

Broadband market Germany

I. Market data analysis

Retail broadband lines (01 / 07 / 2006)

	DSL-lines	Access lines via cable	Access lines via powerline	Access lines via satellite	total
Number of retail broadband access lines Reporting date 01.01.2005	12,2 mill.	0,360 mill.	0,0096 mill.	.	12,6 mill.
Percentage of total	97%	3%	0,076%		
Broadband penetration Percentage of population	14,7%	0,4%	0,011%		15,3%
Broadband penetration Percentage of households	31,1%	0,9%	0,024		32,1%
Broadband coverage Percentage of lines	~92%*	~30%**	< 1%		

*) of customer with telephone lines (39,4 mill.)

**) of households with cable lines (~ 20 mill)

6,09 mill. broadband access lines are provided by new entrants, of which are based on wholesale products:

Reporting date 01.07.2006	Full ULL	Shared access	Bitstream access	Resale	Cable BSA	total
Number of wholesale products	3,2 mill.	0,027 mill.	0,0015 mill.	2,5 mill	0	5,73 mill.

Market share competitors:

Retail level: DSL lines: 46,9%

Broadband access lines: 48,3%

Wholesale level: ULL < 1%

Broadband conveyance (Incumbent's products ZISP): < 5 %

II. Country Case Studies

Broadband retail markets

In Germany the dominating access technology remains DSL. In the middle of 2006 about 12,6 mill. broadband access lines were active. 97% of those lines are xDSL lines. At that time the competitors' market share of broadband access lines was about 48%, which increased for more than two third within one year. They held a market share at DSL-lines of about 46%.

Competitors' success of conquering market shares at broadband access market is a result of appropriate offers of wholesale products. 56% of all alternative DSL offers base on ULL. About 43% of DSL lines marketed by competitors are Resale DSL-lines, of which 80% of value added quota remains at incumbent.

Up to 2004 the incumbent exclusively marketed DSL lines (DTAG) and Internet access (T-Online) in two contracts. Since 2005 after offering a DSL resale product its subsidiary T-Online (ISP) started with the combined marketing of DSL line and Internet access like infrastructure based competitors did from the beginning. After reintegration of T-Online within the Deutsche Telekom Group the significance of this business model will increase. But there is still a high stock of separately sold Internet access agreements (60% at the end of 2005): In addition to the DSL line, the end user has to obtain the Internet access from an Internet service provider (ISP). This Internet access includes the transmission service in the IP networks (from the broadband point of presence = BB-PoP) and the retrieval of content from Internet servers. For this purpose, the end user has to conclude a contract with an ISP. The customer can obtain Internet access either from Deutsche Telekom or from another ISP. The separated marketing of DSL line and internet access is the reason why competitive internet service providers were able to offer internet access products despite the incumbent's high market share on the broadband access market. The competitors' market share on broadband Internet access is higher than the one on the infrastructure market. At the end of 2005 the competitors' market share in Internet access market was 5 percentage points higher than the one in the broadband access line market.

Apart from DTAG there are about 60 often regional providers offering DSL lines. In a few cities competitors could win market shares of higher than 50%. Because of DTAG's resale DSL offers in 2005 the number of supraregional DSL providers grew, despite the fact that Bundesnetzagentur had to prohibit one of its resale offers (Net Rental) because of its abusive character.

In 2005 the bit rate commonly subscribed by end users at ADSL-lines has evolved from the typical "1 Mbit/s access" to the "2 Mbit/s access". Most DSL providers offer access lines with speeds of 1, 2 and 6Mbits. When being able to offer ADSL 2+ technique access speeds of 16 up to 20 Mbit/s are available. High-speed broadband access lines with up to 50 Mbit/s basing on VDSL technique are not yet publicly available. At SDSL lines the average bandwidth did not increase in the last years. At SDSL-lines there are two typical speeds mostly offered: bit rates of 1024 or 2048 kbit/s.

The alternative providers offerings often include the telephone line (narrowband and/or Voice over IP) the DSL line and the Internet access. Resellers of DSL lines are restricted to provide their costumers with DSL lines, Internet access and VoIP. In that case the (narrowband) telephone line is still marketed by Deutsche Telekom AG. All these providers thus have two functions for a customer wishing to use DSL: they are DSL line providers and ISPs. In these cases customers require only one contracting partner. This implies, that customers of these competitive providers do not have the option of choosing other ISPs. The competitors mostly

offer their services on the basis of the unbundled local loop. IF DSL lines base on ADSL 2+ technique providers also start to offer IP TV (Television services over IP based telecommunication lines) → those service bundles, often called Triple Play services first were offered by those TV cable providers who also are marketing Internet access.

At the end of first half of 2006 in Germany there is a broadband penetration (percentage of households) of more than 32%. The DSL-line penetration is 31%, the one of broadband access via cable only 0,9%.

Germany is a country with a high density of population (82 mill. persons), but there is an uneven dispersion. About 41% of the population is living in urban areas, 42% lives in suburban areas and 17% is located in rural areas, with low density of households and business locations. Distribution density is a very important cost driver for fixed network lines. MDF in big cities cover several thousands of households, in rural areas they service only some hundreds of households. That is the reason why the DSL coverage in urban areas is almost complete, in rural areas much lower. The DSL coverage in Germany in total is about 92% (percentage of incumbent's customer telephone lines).

There are three reasons why telephone customers in Germany can't get access to DSL lines: 1. technical reason: The distance between customer and DSLAM is to far (>5 km), so that DSL is technically impossible, 2. the customer density per DSLAM is to low, so that in incumbents view the access to DSL lines is economically not feasible. 3. Some regions in Germany have local loops based on a special hybrid fibre copper cable (Opal/Isis or Hytas), where DSL Technology is not applicable. Point one and two prove that density is important for DSL coverage.

Several providers are interested to fill the supply gap by wireless access technologies. Especially the newer WiMAX technology might be a real alternative to cover the last mile. Actually Bundesnetzagentur prepares the allocation of appropriate frequencies. The frequencies are at 3,5 GHZ and are dedicated as "Broadband Wireless Access". Wireless access services are mostly regional offers, though some providers try to create a nationwide uniform marketing.

Wholesale broadband access markets

Wholesale products for DSL lines

ULL and Line Sharing

Up to the summer 2004 there were two regulated broadband wholesale products allowing the creation of DSL lines: the unbundled local loop and line sharing. Up to that date line sharing was not accepted by the market (competitors criticised high rates!). That is the reason why up to the summer 2004 almost all competitors' DSL offers in the retail market were based on unbundled local loop. There are only very few new entrants' DSL offers basing on self-provided local loops. Those products are mainly high quality products like for example symmetric DSL-lines. This situation started to change in August 2004, when the incumbent placed a DSL-Resale offer on the market. (See the next but one chapter). At the end of first half of 2006 56% of competitive DSL offers were created via TAL, 44% via DSL Resale and 0,47% via line sharing. Compared to 2004 the percentage of DSL lines basing on line sharing doubled on its low level. The increasing demand for this access wholesale product is a result of NRA's rate reduction in 2005. Because of historical reasons this wholesale product still is of low importance compared to the ULL demand. In order to use those wholesale products it is necessary to have own infrastructure reaching to the access network. The new entrant asking for ULL or line sharing as a wholesale product has to collocate at DSLAM location; that means at a very low broadband network level. As none of

the competitors in Germany is economically able to duplicate the ubiquitous broadband network, only providers at regional level invested in local infrastructure. Up to 2004 regional city carriers were the most important competitive suppliers of DSL-lines. They invested in their regions in broadband-infrastructure, besides the last mile. The access lines (local loop) are mainly leased from the incumbent.

Broadband conveyance

In Germany there exists a second regulated broadband wholesale product. It is called ZISP (Zuführung für Internet Service Provider). The product conveys broadband traffic over the concentration network to handover points on a best effort basis in both ways (regional broadband conveyance). For a ubiquitous coverage the ISP has to interconnect at 73 handover points. This wholesale product does not comprise the access to the end customer. Another broadband conveyance product (Gate/not regulated) concentrates traffic to at least one handover point (supraregional broadband conveyance) It comprises the same services like ZISP + conveyance over the managed IP network of the incumbent. This product as well does not comprise access to the end customer.

Those broadband conveyance products are results of the German special feature of marketing DSL lines separately from Internet access contracts.

Up to now there are identified five competitors who also offer broadband conveyance to smaller ISPs. All alternative conveyance services base on the wholesale product ZISP. None of the competitors owns a broadband access network in combination with a concentration network being able to create such a service with its own infrastructure.

DSL resale

Up to the end of 2004 there were only a few providers (Arcor, QSC, celox,), which had nationwide (supraregional) supply of DSL-lines but far away from total coverage. They supplied mainly metropolitan areas. But when in **Summer** 2004 the incumbent started with the supply of a DSL-Resale-product (ADSL) the number of nationwide providers increased (9 providers¹). The access resale product helped Internet Service Providers (operating nationwide) without their own infrastructure to offer to their end customers Internet access products together with a DSL line. As this resale product is combined with a relatively high minimum purchasing quantity its use is not reasonable for smaller ISPs or those who offer high quality access lines to a smaller group of business clients. As a lot of ISPs claimed that the resale product's discount of 11 up to 15 % was too small², in April 2006 BNetzA started a margin squeeze investigation. Before finishing Deutsche Telekom AG raised its discount on monthly retail price to 20%.

Second half of 2005 Deutsche Telekom AG also offered a second retail product (Net Rental). Because of its special price formula big providers with a high demand on resale products could achieve much higher discounts (>40%) than smaller demanders. As a result of an ex ante abusive proceeding BNetzA prohibited Net Rental because of its abusive character. In the end of second half of 2006 almost 2.5 Mill DSL lines basing on Resale DSL were put on the market allowing bigger ISPs the nationwide operating of DSL lines.

¹ February 2006

² Vgl. Martin Virtel, „Kampf um DSL-Kunden wird teurer“ in Financial Times v. 13.07.04

Bitstream access

Up to second half of 2006 in Germany a ubiquitous offer of an IP-Bitstream access product - important for mass-market applications - does not exist. The incumbent does not supply such a Bitstream access product. Deutsche Telekom AG offers only a broadband access product consisting of DSL resale + ZISP (broadband origination on a best effort basis). The NRA does not agree with the incumbent defining this product combination as Bitstream. As it does not include the essential conditions a Bitstream access product has to fulfil: 1. Access to the customer and creating end customer DSL products with individualised quality parameters. A few regional providers are offering customised Bitstream access products in a few places. These Bitstream access products are predominantly ATM-based. Since second half of 2005 Deutsche Telekom AG also is offering an ATM based product comprising broadband access and conveyance (Premium Bitstream access). Up to 1st July 2006 only a few alternative access lines (1500) base on this wholesale product.

Wholesale products for alternative broadband access lines

As in Germany alternative broadband technologies are very unimportant, at the moment no wholesale products exist. The next important access technology are (in great distance) access lines via TV-cable. They have a market share at the retail market of almost 3%. Within one year the number of broadband access via cable almost doubled from 145.000 to 360.000. The market analysis has shown that a few providers are planning to offer a wholesale broadband access product. Because of its unimportance wholesale products based on the HFC (hybrid fibre cable) networks are at the moment not able to create a competitive impact at the fixed network.

Regulatory strategy

As infrastructure competition is seen to be important, the NRA has regulated an unbundled local loop product in the very beginning of market liberalisation (1997). Up to 1st half of 2006 competitors leased almost four mill. ULL. About three third of this figure are of high bit rate and used as a wholesale product for DSL lines. The increased demand of this wholesale product also seems to be a result of BNetzA's regulated rate reduction of monthly ULL rate of almost 10%.

Up to now the second regulated wholesale broadband access product, line sharing, is not very much well accepted by market. Though percentage of access lines realised via line sharing doubled within 18 months (also partly result of rate reduction) less than 0,5% of all competitive DSL lines use this wholesale product. Both wholesale products require network infrastructure by competitors that has to reach the main distributing frame (DSLAM). As no competitor is able to double the broadband network ubiquitously, those competitors with own infrastructure are restricted on local areas, where they compete with the incumbent. In some metropolitan areas they succeeded in getting high market shares.

For competition at access lines retail market Resale DSL is of high significance. Undertakings using this wholesale product do not need own access network infrastructure. The number of resale DSL access lines is ten times higher than 18 months ago. More than 40 % of all competitive DSL lines are realised via this resale product, which often is combined with broadband conveyance products (e.g. ZISP or Gate) or – especially by ISP without own infrastructure – with a conveyance resale product (e.g. OC). Increase in ULL and Resale DSL demand creates the high competitive gain of market shares. Though the value added realised by Resale DSL remained to a high amount at Incumbent (> 80%).

The actually regulated IP Bitstream access product completes for IP products (- as being appropriate for undertakings with a smaller part of own infrastructure -) the bundle of needed wholesale products for broadband access market.

Market analysis

ULL

In the market definition and analysis of market 11, which was notified in December 2004 the NRA has assessed significant market power for the incumbent on the ULL-market. Market share > 90%. Access to local loop was regulated in April 2005.

Broadband conveyance

In autumn 2006 there was a national consultation of Market Definition and Analysis. Two submarkets are defined: regional broadband conveyance and supraregional conveyance. Market shares are >90% and < 50%. 3-criteria test shows that for regional IP broadband conveyance market is regarded as warranting regulation. At supraregional conveyance market this is not regarded necessary.

Bitstream access markets

Up to now, in Germany does not exist a broadband wholesale product, which brings competitors in the position of offering DSL-services with own individualised quality of service parameters without the requirement of having an own nationwide infrastructure network. The definition and analysis of Bitstream access market was notified in December 2005. According to the special German network infrastructure and the announced demand of competitors for an ATM and IP based Bitstream product.

The NRA defines broadband wholesale access markets as follows:

- ATM Bitstream access market
 - with handover at the ATM level (layer 2) at various points in the network hierarchy
- IP Bitstream access market
 - with handover at the IP level (layer 3) at various points in the network hierarchy and HFC with handover at the IP level.

Both markets comprise Bitstream access products which could base either on the high bit rate "virtually" provided part of the local loop or on the complete high bit rate "virtually" provided local loop (with symmetric or asymmetric access).

Separated broadband conveyance is not found in this market.

As Deutsche Telekom is the only operator in a position to make a ubiquitous offering and which has significant market power as well on the corresponding retail markets as on related wholesale markets the NRA finds, that the incumbent has significant market power in the ATM bitstream access market and in the IP bitstream access market. For IP Bitstream access market access for consolidation the remedy decision is published. It regulates IP Bitstream access. The remedy decision for ATM Bitstream access is pending.

Retail markets

A market definition and analysis of retail broadband access market is pending.

Voice over IP (VoIP)

In the beginning of 2004 the first VoIP services for residential customers entered the market. Although some VoIP services existed for many years, it can be said, that these new services

were much better in quality and usability. Furthermore they offered access to the PSTN and not only peer-to-peer-telephony with other clients of a specific service.

At the end of 2005 there were about 500.000 estimated active users of VoIP in Germany. 1.000.000 already had the necessary equipment (hardware or software) at their disposal. At the end there are more than 50 providers of VoIP services for residential customers in Germany. Some of these providers are cable network operators. These VoIP services are based on access lines via cable. As seen above they represent only 3% of the existing broadband lines. So until now they don't play an important role in the broadband competition. This could change in the future. As cable network operators placed massive investments in the upgrade of cable networks in the last 18 month, the potential of this alternative access technology has increased. In future the competitive impact of intermodal competition might become more likely.

It is very clear that the increasing penetration of broadband lines is one main driver of these new VoIP services. A broadband connection is one of the requirements for a VoIP service offering the quality that consumers expect. The other way around it is possible that VoIP becomes a driver for an increasing broadband penetration. From today's view it cannot be said that VoIP already influences the distribution of broadband lines. But the most important providers of DSL lines or of broadband Internet access (Deutsche Telekom AG, Arcor GmbH & Co KG, United Internet AG, freenet.de AG, AOL Deutschland GmbH & Co KG, Tiscali GmbH) are offering VoIP service and most of the providers are using the DSL resale product offers for VoIP. These VoIP services function as an add-on for the DSL line or the Internet access. Some providers seem to use the VoIP service as a marketing tool to sell more DSL lines.

From a customer's point of view there seems to be a demand for "naked" DSL lines. These customers wish to combine "naked" DSL with a VoIP service to get rid of their traditional telephone line. Until now only very few operators are offering this. If there were more comparable offers VoIP could improve the broadband penetration, as there would be more demand for DSL lines. A "standalone" Bitstream access wholesale product could enable providers to offer "naked" DSL. The NRA stated in its market analysis that a wholesale product like this would ease substitution between PSTN and VoIP. In line with the determinations of the market analysis, the IP Bitstream access order provides for a standalone Bitstream product to be introduced in step with European harmonised regulation. VoIP is part of the markets 3 - 6 but there is no significant market power on markets 4 and 6. For markets 3 and 5 retail tariffs of the VoIP services by Deutsche Telekom AG are subject to tariffs regulation (ex post).