

# **Competition in the Local Access Market 2000**

Situation Report on  
Competition in the  
German Local Access Market

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## 1 Summary

This report gives facts and figures on competition in the local access market three years after full liberalisation. It contains data from network operators, collected by the Regulatory Authority for Telecommunications and Post (RegTP) in a survey conducted at the end of 2000. Save for trade secrets, the results are given as of September 2000 and for year's end 2000.

At the end of 2000, more than **52** companies besides Deutsche Telekom AG (DTAG) were active as local telephone service providers. In the whole of Germany, competitors supplied some **650,000** telephone lines in September 2000. This equates to a market share of **1.3%**. At the end of 2000, the competitors' share of the **50 million** fixed lines stood at **1.5%**, or **750,000** lines. Overall, nearly **100** companies plan in the foreseeable future not just to carry calls but to offer access services as well.

Table 1: Competitors' national share of the local access market

Segment		Competitors' share
<b>Lines</b>	Telephone lines (analogue + digital)	<b>1.3%</b>
	ISDN lines	<b>3.0%</b>
<b>Access</b>	Analogue lines <sup>1</sup>	<b>0.4%</b>
	Basic rate ISDN <sup>2</sup>	<b>2.4%</b>
	Primary rate ISDN <sup>3</sup>	<b>6.9%</b>
	DSL connections <sup>4</sup>	<b>2.6%</b>
<b>Traffic</b>	Local traffic (call volumes)	<b>3.1%</b>
	Total traffic switched by access operators	<b>2.6%</b>
<b>Revenues</b>	Access revenues	<b>2.5%</b>

As of end September 2000 for Lines/Access; first half 2000 for Traffic/Revenues

Although the market shares in the table are for the whole of the country, the occasional, much higher, figure is achieved at regional or local level. However, similar shares of the local access market to those for pure switched calls (**22%**) could hardly be expected at national level in the period since liberalisation, particularly since the local access market concerns the edges of the network where the bundling effects found in long distance traffic are absent. Also, the battle for each customer involves greater cost. The result therefore is that nationwide alternative access provision is undoubtedly a more difficult goal to achieve than indirect access, that is carrying calls by way of call by call or preselection.

A number of local loop operators were able at the close of 2000 to provide access in **85%** of their licence area with lines installed themselves or leased from **DTAG**. This means that in certain areas, a large percentage of customers now has a choice of provider – a process that has required lengthy infrastructure-build preparations. Even if **DTAG's** local loops are used for access to the customer, the additional facilities required are not insignificant (colocation, leased lines, own switches).

More than two thirds of competitors' phone lines are local loops leased from **DTAG**. This means heavy reliance on the incumbent's wholesale products, ie on colocation facilities at the main distribution frames (MDFs) and the provision of local loops. By the end of 2000, **DTAG** had logged **321,702** local loops on the basis of colocation. By the same date, **95** companies had signed agreements for local loop access.

<sup>1</sup> Conventional telephone line (one 3.1 kHz telephone service channel)

<sup>2</sup> Basic rate ISDN (Integrated Services Digital Network): two 64 kbps voice channels that can be operated independently of each other

<sup>3</sup> Primary rate ISDN: thirty 64 kbps voice channels that can be operated independently of one other

<sup>4</sup> DSL (Digital Subscriber Line): high bit rate service on the traditional copper pair (up to 2 mbps)

Alternative access technologies for bi-directional access such as wireless local loop (WLL), broadband cable connections and powerline communications (PLC) were still in their infancy at year's end. At the end of last September, some 2,400 wireless channels were operational for telephone service via WLL. The number of lines operated via broadband coaxial cable – some fewer than 2,000 – is on a similar scale. In both cases, supply outstripped demand. With regard to the Internet, there were 260,000 cable connections with return channel capability (cable modem service) at the end of September, of which an estimated quarter were actually used. Commercial powerline offerings were not considered possible before 2001.

The new providers are not present evenly. Thus competition is unfolding at a different pace from region to region. Alternative access offerings are now found in an area in which a third of the total population lives. In 60 cities, customers have the option of switching to one of the new providers – a relatively recent option in some places though, and not necessarily an option in all parts of the city.

The competitors' 1.5% share of lines supplied contrasts to a certain extent with the spread of local access offers. One of the reasons is the considerable delay in providing access via the local loop, DTAG initially being unable to keep pace with the demand for colocation space. To what extent the alternative offerings have actually been taken up by the customer depends on the attractiveness of the packages and on whether or not customers are basically prepared to switch provider.

We note that preselection and call by call are still much in demand. 45% of the call volumes set up by the competitors are on a call by call basis. The long distance operators have captured 22% of the market for call minutes three years after liberalisation, and considerably more in individual segments. Yet the diversity of available offers and the success of the long distance operators would appear to factor into customers keeping DTAG as their local access provider, even though alternative access is spreading.

The main source of the access providers' complaints, aside from the difficulties in accessing the customer via DTAG and the consequent delay in providing service, is the high cost of local access provision and the price squeeze exerted by DTAG offers, encouraging potential customers to remain loyal to the incumbent. Effective competition in the local access market without regulation is not yet possible, as far as the competitors are concerned.

An international league table shows Germany's position as regards competition in the local market three years after liberalisation as not worse than in other countries. It even bears comparison with that of the United Kingdom, where British Telecom's rivals' share of the local access market after the same period of competition was not very different. Unbundling the local loop has been a pioneering achievement in Germany, and one which is beginning to bear fruit as customers' scope for changing provider steadily grows.

## 2 Introduction

RegTP has declared its intent of taking a closer look at the situation and framework conditions of local competition. This was decided in view of the low intensity of competition at local level compared to other segments and reported difficulties in getting this competition up and running. The findings of the study are summarised below, with a view to making this market data generally available.

The study focuses on the local telecoms markets, that is to say the local networks and their peripheries. Here, both the former monopoly operator and its competitors provide access to the customer. In this last mile bottleneck, competitors have to rent or install their own access facilities. There is also a market for local switched calls. Local competition is also interesting as regards traffic development. Access can be provided over different technologies. Providers can either use their own facilities to access the customer or procure these wholly or in part from other network operators. We will therefore begin with an overview of the local access technologies available.

Most access providers limit their activities to particular municipalities or regions. Only a small number provide access nationwide. Starting with the licence holders we will determine first of all how many providers there are offering the different technologies and services and in how much of the country the customer has a choice of local access provider.

The market shares of DTAG's rivals are then presented. This is done with reference to nationwide figures collected from the companies. The analysis of the market is then rounded off with comments from the players, giving their views on how local competition is developing.

In an early market phase in which competing services cannot be expected to be provided throughout the country, a general description of market share may neglect local islands of competition. It might therefore seem useful to look at local markets more closely. Yet this would be an exceptionally complex exercise, given that there are over 5,000 local networks. Our study therefore focuses on selected regions. Despite imperfections, a good picture of local level competition can be obtained. General conclusions drawn on this basis may also be applicable to other regions.

Other countries have likewise liberalised their markets. Some of the new providers in Germany have parent companies in other countries, and can bring their experience to bear. This is one reason why the progress of competition here is being followed closely internationally. Before assessing local level competition in Germany, we may find it useful to refer to other countries' experience in this regard. An international comparison is therefore made at the end.

### 3 Access Technologies in the Local Loop

In the fixed networks, customers can be accessed via copper wire, copper coaxial cable, optical fibre and terrestrial fixed links. Further possibilities are satellite connections and the electricity grid (powerline communications). We summarise the main technologies below, before discussing competition in these areas in section 4.

#### 3.1 Analogue/ISDN

The conventional means of accessing the customer is by copper pair with the simplest form being an analogue line of 3.1 kHz bandwidth for telephony. Special Integrated Services Digital Network (ISDN) transmission techniques have made it possible to add on communication channels. The basic rate ISDN service consists of two 64 kbps, or two telephone service, channels. The primary rate ISDN service consists of 30 channels on a four-wire circuit. It is now possible to realise a primary rate ISDN service on a two-wire circuit (suitable for higher bit rates) as well. Analogue and digital lines can also be realised over any other transmission media, but the copper wire is the most common. Thanks to the advancement of digital transmission methods, the copper wire can be used today for considerably more than just analogue and ISDN lines.

#### 3.2 DSL

Digital Subscriber Line (DSL), variants of which exist as ADSL, HDSL, SDSL and VDSL, is currently being introduced on a large scale in Germany on the basis of the existing copper wire. RegTP paved the way for new providers to enter the market at an early stage by ordering **DTAG** to rent its local loops to competing providers for a fixed price.

Around 95% of all phone lines in cities are not more than 1.9 km away from the main distribution frame (MDF) on average, and so can transmit the higher ADSL and HDSL speeds. If, however, the distance is farther than the transmission capacity of a DSL modem allows – not seldom the case in rural areas for example – a DSL connection can only be implemented with costly regenerators. Thus 100% coverage is unlikely.

Generally speaking, the transmission speed is determined by the quality of the copper pair. As the sole variation factor is the distance between subscriber and MDF, the transmission rate depends on the distance from the customer to the local exchange. This explains why very high bandwidth DSL, such as VDSL, can only be used up to a maximum of 1.5 km from the MDF, whereas ADSL can serve most residential users in urban areas. It is worth mentioning here that technically, the transmission rate of an analogue modem on the local loop could be much greater, but has been limited to 56 kbps for standardisation purposes.

ADSL, SDSL and VDSL all allow the local loop to be used for voice telephony at the same time. As DSL – originally developed for analogue networks – leads to frequency problems in ISDN networks, German access providers use an ISDN-compatible variant.

More details of the DSL variants are given below in light of the current great interest in DSL for Internet access.



### **3.2.1 ADSL**

This is likely to be the most well-known DSL variant. It stands for asymmetric DSL, in other words the asymmetric distribution of transmission capacity. Discrete multitone allows the available bandwidth to be adapted dynamically to distance, cable quality and broadband requirements.

The availability of a DSL connection depends on whether or not the provider's switch has been upgraded to DSL capability. This requires the network operator to connect his line terminations at the main distribution frame to a splitter and a DSL modem. Subscribers must likewise install a splitter and DSL modem.

The splitter separates the low frequency portion of the band (analogue/ISDN) from the high frequency portion (DSL data communications) of the local loop. At the MDF the voice telephony part is provided to the telephone network for further transmission, while the DSL traffic is routed to the Internet backbone via DSL multiplexers.

### **3.2.2 HDSL**

HDSL (High Data Rate DSL) is a symmetric DSL variant, like SDSL. It provides a maximum of 2mbps in both directions. In early versions, the transmission range depended on the number and diameter of the wire pairs used. Covering a distance of three to four kilometres at a speed of 1.5 mbps will require two copper pairs, and three at a speed of 2mbps. Besides these multi-pair requirements, HDSL – unlike the other forms – is concerned purely with data transfer, that is to say analogue or digital telephony is not envisaged.

### **3.2.3 SDSL**

SDSL stands for either Symmetric or Single Line DSL. This technology which, unlike HDSL, requires one copper pair only, delivers a maximum of 2.3 mbps both downstream and upstream. SDSL also accommodates 64 kbps data channels that can be used to provide telephone or ISDN channels.

### **3.2.4 VDSL**

VDSL (Very high bit rate DSL) is the youngest member of the DSL family. It delivers asymmetric rates (maximum 52 mbps downstream, up to 1.6 mbps upstream) and also a symmetric option with a maximum of 26 mbps in both directions. Due to the very high data speed, its range is limited to 0.3 to 1.5 km to the exchange.

Table 2: A comparison of xDSL variants

Variant	Frequency range		Data speed	Range	Telephony
	from	to			
Analogue	300 Hz	3.4 kHz	56 kbps	Unlimited	Yes
ISDN	0 Hz	40 kHz	144 kbps	Unlimited	Yes
HDSL	0 Hz	292 kHz	2 mbps	3 - 4 km	No
SDSL	0 Hz	292 kHz	2 mbps	2.5 km	Yes
ADSL (upstream)	0 Hz	138 kHz	640 kbps	5 km	Yes
ADSL (downstream)	138 kHz	1.1 MHz	8 mbps		
VDSL	200 kHz	20 MHz	52 mbps	1.5 km	Yes

The rollout of DSL may be inhibited by the phenomenon of crosstalk. Crosstalk arises when the majority of copper pairs in the channels transmit very high data rates. Thus mutual interference between services occurs to a greater or lesser extent. Another factor to bear in mind is the radiation of unwanted emissions impairing broadcast or other radio-based services.

### 3.3 WLL

Wireless Local Loop (WLL) provides a wireless (radio) connection from the customer premises to a long distance network by means of fixed point-to-point links. PMP (point-to-multipoint) links allow several customers to be served from one point.

Signals are transmitted in the GHz band. Typically, PMP systems operate in the bands at 2.6 GHz, 3.5 GHz and 26 GHz. High transmission rates are provided over mostly short distances, ranging from a few hundred metres to ten kilometres (depending on the frequency band used). Customers are served through a central station.

The great advantage of this wireless access technology is that it can be implemented rapidly and cost-effectively. All that is required to connect the customer is a dish antenna in conjunction with an outdoor unit, an indoor unit and a router. No expensive cabling is needed.

### 3.4 Satellite Internet Connection

We make a distinction with this type of access between one-way and two-way services.

One-way services refer to the rapid downstream delivery of data from the Internet to the customer via satellite at speeds of up to 4mbps. Besides a receiver, the customer also needs a DVB (digital video broadcasting) decoder to convert the data received. These decoders mostly come in the form of a set-top box or a PC card. The uplink, ie the path from the user to the Internet, is the conventional phone line.

At the end of 2000, a total of five providers offered such services on the EUTELSAT and AstraNet platforms of the [Société Européenne des Satellites \(SES\)](#).

Return channel capability using the satellite infrastructure has now been available for over a year. EUTELSAT offers these solutions to small and medium size enterprises; SES intends

to launch a similar service in 2001. Commercial service for home users is scheduled for introduction at the same time.

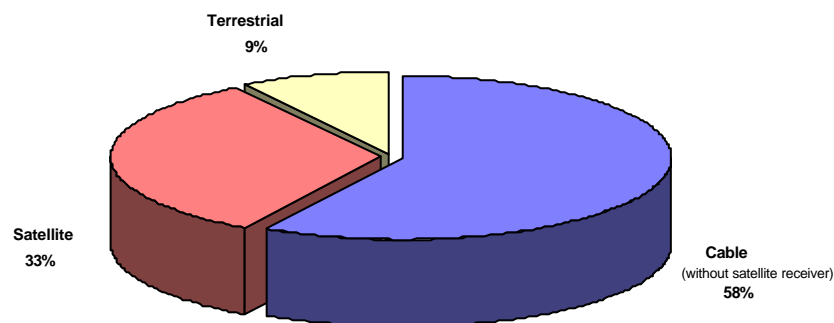
The two-way services are not subject to any local constraints, ie they do not require any wholesale products from the local loop provider. Hence they are outside the terms of reference of this study and so will not be looked at further.

### 3.5 Broadband Cable

#### 3.5.1 Broadcasting over broadband cable

The German cable networks, based on coaxial cable, serve around **20 million** households and thus count among the largest in Europe. More than half of the TV households receive their radio and TV programmes via cable. One third is served via satellite.

Figure 1: TV households by type of infrastructure



Source: SES/ASTRA and RegTP

The coaxial cable network, now comprising 460,000 km, was originally built with a transmission bandwidth of 300 MHz. When the first private broadcasters appeared in 1984 and more and more satellite programming was fed in, it was decided in 1987 to upgrade to the 446 MHz technology. The upgrade was completed in 1997 at a cost of some DM2.5 billion. The extension of the so-called hyperband was originally reserved for the now defunct D2-MAC technology. Some years ago, **DTAG** agreed to the re-analogue of the three lowest digital channels. The remaining eleven are used for digital programmes, and two are reserved for media services (eg **T-Online** and **AOL**).

#### 3.5.2 Reference Chain for the Cable TV Network

The term "hypothetical reference chain" is sometimes used to describe the cable TV network on account of the structure of the network in series, like the links of a chain. The reference chain divides into four network levels. It is relevant not only in technical terms, but it also determines the responsibilities of the network operators.

##### *Level 1: National section*

Delivers content to the TV switching points from the TV studios

*Level 2: Regional and local section*

Feeds content to the head-ends from satellite, broadcasting and radio relay receiving stations and passes it on to the relay stations on the user's side

*Level 3: Local originating and long distance network*

Transmits the signals from the relay stations to the transfer point at the customer premises boundary

*Level 4: Domestic distribution system*

Transmits the signal from the transfer point at the customer premises boundary (or cellar) to the socket in the home. Multi-premises distribution systems allow whole sections of city networks to be opened up at level 4

*Level 5 (optional): Residential section*

Connection in the home, from the socket to the receiving device.

Whereas DTAG is the sole operator of levels 1 and 2, around 10% of the level 3 infrastructure was privately owned prior to disposal of the networks. In the new federal states in particular, DTAG's competitors managed to take over the former community antenna systems or to build their own level 3 infrastructure in lucrative areas and upgrade it for future value added services. At level 4, around two-thirds of the connections are operated by private companies.

### **3.6 Optical Fibre**

The optical fibre market is becoming ever more important as a result of the deregulation of the telecoms markets worldwide and the modernisation of infrastructures, the rapid development of Internet usage in the business community and the demand for broadband capacity that has accompanied it. With the advent of the optical amplifier and the steady increase in bandwidth, optical fibre has become a real economic alternative to copper cable, particularly for building new networks and upgrading existing structures. Bit rates have soared in recent years through huge advances in the technology. Transmission speeds over 40 gbps have already been glimpsed.

Two forms of implementation are fibre to the home (FTTH) and fibre to the curb (FTTC). However, a fibre connection is only regarded here if it is routed, similar to a copper or coaxial connection, into the user's home or onto the premises.

One fibre offers vastly more transmission capacity than an ordinary phone line. Multimedia applications such as TV, video transmissions and high-speed data transfer are feasible via fibre. Fibre to the home, however, has not proved economic on account of the high connection costs involved. True, DTAG has installed fibre connections in grand manner in the new federal states ("Optical Access Line", or OPAL project), but has not followed up with multimedia applications. Today, fibre connections are mainly used for commercial purposes, for instance in the fixed telephone service to provide access to primary rate ISDN. Most of all though, they are used as fixed connections for access to high bit rate data services, for example to the Internet. This form of access is very important in connecting up local area networks (LANs), but also in connecting to international data networks. DTAG also offers other operators access to its fibre local loops.

### **3.7 Powerline Communications**

Powerline communications (PLC) is a transmission technology that uses the electricity infrastructure. At the local substation, data signals and electrical signals are coupled on to the low voltage current and transmitted together to the customer's home.

At the customer's home the data signals are received by an adapter which feeds them to the in-house network. Thus they can be received by all the power sockets in the home, making additional cabling unnecessary. In the opposite direction, the data signals are filtered by a decoder in the substation and fed into the telephone network.

Currently, the maximum data speeds achievable are 1 - 2 mbps. This bandwidth, however, has to be shared between all the households connected to a substation – 200 on average.

PLC has been used in the home for some years now. The baby intercom, for instance, works on this principle; the utilities also use it to set electricity meters for day and nighttime tariffs.

The chief drawback is the susceptibility of the low voltage network to interference caused by the number of inductive consumers and which "contaminates" the network for widespread DSL service. Additionally, there are the following problems:

- Notwithstanding the frequency of the carrier wave signal used to carry the data, inductively coupled interference must be taken into account.
- Feeding the carrier wave signal into an insufficiently screened transmission path at high frequencies may lead to the powerline becoming an antenna and causing interference to terrestrial frequency usages.
- The number of consumers and the amount of use will always vary.

## 4 Competitors in the Local Access Market

By the end of 2000, 361 companies had been licensed to operate transmission paths (Class 3 licence) or to provide telephone service using their own network (Class 4 licence). Of these, 69 had a Class 3 or 4 licence for the whole of the country, while 14 companies had both classes of licence for the whole of Germany.

Table 3: Companies with a Class 3 and/or Class 4 licence

	Class 3 or 4	Class 4	Class 3	Class 3 and 4
Total	361	177	308	124
National	69	63	21	14

As of year's end 2000

The fact that the number of licence holders is still growing is an indicator of competition in the telecoms market. By the end of 2000, 1,950 telecoms service providers had registered with RegTP, in line with the notification requirement in Section 4 of the Telecommunications Act. This number includes both licence holders and companies that do not need a licence for their services.

More than 180 companies offered telephone service in the market at the end of 2000. Of these, roughly 84 were long distance or access providers<sup>5</sup>. Of the 53 long distance operators included in this figure, 39 provided telephone service nationwide on the basis of call by call and preselection. By the end of September 2000, interconnect contracts had been signed between DTAG and 117 competing providers. By year's end 2000 this number had risen to 120. Thus we may expect an increasing number of providers with their own long distance networks. More than 100 other providers were active at year's end as resellers for the network operators, with mostly nationwide offers.

The resale of telephone service covers the sale of the licensed service "voice telephony on the basis of self-operated telecommunications networks" acquired from a third party. Resellers market the calls set up by long distance operators, acquiring call minutes from the long distance operator and selling these to end users/customers<sup>6</sup> under their own name and on their own account.

By the end of 2000, 95 contracts had been signed between DTAG and its competitors on access to the unbundled local loop. In early October 2000 the number was 93. In October 2000, 52 licence holders besides DTAG provided direct access to the customer on the basis of these contracts or of their own local access network. Of these, around 31 companies offered direct access only. A further 21 offered direct access and also indirect access for other customers using the call by call and preselection options.

<sup>5</sup> The number of long distance and access providers does not include resellers. However, it may happen that Class 3 and 4 licence holders also act as resellers for other licence holders, or do so for as long as they do not make use of their own licence rights.

<sup>6</sup> Customers access the telecoms service by

- prefixing a carrier code 010xy (call by call with registration option) or selecting another carrier in advance, as default carrier (preselection option); the call by call customer is recognised by their number and is associated with the reseller through their registration,
- dialling an 0800 number to the carrier's switch; the carrier recognises the caller as authentic on account of their PIN and routes the call on to its destination (*callthrough*),
- dialling the number on a calling card. The subscriber is identified by a secret number, allowing the called party number to be dialled. Calling cards enable many free numbers. They have no electronic components, but serve merely as a reminder of the card number.

Table 4: German telecoms market indicators

Criteria	Number
Inhabitants	82 million
Households	36 million
Businesses	2.5 million
Municipalities	14,500
Local networks	5,200
Access areas/ Main distribution frames (MDFs)	7,900
Local exchanges	1,600
Class 3 licence holders	308
Class 4 licence holders	177
Class 3 or Class 4 licence holders	361
Licensed and licence exempt registered providers under Section 4 of the TKG	1,950
Interconnection contracts	120
Local loop access contracts	95
Phone service providers <sup>7</sup> (no resale)	(84)
Access providers <sup>8</sup>	(53)
Long distance operators <sup>9</sup>	(53)
Pan-European backbone operators	18
Companies with WLL assignments	21
MAN providers	6
DSL providers	(~15)
Cable TV operators (up to level 4)	5,000

As of year's end 2000, figures in brackets are for early October 2000

#### 4.1 Analogue and ISDN access with point-to-multipoint configuration

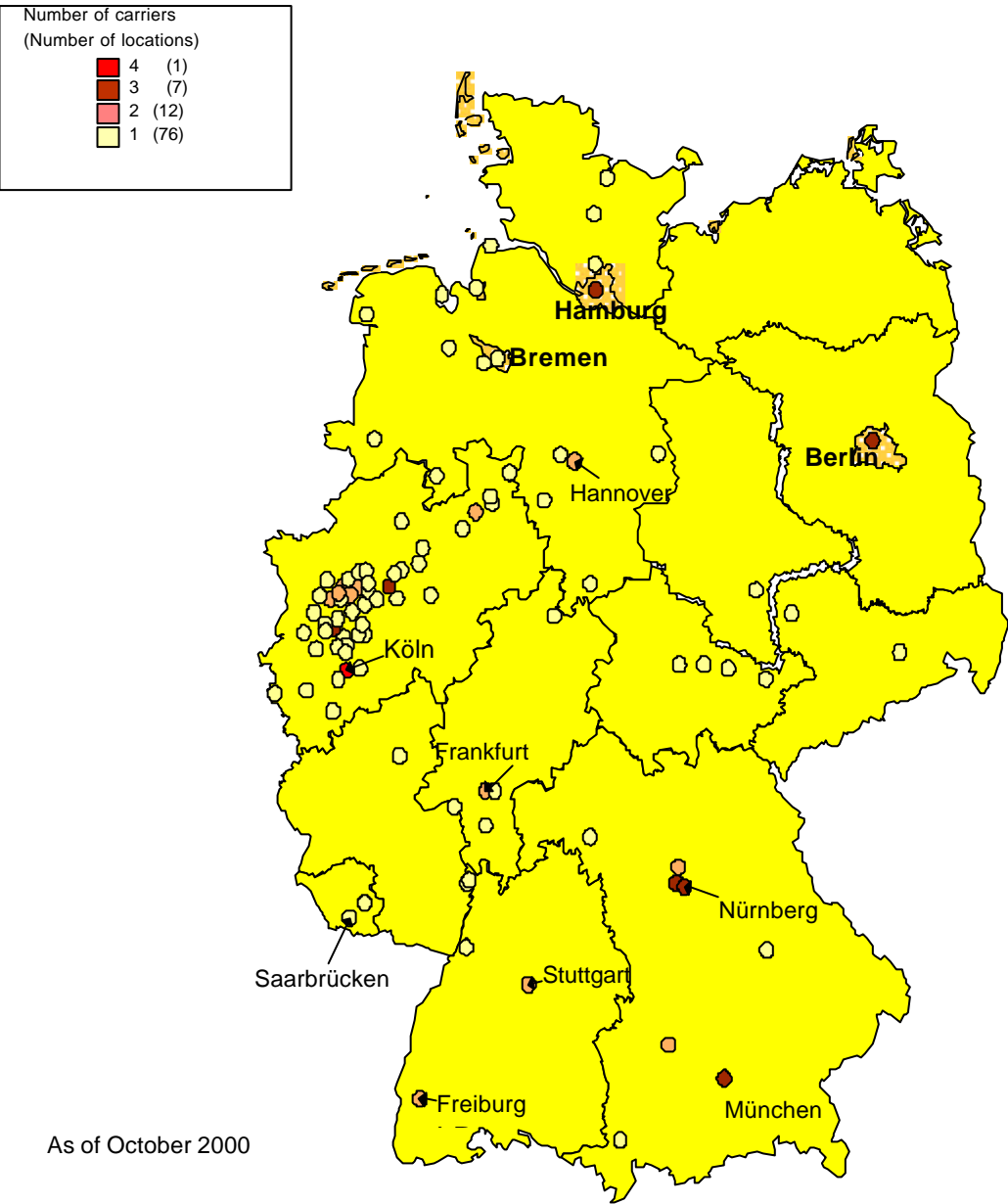
Based on their contracts with DTAG on access to the local loop or using their own access lines, 52 licence holders besides DTAG offered home users analogue or digital lines (as of early October 2000). In 51% of the 188 German cities with more than 50,000 inhabitants customers therefore had a choice between DTAG and another – in some places more than one – alternative access provider. This percentage even reached 72% in the 83 cities with over 100,000 inhabitants. In October 2000, one third of the total population thus had a choice of access provider. In some places, this choice has only recently materialised. In the course of 2001, more customers will experience choice as competitors obtain colocation space and move into other cities. Judging by the colocation orders, we may expect 60% of the population to have a choice of access provider within the foreseeable future.

<sup>7</sup> Of the 84 phone service providers, 22 operated as both long distance and access provider. 31 were long distance operators only and the same number access providers only.

<sup>8</sup> 22 providers offered phone service both as access providers and as long distance operators. 31 companies were active solely as access providers.

<sup>9</sup> See footnote 8.

Figure 2: Number of alternative city carriers in cities of over 50,000 inhabitants





## 4.2 Metropolitan Area Networks (MANs) and City Networks

The terms MAN operators and city carriers are often used synonymously.

A *Metropolitan Area Network (MAN)* is a broadband telecoms network realised almost entirely via modern optical fibre technology. It has a predominant ring structure and connects the most important nodes of a city. MANs are often built by international, financially strong telecoms companies which then integrate the cabled metropolitan areas nationally into a *Wide Area Network (WAN)* or even into an international network structure. The term *Global Area Network (GAN)* is sometimes used to describe the international network structure.

The German MAN fibre rings are part of a Europe-wide system linking Europe's major business centres. The trend towards ever more data and Internet services is unmistakable, as the growing number of broadband connections, backbone networks and the appearance of Internet Solution Centres (ISCs) shows. More and more, voice communication is being seen as just one of a number of services and forms of use of the local loop.

Unlike a MAN operator, a local *city carrier* is understood in the following as a company that has typically evolved from municipal plants and local companies and whose activities are limited exclusively to the particular region. City carriers have extensive rights of way/cable ducts along which the telecoms infrastructure is built. The boundaries between city carriers and MAN operators can be fluid; sometimes, city carriers also appear as MAN operators. As a rule, they have a complementary, rather than a competing, relationship. City carriers not seldom perform feeder functions for MAN operators on the last mile to the customer and are also able to provide transmission capacity (leased lines) for sections of metropolitan area networks.

The authorities responsible for MAN structures in Germany are international operators, the former monopoly operator and local telecoms companies. At year's end 2000, some 22 companies had fibre networks in place in Germany as part of pan-European infrastructures<sup>10</sup>. Of these, 18 already have points of presence (POPs) in Germany. Six of these companies operate 18 metropolitan area networks in eight German cities as feeders for their pan-European networks. Two further firms are in the process of building MANs. Overall, 35 MANs are operated in eight German cities by pan-European backbone operators, or are under construction.

## 4.3 DSL

At the end of last year, 12 licence holders offered DSL service besides DTAG on the basis of their local loop contracts. 78 (42%) of the 188 towns and cities in Germany with more than 50,000 inhabitants – representing around 30% of the population – are expected to have a choice of DSL service provider by early 2001 in at least some parts of the town (8% with one provider, 8% with a choice of two or three and 14% with a choice of at least four). In the 83 German cities the percentage is even 72%, ie DSL service is provided in 60 cities of over 100,000 inhabitants. Overall, some 23 companies besides DTAG are set to offer DSL connections by early 2001. Table 5 shows the growth in national and regional providers.

<sup>10</sup> Intensity of competition in the market for transmission capacity; appeared in May 2001 in the series of WIK discussion papers.

Table 5: Split of regional and national DSL providers

As of	National providers	Regional providers
31 December 1999	3	3
30 September 2000	5	7
End 2000/ 1 <sup>st</sup> quarter 2001	12	11

A breakdown of these figures for the end of 2000/ 1<sup>st</sup> quarter of 2001 shows the national providers to be concentrating on the cities. Table 6 shows the extent of choice in the cities. For example, a customer in Berlin has a choice of seven DSL service providers. These providers are not just active in Berlin, but also offer service in other cities across the country.

Table 6: DSL providers in cities (not including DTAG)

Provider per city			Cities
Provider per city	Focus of operations		
	nationwide	regional	
7	7	0	Berlin, Frankfurt
6	6	0	Hamburg
5	5	0	Dortmund, Düsseldorf, Munich, Stuttgart
4	4	0	Bremen, Cologne, Nuremberg
3	3	0	Essen, Leipzig
2	3	7	20 other cities with 100,000 to 524,000 inhabitants, and two cities of 80,000 inhabitants where there is a choice between two providers. <u>Explanatory note:</u> 10 (3+7) companies are providers in 22 (20+2) cities. Of these, three operate nationwide and seven on a regional basis only. Each city has two providers.
1	4	3	42 other cities with 50,000 to > 285,000 inhabitants with one provider only. <u>Explanatory note:</u> 7 (4+3) companies are providers in 42 cities. Of these, four operate nationwide and three on a regional basis only. Each city has one provider.

As of year's end 2000

It is noticeable that the regional operators are also focusing more on DSL service. The success of DSL is due to residential customers being increasingly targeted by the operators and to DTAG's massive marketing of its T-DSL product.

DTAG, in its own estimates, had already notched up 628,000 T-DSL connections by the end of 2000. By the same time, some 600 local networks were to be upgraded for the new, high-speed Internet access technology, thus serving 60% of German households. By the close of 2001 this figure is set to rise to 90% following investments totalling DM2.2 billion. DTAG forecasts around 2.6 million customers at year's end 2001.

A chart (Table 7) of the forms of DSL available shows the national providers to be focusing on SDSL for business users and ADSL for home users. Local providers, by contrast, favour

HDSL to connect companies. For network build, it is less susceptible to interference on account of its greater range. The large number of ADSL offerings reflects the focus on the residential customer market.

Table 7: Forms of DSL offered by access providers

As of	National providers			Regional providers		
	ADSL	SDSL	HDSL	ADSL	SDSL	HDSL
31 December 1999	0	2	1	0	0	3
30 September 2000	2	2	1	2	1	4
End of 2000/ 1 <sup>st</sup> quarter 2001	5	7	1	6	1	5

Providers began adding SDSL (Symmetrical Digital Subscriber Line) voice and data services to their portfolios at the end of 2000, using the technical capability of DSL to do so. What is new is that SDSL allows up to four basic rate ISDNs to be operated as point to multipoint configurations or as a PABX. Thus the customer can choose whether to use their SDSL connection for broadband Internet access alone, for telephone service or for a combination of the two.

## 4.4 WLL

The 1,671 frequencies for WLL awarded upon request in 1998 and by tender in 1999 and 2000 allow companies to bridge the last mile to the customer by wireless means and thus to offer voice telephony and other high bit rate services independently of the wire line. There are no regions in which frequencies have not been assigned for WLL-PMP, in other words no "blank spaces" on the map. The 21 firms that have been assigned frequencies intend to invest in the provision of radio tails at the network edges.

Table 8: Companies assigned frequencies for WLL (as of 31 Dec 2000)

Company	Number of frequencies assigned
Airdata	32
Associated Com.	36
ArcTel	8
Broadnet	42
Callino	554
ComIn	1
Deutsche LandTel	17
FirstMark	153
HanseTel	5
Highway One GmbH	142
K-net	1
Mannesmann Arcor	201
PfalzKom	2
Regio XtraCom	2
STAR 21	221
Tele 2	3
TeleLev	2
tesion	20
VIAG Interkom	225
Viatel (Viaphone)	2
Winstar	2
<b>Total</b>	<b>1,671</b>

By mid-November 2000, more than 25% of the assignments had been notified to RegTP as operational. Service in the first towns and cities began some months ago.

## 4.5 Broadband Cable

### 4.5.1 Internet Access

Of the 5,000 cable operators in Germany, currently only 9 offer alternative access (for Internet/telephony) via the TV network, or are running trials. Taking the total number of households passed by cable – around 20 million – this means just about 1.1% (259,000 homes) are connected to a network with return channel capability. Even more extreme is the

percentage of customers actually using the return channel capability: according to the operators, less than a quarter of the households with this facility actually use it.

In **nine** of the **83** German cities, **DTAG** competitors offer broadband Internet access in parts of the city. In **two** other cities of more than 50,000 inhabitants and in **four** towns with fewer than 50,000 inhabitants there is a similar choice. In one town of fewer than 50,000 inhabitants, this service was still undergoing trials at the end of 2000.

In areas where the **DTAG** cable companies have not yet retrofitted level 3, private competitors have to build the infrastructure themselves. In cities that already have a retrofitted **DTAG** level 3, **DTAG** allows them to introduce bidirectional services after negotiations with the level 4 operators.

#### **4.5.2 Cable telephony**

While the number of households eligible for fast Internet has already passed the 200,000 mark, the number of households provided with telephone service has not risen above **50,000**. Cable telephony is available in **3** cities; the size of the city is not important, since service is provided in each of the categories – fewer than 50,000, more than 100,000 and more than 1million inhabitants. Altogether, around **23,000** households, or **0.12%** in terms of the total number of cable TV households, have a choice of access provider over bi-directional cable networks. Common to all three cable telephony operators is cooperation with a partner who sees to the regulatory side (eg number management, etc) and ultimately switching in the traditional telephone network as well.

#### **4.6 Powerline Communications (PLC)**

The power suppliers' networks in Germany comprise some 1.5 million kilometres. Two thirds of this is lines in the PLC-enabled low voltage network. The first pilot projects in early 1997 focused on the online reading of water and electricity consumption. PLC now allows power companies to offer telecoms services in partnership with alternative providers.

Half a dozen power suppliers have since 1998 tested alternative access via the electricity infrastructure in pilot projects, now ended after disappointing results. Mainly technical reasons prevented the inclusion of large numbers of participants, as roughly 200 households are connected to a local substation as a rule.

By autumn 2000, four powerline trials were running in Germany, in cities for the most part, and in several smaller communities, too. The location of the projects has no real significance, being selected chiefly for prestige reasons or because of its convenience for the technology partners. The operators of the trials are planning commercial products for 2001, yet there are opposing views on the readiness for market which foresee problems in implementation.

## 5 Competitors' Market Share

Competitors' market share relates in this report to the whole of the Federal Republic. Market share is derived from data collected by RegTP (see section 5.5). The situation as regards access to the customer (network access) is described first. As wholesale products are needed here, access to DTAG's local loops is dealt with separately. Shares in call volumes are shown for each type of call, so that competition in the local market is seen in connection with competition in other segments. Revenues are identified solely for telephone service. These give indicators of revenues for access lines.

### 5.1 Access Lines – Network Access

First and foremost, switched calls in the fixed network are looked at. Also interesting are the transmission media over which access to the customer is realised, ie analogue lines, ISDN, DSL connections via the copper pair, WLL, broadband coaxial and optical fibre connections.

#### 5.1.1 Analogue/ISDN Lines

The yardstick for direct access is the standard size of the voice channel, that is to say the equivalent of a 64 kbps channel. This allows the different types of line such as analogue, basic rate ISDN and primary rate ISDN to be shown together. The line is not understood here as the telephone number but as capacity provided.

In its Activity Report 1998/99, RegTP assumed the number of telephone lines supplied by the competitors would be 500,000 in late 1999. This expectation was based on figures for the first quarter of 1999. The more recent survey on competition in the local access market produced a figure of 375,00 for the end of 1999. Related to the total number, it represented 0.8% of lines supplied. By 30 September 2000 this figure had grown to 649,300, corresponding to a market share of 1.3%. Predicted for year's end 2000 was a share of 1.5% in an estimated total of 50 million lines. In concrete terms, this means that the number of competitor lines to the customer can be estimated at 752,000 on the strength of the local loops rented in the fourth quarter and the competitors' own facilities. DTAG reported a total of 49.4 million lines for its financial year 2000. This gives a total of 50.152 million lines in the fixed network. The exact number of competitors' lines to the customer for year's end 2000 will be given in RegTP's Activity Report 2000/2001, following its data survey.

The percentage of ISDN in the total number of competitors' lines rose from 75% to 78% between the end of 1999 and the end of September 2000. The preference for ISDN is a reflection of the target group. Customers with analogue lines, ie lower call volumes, are certainly catered for but business is chiefly done with customers wanting more than one channel, in other words basic rate and primary rate ISDN. The competitors' share of ISDN channels at the end of September 2000 stood at 3%, showing an upward trend to 3.2% at year's end.

The fact that the competitors tend to have more key accounts is shown by ISDN breakdown. Key accounts using basic rate ISDN stood at 2.4% on 30 September 2000, and at 6.9% for primary rate ISDN. In both categories, market share has grown by 1% since the end of 1999. The corresponding figure for analogue lines was vanishingly small at 0.4%.

Most of the traffic handled by competing providers runs over DTAG lines. Besides the calls handled entirely by DTAG, those set up using the call by call and preselection facility virtually all come about by means of DTAG's direct access.

Calls switched by competing operators are set up either directly via the access provider or using the call by call or preselection facility via a long distance operator. An access provider may also be active as a long distance operator at the same time. Other providers are active as long distance operators solely. Around 13% of all call minutes handled by the competitors is accounted for by the direct access providers (see also section 5.3.5). 2.6% of total traffic is generated in Germany by competitors that have access to the customer.

### 5.1.2 DSL

When the first DSL connections for commercial use were realised, the competitors at the end of 1999 were still ahead of DTAG, but their share of the market fell during 2000 to ISDN levels on account of DTAG's massive DSL promotion.

By the end of September 2000 no telephone lines had yet been provided using DSL. One reason is that ADSL separates the telephone traffic from the Internet data streams (splitters), and another is that other forms of DSL (SDSL, HDSL) are used solely for the Internet, ie data communication. The first DSL telephone service offers have been announced for the fourth quarter.

### 5.1.3 WLL

The statistics for WLL solutions at the end of September 2000 are 475 operational WLL central stations with around 500 connections to the customer and over which only 2,400 wireless channels were routed. Fixed wireless access is therefore still in its infancy.

### 5.1.4 Broadband Connections

By the 3<sup>rd</sup> quarter of 2000 there were some 260,000 cable TV connections capable of being used for bidirectional services such as telephony or Internet access. Taking the total number of 20 million cabled households as a basis, just 1.1% of the households are connected to a network providing return channel capability.

The majority of these connections, around 240,000, have been upgraded for high speed Internet access while the remaining 20,000 are intended for voice telephony. They are operated on an analogue basis or with ISDN supplementary services, or provide comparable service. In terms of telephone service channels there is hence a lower limit of 260,000 and an upper limit of 520,000. According to estimates, customers only actually use a quarter of these connections at most, equating to around 85,000 and 140,000 channels respectively. Of these, fewer than 2,000 are used for telephone service.

### 5.1.5 Fibre Connections

Competitors had at the end of September 2000 a share of 12% of the estimated total of 50,000 fibre to the home connections. This total does not include the 2 million fibre connections DTAG has installed in the new federal states, which run one telephone service channel only to the home (see also sections 3.6 and 6.1.1). If these are included, then the competitors' share is of course much lower. As a rule, the fibre is not used just for telephone



service but for data communication too. If the fibre connections of residential homes in eastern Germany are included, there are altogether 2.23 million channels to the home over fibre. Competitors' share of this figure is low, owing to the specific regional characteristics of eastern Germany mentioned earlier.

### 5.1.6 Private Circuits

Besides the kinds of access described above, private circuits for key accounts are not unimportant. This can be seen simply in the number of fibre connections. Many providers offer their customers switched one way access over such links. This can be implemented on the provider's own infrastructure (eg fibre, WLL) or on leased infrastructure. Wholesale products required could be in the form of rented local loops or, if no colocation space is available, leased lines. Such links make outgoing traffic possible without a number being needed with the carrier. While such forms of access have very little relevance for DTAG, competitors can use them to save originating charges for call set up that would otherwise be payable to DTAG under an interconnect agreement.

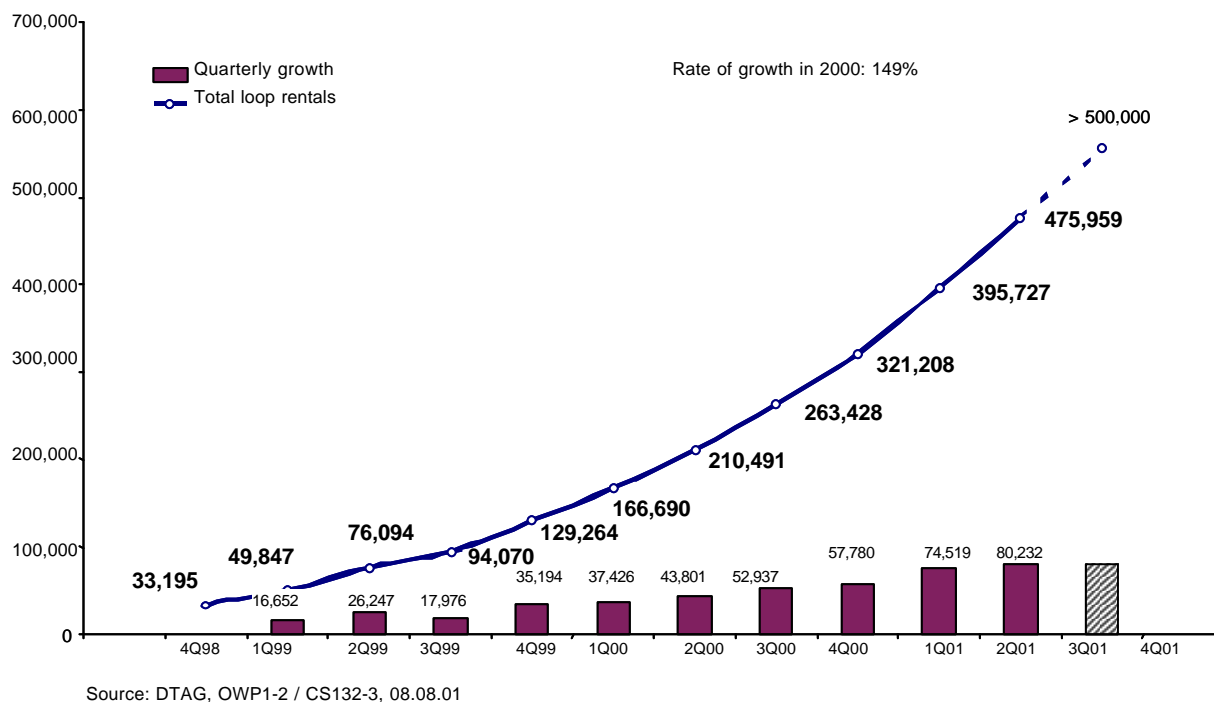
Forms of access of this kind should really be included in an assessment of local level competition. They were not addressed in the survey, however, and so no quantifiable findings can be given.

## 5.2 Rented DTAG Local Loops

DTAG logged 263,428 local loop rentals at the end of September. It has broken down this figure into 18 variants. The breakdown shows 97% of the local loops to be copper two-wire circuits. The number of rentals at the end of October had risen to 280,095, resulting in a monthly rate of growth of 7%. The last rate of quarterly growth determined was 22%.



Figure 3: Growth in DTAG local loop rentals



Source: DTAG

In the survey the competitors gave somewhat different figures for the third quarter of 2000 but DTAG's data is confirmed by and large<sup>11</sup>.

By the end of 2000, DTAG had rented 321,702 local loops. This figure had risen to 406,908 by the end of the first quarter of 2001.

### 5.2.1 Loops Ordered but Not Yet Available

Competitors indicated that 15,146 loops had been ordered by the end of September but not yet provided. This represents 5% to 6% of the total figure. This percentage comes close to the monthly rate of growth in DTAG loop rentals which, with a surplus of 16,327 in September stood at 7% – indicating that most of the orders have now been processed and the backlog, at least related to the whole, is small once the technical environment has been created. All the same, however, attention must be drawn to the numerous, serious causes for complaint (see sections 6.1.2.1 and 6.1.2.2). Of course, local problems do not show up in the overall statistics. DTAG itself could not provide any data on the number of orders still awaiting completion, saying that these were not followed in its management set-up.

The real problem in providing access to the customer is less to be found in dealing with the backlog than in the upstream market of intermediate technical input.

During 2000, colocation requests to DTAG had topped 15,000. Yet requests were also withdrawn, proved unfeasible, or DTAG offers were not accepted. At the end of 2000, 6,537 colocation spaces had been provided and around 7,200 requests were still awaiting

<sup>11</sup> Differences may arise from the fact that no clear distinction was made between rented and ordered loops.

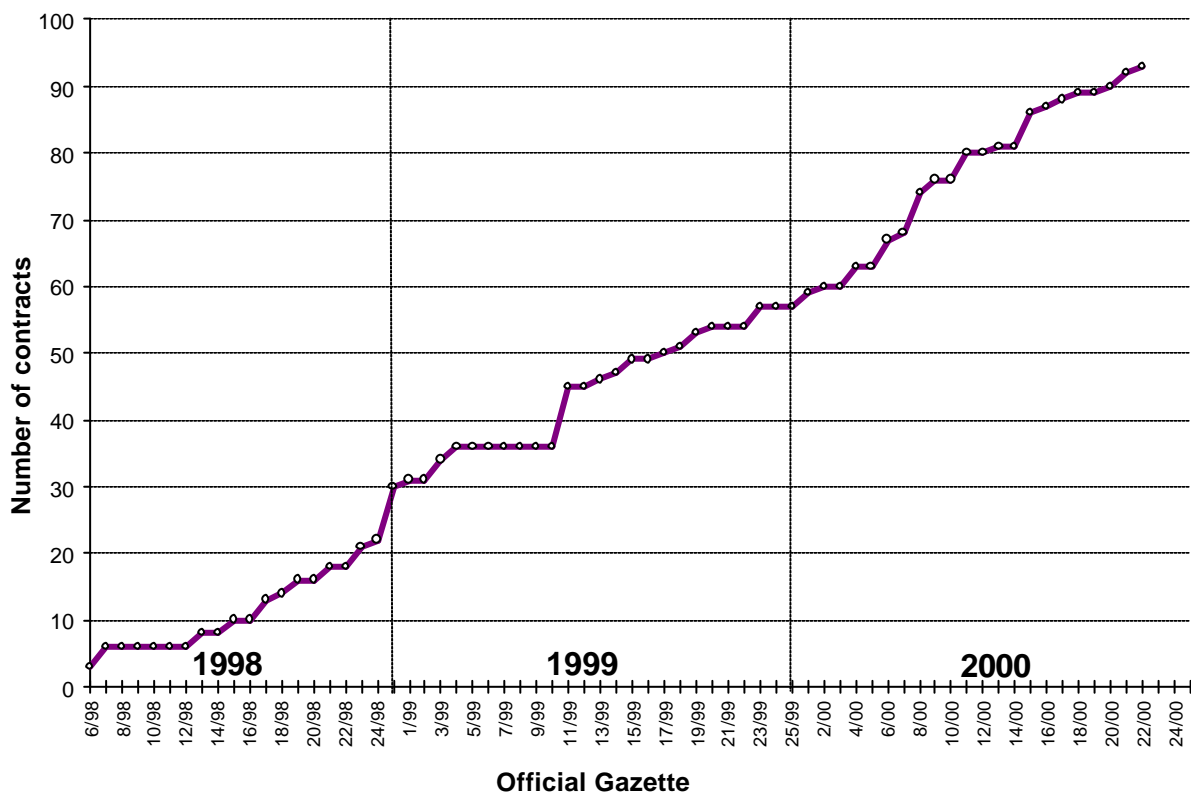
completion (in the implementation or preparation of proposal stage). The total number outstanding at year's end was estimated by DTAG at some 13,700.

In response, DTAG pointed out that it had been unprepared for the host of colocation requests. It had had no opportunity to plan in advance and hence no opportunity to provide the necessary resources, to plan the colocation spaces and to make structural implementation. Internal measures had since been introduced to deal with the flood of orders.

By the end of 2000, colocation space had been provided in around 2,000 access areas, with space still needing to be provided in 700 further access areas. This means there is demand from the competitors in roughly one third of the 7,900 access areas in Germany. To date, competitors have not shown any interest in the remaining areas.

Of the 95 local loop contracts in place at year's end 2000, 38 had been signed in 2000, 27 in 1999 and 30 in 1998. Colocation facilities have been requested by all the contracting parties to a more or less large extent.

Figure 4: Growth in the number of local loop contracts



The RegTP Official Gazette appears fortnightly

## 5.2.2 Direct Access Infrastructure

Most, but not all, rented local loops are used as telephone service channels. Estimates based on the type of local loop show that, at the end of September, some 447,000 phone lines were supplied using rented loops. A comparison with the total of 649,300 lines supplied by the competitors (see section 5.1.1), shows that almost two thirds are provided using the

rented loop facility. Since loop rentals are growing, the relative share of competitors' own infrastructure is falling. This was likely still to have been 44% at the end of 1999, 33% at the end of September 2000, and only 30% at the end of December 2000 with an estimated 750,000 lines supplied.

### 5.2.3 Penetration Rates of Alternative Access Across the Country

Competitors' offerings show that many cities now have a choice of access provider besides DTAG (see Figure 2). Yet this does not mean there is choice all parts of the city. Competitors sometimes expand in the first instance into particular access areas in a town or city. In all, there are 7,900 main distribution frames (MDFs), each of which corresponds to one access area or municipal district, and 5,200 local networks which, with one or two exceptions, coincide with local authority boundaries (see Table 4).

The expectation therefore, based on competitors' requested colocation space (space ordered at roughly one third of the 7,900 MDFs), is for there to be a complete choice of alternative access provider for 60% of the population.

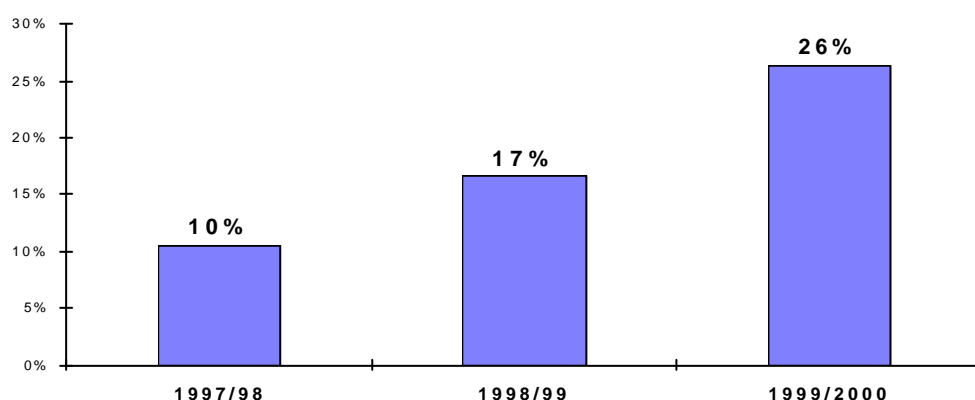
## 5.3 Call Volumes

### 5.3.1 Overview of Development

The development of telecoms traffic at local level should be seen in connection with the development of traffic generally. Details of specific traffic segments and competitors' market shares will therefore be preceded by an overview.

The volume of traffic in the first six months of 2000 was 136 billion minutes. Growth in 2000 could therefore be expected to be 26% higher than in 1999<sup>12</sup>. Figure 5 shows the rates of growth achieved in the first three years of deregulated markets.

Figure 5: Annual rates of growth in traffic volumes in the fixed network



More recent findings show the 14% growth rate forecast for 1999 in RegTP's Activity Report 1998/99 to have been comfortably met. This accelerated growth is largely due to the growth in dial-up Internet access, in the number of calls to mobile networks and in the number of international calls.

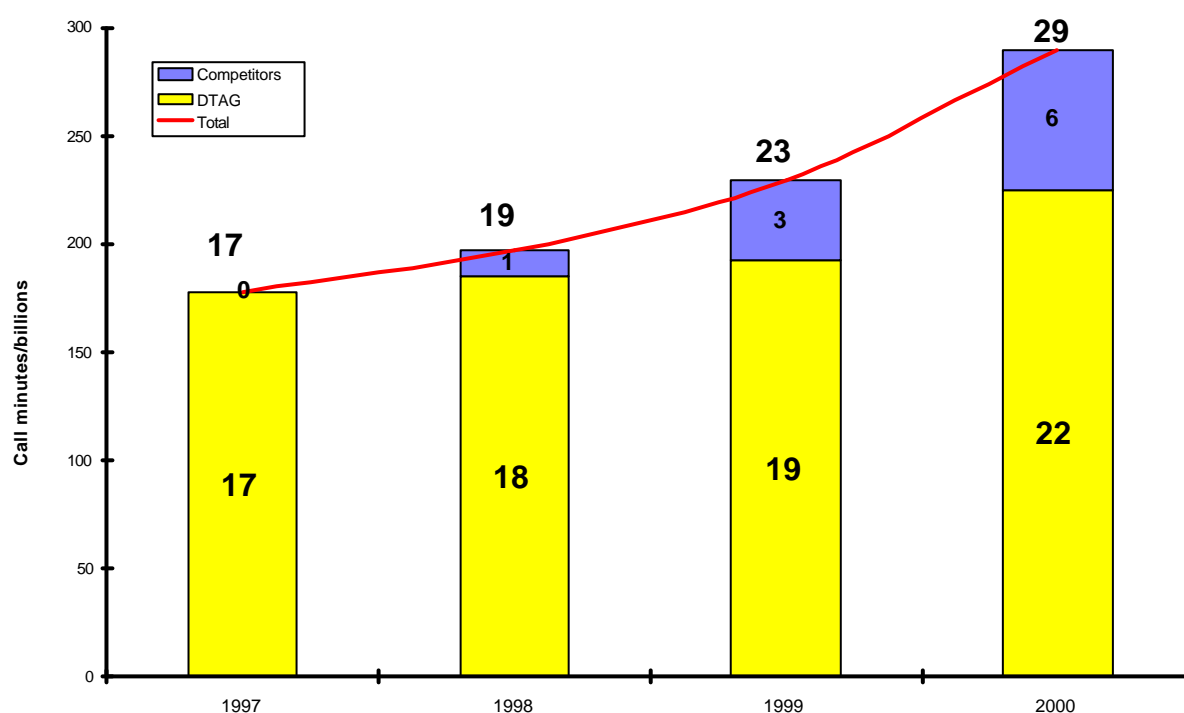
<sup>12</sup> Final figures for 2000 will be given in RegTP's Activity Report 2000/2001.

The average daily traffic volume generated in the fixed networks in the first half of 2000 was **746 million** minutes. Clocking up **29.2 billion** minutes, the competitors increased their call volumes in the first six months of 2000, accounting for a **22%** share of total call volumes.

An average volume of **290 billion minutes** was thus predicted for 2000. In the three years of competition in the telephone service, there has been an increase in call volumes of over **60%**. Internet usage has been the main contributory factor. Internet traffic in the fixed network has now more than tripled within the year<sup>13</sup>.

The call volume for 1999 was around **230 billion minutes**, according to the latest survey.

Figure 6: Call minutes 1997-2000

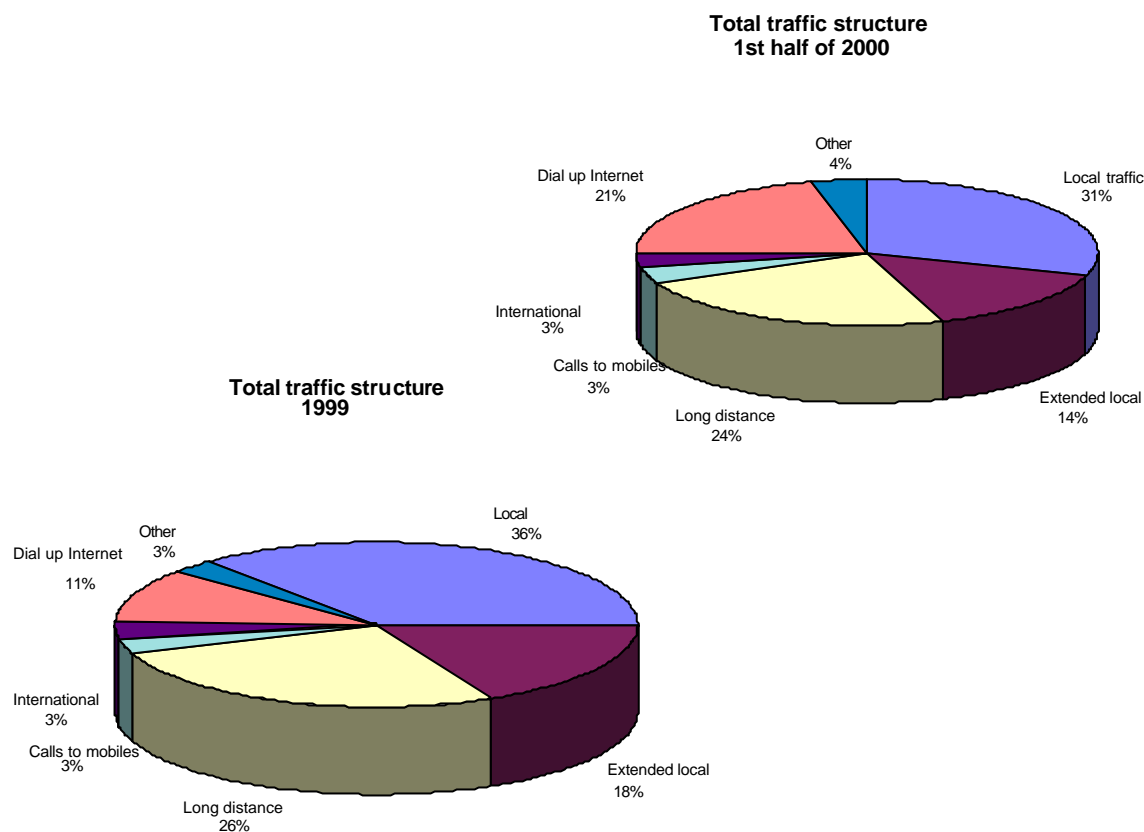


<sup>13</sup> Growth in low bit rate Internet access traffic over ISDN and analogue lines is expected to slow over the next few years as more residential households and businesses access the Internet with DSL and other broadband technologies, instead of over the telephone network. Dial up Internet traffic currently represents only part of the total traffic generated for Internet usage. Some is generated over leased lines. A differentiated study of Internet usage would therefore be useful in future.

Table 9: Call volumes and traffic structure<sup>14</sup> in 1999 and the first half of 2000

Call volumes and traffic structure	1999		1 <sup>st</sup> half of 2000	
	minutes/bn	relative	minutes/bn	relative
Call minutes (total)	230	100%	136	100%
<i>Local</i>	83	36%	41	30%
<i>Extended local</i>	41	18%	20	14%
<i>Long distance</i>	61	26%	32	24%
<i>Calls to mobiles</i>	7	3%	5	3%
<i>International</i>	7	3%	4	3%
<i>Dial up Internet</i>	24	11%	29	21%
<i>Other</i>	6	3%	5	4%

Figure 7: Traffic structure

<sup>14</sup> *Local calls*: Calls not prefixed by "0"*Extended local calls*: Calls going beyond the local network (local exchange) and priced the same as local calls, that is within a 20 km radius of the local network.*Other*: minutes from public telephones, to information and value added services (freecall, special numbers, etc). In 1999 there were 230 billion minutes rounded up from just under 37.5 billion minutes from the competitors and a good 192 billion minutes from DTAG.

In 1999, the competitors accounted for 37 billion minutes, or 16% of the market. Current trends indicated 65 billion minutes for the third year of full liberalisation, and thus a share of roughly 22%.

Table 10: Competitors' market share in 1999 and the first half of 2000

Competitors' share of traffic volumes	1999	1 <sup>st</sup> half of 2000
Share of total traffic	16%	22%
Local	1.8%	3.1%
Extended local	8%	14%
Long distance	34%	40%
Calls to mobiles	23%	29%
International	44%	54%
Dial up Internet	23%	26%
Other	17%	23%

### 5.3.2 Local Calls

In the first six months of 2000, the competitors' share of the market for local calls stood at 3.1%. This is seen in relation to their 1.3% share of direct access, since local calls can only be provided when the customer has fully switched provider. In comparative terms the figure is somewhat higher due to more intensive use by large business customers. It is also worth mentioning that their share of the market for local calls is showing stronger growth than that for access. In the competitors' traffic structure, local calls account for 4.4% of total traffic handled (see Figure 10).

### 5.3.3 Other Segments (Long Distance, International, Mobile, Internet)

Competitors have captured market share in every segment. Their shares can be seen in the following charts.

A distinction between local and long distance traffic is not possible for every provider. It is therefore easier to read the shares as comprising both.

Figure 8: Competitors' shares in various segments in the first half of 2000

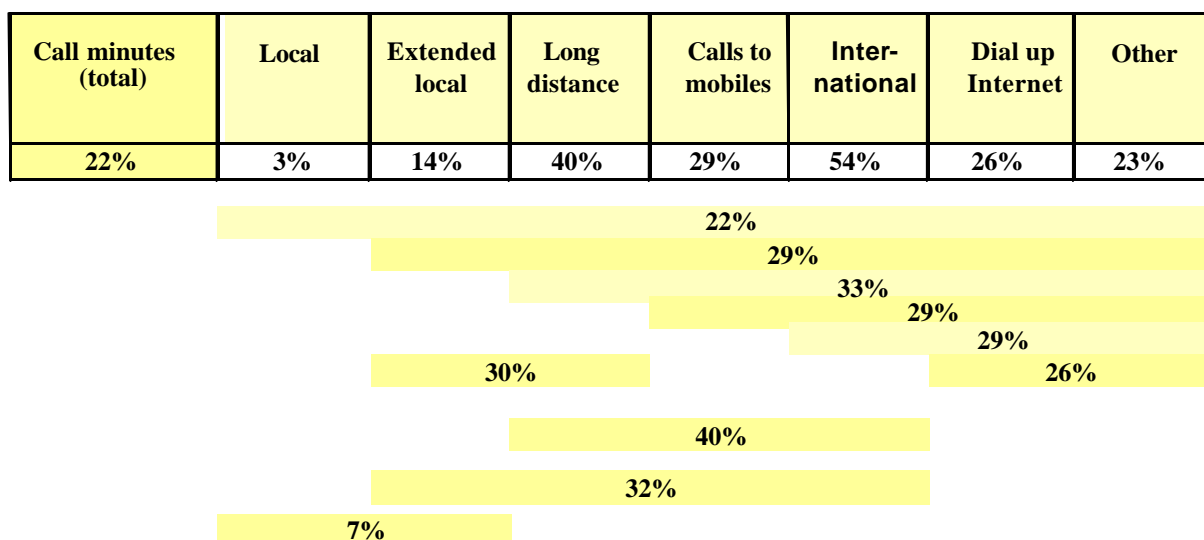
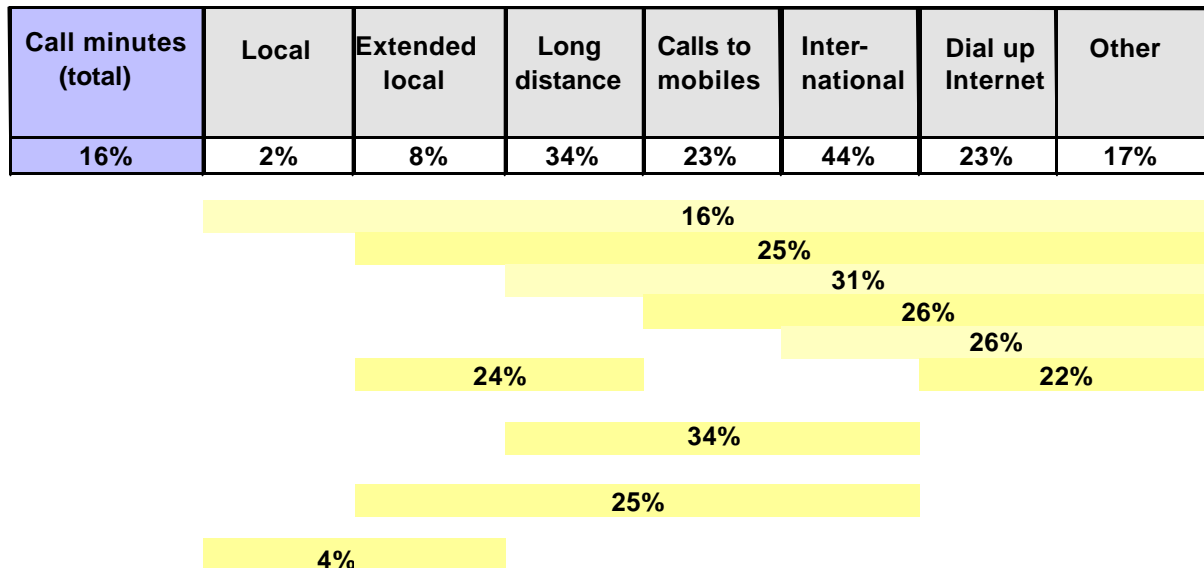


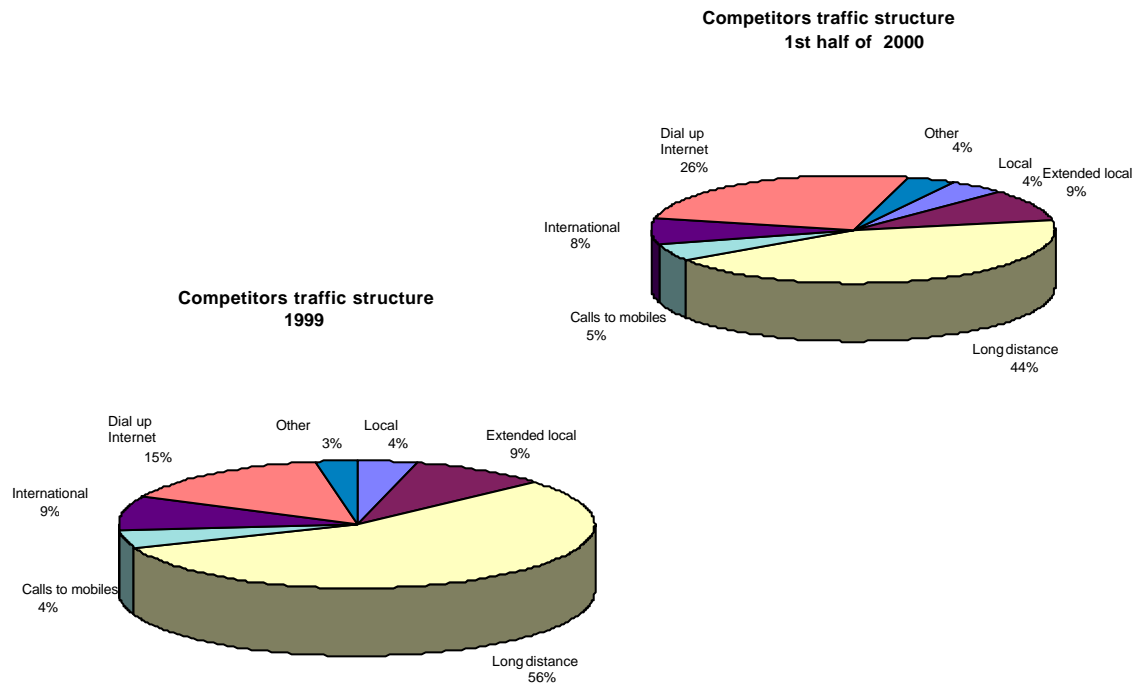
Figure 9: Competitors' shares in various segments in 1999



5.3.4 Structure of Competitors' Traffic

The structure of traffic as a whole is shown in Table 9 and in Figure 7. The structure of competitors' traffic differs from this. If local calls are set up by direct access providers only, the corresponding share will naturally be lower. Of competitors' total traffic, 4% is accounted for by local calls, 53% by extended local and long distance calls, 26% by calls to ISPs, 8% by international calls, 5% by calls to mobile networks and 4% by other. Internet traffic shows the most marked increase.

Figure 10: Structure of competitors' traffic

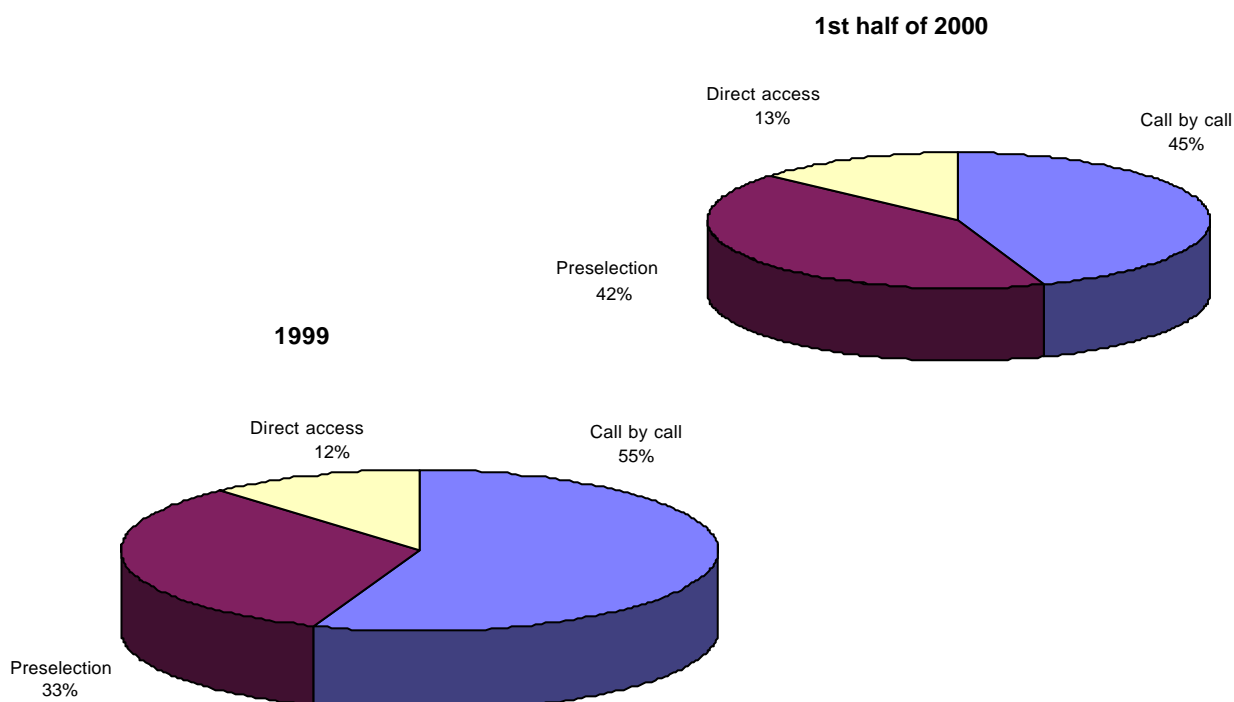




### 5.3.5 Forms of Use and Customers Won

Of all the call minutes handled by the competitors in the first six months of 2000, **45%** were on a call by call basis, **42%** by preselection and **13%** by direct access. The relevant figures for 1999 were **55%** for call by call, **33%** for preselection and **12%** for direct access.

Figure 11: Competitors' forms of use of telephone service (in terms of traffic volumes)



The percentage of customers with a *fixed* relationship with a provider (via preselection or direct access) has grown by a good **10%** since last year. Contributing to this growth has been cheaper pricing, including packages offering lower call charges in return for a monthly fee. Many calls are still made, however, using call by call selection.

These figures are based on call volumes. Statistical consumer surveys, however, are based on whether or not consumers actually use call by call selection, etc, as they will hardly be able to give percentages of call volumes. Such surveys therefore tend to show different ratios since they present patterns or user profiles.

## 5.4 Revenues

In 1999, the telephone service generated revenues of DM **38 billion**, of which the competitors accounted for **14%**<sup>15</sup>. In the first six months of 2000 revenues of DM **18.4 billion** were recorded, with the competitors' share rising to **17%**. **DTAG** revenues fell, owing to lower call

<sup>15</sup> Including services provided over fixed network connections (telephone service, directory enquiry service access codes, value added services and public telephones), revenues for 1999 total approx DM 41.5 billion.

volumes and price cuts, whereas competitors' revenues climbed. With the growing number of lines (telephone service channels) and growing traffic but falling prices being taken into account, stagnating or even falling revenues of around DM37 billion can be predicted for the full year.

#### 5.4.1 Call Revenues

Competitors' share in the volume of telephone calls climbed to 25% in the first six months of 2000 (1999: 20%).

#### 5.4.2 Access Revenues

The number of lines to the customer supplied by alternative providers, as shown in section 5.1.1, is still small. Thus competitors' share of the revenues for monthly rentals and installation fees is correspondingly low. It is now 2.5% – 0.5% higher than in 1999.

### 5.5 Data Base – Survey

Competitors and DTAG were requested in October/November 2000 to supply data on a voluntary basis. The aim was to gain a sufficiently representative picture.

Customer and traffic data from 1999, customer data as of 30 September 2000 and traffic data for the first six months of 2000 were requested. These were then trimmed to the essentials.

The Association of the Providers of Telecommunications and Value Added Services (*Verband der Anbieter von Telekommunikations- und Mehrwertdiensten (VATM) e.V.*) and the Federal Association of Regional and Local Telecommunications Companies (*Bundesverband der regionalen und lokalen Telefongesellschaften (breko) e.V.*) both endorsed the survey.

#### 5.5.1 Companies Surveyed

Data was requested from the following companies headquartered in Germany:

- all Class 4 licence holders providing telephone service,
- Class 3 licence holders awarded a WLL licence,
- every company having a local loop agreement with DTAG.

In all, the survey covered 152 competing providers in addition to DTAG.

RegTP is concerned not to impose too heavy a polling burden. It last requested data in early 1999 on the development of competition in the telecoms markets, for its 1998/99 Activity Report. Meanwhile, however, the data base is out of date and no longer viable for an evaluation of competition in the local access market. A fresh survey was therefore required.

### 5.5.2 Soundness of Data

The return rate was 75% (114 companies), 83% of whom (94 companies) provided usable data.

Although not all the targeted companies took part, virtually all those with appreciable offerings in the market are represented. Once implausibilities had been removed from the competitor data, it was found to be highly consistent and comprehensive. Some supplementary data from DTAG is still awaited (see section 5.2.3).

Findings are therefore based on extensive data from 94 companies.

### 5.5.3 Estimates

The percentages that had to be estimated for some non-participating companies were very low. Thus, for instance, the estimated share of competitors' traffic volume was less than 2.5%.

## 6 Comments on the Development of Competition in the Local Access Market

As well as completing a questionnaire, companies were asked to submit their own assessment of how competition was developing at local level. A total of 41 comments (including that of DTAG) were received in response. These are summarised in the following.

### 6.1 Situation from the New Entrants' Viewpoint

Use of DTAG local loops is enormously important for alternative operators when it comes to realising direct access to the customer, compared with installing their own lines. Firstly, building access networks from scratch requires high investment sums which will only bring returns if revenues per customer are sufficiently large or if teledensity is high. Secondly, alternative technologies such as WLL or powerline communications are only just starting to be used for direct access to the customer, following the award in late 1999 and during 2000 of licences and frequencies. As yet, there is no technology to support the commercial use of powerline communications on a large scale.

Telephony and Internet offers over broadband coaxial cable networks are likewise only available in pilot projects, since the sale of DTAG's cable networks only began in late 1999.

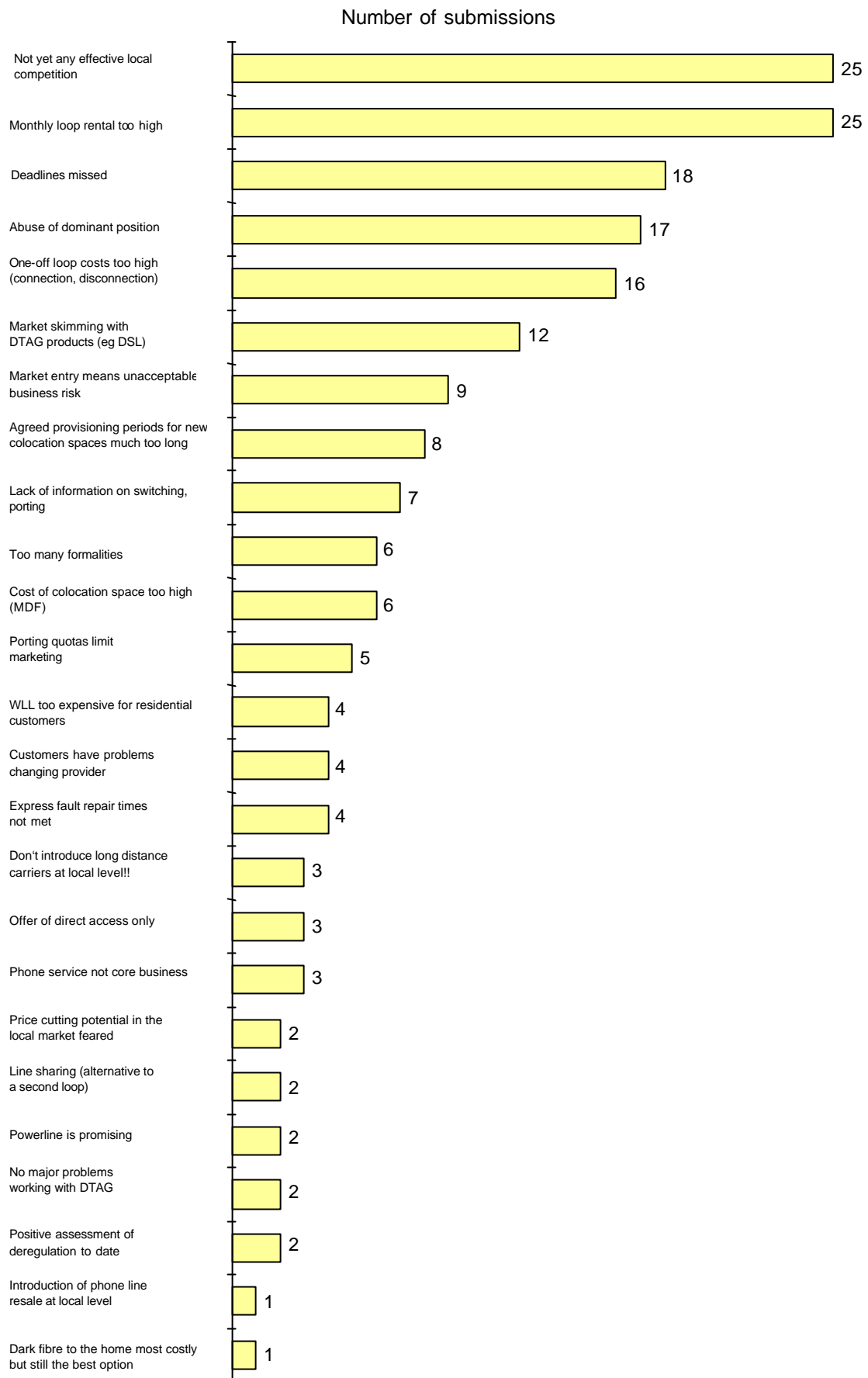
Alternative operators who, for these reasons, are almost wholly dependent on rented DTAG loops, are therefore interested in being able to operate the loops economically and provide good service to the customer.

In all, 40 responses were received from the competitors, with the main points emerging as shown below:

- ⇒ Cost of loops, colocation and other wholesale products
- ⇒ DTAG's behaviour
  - loop and colocation provisioning problems
  - making use of its dominant position
  - skimming off policy
- ⇒ Assessment of alternative transmission media
- ⇒ Proposals for better regulation
- ⇒ General assessment of competition

Details are given on the chart overleaf.

Figure 12: Comments on the development of local level competition



The percentages in brackets in the following are a percentage of the total of 40 comments.

### 6.1.1 Cost of Loops, Colocation and other DTAG Wholesale Products

Just how important local loops are was reflected in the number of points of criticism. Thus 25 of the 40 companies (63%) criticised the level of rental stipulated by RegTP. Negative comments on the one-off connection and disconnection costs were received from 16 companies (40%). It was difficult, they said, to provide local access economically on this basis. Some companies submitted model calculations to show that there was generally no payback on analogue lines; at most on ISDN lines, but only after two years on a simple basic rate ISDN, partly on account of the switching and disconnection costs that could arise if a customer changed back.

Many respondents pointed out that the one-off costs should not be forgotten. This was all too easy, given the public focus on the price of the monthly rental. One company referred to a European Commission study that linked successful rebalancing with the intensity of competition in the local market. Comparing the situation in Germany, Finland, the Netherlands, Denmark and Austria, the study set out to show that the share of the alternative providers in the local market declined the more the margin between loop rental and monthly line rental was squeezed. Rebalancing is explicitly called for by two other companies.

Using the price cap for rates regulation had the disadvantage that lowering the prices of local calls did not need to be considered, due to the large cuts in the price of long distance and international calls. By contrast, another company actually feared that DTAG could lower its local call charges too.

Some of the telephone lines in eastern Germany have been implemented in fibre (optical access lines, or OPAL). DTAG has installed a total of 2 million of these optical access lines, each of which carries one telephone service channel only. This is a relatively large proportion of the total number of lines in the new federal states. Here, then, alternative providers have no opportunity to access the customer via the local loop since the far higher costs of renting a fibre loop just for telephone service are not feasible. Cheaper copper pairs do not exist.

An added factor was that the colocation costs, particularly for smaller providers who were not in a position to attract large numbers of customers, did not pay off. Also, colocation space was undesirable in areas where potential customers were low in number and not likely to yield large revenues.

Six companies (15%) faulted the high cost of utilising colocation space. Costs of up to DM 80,000 per m<sup>2</sup> colocation space on top of the loop rental costs were an added barrier to entering the market. Provisioning fees, flat rate processing fees, non-transparent service charges and too high rental prices made accessing colocation space difficult and put question marks over its commercial sense.

Even if they built their own networks, competitors needed wholesale products from DTAG to complete them. For instance, high bit rate (2 and 34 mbps) carrier leased lines were needed to connect up the central stations serving (WLL) fixed point to point links. As most of these were not in centres of population, DTAG was usually the sole supplier. The links from the colocation spaces to the competitors' networks were likewise implemented with leased lines. Considerable provisioning problems had arisen through orders for leased lines either not being processed or being significantly delayed by DTAG. One company complained that additionally, the cost of leased lines was too high by international standards. DTAG's position in the wholesale products market was altogether far too strong.

## 6.1.2 DTAG's Behaviour

DTAG's behaviour in providing loops and colocation facilities and its behaviour in general feature prominently in the comments. Some of the sources of dissatisfaction were restrictions in extending colocation space and difficulties in accessing in-house cabling. Two companies described working with DTAG as unproblematic for the most part.

### 6.1.2.1 DTAG's Provision of Loops and Colocation Facilities

The procedure for providing local loops and colocation facilities is contractually regulated between DTAG and competing operators. 18 companies (45%) complain that the periods specified in the contracts were often considerably overrun. Besides, eight companies (20%) considered the contractually agreed periods for providing new colocation space much too long. Inadequate information about switching and porting was reported by seven companies (18%). Porting and local loop switching not only experienced delays but sometimes dead lines, too. This was highly detrimental to winning customers. Six companies (15%) criticised excessive formalities in making applications. Five companies (13%) complained about porting quotas, which restricted their marketing scope. Four (10%) commented that agreed express fault repair times were not met.

### 6.1.2.2 DTAG's Dominance

Besides the specific problems experienced in the provision of loops and colocation facilities, DTAG's general behaviour came in for criticism. 17 companies (43%) complained about abuse of a dominant position. It was hardly possible, for instance, for breaches of contract to be punished (no penalties). In a number of situations giving grounds for complaint (power failures, disconnection, deletion from directory services) competitors were not realistically able to seek a solution in court, because this would not resolve the acute problem of winning customers. As a result, competitors suffered substantial disadvantages for which there was no remedy.

### 6.1.2.3 DTAG's Market Skimming Strategy

DTAG's price cutting policy in connection with DSL access was seriously threatening competitors' possible margins for high quality access products, respondents felt. Doubt was expressed that DTAG's DSL prices covered costs. Price dumping was suspected. The investment a competing provider needed for a DSL connection was DM 3,000. Some of the providers saw indications of predatory pricing in DTAG products (T-Online Flatrate, Aktiv-Plus, XXL) offered in conjunction with DTAG lines. 12 companies (30%) expressed concern about DTAG increasingly marketing its products (eg DSL) in this way. Bundling with products in respect of which the incumbent was also dominant was therefore damaging not just for the individual markets but equally for competition in the local access market. Before issuing determinations, the regulator would have to look more closely at the implications for competition, cross-subsidisation and predatory competition. Ex-post controls had proved inadequate, as no risk was involved for the established operator.

One company voiced doubts about DTAG's proposed "Talk2Friends" package<sup>16</sup>. Approving this tariff would inhibit competition in local calls and local access still further. Other providers in the market did not even have a remotely comparable possibility of offering a service of this nature, it seldom happening that both calling and called party were customers of the same alternative provider. DTAG's dominant position would be consolidated and strengthened by such pricing. Three companies (8%) voiced fears about DTAG's price cutting potential at local level as well.

### 6.1.3 Assessment of Alternative Transmission Media

Only a few firms said anything about the deployment potential of their own infrastructure and alternative transmission media. For three companies (8%), voice telephony was not a core business at the time of the survey. Three (8%) declared that they offered direct access only, or that this was their intention. One company (3%) had decided to build a parallel copper wire infrastructure up to level 4; this was still more cost-effective than using DTAG's loops and colocation facilities. Another considered dark fibre to the home to be the most expensive, but still the best, option. One access provider saw an opportunity to enter the market in medium-sized redevelopment areas.

Four companies (10%) deemed WLL too costly for low-revenue customers. The impression was given that WLL rollout was seen as increasingly risky. The uncertainty was caused amongst other things by the electromagnetic radiation debate and local authority reservations. Two companies (5%) thought powerline communications would develop well.

DECT, WLL, DSL, broadband cable and powerline communication technologies would only gain acceptance over time, one company believed, and then not everywhere but in specific customer segments in certain areas, as a rule business centres and not residential areas or a mix of these, so that there was little likelihood of competition intensifying in the local access market in the medium term. Nor would UMTS prove a substitute for a fixed connection in the medium term.

### 6.1.4 Proposals for Better Regulation

To a lesser extent, proposals for better regulation were made. One company suggested that the regulator allow the use of wireless local loops as leased channels for mobile services (for the connection of base stations), currently ruled out by RegTP and representing a barrier.

Two companies (5%) saw line sharing as an alternative to the (second) loop. One company (3%) proposed the introduction of local line resale. At the same time, however, it pointed out that DTAG could stymie resale at this level by imposing prohibitive buying conditions for resellers. This would also set up barriers to entering the market for local calls and local access and hamper unrestricted entry.

One company supported the idea of preselection at local level. The intensity of competition here could be stepped up by introducing preselection (viz Austria and Switzerland). This would put the most frequent type of call in the carriers' portfolio. Two other companies

<sup>16</sup> DTAG's *Talk2Friends* package was turned down by RegTP in November 2000. *Talk2Friends* would have meant a limited flatrate for calls in the city zone (extended local network). For a payment of DM 4.99 a month, customers would have been able, between 12:00 and 20:00 hours every day, free of charge, to talk to all other customers who had also signed up. DTAG's precondition was an ISDN line. It also wanted to make the package conditional upon it being the long distance operator, in other words not allowing the customer to preselect any other carrier. A total of 14 rivals and one telecoms association registered grave concerns, the main points of which were shared by RegTP.



rejected preselection and call by call in the local network on the grounds of it discouraging the customer from choosing a regional carrier for direct access. Local carriers' investments would thus be devalued. Infrastructure-based local competitors would then die out.

### 6.1.5 General Assessment of Competition in the Local Access Market

There was not yet effective competition in the local access market in the view of 25 companies (63%) making concrete statements. Taking into account that two companies only (5%) made a positive assessment of deregulation to date, the number of critical voices must be assumed to be higher still. This is reinforced by the response of nine companies (23%), who considered market entry at the present point in time to be an unacceptable business risk.

The cost of entering the local market was significantly higher for new entrants than entering the long distance or international market. There was considered to be little potential for competition over alternative access technologies.

The impression was that new entrants were being prevented from entering the residential customer market. Unrestricted competition could indeed be noticed in the business customer and key accounts segments, but not in respect of residential and small business customers. DTAG still had an absolute monopoly, in towns with fewer than 100,000 inhabitants in particular. Alternative high speed access options in the local network were really only seen in the return channel capability of the coaxial cable networks and in UMTS. RegTP should lower the barriers to competition.

A number of smaller local companies were highly sceptical about local market entry, considering it restricted to key accounts at best. Broad-based market entry was not considered a viable business proposition at the moment.

## 6.2 Situation from DTAG's Viewpoint

Commenting on the development of competition at local level, DTAG replied that business customers had long had a choice of provider for both calls and access, and in many cities residential customers had this choice, too. Business customers upwards of a certain size even had this choice throughout the country. The fact that competition was not limited to centres of population but was spreading out from these areas was shown by the orders for and implementation of colocation space in towns with fewer than 50,000 inhabitants, eg in Varel-Altjürden in the Oldenburg district, or Vieselbach near Weimar.

DTAG noted that different customer groups and different regions were experiencing appreciable differences in intensity of competition. DTAG's measurable loss, for instance, of extended city calls was 19% as a national average but over 24% in Hamburg. It therefore asked that national averages not be used as the sole reference point.

DTAG pointed out that the potential for competition had been created, potential that would be neglected in just an analysis of the current situation. It cited the example of WLL frequency award. This was subject to a specific degree of coverage being achieved within a certain timeframe and full coverage ultimately. Moreover, sale of its cable networks would generate investment in local network infrastructure.

The major factor influencing development, however, was the soaring demand for colocation space and local loops. Demand was 600% higher than in 1999. It had caught DTAG unprepared. The flood of orders had not been preceded by any planning talks. Nevertheless,

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it had managed to double the number of colocation spaces provided since 1999 with a figure exceeding 4,000. Meanwhile, competitors had contractual arrangements for the rapid provision of space. The necessary action had been taken internally in order to master the situation. Thus competition based on the unbundled local loop was set to enter a phase of considerably more intense competition (see also section 5.2).

## 7 Competition in the Local Access Market by Region

### 7.1 General Characteristics of Regional Competition

Looking first at competition to provide lines in Germany, it can be generally noted that at the end of 2000 this competition was concentrated on one third of the access areas<sup>17</sup>. Clearly, competitors have little interest in the remaining two thirds of the access areas – with the exception of one or two lucrative customers. The first third of the areas are areas of high teledensity and with the highest number of business lines. Around 60% of all the telephone lines are found here.

The offer of analogue/ISDN lines described in section 4.1 shows that the number of competing offers and providers increases with the size of the city. Similarly, alternative operators offer digital subscriber loops (DSL) primarily in the larger towns and cities. Metropolitan Area Networks (MANs) had been installed in eight centres of population in Germany by the end of 2000<sup>18</sup>.

The study looked at individual regions more closely. Specifically, regional differences and the underlying reasons for these were explored. The pattern was found to be the same. In certain urban areas and outlying districts, a local city carrier typically offered access besides DTAG. A company therefore, that had usually evolved from municipal plants and local businesses and whose radius of activity was limited to the region in question. A second such company was often found in the larger cities, along with one or more nationwide operators. MANs, whose networks and customer access lines were usually elements of a integrated international network, were present in a smaller number of cities. And in addition, providers offering specialised DSL services had often established themselves alongside DTAG in urban areas, in the most diverse locations; to begin with, however, they only offered commercial applications.

At a relatively early stage of their activities, new entrants had targeted customers with large communications requirements. This is reflected in, amongst other things, the type of line desired. Section 5.1.1 showed that the competitors had notched up a share of 7% of the national market for primary rate ISDN, a facility found exclusively in this customer group. If virtually all local access providers initially tailor their offers for customers who generate much traffic and high revenues, it is understandable in light of their history. As a rule, they operated corporate networks before the markets were deregulated. Mannesmann Arcor, for instance, represents the fusion of the Mannesmann AG, Deutsche Bank AG and Deutsche Bahn AG corporate networks. It is a similar story with the city carriers. These are spin-offs from municipal plants and banks previously operating local government and local banking networks. The founders are still important customers today. Following liberalisation, the existing networks were expanded to provide publicly available services for other major local customers. The operators of typical MANs such as Colt and MCI WorldCom were looking to serve the international business community from the very beginning.

This situation is reminiscent of the beginnings of telephony. When the fixed network was set up with manual switching and, in the more recent past, when mobile networks were introduced, the new means of communication were first offered to commercial and institutional users. Today, it is by no means true that local access providers have their sights

<sup>17</sup> The access area is the service area in the local network within which the subscriber lines are run to the same DTAG switching facilities (local exchange).

<sup>18</sup> Competition in respect of corporate networks was not looked at, since this takes place outside the sphere of publicly available telephone service and is not therefore subject to (ex ante) regulation.

set on key accounts alone. They are making great efforts to attract smaller customers too. Individual offers show that special access packages for the smaller customer can be highly attractive, eg combining the phone line with cable TV and Internet access via a cable modem for a flatrate or – partially – with power from the socket. Internet services are in fact an important component of many local providers' portfolios. However, such packages still have a long way to go to reach their potential, since alternative access options such as interactive cable TV are not yet widespread and upgrading the networks and building infrastructure simply takes time.

## **7.2 Situation in Selected Urban Areas**

The densely populated areas of Berlin, Rhine-Main-Neckar and Rhine-Ruhr are obvious choices of candidate region. These, the three largest industrial areas, account for 4% of the territory of the Federal Republic but for 24% of the population. Within these areas the cities of Frankfurt am Main, Berlin, Düsseldorf and Cologne were selected for study.

Frankfurt is an international finance centre with specific key accounts that are likely to be particularly attractive for the competitors. Berlin, the capital, is the largest and most densely populated city area. Cologne and Düsseldorf were chosen from the Rhine-Ruhr area on the assumption that competition there in respect of customers with relatively low revenues had progressed furthest. And Düsseldorf, after Frankfurt, is another important service and business centre.

The following gives selected results for the cities of Frankfurt am Main<sup>19</sup>, Berlin, Düsseldorf and Cologne. These are only summarised, however, as details of competitive successes or individual corporate profiles cannot be given. Market share refers always to the group of providers competing with DTAG, and not to specific companies.

With some qualifications, the competitive situation described shows similarities with the situation in other places such as Munich or Hamburg. The general characteristics identified are also applicable to smaller cities.

### **7.2.1 Comparison of Frankfurt, Berlin, Düsseldorf and Cologne**

The following general conclusion can be drawn from a comparison of Frankfurt, Berlin, Düsseldorf and Cologne: Frankfurt ranks ahead of Düsseldorf and Berlin in terms of offers for customers with large revenues, but there is more diversity for residential and smaller business customers in Cologne and Berlin. Cologne and Berlin have five and four providers of ISDN and analogue lines respectively, as against three each in Frankfurt and Düsseldorf. Including firms that have announced offerings, between 16 and 19 companies offer access in these four cities via ISDN, MANs, DSL, WLL or broadband cable.

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<sup>19</sup> The local network covering the municipalities of Frankfurt am Main and Offenbach was looked at.

Table 11: Number of providers in the different segments (including DTAG)

	Frankfurt	Berlin	Düsseldorf	Cologne
Local companies <sup>20</sup>	19	19	17	16
Telephone service providers headquartered in the city <sup>21</sup>	34	14	24	7
Registered providers of telecoms services under Section 4 of the TKG headquartered in the city <sup>22</sup>	93	65	57	38
ISDN	3	4	3	5
DSL	8	8	6	5
WLL (licence holders)	4	3	4	4
MAN	6	5	5	3
Pan-European backbone connections	16	13	17	9

As of year's end 2000

This study of local access providers also leads to an assessment of competitors' share of lines supplied. There are fairly large regional differences. In Berlin, competitors' market share is more or less the same as it is at national level. In Cologne, on the other hand, competitors' market share stands out at **16%**.

These variations are explained amongst other things by the competitors' business focus, by historical development, eg the nature of their activities before and after liberalisation, and by the time of entry. Undoubtedly, elements of local patronage and differences in mentality also play a part. It should be mentioned that the share given relates to the segment analogue and ISDN lines, and not, say, to revenues, traffic volumes, etc. No conclusions can be drawn about competition in the data or the closed user group markets (corporate networks).

Table 12: Structural data and telephone lines in Frankfurt, Berlin, Düsseldorf, Cologne

	Frankfurt <sup>23</sup>	Berlin	Düsseldorf	Cologne
Inhabitants	760,000	3,399,000	568,000	963,000
Households	428,000	1,800,000	310,000	510,000
Size of household <sup>24</sup>	1.77	1.89	1.81	1.90
Area (km <sup>2</sup> )	293	890	217	405
Residential density	2,594	3,818	2,620	2,376
Business addresses	43,000	94,000	31,000	36,000
Number of staff employed	496,800	1,133,000	337,000	430,000
Staff/1000 inhabitants	654	333	593	447
Telephone channels <sup>25</sup>	714,700	2,305,200	580,700	668,000
Channels/ 100 inhabitants	94	68	102	69
Channels/ 100 staff	144	204	172	155
<b>Competitors' market share<sup>26</sup></b>	<b>4%</b>	<b>2%</b>	<b>12%</b>	<b>16%</b>

<sup>20</sup> Refers to the number of local companies already offering or intending to offer ISDN, DSL, WLL, MAN or broadband cable connections. The number of companies offering ISDN lines is given in the fourth line, that of the DSL providers in the fifth, etc.

<sup>21</sup> Not all of these providers operate solely at regional level; some operate countrywide.

<sup>22</sup> See previous footnote

<sup>23</sup> Figures are for the Frankfurt local network (covering Frankfurt am Main and Offenbach)

<sup>24</sup> Persons per household

<sup>25</sup> Analogue and ISDN 64 kbps lines, as of end of September 2000

The following gives an account of the main access providers and the special features of the four cities.

### 7.2.2 Frankfurt

As a finance and business centre, Frankfurt had attracted the interest of international telecoms companies well before competition in voice telephony became a reality. So-called metropolitan area network (MAN) operators discovered Frankfurt as the ideal location for bundling their telecoms activities in Germany, a place from where they could connect up to European and worldwide network structures. Modern transmission technologies based chiefly on fibre rings permit maximum security and a 99.99% guaranteed service availability rate.

International telecoms companies have been operating in Frankfurt in competition with DTAG since 1995. Initially, these competing operators targeted financial service providers and consultancies, who have large volumes of data to manage. Communications companies including COLT, MCI WorldCom, GTS, Level3, Viatel and PanEuropean Crossing offered these companies, for whom security and service availability were paramount, services such as:

- leased lines within the city
- leased lines between the different city networks
- LAN connections between local networks, and
- ATM and frame relay services on the basis of ATM technology.

Continuing the trend, competition in voice telephony was directed at large corporations, whose chief needs are voice communication and data transmission. Corporate networks, within which groups and their subsidiaries handle their voice and data traffic, were also important.

It was only when the voice telephony monopoly was abolished that companies targeting small and medium-size enterprises entered the regional market. Internet, voice and data services are now available as complete, customised packages from companies such as Mannesmann Arcor, MobilCom, VIAG Interkom, as shown below.

Table 13: Access providers and main services offered in Frankfurt

Service	Company
MAN	COLT, DTAG, GTS, Level3, MCI WorldCom, PanEuropean Crossing, Viatel
ISDN (national carriers)	DTAG, Mannesmann Arcor, MobilCom
ISDN (city carriers)	Mainova
DSL <sup>27</sup>	COLT, DTAG, First Telecom, Mannesmann Arcor, MobilCom, QSC, Riodata, SevenL
WLL (frequencies assigned to)	Broadnet, Star-One, FirstMark Communications, Viag Interkom
Cable operators	Kabel Hessen (Klesch/DTAG) –TV only at present

There is little evidence to date of competitors targeting low-revenue customers in Frankfurt.

<sup>26</sup> Market share of all local companies related to telephone lines

<sup>27</sup> Including providers planning to introduce this service by the end of 2000

### 7.2.3 Berlin

Berlin, with 3.4 million inhabitants, is Germany's largest city by far and, with around 3,800 inhabitants per square kilometer, the most densely populated.

Over the last few years, Berlin has become a centre for technology, media, communication and Internet start-ups. According to a study by [Booz, Allen & Hamilton](#), Berlin covers all branches of information and communications technology, but is particularly strong in the content business and the rapidly expanding multimedia sector. Accordingly, Berlin has the highest number of persons working in multimedia (4,650 of 14,850 employed in Germany as a whole). As regards content, Berlin demonstrates its prowess for instance through the film and TV studios of media cities Adlershof and Babelsberg, the television station [SAT1](#) and its extensive press and publishing landscape.

In all, some 100,000 persons are employed in the 8,000 or so companies that make up Berlin's film and TV, publishing and advertising industries.

The study also rates as attractive the research activities carried out in the capital by, for instance, the Heinrich Hertz Institute ([Heinrich-Hertz-Institut für Nachrichtentechnik](#)), the Technical University ([TU Berlin](#)) and the German Research Network ([DFN-Verein](#)). Berlin's strong commitment to the Internet sector is also underpinned by the 'Internet World', the largest New Economy trade fair outside the US.

Now that the government has moved to Berlin, the city has a high concentration of public authorities, embassies and regional offices.

Its central position in Europe and relative proximity to eastern European countries make Berlin attractive to telecoms investors as well as carriers. Thus in 1999 [Mannesmann Arcor](#) sought to take a stake in [BerliKomm](#), in order to gain a foothold for further expansion into eastern Europe. Other companies gave similar reasons for choosing Potsdam as their headquarters, believing that the area in and around Berlin was a magnet for IT start-ups and customers.

Table 14: Access providers and main services offered in Berlin

Service	Companies
MAN	<a href="#">BerliKomm</a> , <a href="#">COLT</a> , <a href="#">DTAG</a> , <a href="#">GTS</a> , <a href="#">Viatel</a>
ISDN (national carriers)	<a href="#">DTAG</a> , <a href="#">Mannesmann Arcor</a> , <a href="#">MobilCom</a>
ISDN (city carriers)	<a href="#">BerliKomm</a>
DSL <sup>28</sup>	<a href="#">COLT</a> , <a href="#">DTAG</a> , <a href="#">KKF.net</a> , <a href="#">Mannesmann Arcor</a> , <a href="#">MobilCom</a> , <a href="#">QSC</a> , <a href="#">Riodata</a> , <a href="#">SevenL</a>
WLL (frequencies assigned to)	<a href="#">Broadnet</a> , <a href="#">FirstMark Communications</a> , <a href="#">Star-One</a> , <a href="#">VIAG Interkom</a>
Cable operators	<a href="#">EWT/tss (PrimaCom)</a> , <a href="#">Kabel Berlin/ Brandenburg (DTAG)</a> , <a href="#">TeleColumbus</a>

<sup>28</sup> Including providers planning to introduce this service by the end of 2000



Compared to Frankfurt, Berlin has fewer offerings from alternative providers for high-revenue customers (4 as opposed to 6 MANs), but more services for residential and small business customers. Thus Berlin is the first city in Germany to have cable telephony, supplied since March 2000 by EWT/tss (PrimaCom) in conjunction with STAR Telecom. In addition, Kabel Berlin/Brandenburg (100% DTAG subsidiary) and TeleColumbus are planning to offer Internet access via cable. Including BerliKomm (100% subsidiary of BEWAG), the local city carrier, ISDN lines are now available from three providers beside DTAG – more than in Düsseldorf or Frankfurt.

#### 7.2.4 Düsseldorf

Düsseldorf is another major trade and service centre in Germany, after Frankfurt. Unlike in Frankfurt, however, financial services play a subordinate role. As a centre for international corporations (Japanese companies above all), a city with a substantial advertising industry, a trade fair and good connections provided by the airport, Düsseldorf is an attractive location for telecoms providers also.

In Düsseldorf too, it is chiefly international telecoms companies such as COLT, MCI WorldCom and Viatel that are looking to compete with DTAG and serve business customers with their state of the art fibre ring infrastructures and DSL services. Unlike in Frankfurt, competition is not primarily for the high-revenue customers. Owing to ISIS Multimedia GmbH commencing operations relatively early – in 1994 – DTAG soon found itself up against rivals in the market for residential and small business customers once the market was fully liberalised.

With 16 gbps Internet capacity to other countries in mid-2000, Düsseldorf is one of the ten major Internet exchange points and has more capacity than Tokyo or Milan.

As in other German cities, so too in Düsseldorf do telephone service customers have the call by call and preselection options. These are favoured mainly by the smaller customers, using companies like Mannesmann Arcor, MobilCom and VIAG Interkom. Altogether, there are 24 registered telephone service providers in Düsseldorf, the second highest number in the country as a whole.

The following table shows the main telecoms companies operating in Düsseldorf.

Table 15: Access providers and main services offered in Düsseldorf

Service	Companies
MAN	COLT, DTAG, ISIS, MCI WorldCom, Viatel
ISDN (national carrier)	DTAG
ISDN (city carriers)	ISIS, TeleLev (TROPOLYS)
DSL <sup>29</sup>	COLT, DTAG, KKF.net, KPNQWest, QSC, Riodata
WLL (frequencies assigned to)	Broadnet, Deutsche LandTel, Star-One, VIAG Interkom
Cable operators	Kabel Nordrhein-Westfalen (Callahan/DTAG) – TV only at present

<sup>29</sup> Including providers planning to introduce this service by the end of 2000



City carriers in Düsseldorf also provide a not inconsiderable number of analogue lines, a statistic which does not appear in the table above.

### 7.2.5 Cologne

In recent years, Cologne has transformed itself from an industrial to a media city. Numerous TV stations and production companies, a music and fine art industry mean that Cologne now generates some of the highest revenues and greatest number of jobs in these branches. Proportionately, Cologne has the greatest importance.

Table 16: Access providers and main services offered in Cologne

Service	Companies
MAN	COLT, DTAG, NetCologne
ISDN (national carriers)	DTAG, Mannesmann Arcor, MobilCom
ISDN (city carriers)	NetCologne, TeleLev (TROPOLYS)
DSL <sup>30</sup>	COLT, DTAG, Mannesmann Arcor, MobilCom, QSC
WLL (frequencies assigned to)	Broadnet, Deutsche LandTel, VIAG Interkom, Winstar Communications
Cable operators	Kabel Nordrhein-Westfalen (Callahan/DTAG), NetCologne – TV only at present

5 companies (not including DTAG) provide ISDN lines for residential and small business customers in Germany, making Cologne the city with the largest number of alternative ISDN providers. Two are rival city carriers. A statistic that does not appear in the table above is that Cologne's city carriers have also supplied a relatively large number of analogue lines. Compared to Frankfurt, Berlin and Düsseldorf, Cologne has the smallest number of operators competing with DTAG (MAN, xDSL, pan-European providers) for the attentions of the large business customers.

<sup>30</sup> Including providers planning to introduce this service by the end of 2000

## 8 International Comparison

A look beyond the borders shows that it usually takes some time to achieve any notable competition in the local market. This concluding section therefore takes a look at the situation in other European countries and in the US.

### 8.1 Competitors' Share of Lines in Other Countries

The first meaningful statement is provided by looking at the competitors' percentage of telephone lines as at mid-2000.

Table 17: International comparison of competitors' share of telephone lines

Country	Share
UK <sup>31</sup>	15.4%
US <sup>32</sup>	3.9%
Germany <sup>33</sup>	1.3%
Other EU countries <sup>34</sup>	0.25% - 1.7%

The UK is seen to occupy a special position, which will be discussed in section 8.3.

### 8.2 EU Countries

In Europe, Germany has been a pioneer in local loop unbundling (LLU).

There are three forms of LLU:

- Full LLU, involving another company taking over the copper pair or fibre loop upon request. Where multiple use rules this out, access is provided simply by using upstream transmission facilities (sub-loop unbundling).
- Shared access to the loop, whereby the competitors are given – for their exclusive use – the high frequency portion of the loop not used for voice telephony, for the provision of high bit rate services such as DSL.
- Access over high speed bit streams, whereby competitors can deliver high bit rate services over the loop, without the former operator being restricted in the services hitherto provided.

To date, there is regulated access to the fully unbundled local loop in four EU countries: in Germany, Austria, Denmark and the Netherlands. In Spain, high bit rate access is the only form introduced so far. The Commission presented on 12 July 2000 its "Proposal for a Regulation of the European Parliament and of the Council on unbundled access to the local loop" COM (2000) 394. The Regulation was approved, with amendments, by the Council on 3 October 2000. It commits dominant undertakings in the EU to provide, by 31 December 2000, fully unbundled access to the local loop and shared access. In many countries, implementation will be delayed until mid-2001 on account of technical problems.

<sup>31</sup> As at early August 2000

<sup>32</sup> As at 30 June 2000

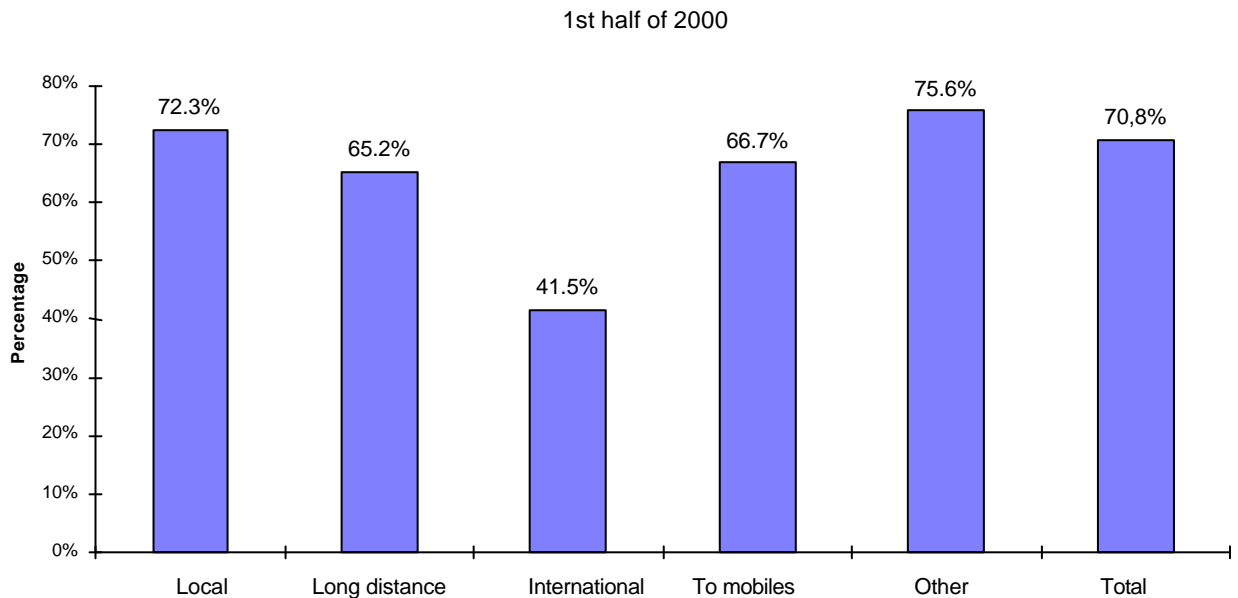
<sup>33</sup> As at 30 September 2000, RegTP survey

<sup>34</sup> Source: European Commission survey of NRAs for its 6th Implementation Report. Not all country data was published.

### 8.3 UK

The UK was the first EU country to enable competition. This happened in the mid-80s. After almost 15 years of deregulated markets, the position of **British Telecom (BT)** can be depicted as follows.

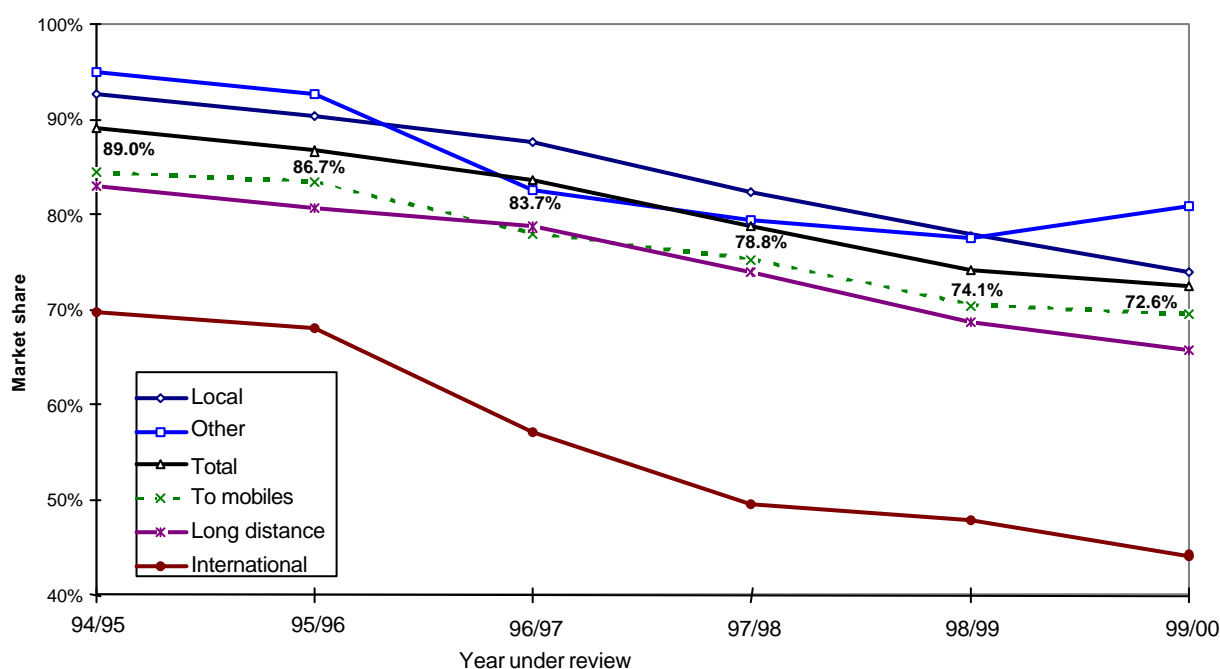
Figure 13: British Telecom (BT)'s share of call minutes in different segments



Source: Market Information Update, OfTel, November 2000, p 11

In the first six months of 2000, **BT's** share of total call minutes in the UK was just under **71%**. This figure stood at **72%** for local calls. It was lower for long distance (**65%**) and international calls (**42%**).

Figure 14: Development of BT's share of call minutes in the different segments in the years under review 1994/95 to 1999/2000



Source: Market Information 1994/95 to 1998/99, OfTel, January 2000; Market Information Update, OfTel, July 2000

In the years under review 1994/95 to 1999/2000, BT lost an annual average of 3.3% share of total call minutes (share falling overall from 89% to 73%). Most severely affected was its international calls business. BT's recorded share here was a little more than 40% only.

In the one and a half decades since the UK market was liberalised, BT had, by mid-2000, lost around 29% of its traffic volumes to the new entrants. By way of comparison, DTAG has already, in the 2½ years since the German market was liberalised, lost some 22% of its call volumes (or 10% annually).

Table 18: BT and DTAG shares of total call minutes per segment for the first half of 2000

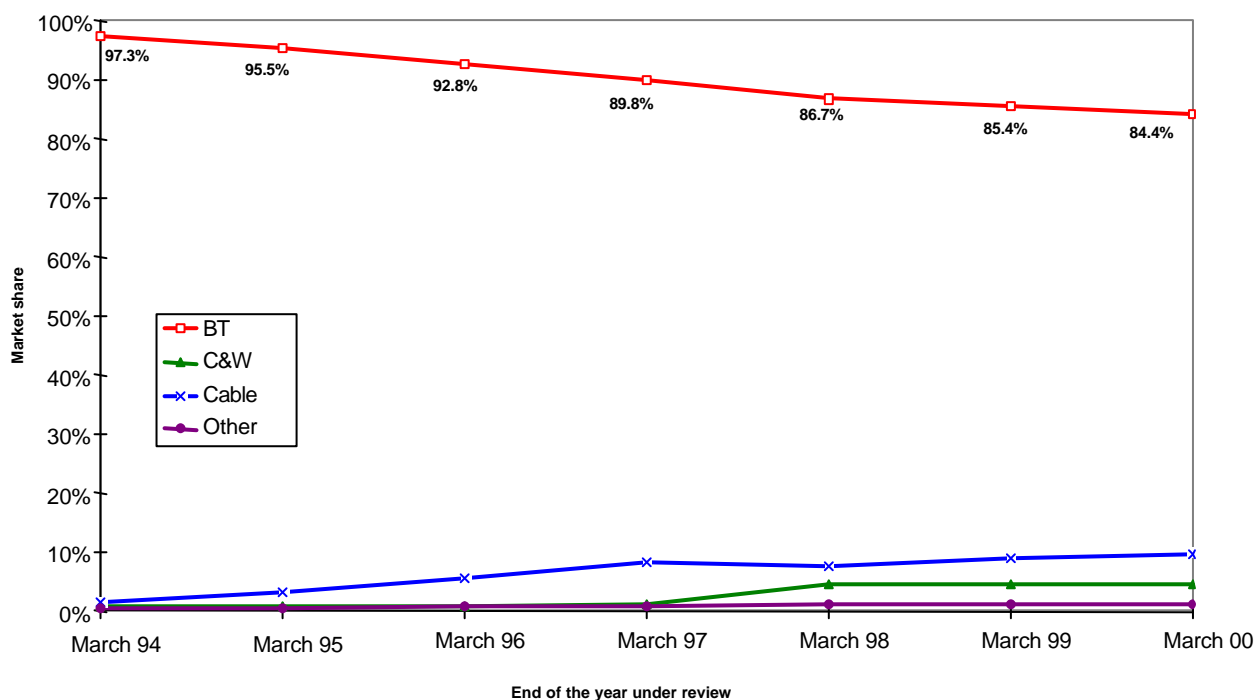
Segment	BT	DTAG
Local / Extended local	72%	93%
Long distance	65%	60%
International	42%	46%
To mobile networks	67%	71%
Other (inc Internet)	76%	74%
Total	71%	78%

After just 2½ years of liberalisation in Germany, the intensity of competition in Germany and the UK is very similar in every segment except local/extended local calls. Here<sup>35</sup>, BT has surrendered fourfold market share to the competitors. DTAG

<sup>35</sup> OfTel makes no distinction between local and extended local calls.

has actually lost a greater share than **BT** of the long distance market and the segment classified as Other.

Figure 15: Development of BT's share of telephone lines in the UK from March 1994 to March 2000



Source: Market Information 1994/95 to 1998/99, Of tel, January 2000; Market Information Update, Of tel, July 2000

This keener competition at local level is explained by the fact that **BT** has already lost a good 15% of lines to the new operators (**Cable & Wireless**, cable operators, etc). **BT's** loss of market share has slowed over the last two years, however. In Germany, **DTAG** has only lost 1.3%.

The 15% share of lines that competing providers have captured puts the UK among the international leaders. This is the result of the special treatment afforded the cable operators, who only built their networks when cable telephony was already a reality and therefore equipped them for TV broadcasts and telephony right in the early stages of rollout.

At that time, cable television networks had already been set up throughout Germany, on a scale not comparable with the UK<sup>36</sup>. They were virtually all in the hands of the monopoly operator, **DTAG**. Even if this had not been the case, retrofitting the cable TV networks for voice telephony would only have been possible after 1998. Following the Duopoly Review, cable operators in the UK were permitted in the early 90s to offer switched communication including voice telephony service, on their cable networks. There had previously been a duopoly in the telephone service. Cable operators and other new entrants had almost

<sup>36</sup> At the end of 1992, 430,000 households in the UK had a cable TV connection, and 1.94 million households were capable of being served. In Germany at the same time, 11.82 million households had a cable TV connection, and 19.63 million were capable of being passed.

10 years' time in which to compete with the incumbent to provide telephone lines. After three years of full liberalisation in the UK, BT's loss of market share was hardly larger than after three years of liberalisation in Germany (see data for 1994 in Figure 15).

For a long time, the British government pursued a policy of facilities competition, ie competitors/licence holders in the UK telecoms market were to serve customers using their own infrastructure. Today, in matters of local loop unbundling and preselection, the UK lags Germany by 3 to 3½ years. Oftel has been publicly rebuked by the European Commission for its arrangements in assigning colocation space and discussion of the technical difficulties reported by BT in local loop unbundling.

## 8.4 USA

The situation in the US cannot really be compared to that in Europe. For example, there are 1,300 incumbent local exchange carriers, or ILECs, whereby some of these are owned by larger companies. The 1984 divestiture of AT&T separated the local from the long distance operators, a separation not found in Europe (where the incumbents offer both). There has been competition in the long distance market since 1984, but the local networks continue to be regulated monopolies.

Since about 1994, some of the states have lifted the monopoly on local calls. This has allowed the competitive access providers (CAPs), who used to supply data circuits to key accounts, into metropolitan area networks (MANs), the business of installing whole optical fibre networks, and finally to operate as competitive local exchange carriers (CLECs), offering subscriber lines and xDSL via colocation facilities in the main distribution frames of the ILECs.

Local network monopolies were abolished throughout the US with the Telecommunications Act of 1996. Incumbent local exchange carriers are now obliged to grant competitive local exchange carriers access to unbundled network elements (these include the local loop)<sup>37</sup>. When the local exchange carriers have met these requirements, they will be permitted to enter the long distance market too (to date, this has happened in New York and Texas). Interpretation of the provisions of the Telecommunications Act has brought many legal battles, right up to the constitutional court. The FCC's responsibility for unbundling and interconnection issues has been affirmed, but the way in which it regulates prices is still contested.

As required by the 1996 Telecommunications Act, the FCC collects data on local level competition and the spread of broadband services (requesting data from ILECs, CLECs, DSL, cable, WLL and satellite operators alike).

In December 2000 the FCC presented its report *Local Telephone Competition: Status as of June 30 2000*. It showed the competitors (CLECs) in mid-2000 to have more than 6.9% of the telephone lines in the US (1.7% unbundled local loop, 2.2% their own infrastructure and 3.0% resale). This means that the CLECs operate 3.9% of the lines over their own systems (direct or unbundled) after more than four years of competition. This figure rose from 2.3% to 3.9%, an increase of 70%, in the six months from the end of 1999 to mid-2000 alone. By way of comparison, roughly 1.5% of the telephone lines have been realised by the competitors in Germany on the basis of their own systems (directly or unbundled) after three years of competition.

<sup>37</sup> Exceptions were made for small ILECs with less than 2% of telephone service channels in the US. Altogether, this group operates more than 10% of the telephone service channels in the US. This exemption for rural ILECs has even been incorporated in the US Annex to the WTO Basic Telecom Agreement.

In its study *High Speed Services for Internet Access* of October 2000, the FCC noted that by mid-2000, 3% of US households had signed up for high bandwidth services<sup>38</sup>. 95% of the population lived in zip code areas in which the presence of at least one broadband subscriber was reported<sup>39</sup>. The number of broadband providers (especially DSL and cable) depends heavily on population density. Two thirds of the broadband connections of homes and small businesses are realised over cable and a quarter over DSL. In the last six months, the number of DSL connections rose by 164% and the number of cable connections by 55% – all broadband connections together by 75%. Currently, 45 companies offer DSL and 33 cable Internet access.

Germany, meanwhile, is closing the broadband gap. The data show about 1% of German households to have a broadband connection. This figure was expected to rise to 2% in early 2001, making Germany only about a year behind.

Regulatory attention in the US is currently focused on whether or not the ILECs' obligation to allow the CLECs access to their local networks – eg for DSL either by unbundling or by line sharing – should also be made applicable to AT&T or Time Warner's cable networks so that Internet and broadband competition can flourish. This debate is being conducted in the US under the title "Open Access".

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<sup>38</sup> The study makes a distinction between "high speed" (in at least one direction with a transmission speed in excess of 200 kbps) and "advanced" (in each direction with a speed in excess of 200 kbps).

<sup>39</sup> Customers of nationwide satellite services were also included.

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