

**Developing competitive broadband markets: Lessons learnt
from German and European regulatory approaches on broad-
band access**

By

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Abstract –

A key feature of future broadband markets will be diversity of access technologies, meaning that numerous technologies will be exploited for broadband communication. Various factors will affect the success of these future broadband markets, the regulatory policy being one amongst others. So far, a coherent regulatory approach does not exist as to broadband markets. First results of policies so far suggest that less sector-specific regulation is likely to occur. Instead, regulators must ensure that access to networks and services of potentially dominant providers in a relevant broadband market will satisfy requirements for openness and non-discrimination. In this environment the future challenge of regulating broadband markets will be to set the right incentives for investment into new infrastructures.

This paper examines whether there is a need for the regulation of future broadband access markets and if yes, what is the appropriate regulatory tool to do so. Thereby the focus is on the analysis of European broadband markets and the regulatory approaches applied. The first section provides a description of the characteristics of future broadband markets. The second section discusses possible bottlenecks on broadband markets and their regulatory implications. The third section will examine regulatory issues concerning access to broadband networks in more detail. This will be done by comparing the regulatory approaches of European countries and the results in terms of broadband penetration. The final section will give key recommendations for a regulatory strategy on broadband access markets.

1 Introduction

Broadband markets have only just begun to develop. The first examples of what will be possible in the near future are beginning to emerge. For example: downloading video to a mobile phone; digital cameras connecting to the TV; TV via IP (Internet Protocol) or IP through a digital TV; and the in-home network allowing interaction between all enabled domestic appliances. Once in a digital format, information can be sent and stored by almost any device, provided it has the appropriate hardware and is loaded with the necessary software.

The consequences of digital convergence are closely linked to the future broadband era. Thereby the future of broadband access to the home is about both the availability of transmission platforms of high capacity, and the development of broadband content. With the importance of broadband markets increasing over the coming years the question of finding the right regulatory response will also grow in significance. One of the issues to be solved will be how to shape the relationship between network operators, service providers and content providers in view of ensuring competitive broadband markets. Control over access bottlenecks may allow certain market players to exercise market power at the detriment of others, providers and consumers.

The paper is organised as follows. The first section provides a description of the characteristics of future broadband markets. The second section discusses possible bottlenecks on broadband markets and their regulatory implications. The third section will examine regulatory issues concerning access to broadband networks in more detail. This will be done by comparing the

regulatory approaches of European countries and the results in terms of broadband penetration. The final section will give key recommendations for a regulatory strategy on broadband access markets.

2 Characteristics of Broadband Markets

As of today there is no universally recognised definition of broadband (Tadayoni, 2005). The technical term ‘broadband’ was originally defined by the ITU as transmission capacity that is *faster* than primary rate ISDN (*i.e.* 1.5 or 2 Mbps). For the purposes of analysing broadband markets a widely used definition is a minimum threshold for broadband of 256 Kbps for downstream (*i.e.* data transmissions *to* the user) and 64 Kbps for upstream (from the user).

From a regulatory perspective it is important that any definition of broadband is flexible enough to accommodate the full variety of products available. Any definition of broadband must also be platform-neutral to the extent that it is possible to offer a variety of broadband products over different delivery platforms that offer users similar experiences.

2.1 The value chain on broadband markets

The broadband environment is characterised by different types of market players: Network access operators, hardware manufacturers, service providers (including ISPs and content providers, all of them being able to control important parts of the value chain.¹ Their potential role in the value chain on broadband markets is described in the sections below.

2.1.1 Network Access Operators

Network access operators use many different access technologies for delivering broadband services. These include DSL on (telecom) incumbent copper pairs, cable modems on cable networks, Ethernet provided on fibre access, satellites, fixed wireless access, electrical power lines, mobile communications, wireless LAN and free-space optics. All these technologies have strengths and weaknesses, for example, in relation to maximum transmission speeds, vulnerability to interference and capacity constraints.

Network operators provide end-customers with connectivity to their access network. In addition, an offer to the end-customer requires management of the customer relationship, including at least:

§ marketing and advertising the (network) service to acquire customers in the first place;

¹ Hardware manufacturers - providing computers, television sets, set-top converters, video recorders, modems and others - are not considered in this report, although they may be seen as attractive partners (in particular handset manufacturers) due to the fact that “Handset ownership” is a very important part of brand building and customer ownership.

- § providing customer support (which is typically a significant cost given the technical problems that customers may have in setting up computers to use broadband connections); and
- § billing and credit control.

2.1.2 Service providers

Service provision usually comprises a wide range of activities. The essential activity at this level is the acquisition, packaging and presentation of services and contents, possibly from a variety of sources. Service providers may run their own “servers” connected directly to access networks, or use others’ servers. Some may collect bills, recruit advertisers, and run navigation systems. Equally, these functions may be carried out by network operators. Service provision is the key to innovation and its development is probably the single most important factor in the growth of the overall broadband market. A service provider may choose to provide value-added services in addition to simple connectivity to the Internet. These services may include:

- § Internet-based content, as for example some ISPs such as AOL offer bundled with broadband access;
- § Internet-based applications, such as email or web hosting;
- § bundled software, such as anti-virus or parental control software;
- § broadcast TV distribution;
- § video-on-demand; and
- § voice telephony.

2.1.3 Content providers

The level of content provision covers the processes of obtaining content and deciding upon making it available via service providers for end users. It may also include the creation of that content. The level includes the provision of content produced by film companies, television programme producers, information providers, database creators, software programmers, advertisers, publishing, etc.

On the broadband market, content providers face new opportunities for both distributing traditional content and deploying new multi-media services. It is likely that content providers will look into both the operator and handset/terminal space to gain more control of distribution channels.

2.2 The future relationship between market players

Access operators, service providers and content providers depend on each other in a broadband environment. Access operators bring broadband capacity to customers, and service/content providers have the content and applications needed for access operators’ customer acquisition and retention. As such they will need to work with as many access/service providers as possible.

Network access operators are currently focusing on the rollout of the basic broadband infrastruc-

ture and the resulting basic services: fast Internet access, email, and in the case of mobile operators, picture messaging. Business models, standards, and user expectations have not yet been established for advanced services. As a result, it is difficult to predict which services and which business models will become most profitable for advanced broadband services. Opportunities for enhancing existing services appear to be in many different vertical industry sectors (e.g. telemedicine, emergency services, location based services). This may indicate that a number of diverse services are revenue opportunities for broadband.

For network access operators this indicates a greater need for partnerships than has been the case in traditional communication services, where many services make use of the same underlying facilities provided by the service provider. Third party service providers, virtual network operators and content providers are likely to play an increased role in delivering broadband services.

3 Potential bottlenecks on broadband markets

In the future, the institutional regulatory framework as well as broadband technologies will create a new environment in the communications sector. While traditional regulatory requirements may become less relevant, other requirements will remain but change character (Tadayoni, 2005). A proper assessment of the regulatory needs on broadband access markets requires an analysis of potential bottlenecks, allowing operators and/or providers to exercise market power. Once bottlenecks are identified, there may be a case for regulation to ensure competitive broadband access markets. We will identify and discuss possible regulatory issues on broadband access markets.

As of today there is no consensus whether and to what extent bottlenecks will emerge on broadband markets nor a common understanding of what the potentially harmful bottlenecks may be. Given the complexity of the broadband environment, it is possible to construct a number of possible cases under which a dominant network operator controls an important part of the value chain.

Potential bottlenecks may involve ownership of elements that would be necessary in order to provide certain services and that could not easily be replicated. The local loop is a classic example of such an element. On broadband markets, there might be other elements that are equally critical for the provision of a certain set of broadband services and contents. They would probably be strongly related to individual customers, such as customer identity information or information on customer preferences. Subsequently a number of possible bottlenecks are identified that may arise in the future broadband environment and which therefore could provide a case for regulatory intervention (Dame, 2003).

3.1 Access to network functions

Some potential bottlenecks in the broadband environment relate to the **control of network related functions**. These functions determine what can be done with the network infrastructure and how dominant operators can limit the infrastructure capabilities of competitors in providing network access. For instance, access network operators are likely to control the access link relating

to both technical capabilities and termination rates. This control could be extended to the termination capabilities for certain types of traffic. If broadband services depend on a single access link, the network access operator controls an important bottleneck. Other possible bottlenecks relate to the control of communication capabilities, the control of quality of service capabilities, and the control of data flow. Network operators might be able to leverage the market power resulting from the control of network capabilities to upstream markets. For example, by refusing to provide the same quality of service capabilities to other operators, a network provider could effectively force users to subscribe to him for services requiring certain QoS parameters.

Access network operators may exercise market power on broadband markets not only as a result of controlling network capabilities but also because they may **control service related network functions**. This can be done by specifying the terms and conditions of service provision. For instance, standards - be they proprietary or non-proprietary - may dictate what functions and services can be supported on broadband markets. If such standards are controlled by network access operators, they can retain control over the service provided. Moreover, in controlling the degree of interoperability between the transport/control layers and the service layers a network operator can exert some control over the capabilities of service providers. It must be mentioned here, that service related network functions can also be controlled by service providers which would then be able to exercise market power. For example, if a proprietary Application Programming Interface becomes a “de facto standard”, this would allow involved software or service providers to control what functions and services can be supported on broadband markets. Thus, the potential for service competition on broadband markets will partly be determined by the degree to which access network operators and/or service providers control service related network functions.

3.2 Access to services

Network operators may also exercise **control over access to services**. In determining what services a user can access, operators might be able to limit the choice. For example, in bundling software, elementary service functions and network infrastructure, access network operators would be able to mandate certain infrastructure elements under the argument of security or quality. Such vertical integration may prevent open access on various levels of the broadband infrastructure.

Another form of controlling user access are (semi-)walled gardens.² It describes a business strategy designed to attract and retain customers. The network operator or service provider chooses to control the content and services that can be accessed by a customer. As such a walled garden could become an important bottleneck in differentiating the availability of services and contents. As an example, an operator with a large market share in a given area can attempt to impose a

² “Walled garden” (closed garden) is a term applied to a service package that provides customers access to certain pre-determined functions and content (Cullen International, 2003, p. 95). It is a branded service and is actively promoted by the service provider and its partners, and contains high quality content that is intended to improve and enrich the users experience and thereby increase their service loyalty and reduce churn.

'walled garden' on its customers, restricting their access to services from other operators. Examples have already emerged, where Cable TV and Digital TV operators are seeking to create a walled garden for a selection of services suitable for the TV interface (buying flowers, simple home banking etc.).

4 Lessons from German and European Broadband Markets

4.1 Market Developments

4.1.1 Some facts

At the end of 2005 in the EU(15) already 56,8 Million households (or 34,5%) were connected to broadband lines. This is an increase of 45% compared to 2004 when broadband penetration rate was 24% (being 17 Mio. more than 2004) (Commission of the European Communities, 2006a, p. 3). Yet, broadband penetration varies widely in Europe:

§ Netherlands (56% of households) and Denmark (53%) are the leading countries in terms of broadband access.

§ In Germany, there were 10,4 million DSL-lines (27% of all households) at the end of 2005, having one of the strongest increases in the EU of more than 50% compared to 2004.

§ Greece (3%) and Portugal (21%) have the lowest penetration rate in the EU(15).

It is expected that broadband penetration rates will increase further within the next years (Commission of the European Communities, 2004a, pp. 5). In countries such as Sweden, Denmark and Belgium it is predicted, for instance, that the household penetration rate will rise towards 80% by 2010.

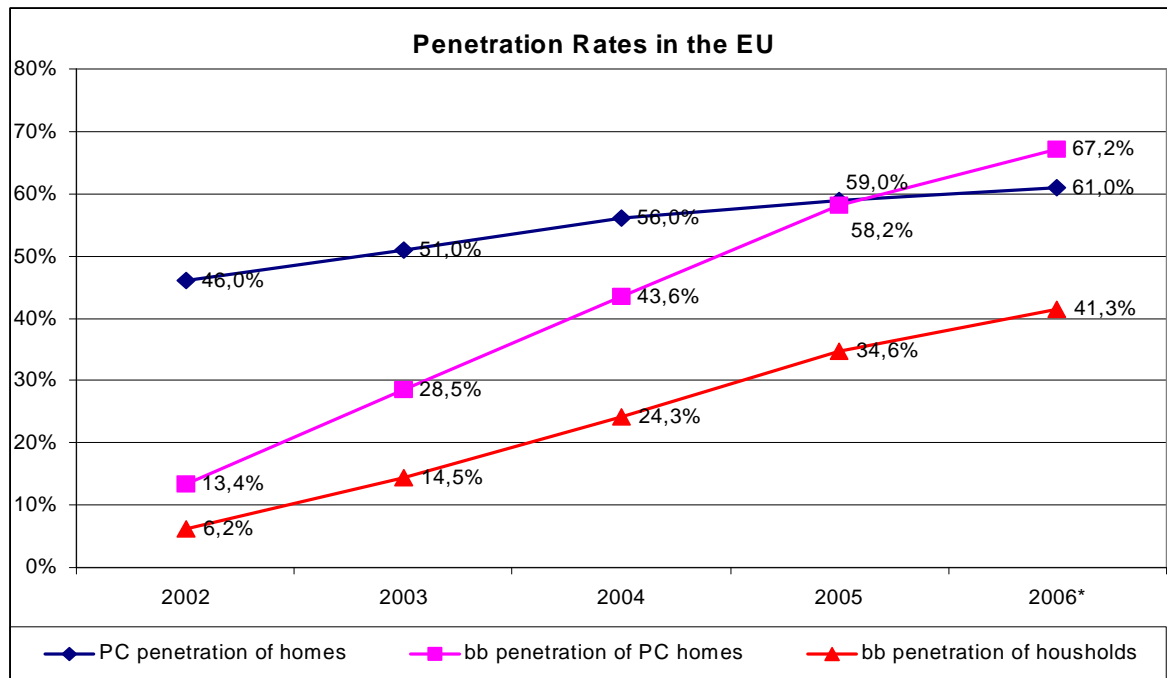
The broadband penetration rate is closely related to the PC penetration rate, which in the EU(15) has increased from 46% to 59% over the last 3 years. During the same period the broadband penetration of PC households increased from 13% to 59%. The relatively low BB penetration of PC households in Germany (45%) goes hand in hand with the highest share of ISDN lines in Europe (30%)

Across EU countries, the vast majority of broadband subscribers accesses broadband services through two broadband access platforms: DSL and cable TV (Commission of the European Communities, 2004b, pp. 50). Their relative share of broadband subscribers varies significantly from country to country. In the EU, DSL is the largest platform with just growing its share from 71% in 2002 to about 80% in 2005. Only 20% are using other access technologies, mainly CATV.³ Fibre networks have so far only gained a significant proportion of subscribers in Sweden

³ Within the EU there are some countries, where cable is dominant, i.e. in the Netherlands and United Kingdom. Also in the United States, cable modem is the dominant technology (64% market share) with DSL catching up only slowly.

Italy.

Graph 4-1: Penetration rates of Broadband and PC in EU(15)



* estimates

Source: ITU, own research; January 2006

The current dominance of DSL over cable as the main delivery platform for broadband services⁴ has different reasons, two of which are:

- § Cable roll-out varies significantly from country-to-country (not least owing to historical factors to do with the roll-out of television services).
- § Existing cable infrastructure often requires upgrading in order to carry broadband and this additional investment has not always been forthcoming.

4.1.2 Operators and Access Technologies

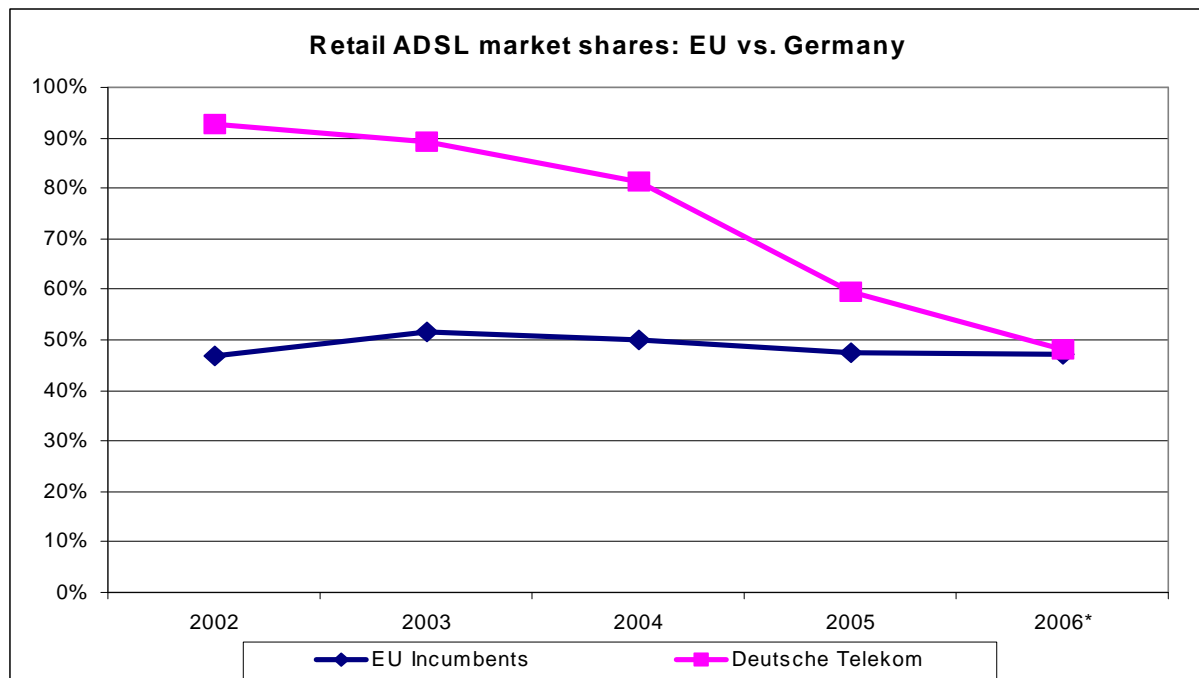
Over recent years, the incumbents' ADSL market share in the EU remained rather stable at a level being slightly below 50%. Only within the last year (from 2004 to 2005) the incumbents' retail share of net adds has dropped slightly from 51% to 37%. Yet, in several Western European countries (such as the Netherlands, Spain and Portugal), incumbents were able to consolidate their market shares (partly due to missing attractive wholesale options). For instance, the Dutch incumbent KPN could increase its retail market share from less than 25% in 2003 to more than 35% at the end of 2005). In contrast, the German incumbent DT recently has been under high pressure

⁴ In 2003 DSL accounted for 53% of residential broadband connections worldwide.

from both ISPs and alternative network operators (ANOs (and also CATV since early 2006) (BnetzAG, 2006, pp. 32).

- § In 2005 DT lost heavily market shares and had one of the lowest net adds (less than 25% at the end of 2005) of incumbents in Europe.
- § At the end of 2005 already 38% (up from 8% in 2002) of all direct DSL-lines are owned by competitors of Deutsche Telekom (usually via renting the unbundled local loop, high bit rate version from Deutsche Telekom).
- § In late 2005 for the first time competitors had more “new broadband subscribers” than Deutsche Telekom.
- § For 2006 it is expected that the incumbents retail ADSL market share will be lower than the market shares of Deutsche Telekom’s competitors.

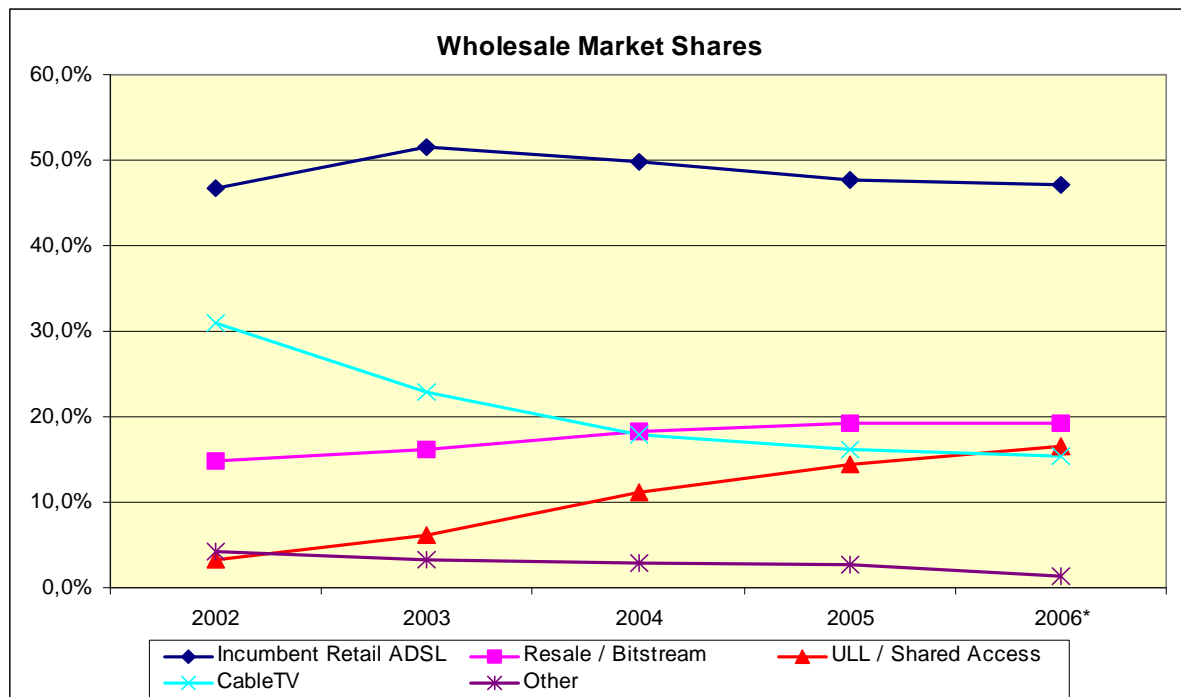
Graph 4-2: Market shares of incumbents: Deutsche Telekom vs. EU(15) average



* estimates

Source: own research: web pages of operators and regulators, January 2006

Graph 4-3: Market shares by operator and access form in EU(15)

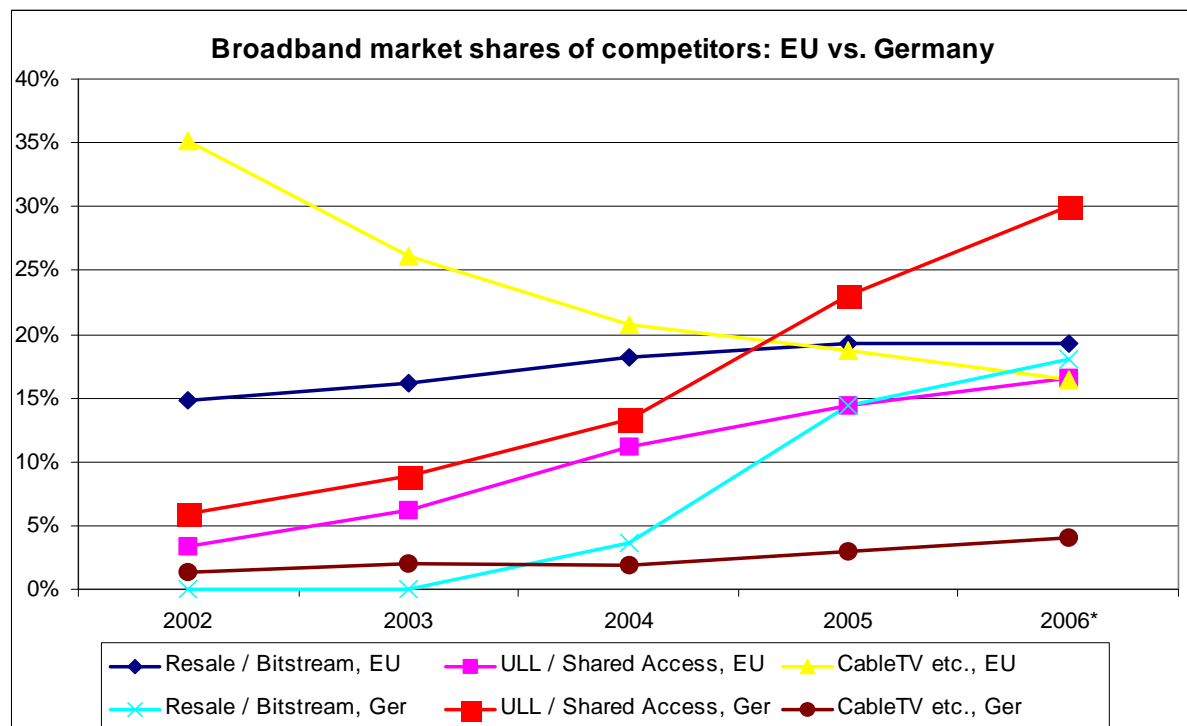


* estimates

Source: own research: web pages of operators and regulators, January 2006

When comparing the market shares of different access technologies one can observe that the share of DSL-based products offered by competitors increased from 18% in 2002 to 36% in 2005 (Commission of the European Communities, 2006b, pp. 33). During the same period, the CATV market share went down from 31% to 15%. Only recently cable has stabilised its share vs. DSL. Competitors of the incumbents were especially successful in selling ULL-based broadband access lines. This market share increased by more than 10% within three years. In late 2005 already more than 20% of retail net adds were ULL based. This is partly because in Europe, resale market shares have now begun to decline as alternative network operators migrate existing customers (to bitstream access and ULL based products).

In Germany, the situation was quite different from Europe. CATV and other access forms played only a minor role on the broadband market. On the other hand, the share of ULL-based broadband connections was always significantly higher than in the rest of Europe.

Graph 4-4: Market shares by operator and access form in EU(15)

* estimates

Source: own research: web pages of operators and regulators, January 2006

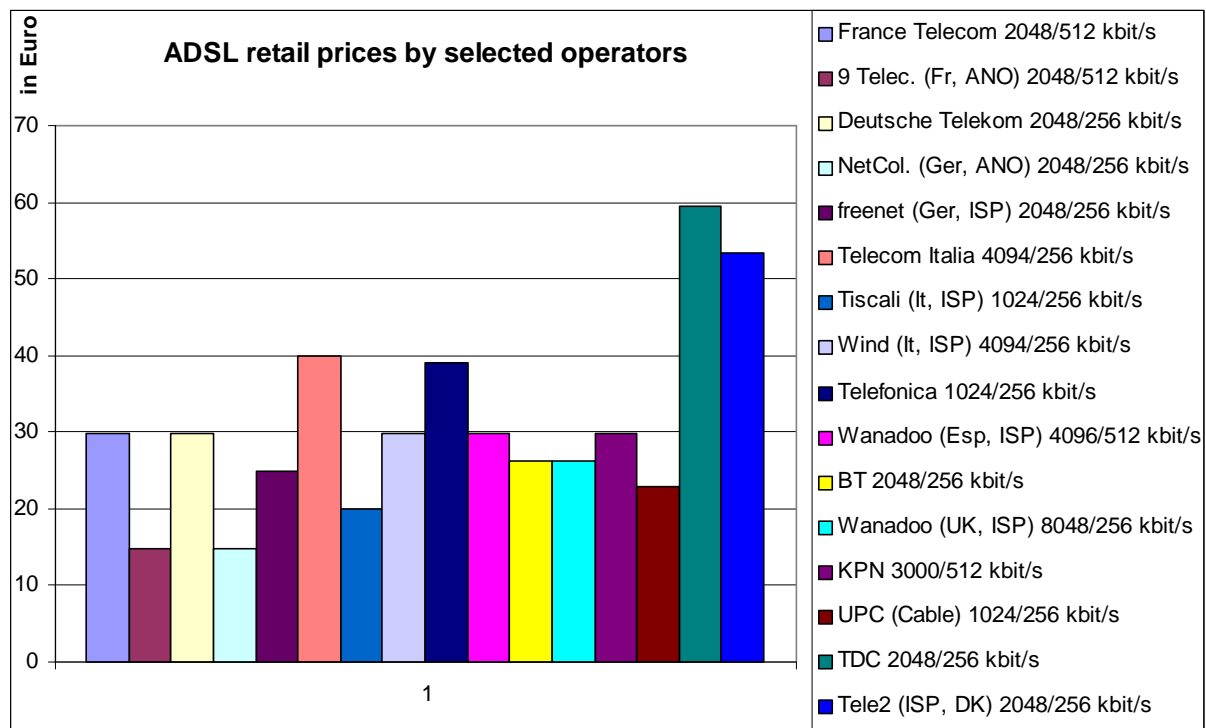
4.1.3 Tariff developments

Prices of ADSL-products vary across EU countries, and the comparison is made complicated by the different speeds offered and variations in pricing structures. A common characteristic is that prices are similar across countries at low speeds, while variations are more pronounced at higher performances. A striking feature is that prices charged by incumbents in EU Member States have been continuously lowered over recent years.

- § In average, in EU countries prices went down by about 20% from 40 € at the end of 2004 to 32 € in 2005 for a basic connection of 1-2 Mbit/s).
- § In the UK, average price of a 1Mbit/s DSL line (512kbit/s in 2004) went down from 37,5 € in early 2004 to 22,5 € in mid 2005.
- § In France, the price of a 1Mbit/s DSL line went down from 40-85 € in 2002 to 20-45 € in mid 2004.

An interesting observation is that Denmark is among the 3-4 most expensive countries in as to the provision of broadband access. This despite the fact that it is among the leading countries in the world with regard to penetration of broadband (53 connections per 100 households at the end of 2005). From this one can conclude that high penetration rates are not necessarily related to more attractive offers in terms of prices and speeds.

Graph 4-5: ADSL-Retail-Prices by operators in selected EU countries



Source: own research, web pages of operators, 2006

In Germany broadband prices are among the lowest in Europe:

- § CATV-operators offer the bundle of a 2 Megabit internet access line, a telephone line and a flat rate for unmetered access to voice telephony and internet at a price of 40 € 16 € less than T-Online
- § Fierce price competition comes from so-called “City-Carrier”, renting the ULL from DT and offering ADSL- and Internet access at very low prices
- § Prices for broadband Internet access in Germany for small quantities of data (< 3 GB) is significantly lower than the price for similar services in other OECD countries.

Table 4-1: Prices for broadband Internet access in Germany by selected carriers (15)

Operator	T-Online		freenet		NetCologne	
Service	1 Mbit	2 Mbit	1 Mbit	2 Mbit	2 Mbit	4 Mbit
analogue subscr. line	15,95	15,95	15,95	15,95	18,9	18,9
ISDN subscr. line	23,95	23,95	23,95	23,95	19,9	19,9
monthly ADSL line	16,99	19,99	16,99	19,99	9,9	14,9
one-off connection	49,9	0	49,9	0	0	0
free ADSL modem	yes	yes	yes	yes	yes	yes
Cityflat	9,95	9,95	4,9	4,9	4,9	4,9
one-off installation	0	0	0	0	0	0
voice flatrate		14,9		14,9	14,9	
Total analogue	42,89		37,84	40,84	33,7	38,7
Total ISDN	50,89		45,84	48,84	34,7	39,7

Source: own research, web pages of operators, 2006

4.2 Regulatory intervention on European broadband markets

Regulatory intervention on broadband markets so far took mainly place at the network access level. In most EU countries, network access operators from the telecommunications sector have already been subject to strict regulatory rules on access for some years. Legal and regulatory instruments provided by sector specific regulation have been employed to guarantee access of both new network operators and service providers to essential facilities and networks controlled by the incumbent.

4.2.1 Regulatory approaches in EU countries

In the European Union (EU), all incumbent telecom operators in Member States were required to provide unbundled local loops by January 2001. According to this legislation three different forms of network services can be used for broadband provision over telecommunications networks (Commission of the European Communities, 2004b, pp. 54-55):

- § full ‘metallic’ local loop unbundling (LLU) under which the competitive provider has access to the entire line, both voice and data;
- § line sharing of unbundled local loops, according to which the competitive provider has access to the data transmission portion of the line; and
- § bitstream access where the incumbent installs a high-speed access link to the customer and allows competitive providers access to this link. The incumbent maintains control of technical and service provision.

On the other hand, cable TV companies in EU countries, many of whom enjoy also significant market power (SMP) in parts of their business (such as broadband Internet access and pay TV), have in the past not been obliged to open their local access network to third parties. As in most countries worldwide, no regulatory provisions exist on cable access facilities to be made available

to service-based providers on fair, reasonable and non-discriminatory terms.

4.2.2 Regulatory approaches in Germany

In the German broadband market regulatory intervention has been rather restrictive compared to other European markets. The regulator has focused on unbundling the local loop which is already available for more than 7 years. Neither did the German regulator mandate bitstream access, nor did the previously called RegTP interfere into DT's offer of resale product.

As a consequence, until the end of 2005 bitstream access products have not been available in Germany. Deutsche Telekom only offered conveyance products at the IP level that allow alternative network operators to send their traffic over DT's broadband network. These (resale) products are T-DSL-ZISP, ISP-Gate and Online-Connect-DSL. They do neither allow alternative network operators to establish a direct link to the end customer. (instead the end customer subscribes to the DT product T-DSL or DT's resale product) nor do they enable them to offer its own value-added services or differentiate its services from DT's service (DT manages the entire traffic between the end customer and its own IP network).

Nevertheless Germany today has one of the most competitive broadband markets with

- § net adds are among the highest in Europe,
- § net adds of competitors are higher than those of the incumbent DT,
- § broadband prices are among the lowest in Europe,

4.3 Conclusion

As a conclusion of the broadband access policies in EU countries the following key points can be identified: After a rather slow take up, European broadband markets have increased rapidly over the last two years. This speedy growth in broadband take-up is clearly linked both to facility-based competition and the increase in competition within the DSL market with ULL being now available all over Europe and also bitstream access being mandatory in most European countries.

Asymmetric regulation in the form of heavy access regulation imposed on the incumbent has failed to stimulate competition on broadband markets in most EU countries. In terms of competition at the access network level those countries are more successful which do not have heavy regulatory intervention but the absence of burdensome regulatory rules favoured a competitive broadband environment at the network access level.

Regulators are starting now to adopt a more "technology-neutral" approach towards the regulation of broadband services. In some countries such as the Germany, there is a strong and growing political impetus to ease regulatory burdens on telecom incumbents.

This short overview of broadband market developments and corresponding regulatory policies in EU countries leading the broadband development has shown, that various factors decide on the

success of broadband development, the regulatory policy being only one amongst others. Also there is no optimal regulatory policy to be adopted. Rather the best regulatory approach depends on country-specific characteristics, such as whether competing broadband infrastructure exist already or not.

Moreover, the analysis in this chapter has indicated how government policies can influence the (un)successful development of new markets. If a government's "pro-competition access policies" goes hand in hand with fierce government intervention the incumbent's broadband business model cannot exist. With no incentive for broadband roll-out, services and content cannot be brought to customers because the necessary infrastructure doesn't exist. Moreover, in prescribing an extremely specific policy framework, a government removes flexibility from its policy mechanisms.

One conclusion to be drawn from these considerations is that several factors account for high broadband penetration rates in some countries, above all government support, but also demand- and supply-side factors. A regulatory environment supporting competitive broadband markets is only one factor which will be analysed in more detail in the following section.

5 A regulatory strategy for broadband access markets

5.1 Need for regulating bottlenecks on broadband access markets?

As has been described in section 2 various potential bottlenecks may allow network operators to exercise market power in the broadband market by controlling important access points. In such cases one could argue that some form of access regulation is a natural consequence. Access regulation is a major feature of current regulatory systems for communications markets. Regulatory concerns arise in all those cases where parts of the value chain are essential to provide a service and which limit the number of potential providers. Control of a bottleneck in the value chain could lead to market power being exercised to the detriment of customers.

Yet, regulators need to consider whether these potential bottlenecks do create market power sufficient to justify regulatory intervention. The assessment of whether to introduce regulatory measures can be extremely difficult because of the complexity of the broadband environment and because the consequences of regulatory action cannot be entirely foreseen. This is the main challenge for regulators in the broadband environment where there are risks associated with any type of regulatory action. There are several good reasons why regulators should not intervene on broadband access markets:

§ Search for success is a natural business objective that may lead to a strong but not necessarily dominant market position warranting regulatory action. Inappropriate intervention would alter the risk and reward calculations that drive investments and could create the impression that success will be punished by regulators. This could hinder investment in the broadband sector and retard broadband development.

- § Inappropriate regulatory requirements would in affect mean that the regulator would pick winners and losers. Given that there are many possible broadband provision strategies available to entrants, regulatory intervention that favours one particular strategy necessarily distorts these choices.
- § The business models on broadband markets may not yet be stable and regulatory intervention could freeze commercial arrangements and market structures that are not efficient or viable in the longer term;
- § It may well be that most of the activities necessary to provide a broadband services and content are not subject to economies of scale, are replicable and could be easily subject to competition.
- § The importance of the bottlenecks could fade away over time with new technology or other service alternatives. This means that the consequences of regulatory inaction over time could be less important than they appear at the outset.
- § If network access is unrestrictedly opened to any application or player, the operator keeping control of these elements will no longer be able to ensure end user quality and security.

There is thus significant risk that regulatory intervention could be counter-productive in the sense that the regulator would in effect be micro-managing the market instead of letting the market find its own solutions. Furthermore, the potential negative consequences of inaction could be remedied in time by other mitigating market developments. All of this suggest that regulators should avoid the temptation to intervene unless significant negative consequences of inaction are clearly foreseen.

On the other hand, it cannot be ruled out that dominance over certain control points could lead to serious barriers to market entry and thus justify regulation. In such cases, lack of regulation could actually hamper development of the broadband market. In other words, potential bottlenecks on broadband markets make it necessary that a regulatory framework is in place, allowing the responsible authority to take regulatory action on content provision via broadband networks if necessary. The shape of such a regulatory framework will be outlined in the following section.

5.2 Criteria for taking regulatory action on broadband markets

When a regulator decides to intervene on broadband markets he has to apply criteria. These criteria are defined against pre-defined policy objectives. On broadband markets such objectives could be to:

- § promote the investment in and roll-out of broadband infrastructure;
- § encourage the introduction of new and innovative services (health services, electronic commerce, etc.) over the broadband Infrastructure;
- § promote the dissemination of and access to diverse content over the broadband Infrastructure;

- § ensure that end-users derive maximum benefit in terms of price, choice, innovativeness and quality; and
- § ensure that there is no distortion or restriction of competition in the broadband communications sector.

Given these possible objectives criteria for the adoption of a coherent regulatory framework on broadband markets may be (ITU, 2003, pp. 34):

- § A stable but **sufficiently flexible regulatory environment**. In any rapidly changing environment it is very difficult for regulators to foresee or quickly respond to market developments. Thereby the usage of structural and incentive-based approaches to regulation should be considered to keep pace with technical and market developments, and to enable the introduction of new services and technologies.
- § **Technological neutrality**. In view of telecommunications, broadcasting, and IT to converge inconsistent treatment of service providers in different sectors should be avoided. In this regard, regulatory interventions should neither act as a barrier for a particular technological delivery platform nor interfere in the value chain to avoid distortions in the future new business models. Asymmetric access obligations applying to particular platforms distort competition, reducing roll-out incentives for those platforms affected. Broadband delivery platforms operate in the same market; convergence means that they all have the potential to deliver similar, closely substitutable services. Therefore, there is no rationale for imposing technology-specific or platform-specific obligations. To the extent to which there are different competitive conditions in different product areas, variety of sub-markets for broadband may be identified that need different treatment.
- § **Clarity of regulation**. The legislation should also provide sufficient certainty for market participants by concentrating on a number of clearly defined general regulatory principles. In this context the regulator could specify services it would **not** expect to be subject to regulatory requirements unless there were compelling special circumstances. This would favour a rules-based, rather than discretionary approach and so promote much greater certainty in investment decision making.
- § **Ensuring a minimalist approach to regulation**. This implies relying where possible on voluntary action by market players, but grant the responsible authority the power to intervene when necessary. Only where there are significant bottlenecks that threaten to block the development of the broadband market can regulation be justified as a means to achieve fair competition. Sector-specific (*ex-ante*) rules should only be applied to companies that enjoy “significant market power” with competition law regulating everything else.

When applying these criteria for adopting a regulatory framework for broadband access markets we recommend TA to be guided by the following principles (Fredebeul-Krein, 2003, p. 4):

- § The regulator should be required to carefully analyse the impact that the application of regulatory and competition law instruments will have on the communication markets.
- § The framework should allow a differentiated approach to address different market stages adequately, less intrusive intervention in more advanced markets but also in very immature markets as can be found in the broadband environment, and continue regulation where necessary such as in bottleneck type markets.
- § Market analysis must take into account different market characteristics, but the same regulatory consequences should be triggered by dominance.

These criteria and principles are not easy to implement. The convergence of telecom and media regulation requires an institutional structure to be effective in terms of decision-making, and for determining SMP a clear and coherent framework on competition policy to be applied to the communications sector needs to be adopted. Only when markets are not competitive and it can be established that dominance by one operator harms the development of broadband markets, regulatory intervention shall take place.

5.3 Regulation of Broadband Access Markets

As has been described above, the broadband access market can be considered to be vertically structured at three levels: network provision, service provision and content provision. It is now technically possible for a network operator to operate in all the three levels. However, a business in one cannot be made without access to the other two. This leads to the requirement that the owner of any facility at any level should provide access to the owner of any other operator according to competition principles (Commission, 2004c, pp. 19).

5.3.1 Access obligation of dominant operators

A generally accepted view is that regulation is required for dominant operators/providers to grant open and non-discriminatory access. If an operator/provider with a dominant position in the broadband market refuses to connect with others such a behaviour could have significant anti-competitive effects on the service provision and content creation markets and could also serve to inhibit the development of competing access networks. For this reason, regulatory provisions should ensure that a dominant position cannot be misused to offer discriminatory access conditions to others. The provision of open and non-discriminatory access to be granted by dominant operators ensures thus that competing companies on the broadband market permit open, fair and equal access to their facilities.

5.3.2 Access obligation of non-dominant operators?

One controversial issue of regulatory provisions on access to broadband networks is whether any or only dominant operator in the broadband market should be obliged to provide open and non-discriminatory access to service providers. While it could be argued that any network access operator should be subject to the provision of open and non-discriminatory access on broadband

markets, there are also strong arguments in favour of not regulating non-dominant operators. This is, because there is an inherent conflict between granting unlimited access and attracting investment, especially that needed for the continued construction of broadband infrastructure and development of broadband products. The question therefore arises whether to apply the principle of open and non-discriminatory access also to non-dominant operators.

It could be argued that non-dominant operators of access networks could be able to exclude service suppliers from access to their network. Yet, in practice, non-dominant access network operators have little incentive and limited opportunities to act anti-competitively by exclusivity, by refusing to supply services, or even by overpricing services to customers. The decision of the smaller mobile operators in Europe not to adopt a walled garden approach for their mobile portals confirms this. Given all the other difficulties of entering this market, such as infrastructure costs, and the presence of more established operators, non-dominant operators should therefore not automatically be prevented from restricting access to their networks.

Against this background we recommend the following as to network access:

- § The principles of open and non-discriminatory access should only apply to broadband access networks of dominant operators and not to all network operators.
- § Depending on the circumstances of a particular case other remedies may be applied to dominant operators on the broadband market as well (i.e. price regulation).
- § The terms and conditions of access to broadband networks of non-dominant operators should be a matter for commercial agreement, subject to the application of competition provisions and to ordinary commercial and technical limitations. Those limitations may include credit-worthiness, access provider's own requirements, pre-existing or anticipated third party needs, and the integrity of the underlying network.

5.4 The role of regulators

It has been argued above that a regulatory framework for broadband access markets should follow a technology neutral approach. In other words, communications regulations should apply to any provider of broadband products regardless of the technology applied. This raises the question of what role regulators should play in creating a favourable environment for broadband markets to develop.

Against the background of converging markets, a regulator should be vested with all powers and responsibilities to co-ordinate, regulate, monitor and control the application of the national legislation related to the broadband environment. Only then it is able to properly fulfil its role of effectively regulating broadband access markets. In other words, one authority should be responsible for both telecommunications and broadcasting regulation. Besides networks and services this includes also being responsible for content regulation. Such a combination of regulatory functions may provide the benefit to:

- § ensure a truly technology neutral regulatory approach;

- § pool the knowledge about the underlying technology of both broadcasting and telecommunications; and
- § reduce administrative cost by having the infrastructure for only agency (economies of scope and scale).

6 Conclusion

Various factors decide on the success of broadband development, the regulatory policy being only one amongst others. This paper has demonstrated that most likely there will be no optimal regulatory policy to be adopted. Rather the best regulatory approach depends on country-specific characteristics, such as whether competing broadband infrastructure exist already or not. Thereby the future challenge of regulating broadband access markets will be to ensure that access to the network, services and/or content of a potentially dominant provider in a relevant broadband market will satisfy requirements for openness and non-discrimination.

At the current early stage of market development a regulator should abstain from taking any premature regulatory action. Instead, when applying the principle of minimalist regulation, the first action to take for a regulator should be to remove any remaining regulatory barriers to competition in access to broadband markets so that all market players, network operators, service providers, content suppliers and end-users (the public) have affordable and non-discriminatory access to the various levels of the broadband market. Against this background a regulator should

- § abstain from requiring non-dominant operators to provide open and non-discriminatory access;
- § be cautious when putting in place ex-ante measures, and apply instead ex-post tools which are sufficient for large parts of the broadband market;
- § distinguishing between potential bottlenecks that promote normal competitive activity, and those that may harm competitive activity;
- § be careful of not regulating too early and take into account “long-term risks and reward aspect”;
- § require all dominant “broadband” providers to establish separate accounts for activities on different vertically integrated markets (network, service, content);
- § apply the principles of transparency and non-discrimination, complemented by practical rules for dispute resolution and availability of a speedy remedy for abuse of dominance when determining the conditions for broadband access to networks and services.

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