NGA, IP-Interconnection and their Impact on Business Models and Competition

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Abstract: Developments towards Next Generation Networks (NGN) have a strong impact on the design of the markets for electronic communications in general, but specifically on intercarrier relations with respect to interconnection and access. Due to the fact that competition in the European telecommunications environment has brought about alternative providers and their business models it is an interesting area to investigate how these business models will develop in an NGN environment and which (additional) business models may emerge in the future. To that end, the current paper looks at the development of different business models in the PSTN world and likely developments in the NGN world. This leads to conclusions with respect to requirements of the future regulatory framework of next generation networks in order to maintain the achievements of competition in the telecommunications area.

Key words: NGN, business models, migration, competition, regulatory framework.

■ Business models in the PSTN world

The current market structure has its root in the process of a liberalization which started in the 1990s. For the first years after market opening, developments were centering very much on voice communications, and the EU member states experienced different competitive developments in the core and in the access area (European Commission, 1999). Entry of new players led to significant market share losses of the incumbent operators (30 to 45 % in some countries for international calls, but significantly lower for

local calls [1], and approximately 10.5 % in the access area) as well as decreasing prices. Thereby, the unbundling policies needed more time to develop than competition by carrier selection [2].

Further, new business models have appeared which enable an easier market entry into broadband and data communication via regulated wholesale products such as line sharing or (in some countries) bitstream access. Not all of these business models have come about by regulation, some have developed on the basis of voluntary offers and purely commercial negotiations.

For the purpose of this paper we analyse the following existing business models:

- Incumbent operators which still have significant market power in most of the markets.
- Alternative access (network) operators (ANOs): We classify alternative operators by business models. In this category we allocate operators that are active in the access area either by buying unbundled local loop or bit stream access from the incumbent (i.e. wholesale products relating to access) or by rolling out their own infrastructure to end users. These operators are not restricted to voice services and increasingly compete in broadband access.
- Cable TV operators: They have their own infrastructure in certain areas. Usually the coverage is regionally limited. Cable TV operators are usually subject to regulation to a much lesser degree if not even freed from regulation.
- Carrier selection operators: These operators have opened up the market for voice telecommunications. Carrier selection operators use the wholesale products call originiation and call termination (i.e. wholesale products related to interconnection). For them the number, location and layers of points of interconnection play a crucial role.

Please note that the scope of this paper is limited to the fixed networks. We have not analysed the impact on mobile networks, whereby we

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1 The EC Commission, 12th implementation report, p. 21, calculates on average that incumbents have retained 56.7 % market share for international calls and 71.8 % of local calls (with national long distance calls and calls to mobiles to be found in between).

2 For figures on wholesale products used in the access network, see European Commission, 2007a, p. 37.

recognize the interrelationship as demonstrated by the extended service provision of mobile operators e.g. in data markets. A more detailed analysis is left for future research.

The situation we see today is characterized by new investments into "next generation networks". IP technologies are deployed in core and access networks, which have significant technical, economic and regulatory impact. As the process is going on regarding how to deal with these investments in new networks under the regulatory regime (especially in terms of incentives for investment) it also needs to be considered that the competitive process based on the existing technologies and the existing regulatory framework is still going on (we still see an increasing number of unbundled lines, line sharing, bitstream access, etc.). A number of these competitive business models, however, rely on the current network structures (e.g. main distribution frames for access to the local loop and Points of Interconnection). The most significant developments are next generation access and interconnection of IP-based core networks.

The tendency towards implementation of optical fibre in access networks means that the points of traffic concentration, i.e. those technical network elements where lines and traffic are concentrated and are not transported on individual cables per customer anymore, move closer to the end user. Although the general renewal and upgrade in the access network is usually considered by the incumbent this has an impact on the rollout strategies of alternative operators as well because traditionally they have attempted to realize access to the incumbent's network at exactly these locations. The request for wholesale products will depend on the incumbent's rollout strategy and this will also determine the need and technical implementation of wholesale access products. It could even be, a very dynamic market development assumed, that competitors move to fibre right away as their access strategy. This could then be a sign of sustainable competition at least for some parts of the market.

Likewise, the interconnection world is under significant change. The introduction of IP in the core network would only require a smaller number of points of interconnection in the core network with different functionalities (not only carrying voice traffic but also being available for e.g. IP wholesale products such as bitstream access). Both these tendencies imply that the cost allocation that has been applied since 1998 in a very consistent and identical way needs to be rethought. It has to be discussed, whether the traditional delineation between core and access network is still to be applied

in an identical way as before - and how costs should be allocated (RTR, 2007a).

■ The upcoming challenge: changes from NGN and Voice over IP technology

All-IP, NGN and NGA

It is unanimously recognized that IP-technology will be the future. Carriers have started to use VoIP technology as bypass to the traditional accounting regime, users avoid international rates by using VoIP. The technology in the enterprise market changes and also the carriers' networks start to adopt IP-technology. The ITU T defines a Next Generation Network (NGN) as:

> "a packet-based network able to provide telecommunication services and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies. It enables unfettered access for users to networks and to competing service providers and/or services of their choice. It supports generalized mobility which will allow consistent and ubiquitous provision of services to users". (ITU-T, 2004)

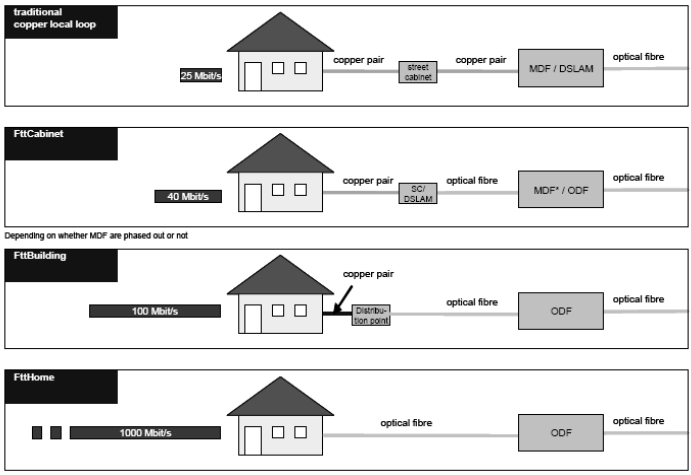
The evolution to next generation networks can be split into three areas; the core, the access and the service provision/control platform. Operators do not need to be active in all of these areas. For the course of this paper, the authors define "All-IP" as a technical concept of implementing IP-based technology in any kind of network thereby triggering technical changes. NGN is the overall concept in the sense of the ITU definition. NGA refers to the implementation of new technologies (VDSL, fibre etc.) in the access network leading to a new network structure and triggering changes with respect to retail and wholesale access products.

Next Generation Access

This chapter focuses on changes brought about by deployment of next generation access. From a market regulation perspective thereby unbundling and wholesale broadband access are affected.

The following figure (ERG, 2007, p. 6) shows the push of fibre and bandwidth into the access network.

Figure 1 – Access architectures using fibre



Source: ARCEP, ERG

The technological trends and strategies referred to above focus strongly on the current considerations of telecommunications operators – incumbents as well as ANOs which build their business models on wholesale products. In the "technological race", however, also the strategies, options and opportunities of further players need to be considered, e.g. cable operators and mobile operators.

Changes in the access network by various strategies of incumbent operators (FTTC, FTTH, FTTB, PON) and alternative access operators

Above we already alluded to various strategies for next generation access. All of them imply a different degree of establishment of fibre in the – formerly – local loop. Fibre optic networks may be extended (from the point

of view of the MDF) to the street cabinet (curb), the building or the home. In some countries this has triggered a number of questions such as:

- Will wholesale products remain available, if the incumbent reconfigures his access network?
- How to achieve cost savings by incumbents and competitors?
- Are the different access strategies of incumbent and competitors compatible?
- Consideration of customer issues in an environment of change (requirement to migrate)?

Again, the incumbent's strategies trigger the further development. Such developments will be enrolled once transparent information is available with respect to the continued supply of wholesale services, the continued availability of access points and services, the description of the wholesale service portfolio in the changing environment.

An important point is that the changes the incumbent introduces will affect the technological and economic framework for competitors. Depending on the strategy chosen by the incumbent, some business models may be endangered.

More complexity is added to this picture when considering that there may be different technical implementations in different regions of a country also under different competitive conditions (fibre optic networks in urban areas and copper based access still in rural zones).

Potential dismantling of the main distribution frames and its effects

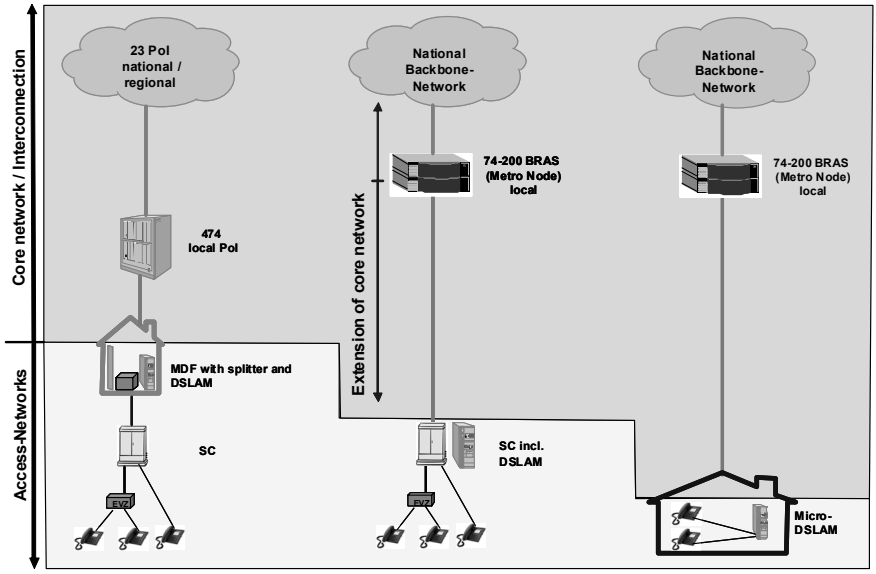
Strategies regarding next generation access have triggered discussions in a number of countries (predominantly in the Netherlands) with respect to the future of the main distribution frame in the incumbent's network. With the migration to an NGA network, incumbent operators may not need the main distribution frames in the long run and therefore may be interested to dismantle the buildings and the MDFs. For alternative access operators relying on the business model of unbundling, the main distribution frames are the most important access point for unbundled local loops (full unbundling and line sharing). Therefore, they fear that such a strategy of the incumbent may endanger their business approach and that viable alternatives are not available.

In the future there will be more fibre in the access network and therefore the question is whether an alternative "unbundled" product will be available at all. If such a dismantling of the main distribution frames takes place, it will lead to a number of strategy revisions with respect to how alternative access operators can realize the connection to their customer. It may lead to an increased investment in fibre networks by alternative operators or to the use of "imperfect" substitutes such as bitstream access, DSL wholesale etc. On the other hand, these operators may have to write off investment undertaken in the MDF (such as for collocation) if the MDF location is taken out of service prior to complete depreciation.

Changes with respect to the delineation between access and core network also implying a change in cost allocation

As outlined above the regulation of wholesale products so far and especially the differentiation between core and access network has relied on the EU commission's view of 1998 that the split between core and access takes place in the main distribution frames. If the main distribution frames are being replaced respectively if the roll-out of fibre in the local loops makes the street cabinets the central points for wholesale access products, it will also be necessary to recalculate the prices of regulated wholesale products. In such a case, a delineation at the main distribution frame is not the appropriate methodology. Rather, it will be necessary to rethink whether and where a split between core and access is seen as reasonable. On the other hand, the core network so far (of alternative network operators) ended at the point of interconnection. As these points of interconnection also changes, and it is expected that for IP interconnection the number of PoIs are reduced, it could be that the core network of alternative operators is extended in length in order to connect their inside plant facilities with the points of interconnection available from the incumbent. Both tendencies show that there is an extension of the core network of the incumbent operator and a reduction with respect to the "size" (extent) of the access network. Depending on how far fibre is deployed in the access network (fibre to the curb vs. fibre to the building or fibre to the home) the access network could be minimized.

The following graph shows an example from the potential development regarding PoIs and NGA roll-out whereby the figures refer to the German market and the ongoing discussion there [3].



Changes in the markets for unbundling and wholesale broadband access

Up until recently [4] fibre optical networks were not included in the analysis of the market for unbundled local loops and remedies were usually not levied regarding fibre access lines. Also, most of the regulatory remedies focus on the current structure and access at the main distribution frame. This will change, as the market definition has revised the recommendation of the EU commission and now refers to wholesale physical network infrastructure access [5].

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[3] As regards the impact on interconnection in an IP world, the German regulator, after long discussions, has issued a position paper on IP interconnection thereby dealing with the changes expected regarding structure of tariffs and definition of services, see *BNetzA: Eckpunkte der Zusammenschaltung IP.basierter Netze,*
http://www.bundesnetzagentur.de/media/archive/12699.pdf

[4] We are here referring to European Commission, Market recommendation, 2003, which was changed in November 2007.

[5] See: http://ec.europa.eu/information_society/policy/ecomm/doc/library/proposals/879/l_34420071228en00650069.pdf

The same holds true for market for wholesale broadband access. With new products such as IP bitstream and certain types of bundled fibre optical access lines, the analysis may at least have to be repeated in many countries to take account of the new forms of access. Especially if competitors demand that the new options of fibre access (be it completely fibre or hybrid solutions with PSTN elements) must be assessed in the overall market analysis.

Conclusion

We have shown that next generation access networks can have a significant impact on wholesale products like unbundled local loop. Alternative operators which rely on these products need to invest in their own infrastructure or use other, evolved wholesale services. Regulators need to observe the evolution of the market in order to understand where new bottlenecks might evolve.

Interconnection of Next Generation Networks

Interconnection is an essential element in any multi-network environment. Interconnection is likely to gain even more importance in times of technological changes brought about by IP-technology:

> "The tension between the convergent forces of technology and the centrifugal forces of business competition is most pronounced on the front where they intersect: the rules of interconnection of the multiple hardware and software sub-networks and their access into the integrated whole. As various discrete networks grow, they must interoperate in terms of technical standards, protocols and boundaries. In the networks of networks, their interconnection becomes critical. Control of interconnection by any entity, whether by government or by private firms, is the key to the control of the telecommunications system and its market structure." (NOAM, 2001)

Agreement on technical and commercial conditions may not always come easily – which implies a continued need for regulatory intervention, at least as a fallback solution.

In the current environment, we have a significant market share and role of carrier selection operators and "alternative access operators" which on the one hand base their success on the availability of a voice interconnection regime and on an unbundling regime (including line sharing). If the

developments on the technical level with respect to next generation networks in the core and in the access area continue, alternative operators' business models will also undergo massive change.

Evolving technical standards for NGN interconnection

Since telecommunications networks move to IP-based networks, it would seem reasonable that interconnection agreements become alike. The main difference between interconnection agreements in the PSTN [6] and in the public internet is the treatment of services. IP interconnection agreements – be it peering or transit – are not concerned with services, PSTN interconnection agreements are. It can be predicted that today's vertically integrated interconnection agreements will split into a common connection oriented interconnection with different QoS classes and different service oriented interconnection agreements.

Although existing interconnection agreements will continue to be in place as long as traditional TDM based networks exist, a gradual introduction of arrangements based on IP standards will take place. These new technical and commercial arrangements should allow for all parties involved to leverage the advantages of new technologies. If the incumbent moves to a next generation network it is assumed that new IP-based interconnection will be offered and a phase-out of legacy interconnect services will eventually be announced.

Changes to the number and locations of Points of Interconnection

IP interconnection has considerable effects on networks structure, investment, interconnection services, billing, technical implementation, etc.

It can be assumed that the way interconnection is organized, with respect to the number and location of PoIs, will change. IP-technology allows for more bundling of services and infrastructures and makes the costs of transmission less distance dependent. Consequently, the number of PoIs needed for IP interconnection is lower than for PSTN interconnection. This may lead to certain cost savings, however, it needs to be kept in mind that a migration from PSTN interconnection to IP interconnection will happen gradually. This means that location of PoIs may be changed including the

6 ITU-D, 2004, provides an excellent overview of existing interconnection agreements.

cost effects mentioned above but regarding the services there will be a period of parallel provision of new and old interconnection services.

Such developments can put competitors at a significant cost disadvantage to incumbents. It can also have further reaching consequences, e.g. that a certain business model becomes superfluous. For carrier selection operators, the PSTN interconnection system, to a certain degree, guaranteed that there was a justification for these business models as they took care of call conveyance and transport. A reduction of the number of PoI and thus less backbone transport endangers the business model of carrier selection. So does the accelerated tendency towards bundled products of access and call conveyance offered by incumbents and alternative access operators. Also, the distinction between local, regional and national transfer of traffic and the concept of single and double tandem will probably decrease in importance.

Interconnection pricing and cost allocation

The cost advantage of IP networks and IP interconnection will become more viable the more traffic is transported over these networks. Thereby, the costs per unit are reduced. Also, it has been discovered that distance is less important, although it does not loose its relevance completely. At least the transport of traffic via IP network make the costs less distance dependent than before (see e.g. DotEcon, 2006). On the other hand we will experience decreasing traffic in the PSTN networks. This will lead to increasing unit costs in the PSTN/interconnection networks for the remaining time. Therefore, one of the crucial questions is how to maintain a balance in the interconnection rates under these changing conditions regarding costs.

The interconnection rates are influenced not only by the discussion of costs of IP transport but also by the debate about the system of cost coverage, i.e. billing and charging principles. There are a number of options for billing retail and wholesale services. One point which moves increasingly into the focus of discussion is whether the billing system should be adapted from calling party pays (for most services at least) towards Bill & Keep. The consideration of this system of course has its root in the "internet world". Bill and Keep can have many facets which have been presented in various publications (VOGELSANG, 2006; MARCUS, 2006; DEGRABA, 2000; RTR, 2007b).

Implications for market definitions for interconnection markets under an NGN environment

In the European Union market regulation focuses on a number of markets which are susceptible to *ex ante* regulation and which are contained in the commission recommendation on relevant product and services markets (European Commission, 2003). Amongst those are three markets which are related to interconnection which are market no. 8 (origination), no. 9 (termination), and no. 10 (transit) – whereby we use the numbering implemented by the EU's first recommendation from 2003 [7]. Interconnection origination is defined as a market of national scope whereas interconnection termination is defined on the basis of network individual markets (one network is assumed to equal one market). The change in the number and location of points of interconnection as well as the change of services in terms of structure, content, billing etc. will lead to a new way of analyzing these markets. Also, the aspect of technological neutrality is covered and thereby the extent to which the services of interconnection markets on an IP basis are full substitutes to the respective PSTN-based services.

As these markets are defined according to delineation between services (e.g. termination including or excluding certain elements of transit; determination of the location from where termination takes place, e.g. the local exchange), new ways of interconnection may be organized in an all-IP world and this may also impact the way markets are treated from a regulatory point of view. IP-technologies may change the regulatory analysis with respect to significant market power on the market for origination which again may impact the regulatory tools such as remedies regarding carrier selection and preselection. With voice over IP and an existing PSTN access line, the customer has the choice of a number of operators (including voice over IP providers) even without making use of carrier selection. Therefore, the necessity to levy such a remedy on the incumbent operators may be questioned.

Regarding transit (market no. 10 under the "old" recommendation on relevant product and service markets) we see a strong trend already today that not all countries levy remedies due to the fact that there are existing competitive networks for transit services. With the appearance of IP

[7] In the revised recommendation of November 2007 the transit market is not contained in the list of markets susceptible to *ex ante* regulation any longer.

backbone networks, the need for regulatory intervention in this area could be further reduced [8].

Conclusion

The impact of next generation core networks on interconnection has an even bigger impact as the access networks. The reason might be that interconnection is more connected to a specific technology than access. Business models that rely on wholesale products with regard to interconnection, like carrier selection operators, will be heavily affected.

■ Evolution and comparison of current and future business models

As described in chapter one, the developments regarding the movement towards All-IP-networks and the changes for interconnection as well as for "unbundling" (next generation access) trigger changes also for the existing business models. This section will look at how operators with their different business models are affected by the changes from PSTN-centric networks to NGN.

Incumbent operators

Incumbent operators do not only have to deal with the effects of IP interconnection in the core network but also with next generation access issues. By bundling access and call conveyance services they have already tried to strengthen the relationship with their end users. By offering higher bandwidths by FTTx investments, a further strengthening of this relationship is intended as it entails the attempt to offer very high bandwidths. This will then regularly include the access, the voice telephony service and of course also the broadband/internet access. It can go as far as also containing IP TV or other content services. Again, one of the main steps is that different

[8] In the first round, Austria, the Czech Republic, Hungary and Portugal found competition to exist on market no. 10 (European Commission, 2007b). Meanwhile this is also the case for Finland. The removal of that market from the list of markets susceptible to *ex ante* regulation in the EU commissions revision of 13 November 2007 may serve as a confirmation.

services are offered in a bundled way and due to the network structure there are economies of scale and scope in such an offer.

On the other hand, this strategy requires a network rollout either by deploying additional fibre between the main distribution frames (MDF) and the street cabinets (and relying on copper access from there on towards the households) or by deploying fibre to the buildings or to the homes. The strategy depends strongly on:

- the current network structure and which bandwidths can be transported over the existing copper lines,
- the existing competition in the market for customer access,
- the regulatory regime with respect to incentives for investments, and
- the foreseeable regulatory agenda.

The rollout of fibre to the street cabinets or even further could lead to new access obligations for incumbent operators having to offer specific services under the applicable regulatory regime [9].

ANOs active in the access network

Alternative operators could just wait and buy wholesale services at regulated prices and try to lower those prices by lobbying and in regulatory procedures. There are however areas where the deployment of alternative infrastructure can be much more profitable than waiting for the incumbent to move with wholesale offers, also given the fact that the outcome of regulatory proceedings is uncertain.

Alternative access network operators are currently considering rolling out their own "new" access networks. The decision to be taken entails the options of FTTC, FTTB and FTTH and the strategic choice depends on a number of factors to be taken into account such as:

- the rollout strategy of the respective incumbent operator,
- the market for broadband access in the various countries,
- the foreseeable regulation regarding access to network elements of the incumbent operator,

[9] *E.g.* the German regulator recently determined that the unbundling obligations would be extended by the obligation to grant access at the street cabinets, collocation in/at the street cabinets and access to ducts between MDFs and street cabinets and (if that is not technically possible) access to dark fibres.

- the competitive picture with respect to alternative infrastructures e.g. cable networks,
- the availability of alternative infrastructures to lay fibre optic cables in the local areas,
- Intermodal competition from wireless operators (not analyzed in this paper).

Of course, also the option to stay with the current approach of unbundling (access at the MDF) is one option which however entails two main risks which are (1) the dependency on the incumbent operators strategy that he maintains the MDF access and (2) the limitation regarding the bandwidths which can be offered to ADSL 2+. If alternative access operators follow a strategy of additional rollout, this triggers additional investment. The starting point for such investment activities must be seen in the activities of the incumbents operators to enhance their networks.

Alternative operators have different options to chose between, even if they decide to try to leapfrog a (V)DSL strategy by own fibre networks. It may happen that the demand for bandwidth leads some operators to consider not to move to VDSL products with wholesale dependency but to go to fibre right away as seems to be the case in Japan where the DSL market is already shrinking.

CATV operators

The third group of operators affected by these activities are the cable networks. The cable networks represent independent access infrastructures which can enable customer access (to the households). These networks have existed already for some time and they are available to a very different extent in international comparison. Also strategies of cable operators have focused on rollout and technical upgrades with respect to how it is possible to make use of these networks for a competitive telecommunications business. When considering that triple play is an option that telecommunications carriers are following, this must also be regarded as an option for cable networks. They already have access to content and broadband capabilities so that in order to be able to offer triple play services they must add the internet access component and the voice component. This seems to be easier with regard to extending the business model than the other way round.

However, it must also be seen that whereas voice over IP is a "second line", customers who would switch from the telecommunications operator to cable operator offering triple play services expect a first line service which cannot be provided by voice over IP only. Cable network operators are not that dependent on telecommunications wholesale regulated products, although they, in any case, require interconnection possibilities. This refers to origination and termination which is also a service that they are offering on their networks. Next generation access issues affect these cable operators strategically and IP interconnection discussions affect these operators on an operational level.

Carrier selection operators

One of the drivers of competition over the past decade has been the possibility of selecting an alternative operator for call conveyance by carrier selection or carrier pre-selection. This business model has worked very well but has meanwhile come under pressure as incumbent operators have initiated a bundling of services thereby combining access and call conveyance to bundles or optional tariffs including flat rates. Additional pressure arises from the need for higher bandwidth to the end user in the access networks and the enhancement of many copper lines by DSL in order to provide broadband internet access. For operators offering such broadband lines not only the issue of flat rate offers becomes relevant for voice telephony but also the possibility to offer IP telephony thereby adding only a small cost portion to the broadband service (internet access) by including a voice over IP product. Such products imply a further decrease of costs and prices and this brings some difficulties to the economic viability of PSTN-interconnection based business models of carrier selection operators. Such operators have also invested in points of interconnection in order to be able to optimize the interconnection, origination, termination and transit services requested and needed from the incumbent operator. Such investments have taken place in the last decade and may not be written off completely by now. This entails the risk of stranded investment for such operators.

The development towards IP interconnection and a redesign of interconnection structures may also bring into question the economic viability of carrier selection business models. The smaller the number of points of interconnection needed in the future (this includes the question whether voice PoI are combined with broadband remote access servers), the more

critical the future for carrier selection operators. Although, one can assume that the core networks increase in size (due to the development of IP interconnection and next generation access) the smaller the need for carrier selection operators. Although this rather sounds like a paradox, the reasoning behind is that the provision of network services which include access and core networks is increasing and that an isolated supply of core networks for call conveyance (also due to the decrease of cost and thereby the lesser importance in the value chain) of carrier selection operators becomes less important.

New entrants are building open-access fibre networks

The move toward next generation networks and specifically next generation access networks represents an opportunity for players from other industries to venture into the telecommunications market. The OECD report on internet traffic priorisation (OECD, 2006) mentions the moves of municipalities towards fibre. This evolution could eventually lead to infrastructure based competition in next generation access networks.

■ How to secure competition in NGN?

It must be borne in mind that the main goals of the European telecommunications policy are securing competition, establishment of a common market and safeguarding consumer interests. VoIP technology, next generation networks and next generation access are already changing the technical and commercial landscape, challenging the European commission and the national regulatory authorities to evaluate the impacts on the sector specific regulation.

The regulatory framework has successfully accompanied the transition from monopolies towards competition. Competition is also the driver in the ever-lasting search for new more efficient technologies. One of the cornerstones of the regulatory framework is the principle of technology neutrality. This means that regulatory rules must not be technology specific but flexible enough to remain valid if and when technological changes occur. The move to next generation networks represents a test for the technological neutrality of the framework.

In this paper we have identified two main areas of impact of NGN on business models:

Interconnection [10] and business models of carrier selection operators

IP-based networks can be interconnected differently from today's PSTN networks. The number of interconnection points will diminish significantly. The technical layout will likely resemble today's internet exchanges. Commercial arrangements will have elements from both traditional PSTN agreements and internet transit or peering. It must be borne in mind that the business models of carrier selection operators depend heavily on the existing interconnection regime and changes must be supervised by the NRAs, allowing a balance between the protection of competition and the possibility to leverage the opportunities of new technologies.

Next generation access and ULL business models

Fibre push into the access network is necessary to overcome the limitations of the outside copper plant. This might lead to dismantling of co-location points and therefore impact the business models of ULL customers. Again a balance has to be struck between safeguarding competition and exploiting the opportunities of new technologies.

In this paper we have identified the following issues:

Impact on markets

The move toward next generation networks has impacts on the wholesale markets. Wholesale products are evolving toward next generation wholesale products. These products are yet unknown and will be determined as technological implementation continues.

Stranded investment

The changing wholesale products endanger the investment made by competitive operators. This may put alternative operators in an economically difficult position with accelerated depreciation of PSTN technology and a downside for their business cases.

10 On this item also see the study of WIK Consult: *The future of IP interconnection*, January 2008.

Migration periods

In order to balance business interests of incumbents and alternative operators' migration periods, models for parallel offering of old and new wholesale products need to be negotiated. Not all alternative operators can (and want) to switch to NGN at the same pace as e.g. the incumbent or other competitors. There may also not be the need to do so. In order to maintain an environment of legal certainty, a period of offering old and new wholesale products will be required. This may imply a period of increased costs for maintaining the existing and introducing the new wholesale environment.

The need to safeguard competition

The safeguarding of competition and a common European market remain the paramount goals of sector specific regulation in the telecommunications area. A roadmap on how this should be done in an All-IP environment does not yet exist. Thereby, safeguarding competition does not mean safeguarding competitors, i.e. if technological developments bring some dynamic to the business models and e.g. negatively impacts some while allowing for new opportunities on the other hand, this needs to be looked at carefully with respect to the effects.

The quest for infrastructure competition

Infrastructure competition could lead to the removal of bottlenecks and withdrawal of regulatory measures,since the model of the ladder of investment remains important. Although in reality infrastructure competition might come from new entrants in the access networks instead of carrier selection providers. It remains an open question as to which direction ULL operators will develop their business.

Cost allocation and interconnection / wholesale pricing

New products in the wholesale business will appear implying changed prices. Also, new access products (wholesale) will be introduced and it will be interesting to follow to which degree regulators manage to implement a consistent pricing regime for all wholesale products on different rungs of the ladder of investment. Also, the delineation between core and access networks shifts and this has implications on regulatory cost accounting and allocation.

The examples shown above refer to a number of issues under consideration. We did not intend to recommend strategies but we intended to show likely and / or possible developments and what impact they could have on the competitive landscape.

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