



## ERG consultation on IP interconnection

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## 1 NGN opportunities and risks

Tiscali welcomes the opportunity to comment on ERG's document on IP interconnection. This is a key element in a wider debate, and we appreciate ERG's announced initiative to promote an open dialogue with stakeholders on the more general issue of NGN.

A number of major telecommunication operators, Internet Service Providers (ISPs), and non-traditional communications entities such as cable operators, utilities, and wireless companies have been putting in place plans for NGN and established test-beds for their equipment and services for the future deployment of NGN. Some network operators have already finished their initial tests and started to replace their current Public Switched Telephone Network (PSTN) network with NGN equipment.


NGNs essentially deliver convergence between the traditional world of public switched telephone networks, and the new world of data networks. From an operators perspective they provide a means of migrating from the old world to the new world, delivering substantial cost savings due to the economies of scope inherent in a single converged network. From a consumers perspective they can offer innovative new services, greater control and personalisation, ease of migration between services as well as offering continuity for existing PSTN services.

There are several kinds of forces driving the deployment of NGN, including structural changes taking place in ICT markets, changes in services and uses, and technical evolution.

During the last decade the telecommunications market has undergone significant structural and regulatory change.

On one hand, AltNets have invested in switched network infrastructures, on the other fixed voice market has become mature (steady if not with a reduction of voice traffic) and competition has increased significantly through other services such as VoIP and cellular mobile services. These developments (significant investments, reduction and replacement of traffic) have resulted in a decline in the traditional sources of revenue in the voice market and a shift to other service. At the same time IP traffic has been growing at 85% annually.

With the rapid diffusion of broadband Internet services, network service providers have identified customers' growing need for more flexible broadband multi-media services, which cannot be accommodated by the current PSTN network. The increasing problem of the current PSTN network is the limited interworking capacity in a heterogeneous network environment. As an example of the need for

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IP based network services in the business sectors, a European Global Network Strategies survey carried out in 2004 showed that 91% of manufacturing organisations now have IP-centric networks, and 74% of manufacturers plan to integrate their voice and data network within 2 years. The innovative developments in VoIP, cellular, wireless and digital TV services added pressures for telecommunication operators to accommodate the increasing needs of customers by embracing the efficiencies of packet-switched multi-service networks, or NGNs.

Together with broadband Internet, the widespread use of VoIP has acted as the catalyst to stimulate the development of NGNs, by putting pressure on prices offered by PSTN voice providers. However, we should also bear in mind that NGNs are capable of supporting numerous IP-based applications of which VoIP is only one.


Among the technological developments in the area of IP, one should mention IPv6, digitalisation, increases in computer power and memory, and optics, that allow for a combination of voice and multimedia traffic over networks. In addition, the quality of service and call control technology for IP such as RSVP, INTServ, DiffServ, MPLS and SIP have improved noticeably.

Among the factors we have briefly recalled, the most significant catalyst for the deployment of NGN is the technical and market development in the area of IP, including broadband and VoIP, which present opportunities for new capabilities for users and revenues for service providers. At the same time they pose challenges to incumbents who do not respond to the changing conditions and thus risk losing some of their market and revenue.

From the point of view of interconnection too, NGNs represent a synthesis of existing world of the “traditional” PSTN with the world of the Internet. The economic and regulatory arrangements for the two have historically been very different. This migration raises many thorny regulatory questions, especially in the area of network interconnection.

Many of the networks created over the past ten years contain most of the key elements of an NGN. Most, if not all, of the technology necessary for IP-based NGN interconnection has been available for five to ten years. Advanced approaches to interconnection have been slow to deploy, even where the technology has been mature or within hailing distance of maturity. The NGN interconnection problem therefore should be explored rather as an economic problem (i. e. how regulation can create the right incentives) than one of technology.

The PSTN operates under a well established set of interconnection rules that have been more than a century in the making. In the Internet, by contrast, interconnection is generally a matter of commercial bilateral agreements, usually with no regulatory intervention at all, and its outcome is a free access system in

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the vast majority of cases. Both systems seem to work reasonably well most of the time in their respective domains, but how should they be combined?

A body of economic theory that first appeared twenty years ago analyzed incentives of firms to conform standards when participating in markets characterized by strong network externalities<sup>1</sup>. Economic analysis suggested that a firm that had a large or dominant customer base would not wish to adhere perfectly to open standards, because full adherence (and thus full fungibility with competing products or services) would limit the ability of the dominant firm to exploit its market power. Some years later, it was recognized that substantially the same analysis applied to network interconnection.

Literature developed for major mergers cases in the US<sup>2</sup> came to the conclusion that in a market for Internet backbone services characterized by strong network externality effects, if one backbone were to achieve a very large share of the customer base, it would have both the ability and the incentive to disadvantage its competitors. Conversely, as long as the largest backbone had not too large a share of the customer base, and as long as the disparity between the largest backbone and its nearest competitors were not too great, incentives to achieve excellent interconnection would predominate.

The thresholds at which the potential anticompetitive effects might dominate have not been rigorously determined.


As Internet interconnectivity appears to be quite effective and peering disputes are, in a relative sense, quite rare, it would seem reasonable to conclude that the global Internet is operating well below the thresholds where the anticompetitive effects would predominate, i. e. Internet backbones do not possess significant market power.

The migration to IP-based NGNs, together with industry consolidation, is one of the main factors that have the potential to change this assumption in a number of ways. On the one hand, as wired incumbent telephone companies and, in some countries, cable companies evolve into vertically integrated enterprises that are also significant Internet backbones, it is entirely possible that they might leverage the market power associated with last mile facilities into their Internet role. On the other, market power may be mitigated by the emergence and deployment of technological alternatives (cable, broadband over powerline, broadband wireless etc.) but these tend to be rather marginal in the EU.

At the same time, interoperability is key in this transitional phase, as the inherent risk of re-monopolisation in an NGN environment of nascent multimedia services

<sup>1</sup> See M. Katz and C. Shapiro (1985), "Network externalities, competition, and compatibility", American Economic Review 75, 424-440.; and J. Farrell and G. Saloner (1985), 'Standardization, compatibility and innovation', Rand Journal of Economics 16, 70-83.

<sup>2</sup> WorldCom-MCI and WorldCom-Sprint, See J. Cremer, P. Rey, and J. Tirole, Connectivity in the Commercial Internet, May 1999.

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is particularly acute when walled gardens can be created. To take the example of IPTV, if a “walled garden” service is offered by an incumbent operator, content providers will have a clear incentive to offer their content through that platform, so as to reach the biggest customer base (as in the software sector application service providers have an incentive to produce software for Microsoft). Once a wider offer is available, consumers will naturally chose the incumbent service, thus reinforcing a vicious circle whereby network effects<sup>3</sup> arising from a walled garden situation in the market for IPTV services are reinforced by the indirect effects in the market for content.

For these reasons IP interconnection and interoperability become the critical issues in an all-IP world.


To conclude, transition towards NGN poses considerable challenges to policy makers and regulators, and their role will be significant especially in this early stage of NGN deployment. Most of all, in this early stage, a primary interest for policy makers and regulators will be to track carefully the technological and market developments taking place. They also need to assess new networks, applications and services, and to review the regulatory regime to ensure that policy is not an impediment to new applications, services, demands, innovative investments and network developments. A market open to innovative players is after all the best way to safeguard the long-term interests of users. It is also necessary for policy makers or regulators to track market signals carefully, and then tailor the regulatory approach accordingly in order to encourage both infrastructure deployment and competition. At the same time, the regulatory structure needs to be as stable as possible, since it is not possible to run a business and create long term investment plans if the business needs to react to unexpected regulatory changes.

## 2 NGN structure and IP interconnection/interoperability

The evolution of the network architecture will depend on the purpose that the incumbent intends to achieve with the introduction of the NGN.

If the purpose is to reduce the number of nodes geographically (due to an old infrastructure based on high capability services and customer), the trend will be towards the reduction of nodes. However, if the introduction of NGN is to push IP at access level, the hierarchy levels can reduce so that the number of transport

<sup>3</sup> Network externality has been defined as a change in the benefit that an agent derives from a good when the number of other agents consuming the same kind of good changes. See M. Katz and C. Shapiro (1985), op. cit.

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nodes could also increase (adding to the account also the metro bistream nodes).

Incumbents in different member States seem to choose different solutions so, at present, it is not possible to have (give) a unique model of NGN structural deployments.

In Italy, Telecom Italia announcements about its IP plans<sup>4</sup> have only outlined very broad objectives, without giving technical details. One might suppose that they will evolve in both the above directions, leaving the actual geographic number of interconnection nodes more or less unchanged. However, there is no official technical position and future development is not clear. For example one plan could be to push the IP interconnection level at metro POP or at MDF CO level, even if this scenario seems a long-term perspective. Now Telecom Italia has not yet defined which level of interconnection will be able to offer, however from first contacts the steer appears to be higher up the network, or at least through a more restricted number of points, perhaps 20-30 nodes. Following the introduction of NGN and during the years the process to interconnect at local level will go forward.


In August this year, the Italian NRA, AGCom, has opened a public consultation on VoIP and IP interconnection. Regrettably, though, after some initial steps, the technical body that was supposed to tackle these problems never really started working.

In the UK, Ofcom has promoted several industry bodies involving all stakeholders to deal with this issue. It is a long and complex process so, at present, AltNets simply don't know where they will be able to get access. It could be at MSAN level through all sites; however, based on current discussions, the steer appears to be higher up the network, or at least through a more restricted number of points, perhaps in the region of 30-50. A possible result would be a combination focussing on access at MSAN sites in certain areas where it is likely to result in sustainable competition, leaving the higher metro node access elsewhere.

Due to the complexity and the importance of the issue, we consider necessary for the NRAs to create a national industry body that - taking into account the specific plans of each incumbent – will be able to ensure the involvement of all stakeholders in this critical transition phase.

The UK experience appears a useful starting point in this respect. BT's plans and designs are being closely monitored by the rest of industry through the Consult21

<sup>4</sup> Please refer to the presentation of Riccardo Ruggiero and Marco Tronchetti Provera, respectively TI CEO and former President, at meetings with the financial community 2005 and 2006, see: [www.telecomitalia.it](http://www.telecomitalia.it)

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process to ensure any anti-competitive behaviour is avoided. In addition, the creation of NGNuk which aims to ensure that “...*the UK communications industry will have an agreed NGN interconnect model that allows the predictable & seamless transport of a technically unrestricted range of services across multiple NGNs using a commercial framework that drives service & application innovation and efficient investment*”<sup>5</sup> should ensure that restrictions are not put in place by the incumbent which could frustrate access, quality of service or competition.

### 3 SPM product and bottleneck facilities in NGN

First of all we strongly agree with ERG consultation document that “*the move to NGNs does not provide an opportunity to roll back regulation on existing services if the competitive conditions have not changed*”<sup>6</sup>, as it is hard to see a cause-and-effect link between NGN deployment and overcoming of anticompetitive conditions.

Recently TAR (the Italian administrative tribunal) sentenced that the right of enterprise of a company that has a dominant position is constrained by a “special responsibility” stemming from its dominant position. Consequently, an incumbent commercial initiative may be considered an abuse of dominant position (as e. g. the principle of equal opportunities is not guaranteed), while the same action, if carried on by any other company, can be considered legitimate<sup>7</sup>.

Even (and, probably, especially) after the complete deployment of the NGNs, national incumbents will continue to control the essential facility that is the source of all anticompetitive conditions and behaviours in fixed networks markets: the so called “last mile” (i.e. the access network). So if the incumbents will control the access, it is highly probable that they will continue to be in SMP conditions exactly as today.


Furthermore, because of NGN structure - i.e. the “*more defined separation between the transport (connectivity) portion of the network and the services that run on top of that transport*”<sup>8</sup> - access obligations may not ensure the possibility to provide any kind of products and services if not linked to interoperability and IP interconnection obligations.

<sup>5</sup> Please refer to NGNuk website, <http://www.ngnuk.org.uk/8.html>

<sup>6</sup> ERG consultation document, executive summary.

<sup>7</sup> Please refer to decision by TAR Lazio number 12517/06, which can be downloaded at the following internet site: [www.giustizia-amministrativa.it](http://www.giustizia-amministrativa.it)

<sup>8</sup> ERG consultation document, page 10.

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However transition toward NGNs, if carried out according to interoperability and interconnection principles, could offer the occasion to overcome some market failures. In fact, all-IP networks, through strong reduction in network costs, contribute to lower some entry barriers allowing operators to provide innovative products/services in order to promote competition not only through lower prices but also through better and innovative products/services to the benefit of consumers.

In conclusion, we wish to underline one more time, that IP interconnection is a central issue to continue developing competition. Such important theme need to be promptly and thoroughly addressed by NRAs together with all market players (incumbent and AltNets).

#### 4 Wholesale pricing model


Defining the correct wholesale pricing regime for IP interconnection seems to be the classical situation in which the answer can only be found assessing trade-offs between different options. Therefore probably there is not a “first best” solution but only a “second best” one. The definition of the problem constrains becomes the key step in addressing the question.

First, therefore, we will outline the principal issues that must be taken into account in defining a pricing regime, then we will suggest the compromise that seems to be the most satisfactory one.

Migration to an all-IP interconnection regime represents a deep change in telecommunications industry and must be faced taking in account actual business models. As correctly pointed out in the consultation paper, the “all-IP world” will originate by merging PSTN and Internet and these markets have different rules that must be harmonized by new billing regime.

Adopting a “PSTN model” (i.e. CPNP) risks to annul any cost saving incentives for incumbents as by favouring an interconnection costs reduction they would significantly reduce their revenues. Conversely, in a pure “internet model” (i.e. Bill & Keep) AltNet infrastructures investments are sunk costs: the price competition by an operator without substantial network infrastructures would not be sustainable for an AltNet that has to recover its investments.

Therefore, the migration from a PSTN/IP world to an all-IP one is closely connected to the so called “*ladder of investment*”.

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Present (and future) European regulatory framework provides strong incentives to move service based competition towards a facility based one<sup>9</sup>. From 1998 on several AltNets - such as Tiscali - have been deploying a considerable number of points of interconnection in the existing PSTN, with considerable investments in their core networks and to develop innovative products. Consequently, if a IP pricing regime has to protect and favour (efficient) network investments, as we pointed out, B&K does not seem to be the correct choice.

In fact a pure B&K does not address the principal issues linked with investments, i.e. promoting (i) new and innovative infrastructures' deployment, and (ii) the maintenance of the existing ones. As correctly underlined by ERG *"Bill & Keep can lead to a 'hot potato' problem because providers have an incentive to hand over their traffic into another network for termination as early as possible"*<sup>10</sup> and *"the 'hot potato' problem is the reason why Bill & Keep could possibly lead to underinvestment"*<sup>11</sup>.

For all these reason Tiscali thinks that a *"two-level"* regime (see paragraph 4.2.4, option c)) should be the best compromise if it is associated with a minimum (i) number of interconnection points and (ii) level of QoS as prerequisites for participating in the B&K.

This approach should:

- accompany migration from PSTN/IP to all-IP interconnection in a soft way;
- minimize the 'hot potato' problem;
- protect the investments that are already fully realized;
- provide incentive to invest in new infrastructure and to maintenance the existing ones;
- avoid the termination monopoly.


However, even if it seems to be the most reasonable solution, the above dual regime requires further analysis of some aspects that are still unclear:

- how address the transition's phase?
- how give incentive to develop and maintain QoS?
- how face the case of unbalanced traffic flows?
- how harmonize this dual regime for fixed networks with the wholesale pricing model in mobile ones?
- which is the "fair" minimum number of interconnection points as a prerequisite for participating in the B&K?
- which is the boundary of:
  - a. the core network and backhaul in a NGN?

<sup>9</sup> See directive 2002/21/EC, article 8.2c

<sup>10</sup> ERG consultation document, page 3.

<sup>11</sup> ERG consultation document, page 27.


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- b. the backhaul and the access network in a NGN?

## 5 Conclusion

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The importance and great uncertainty about NGN deployments and IP interconnection require further analysis by all authorities involved (ERG, EC, NRAs, ...) in order to guarantee that the investment becomes profitable for all the market players (meaning the customers and the AltNets too) rather than a tool for incumbents to lawfully re-monopolize the market for NGN services.

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