porting regime is desperately needed. As such, with regard to the service interconnection, eco in principle supports the project group's approach of simplifying the location of the appropriate termination points in the call setup in such a way that a central database of all available numbers from the +49 number range is to be created. A central database seems sensible not only because of the long throughput times and proneness to errors of the current process, but because it also enables the prompt integration and enhancement of new technical features, given an appropriate design. Direct administration of derived allocations, easy enhancement with regard to new technical features, as well as the substitution of additional features (certainly sensible in the field of VoIP) like the desired codec for speech transmission, the preferred billing service provider, or the geographic location, for example, can be implemented for this reason. An important prerequisite for a future central database should be an integration and combination of the requirements and administrative procedures of the classic PSTN porting information exchange process with the requirements of internet-based service providers and corresponding voice over IP call setups.

eco of course considers it reasonable for the central governance of the national number space, as well as the original allocations, to remain with the Federal Network Agency. However, the responsibility for the operation of a central database should be given to an independent and neutral service provider, and ideally one that is not a participant in the market. In this context, the participation of all vendors of voice services in a system of this type would be desirable, in particular the PSTN and VoIP operators, and even the mobile telephone networks and other possible vendors.

IV. Billing Regime

Although eco favors the discussion advanced by the present final report of the project group regarding "bill and keep" as a possible future goal for a billing regime, at the present time we consider it a mistake if the discussion regarding the basic questions of the interconnectivity of IP-based networks were to be authoritatively managed before this backdrop of a future billing regime, and affected by it.

In eco's opinion, for an open-ended discussion regarding a future billing regime, it is a fundamental prerequisite that the issues of technical interconnectivity of transport networks and services must first be resolved. Changes to the current scheduling regime should then be made together on this basis and coordinated with all market participants, and a change to "bill and keep" as a future billing regime should be made subsequently.

Independently of this, however, in the course of a neutral, equitable market adjustment, in eco's opinion it appears exceedingly questionable when in the recommendations of the final report a definition of regional transfer points is provided that is sensible neither from a technical network perspective nor an economic perspective, which is to apply to all operators as well – independently of their geographic development. According to eco's approach, such a definition for the transfer points would not be in conformity with market practice in any way, but instead might scarcely be approvable on the basis of the resulting market barriers to entry before the backdrop of a European market – because only through participation at all points would a change in the billing regime be proposed. The recommendation included in the final report that the target regime "bill and keep" and "equitable peering" be carried out only for "large" networks "participating at all interconnection points" continues to disregard all practical experience that can be gathered from the normal peering agreements for the internet. Independent of the size of a network and the number of interconnection points offered, additional economic considerations have a decisive affect on the establishment of a reciprocal traffic relationship. To be mentioned here are, for example, the relevance of the capacity or customers reached through the peering in the overall context, the share of international transfer payments, or even company policy considerations. This established and hitherto stable, functioning system of reciprocal relationships would be unreasonably burdened by a regulatory requirement, and could have serious and even global effects on the traffic relationships of the internet.

In addition, eco assumes that a regulatory differentiation of the provision of voice services cannot be justified on the basis of technical features. Therefore, given the

premise of technology-neutral regulation, in eco's opinion no distinction can be made with regard to the termination and delivery services based on the technological basis of a voice service implementation. Before the backdrop of the specified mandatory competitive regulation in the field of telecommunications, an efficient provision of voice services should be oriented to the use of the most efficient technology in a technology-neutral manner.

In this context, eco would like to confirm its demand for an explanation of the migration plans of DTAG for the expansion of the existing networks to an IP-based NGN network infrastructure, because they are anticipated to function as a basis for billing corresponding to the previous price discovery mechanism, and will define the period of the transitional phase.

In addition, eco considers it problematic that in the present final report of the project group no solution approach is introduced for the billing problems, significant even today, between service providers that service and serve customers in the classic CPP process, and which already typically manage interactive media - like the internet - as an integrated service, which means billing systems changed not as a component of the transport mechanism, but rather of the billing system implemented for the service. This is even more amazing, as these vendors of new service types were one of the initiators of the discussion regarding "interconnectivity" in the working group for numbering and network interconnectivity (AKNN).

In the meantime, the popular service SKYPE, for example, which makes a "premium rate" service of the 0900 variation available without integration into the transport mechanism shows that services of this type can replace classic premium-rate services of the PSTN in an appropriate manner.

However, these service providers are emphasized as "to be treated separately" in the final report - as are all NGI vendors - but without providing vendors with a solution approach for the treatment of these infrastructure solutions.

eco is of the opinion that a plan for the integration of these services is one of the most urgent problems of a new interconnectivity regime. In comparison with this, detailed technical and administrative issues clearly recede in importance in comparison to an urgently needed integration plan.

In principle, we once again find ourselves at the starting point of the discussion and the convention of the project group "Framework Conditions for the Interconnection of IP-Based Services".

V. User-managed and integrative services

At this point, eco would like to point out that we have come to no explicit conclusion as to which rules should be applied for the items mentioned above. The corresponding positions are disputed between the Internet/VoIP market participants, and will be discussed with controversy. However, it remains to be established that, in the present model, the control of the voice service remains with the network operator and not switched to the realm of control of the consumer. At this juncture, it indeed remains unsettled how the +49 number range is to be avoided with the user specifications already existing today from the realm of the official ENUM database, for example.

Also still open are all questions on service neutrality and free operator selection in the field of voice services for outgoing communication. These should also be added, at least corresponding to the previous options for selection - free operator selection from the service vendors.

In addition, the range of gateway services between divergent voice networks, which in part use different identifiers, should be included in the overall context. As such, subscribers in the E.164 number range for subscribers of new types (Skype, Google Talk, and others), for example, can be reached unidirectionally without problems. In contrast, by the same token a communication path from the realm of E.164 networks is not currently defined in the realm of these divergent voice networks.

VI. Additional Considerations

In eco's opinion, the present recommendations from the final report of the project group, and the analysis from the ongoing consultation, should be categorically reviewed with regard to its suitability for transfer regulations applicable not just in the short-term, which means for a period of less than 5 years. This emerges even from the problem of implementation periods, which can be reconciled with the change in telecommunications infrastructures, carried out with increasing speed as a result of considerations of profitability, only with difficulty in our opinion.

It should be assumed that the major portion of the telecommunications companies will have already migrated their networks to "IP only" network operation by 2010. This is already the reality for pan-European operators in particular, where there will be no more PSTN in several other EU member countries – NL 2010, UK 2012 and others. Against this background, it is already obvious that regulations will have to take network infrastructures of the IP-only generation into exclusive account in the future. In eco's opinion, this fact alone justifies a corresponding

target regulation at the present time, which could hardly be valid prior to 2009, taking into account to the appropriate transitional regulations themselves in the case of favorable prediction.

Furthermore, in eco's opinion, in the course of the maintenance of service neutrality it appears necessary to define a regulated offering for the provision of quality-assured, competition-neutral connections, independent of the specific individual service, even in the environment of possible NGN network infrastructures. Here, it must be ensured that the competitors are not limited to "best effort" services for the provision of their services, but instead also have the opportunity to be able to provide their services to consumers in the context of quality-assured NGB connections at defined terms. This is a basic functionality of the functional scope defined by the ETSI working group TISPAN, but which is in no way to be implemented by all potential vendors according to the plans of which eco is aware so far for the conversion to TISPAN based networks.

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