Oftel Office of Telecommunications

International benchmarking study of Internet access (dial-up and broadband)

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Summary

Scope

S.1 This report is an international benchmarking study of Internet access covering both basic dial-up access and broadband services. The report covers Internet services in France, Germany, Sweden, United Kingdom and the US (the States of Ohio and California are used for dial-up services; the study covers a number of the largest providers of broadband who offer services across a range of States).

S.2 This study is a follow up to the study published by Oftel in June 2003, based on February 2003 prices. Oftel has carried out the analysis and drafting of this report. The tariff data used in this report have been collected by consultants HI Europe.

S.3 The report considers comparisons of retail prices as well as comparisons of:
- Internet options in each country
- take-up and availability; and
- price and availability of services provided using "alternative" broadband technologies such as Broadband Fixed Wireless Access and satellite.

S.4 Points that should be borne in mind in interpreting the results are detailed in paragraphs 1.8 - 1.11 of this report. This report is not intended in any way to be a buyer's guide to services in the UK.

S.5 The results presented are based on a snapshot of prices as at 15th August 2003.

Results for "basic" Internet Access

S.6 Figures 1 and 2 show the results for the price index for basic Internet access (i.e. Internet access for consumers who have no particular requirement for access speed), for residential usage and for business users respectively. This is expressed relative to the UK price index.

S.7 The methodology used in previous reports has been reviewed and the usage baskets have been revised, based on recent market research carried out by Oftel into actual Internet usage patterns.

S.8 These results show that, based on the sample of service providers selected for residential and business consumers, UK prices are cheaper than all other countries for basic Internet access.

S.9 In the UK and US, unmetered dial-up services are widely available. In the other European countries this is not the case, and cable modem and DSL services may be more cost effective than dial-up for consumers with high usage. The results are based on the average of the two cheapest available options, and hence include some broadband packages.

Figure 1: Comparison of residential Internet access prices

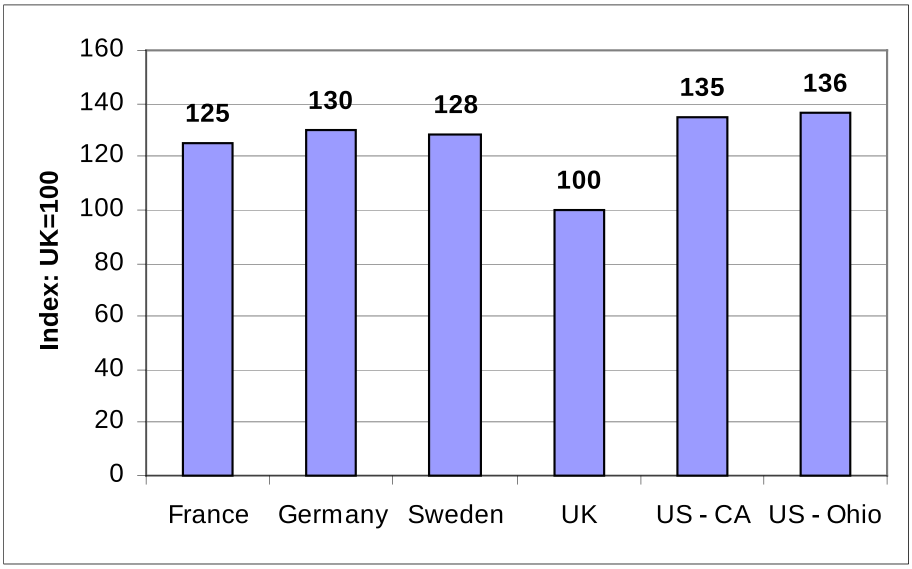
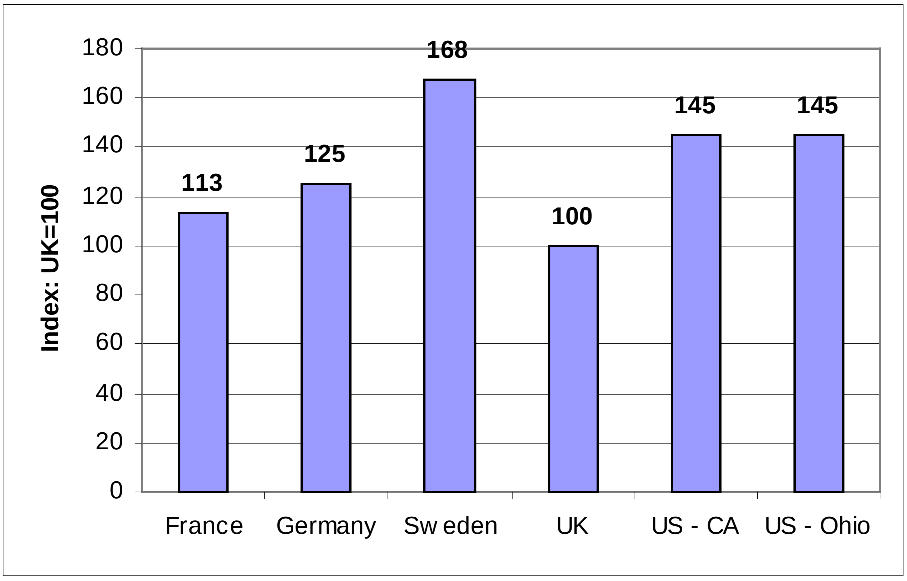


Figure 2: Comparison of business Internet access prices



S.10 The use of new basket parameters means results are not directly comparable with previous reports, hence past results have been re-run using the new baskets. This shows that from the period February 2003 to August 2003 the UK's relative position has remained the same.

Results for broadband Internet access

S.11 Figures 3 and 4 show the results for the price level and the price index (relative to the UK) for broadband residential and business services. The results are based on the average of the two cheapest deals available from the service providers covered in this research. Prices shown include the monthly subscription, as well as set up costs spread over three years. Results are presented both with and without cable modem offers included.

Residential broadband services

S.12 Figures 3a and 3b show the results for the price index (relative to the UK) for broadband residential services. The results are based on the average of the two cheapest deals available from the service providers covered in this study as at August 2003. These results show that as at August 2003:

- for the “higher speed” residential broadband basket (i.e. where the consumer has a minimum bandwidth requirement of 257kbit/s),
  - when cable modems are included prices in the UK are significantly cheaper than Germany and the US, similar to France and only in Sweden are prices cheaper; and
  - when cable modems are excluded the UK is similar to France and cheaper than all other countries.
- for the “entry level” broadband residential basket (i.e. where the consumer has a minimum bandwidth requirement of 128kbit/s):
  - when cable modems are included, UK prices are significantly cheaper than Germany and the US and more expensive than France and Sweden; and
  - when cable modems are excluded only in France are prices cheaper than the UK.

Figure 3a: Results for price level and (downstream) bandwidth for "higher speed" residential broadband services

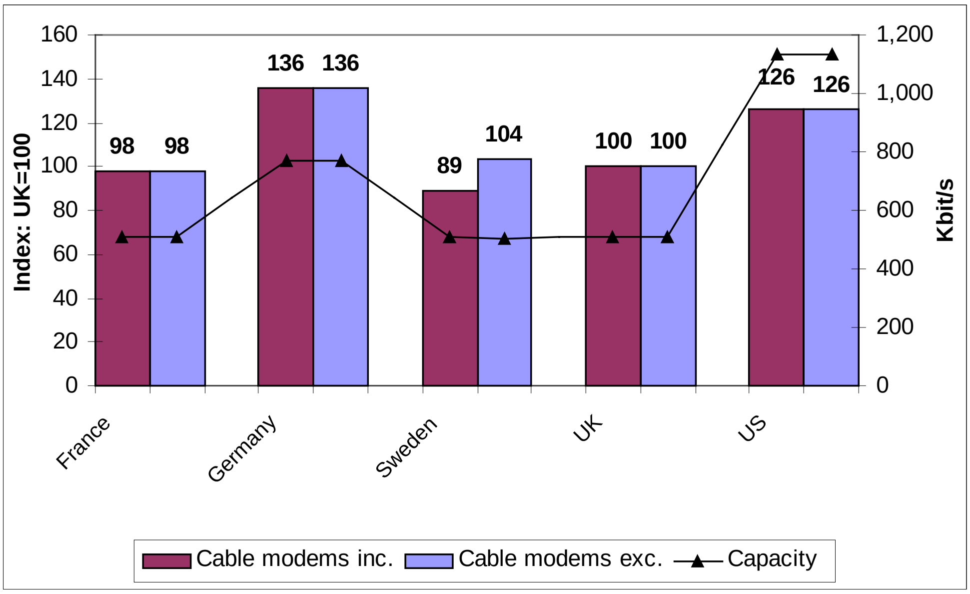
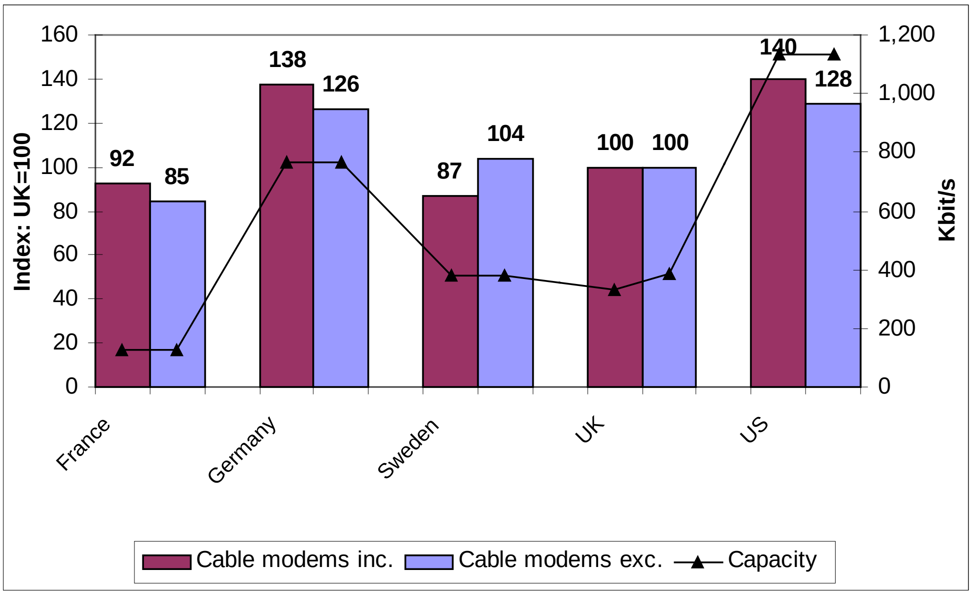


Figure 3b: Results for price level and (downstream) bandwidth for "entry level" broadband services



S.13 Since the last benchmark the UK's relative position for the "higher speed" broadband basket has improved against all countries except France. For the "entry level" basket the UK's position has deteriorated against all countries except the US.

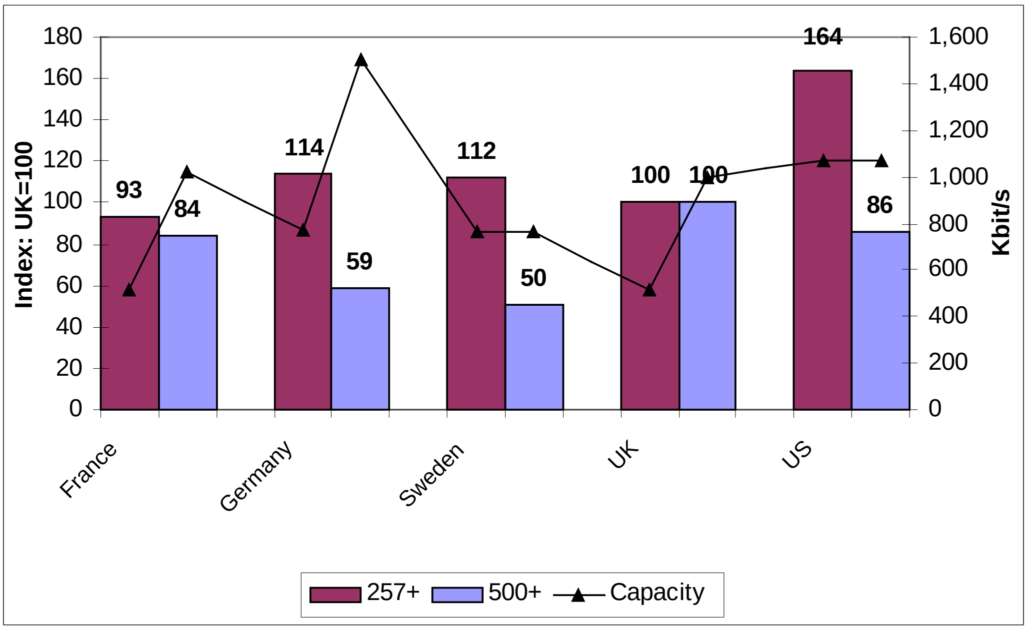
Business broadband services

S.14 Figure 4 shows the results for the price index (relative to the UK) and bandwidth provided for broadband business services, for a variety of consumer types. The results are based on the average of the two cheapest deals available as at August 2003.

S.15 From Table 6 it is seen that as at August 2003:

- for the most basic services available to business (i.e. where the business has a minimum bandwidth requirement of 257kbit/s)[1]:
  - only in France are prices cheaper than the UK; and
  - the average speed of service in the UK is similar to all countries except the US, which offers higher speeds.
- for business services where a minimum *geometric mean (*i.e. square root downstream bandwidth x upstream bandwidth) bandwidth of 500kbit/s is required[2]:
  - UK prices are more expensive than elsewhere; and
  - the speed in all countries is similar.
- for business services where a minimum *geometric mean* bandwidth of 1000kbit/s is required:
  - services are available in all countries but there is only one service available in France and the UK; and
  - prices in Germany are much more expensive than Sweden or the US.

Table 4: Results for price level, price index and bandwidth for business broadband services (cable modem services included)



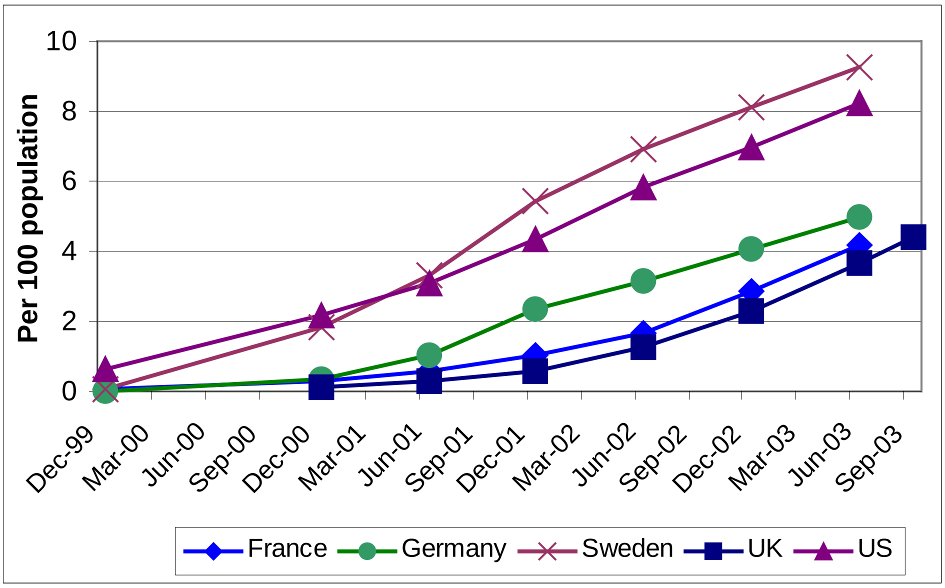
[1] In practise in the UK services in this basket have a downstream speed of 512kbit/s.
[2] In practise in the UK services in this basket have a downstream speed of 1000kbit/s and an upstream speed of 256kbit/s.

S.16 Since the last benchmark, the UK's relative position for basic business service has improved against all countries except France. When there is a minimum bandwidth of 500kbit/s, the UK's relative position has also improved but the UK is still the most expensive country in the benchmark.

Take-up of broadband services

S.17 Data on take up is presented as a percentage of population (using OECD population figures for 2001) in Figure 5. Although current levels of broadband are low (below 10% of the population), take-up of broadband continues to increase. While the UK remains behind in subscriber figures, the growth rate is faster then any other country included in the benchmark.

Figure 5: Broadband take-up over time



Source: ECTA, Point Topic, companies & regulators

Alternative Broadband Technologies

S.22 The report has considered the availability, price and take-up of alternative broadband technologies such as Broadband Fixed Wireless Access (BFWA) and broadband satellite access. The market for alternative broadband technologies is still very new and this study reports on new developments.

Wholesale inputs in the broadband market

S.23 The wholesale DSL price comparisons for the UK and France have been updated with new wholesale prices from BT since May 2003 and new retail prices as at 1st October 2003. On the basis of the new prices:

- for residential DSL services France Telecom's wholesale price is above BT's;
- for business DSL services with 1Mbit/s downstream, France Telecom's wholesale price is also above BT's; and
- the margin for the incumbent's ISP is greater in the UK than in France for both the residential and the 1Mbit/s business service.

S.24 Local Loop Unbundling (LLU) has been compared on the basis of a number of measures across the benchmarked countries. In all countries, DSL services over unbundled local loops are started to be provided by end users, particularly business users, increasing the range of broadband services available (eg increasing the range of speeds and contention ratios available). Take-up is currently low in Sweden and the UK, but is growing. In Germany and the US take-up is higher, accounting for around 6 per 100 incumbent DSL lines. The biggest change in the last 6 months has been in France where take-up of LLU (mostly shared access) has increased around 8 fold, although this still leaves France take-up of LLU behind that in Germany and the US.

Chapter 1

Introduction

1.1 Oftel's aim is to provide the best possible deal for telecommunications customers in terms of quality, choice and value for money through effective competition. International comparisons of telecom services are one way of assessing the achievement of this aim.

1.2 Oftel carries out regular reviews of the major telecom markets to determine the appropriate level of regulation for the future. Regular benchmarking exercises allow a time trend to be developed, which provides greater information than a single snap shot. The results in this report will form part of the data input for future reviews.

1.3 This study focuses on comparing the cost for representative users for Internet access in each country using a "basket" methodology. Oftel has carried out its own benchmarking work (as opposed to using alternative published sources) to ensure that the methodology is rigorous and robust and that it addresses the following issues:

- usage baskets need to reflect a range of patterns of use representative of different groups of consumers; and
- consumers have a potentially wide range of choices for their telecom services:
  - consumers have a choice of competing service providers all of whom will offer different packages; and
  - each service provider may offer a variety of different packages and discount schemes targeted at different segments of the market.

  Price comparisons need to take into account the range of products available to the consumer.

1.4 The following countries are included in the analysis:

- France;
- Germany;
- Sweden;
- UK; and
- US (the States of Ohio and California are considered for dial-up Internet access; the study covers a number of the largest providers of broadband who offer services across a range of States).

1.5 This study is a follow up to the study, *International benchmarking study of Internet access (dial-up and broadband)*, published by Oftel in June 2003, which was based on tariff data valid as at February 2003. A list of the "tariffs valid at" date and date of publication of previous studies is given in Table 1.1;

Table 1.1: List of previous studies

No.	Tariffs valid at date	Date published	Internet services covered	Report prepared by
1.	February 2000	April 2000	DSL	Analysys
2.	February 2000	May 2000	Dial-up	Teligen
3.	August 2000	December 2000	Dial-up	Oftel
4.	October 2000	January 2001	DSL and cable modem	Oftel
5.	February 2001	June 2001	Dial-up	Oftel
6.	August 2001	December 2001	Dial up, DSL and cable modem	Oftel
7.	February 2002*	June 2002	Dial up, DSL and cable modem	Oftel
8.	August 2002	December 2002	Dial up, DSL, cable modem and alternative broadband access.	Oftel
9.	February 2003	June 2003	Dial up, DSL, cable modem and alternative broadband access	Oftel
10.	August 2003	October 2003 (current study)	Dial up, DSL, cable modem and alternative broadband access	Oftel

Reports can be found at: www.Oftel.gov.uk/publications/research/index.htm
** Some data for April 2002 was also included here.*

1.6 Oftel has carried out the analysis and drafting of this report.

1.7 Data has been collected from the vast range of tariff packages available to residential and small/medium sized businesses, for major service providers and service providers in each country as at 15th August 2003. The tariff data used in this report have been collected by consultants HI Europe.

Points to bear in mind

1.8 There are a huge range of operators and service providers offering services to consumers and it is not possible to cover all packages on offer. In addition, it is not possible to fully capture all aspects of innovative tariff products. While it is believed that the sample chosen is fully representative and covers the range of offers available by country, the possibility that consumers have access to additional offers outside the range calculated for the sample used in this report cannot be excluded. Not all tariffs included will be available to all consumers in a particular country.

1.9 The objective of this report is to provide a comparison between countries for a range of consumer usage profiles. A range of profiles is chosen to be illustrative of the most frequent types of customer calling patterns, but is not comprehensive. **Prices are based on a snap shot as at 15th August 2003**. Although providing a sound overall picture, the comparison of companies *within* a country should not be taken as necessarily being representative for an individual consumer.

1.10 The analysis is based on a basket methodology, which allows prices to be compared across different service providers in different countries. It is not, however, intended to be a buyer's guide to services as:

- it provides only a snapshot of the price levels for a continually changing set of price packages; and
- the residential or business consumer will have to access more specific usage information in order to determine the best option for that person or business.

The objective is to illustrate the scale and level of prices available to consumers in different countries.

1.11 There are separate industry funded initiatives and reports which seek to help UK consumers be better informed purchasers of telecommunications services (examples are: fixed and mobile quality of service indicators –*www.cpi.org.uk and www.oftel.gov.uk*; and information for small businesses about using telecoms and the internet –*www.telecomsadvice.org.uk*). Oftel has also recently produced a range of consumer guides and has introduced a seal of approval, called the Oftel PASS, for websites that compare the prices of different suppliers and provide impartial and accurate information - *http://www.oftel.co.uk/publications/consumer/2002/pass0902.htm*. This report is **not** part of that body of work as it seeks to compare positions between, not within, countries and it is not, therefore, intended in any way to be a buyer's guide to services in the UK.

Outline of the report

1.12 There are seven subsequent chapters that present the results for:

- Internet access – basic (Chapter 2);
- Internet access – broadband / always-on (Chapter 3);
- Internet Access – dial-up and broadband comparison (Chapter 4);
- Internet Access – availability and take-up (Chapter 5);
- alternative broadband access technologies(Chapter 6); and
- wholesale inputs in the broadband market (Chapter 7).

1.13 In general, the methodology used is very similar to that used in previous reports. The methodology is designed to allow a comparison to be made of dial-up services and broadband services as well as allowing a comparison to be made of the gap between unmetered dial-up and broadband products in each country.

Chapter 2

Internet access – basic

Introduction

2.1 This chapter covers “basic” Internet access, i.e. access to the Internet by consumers who have no requirement for “high speed” access. Mainly this will mean PSTN dial-up access, as this is usually the cheapest option. However, there are circumstances where other access mechanisms may be cheaper. In countries where unmetered PSTN dial-up access is not available, broadband access may be a cost effective alternative for consumers with high usage. In this chapter a range of access mechanisms are considered (i.e. PSTN and ISDN dial-up, DSL and cable modem) and the results then focus on the cheapest available options. Price comparisons for consumers requiring greater access speed, and the “always-on” facility, provided by DSL and cable modem, are presented in Chapter 3.

2.2 In January 2002 Oftel published an Effective competition review for dial-up narrowband Internet access which concluded that the retail market for dial-up access was effectively competitive. Past benchmarking studies formed part of the data input to this review. This study forms part of the ongoing monitoring of the retail market for dial-up Internet access.

2.3 The results provide an update of the results presented in the June 2003 report (based on prices as at February 2003). This study is the eighth in a series that started with a study carried out by Teligen for Oftel published in May 2000 (based on prices as at February 2000).

2.4 The selection of service providers for inclusion in this report has been reviewed and some changes have been made to ensure that the tariffs included are representative. These changes may impact on the apparent price trends reported.

2.5 This chapter follows broadly the same format as the previous reports and shows:

- a summary of developments over the last 6 months;
- a summary of the methodology used;
- results for business and residential consumers showing:
  - price indices for a range of baskets;
  - price movements over the last 6 months;
- conclusions.

2.6 Detailed results for the packages modelled are shown in Annex D & E and sensitivities are shown in Annex H.

Market developments

2.7 Results from Oftel's latest consumer research (conducted in August 2003) show 50% of homes are connected to the Internet, compared to 45% in February 2003. Table 2.1 shows that:

- the use of broadband continues to rise; and
- most people upgrade to broadband from an existing narrowband package.

Table 2.1: Residential Internet market developments from February 2003 to August 2003

	Access method/ Package* Base: UK homes with Internet access, Feb '03 (Base 986, excludes 3% 'don't knows') August '03 (Base 1069, excludes 2% 'don't knows')			**Broadband: previous package used**** Base: Broadband decision makers, Aug '03 (Base: 133)		
	Broadband (based on industry supplier figures)	Narrowband, unmetered	Narrowband, metered	No previous connection	Narrowband metered	Narrowband unmetered
February 2003	16%	38%	25%			
August 2003	18%	34%	28%	11%	38%	45%

* 17% are unsure of which narrowband package they are on
** Approx. 5% are unsure which package they were previously on

2.8 The results also show that around 65% of small and medium sized businesses (SMEs) are connected to the Internet, this has remained stable over the year. Table 2.2 shows that:

- two-thirds of SMEs with Internet use a narrowband connection (PSTN or ISDN);
- unmetered access is the favoured type of narrowband package; and
- the use of broadband continues to rise – a third of businesses with Internet now claim to use broadband.

Table 2.2: Business Internet market developments from February 2003 to August 2003

	Internet access methods/ package types Base: UK businesses with Internet access, Nov '02/ Feb '03 (Base: 1331), May '03/ Aug '03 (Base: 1280)				
	Unmetered	Metered	Broadband	Leased line	Narrowband – Unsure of package type
November '02/ February 2003	35%	30%	16%	3%	15%
May '03/ August 2003	30%	27%	34%	4%	5%

Methodology

2.9 The methodology used in previous reports has been reviewed and the usage baskets have been revised. The new residential profiles (described in detail in Annex B) are based on recent market research carried out by Oftel into actual Internet usage patterns. The key features are:

- a number of off-peak usage baskets have been defined, with usage levels of 5, 10, 20, 40 and 100hrs per month, and usage spread over evenings and weekends (several of these baskets are similar to baskets previously used); and
- a number of "combination" usage baskets have been defined, with usage levels of 10, 20, 40 and 100hrs per month, and with usage spread over all times of the week (these are different to the previous "peak" baskets where usage was weekday/daytime only).

2.10 Business profiles now consider peak use of 10, 20, 40 and 100 hours/month.

2.11 The new profiles do not include the cost of the fixed line (a change from the previous profiles where it was included for the higher usage baskets). The reasons for this change are discussed in annex B.

2.12 The comparisons can be thought of as comparing the cheapest prices available for those who are unconcerned about speed and unconcerned about the inconvenience of blocking the line for voice and having to dial-up. This is consistent with Oftel's definition of the narrowband market. This provides a clear distinction between comparisons for "basic" Internet access and broadband services (which are compared in the following chapter).

Results for residential baskets

2.13 The price index (based on the average of the two cheapest packages from different service providers in each country) is presented in Table 2.3 for residential baskets.

Table 2.3: Comparison of residential package prices

Baskets	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Weighted average across baskets ***
	Off-peak baskets					**Combination baskets**				
(UK=100)	5 hours	10 hours	20 hours	40 hours	100 hours	10 hours	20 hours	40 hours	100 hours	
France	149	127	91	111	174	97	89	111	151	125
Germany	101	84	87	170	184	79	100	179	160	130
Sweden	103	91	89	163	179	90	93	163	156	128
UK	100	100	100	100	100	100	100	100	100	100
US, CA	296	163	100	124	118	125	97	124	102	135
US, OH	299	165	100	125	119	127	98	125	103	136

* Basket 9 is given a weight of 2 – see Annex B

2.14 From Table 2.3 it can be seen that:

- on average prices in other countries are at least 25% more expensive than those in the UK;
- for the highest usage baskets (40 and 100 hours) the UK is cheaper than all other countries; and
- for the lower usage baskets the price rankings vary between countries and baskets.

2.15 In Sweden, there are no dial-up unmetered packages and in France and Germany services are limited (eg not available from the incumbent operators ISP). In Sweden prices for the 100-hour basket is based on DSL/cable modem offers. In France the 100-hour basket is based on a 64kbit/s cable modem service.

2.16 Since the June 2003 report (past results have been re-run with the new basket parameters) the UK's ranking has remained the same and the relative position of the other countries has deteriorated slightly compared to the UK. This is due to a price reduction in BT's local call rate and changes in the service providers covered.

Price trend

2.17 A summary of price changes since February 2003 is provided in Table 2.4. The average price change shown is the mean of the percentage changes across each of the original 9 baskets. Price changes are presented in real terms.

Table 2.4: Percentage change in price levels for residential baskets February 2003 – August 2003

Baskets	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Weighted average across baskets ***
(UK=100)	**Off-peak baskets**					**Combination baskets**				
	5 hours	10 hours	20 hours	40 hours	100 hours	10 hours	20 hours	40 hours	100 hours	
France	0%	0%	0%	0%	11%	0%	0%	0%	-2%	0%
Germany	-2%	-12%	-12%	-9%	-1%	-4%	-4%	-4%	-1%	-5%
Sweden	1%	1%	-4%	-9%	-12%	3%	-12%	-12%	-12%	-7%
UK	-24%	-22%	-17%	-15%	-10%	-1%	-15%	-15%	3%	-11%
US, CA	0%	-3%	13%	10%	10%	-3%	13%	10%	10%	7%
US, OH	0%	-3%	0%	0%	0%	-3%	0%	0%	0%	-1%

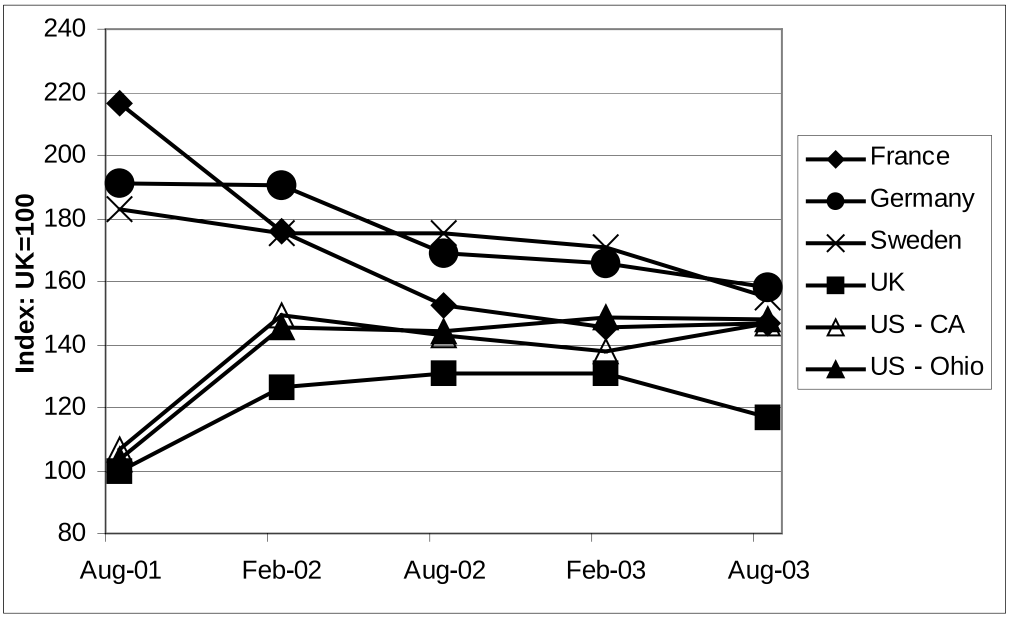
* Basket 9 is given a weight of 2 – see Annex B

2.18 From Table 2.4 it is seen that overall;

- prices have remained relatively stable in France and Ohio;
- prices have dropped slightly in Germany and Sweden and increased slightly in California; and
- prices in the UK have decreased more significantly, especially for the lowest off-peak usage baskets (this is due to price reductions of BT's local call rate).

2.19 Price changes need to be considered together with price levels. Since the current results are based on a new methodology past results have been re-run using the new methodology to ensure a consistent comparison can be made throughout the period. The following chart (Figure 2.1) shows price changes relative to UK prices as at August 2001.

Figure 2.1: Price trends by country from August 2001 to August 2003 for residential baskets



2.20 Figure 2.1 shows that over time Internet prices in the countries considered have converged. In August 2001 unmetered services were only available in the US and the UK. As broadband prices dropped and unmetered services became available in Sweden, France and Germany, prices in these countries have become more comparable to those in the UK and the US.

Results for business baskets

2.21 The analysis for the business baskets is based on packages that are specifically targeted at businesses. However, there are some packages targeted at the residential market that will also be used by small businesses (some residential packages explicitly prohibit business use while others do not). The dividing line between a business and a residential package is not always clear, and the results presented may not represent the prices actually paid by a business. In general, a business will expect to pay more for Internet access than residential consumers as they receive additional value and services in their packages, for example, extra email addresses or web space. Smaller businesses may not require these additional services and residential packages may be sufficient for their needs.

2.22 The price index (based on the average of the two cheapest packages from different service providers in each country) is presented in Table 2.5 for business baskets.

Table 2.5: Comparison of Business package prices

Basket (UK=100)	**10** 10 hours	**11** 20 hours	**12** 40 hours	**13** 100 hours	**Average across baskets**
France	119	101	112	122	113
Germany	93	93	131	183	125
Sweden	132	131	183	225	168
UK	100	100	100	100	100
US, CA	236	140	102	102	145
US, OH	236	140	102	102	145

2.23 From Table 2.7 it is seen that:

- on average prices in other countries are at least 13% more expensive than those in the UK;
- for the lowest usage baskets Germany is slightly cheaper than the UK; and
- for the higher usage baskets prices in the US are similar to the UK.

2.24 In several countries, cable modem or DSL services appear as the cheapest package for some baskets. In Germany and Sweden there are no dial-up unmetered packages and in France availability is limited. In Germany, cable modem/DSL packages start to become cost effective at 40 hours and in Sweden and France at 100 hours usage per month.

Price trend

2.25 A summary of price changes since February 2003 is provided in Table 2.6. The new basket parameters are different to those used in previous benchmarks, hence past results have been re-run using the new baskets. The average price change shown is the mean of the percentage changes across each of the four baskets. Price changes are presented in real terms.

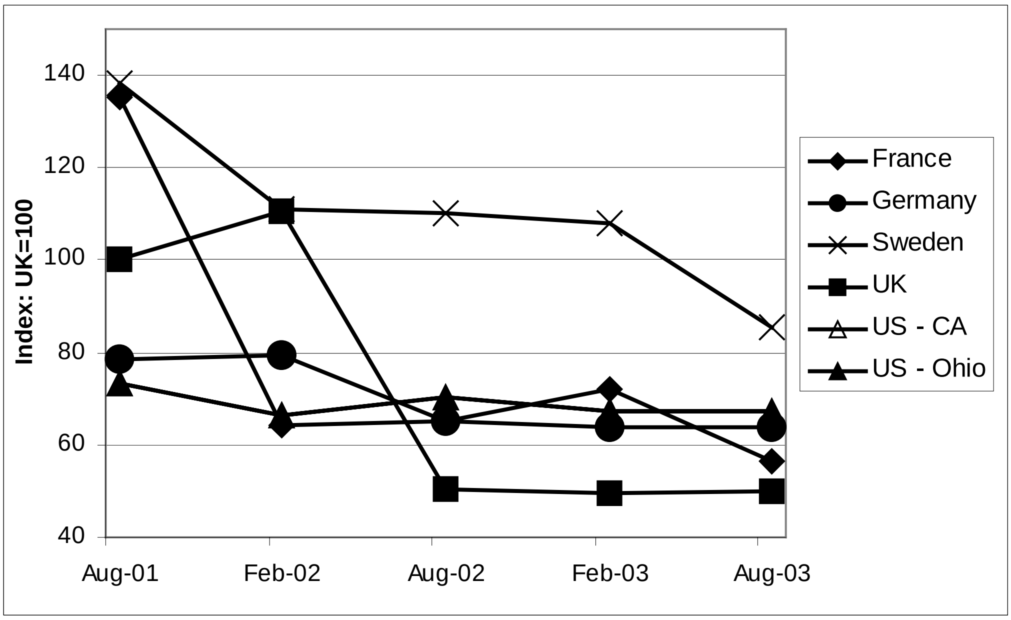
Table 2.6: Percentage change in price levels for business baskets February 2003 – August 2003

Basket (UK=100)	**10** 10 hours	**11** 20 hours	**12** 40 hours	**13** 100 hours	**Average across baskets**
France	6%	28%	18%	-58%	-1%
Germany	-1%	-1%	-1%	1%	-1%
Sweden	-21%	-11%	-10%	-32%	-19%
UK	-1%	-1%	2%	2%	0%
US, CA	0%	0%	0%	0%	0%
US, OH	0%	0%	0%	0%	0%

2.26 From Table 2.6 it is seen that;
- overall, prices have remained stable in all countries except Sweden where prices fell by 19% (this is due to the introduction of new services by a number of ISPs); and
- in France, although overall prices remained stable there were large price increases for the10-40 hour basket and large price decrease for the 100 hour basket. The price increase is due to price increases in a number of bundled packages and the price decrease is due to the introduction of a new 100 hour bundled package.

2.27 Price changes need to be considered together with price levels. Since the current results are based on a new methodology past results have been re-run using the new methodology to ensure a consistent comparison can be made throughout the period. The following chart (Figure 2.2) shows price changes relative to UK prices as at August 2001.

Figure 2.2: Price trends by country from August 2001 to August 2003 for business baskets



2.28 Figure 2.5 show prices in the UK have been stable since August 2002 and are lower than all other countries. It also shows prices in Sweden have been consistently high, prices in the US and Germany have remained stable over the period and in France prices are moving closer to those in the UK.

Conclusions

2.29 The UK has the cheapest prices for both business and residential basic Internet services. For residential services prices in all countries have converged. However, prices in the UK have been consistently cheaper than elsewhere and since the last benchmark there was a notable price drop.

2.30 For business services, prices in the UK have remained stable since August 2002 and are lower than all other countries.

2.31 A number of sensitivity tests have been run and show that for dial-up services, changes in the assumptions regarding the inclusion of fixed line costs and the inclusion of broadband offers do have an impact on the results, especially for business services. However, UK prices are still close to the cheapest in most scenarios and below average in all cases.

Chapter 3

Internet access – broadband

Introduction

3.1 This chapter covers Digital Subscriber Line (DSL) and cable modem services. These services provide high-speed telecom services to consumers over the local loop/cable network. These services are becoming increasingly important in providing consumers with access to a range of services, such as fast Internet access and video on demand. This chapter focuses on comparing the cost for different types of users of broadband services providing Internet access. Further information on broadband markets is presented in subsequent chapters of this report.

3.2 The results provide an update of the results presented in the June 2003 report (based on prices as at February 2003). This study is the seventh in a series, which started with a study carried out by Analysys for Oftel and published in April 2000 (based on prices as at February 2000).

3.3 The selection of service providers for inclusion in this report has been reviewed and some changes have been made to ensure that the tariffs included are representative. These changes may impact on the apparent price trends reported.

3.4 A full update of prices has been carried out based on tariffs as at 15th August 2003.

3.5 Since services differ in the amount of bandwidth (both downstream to the consumer and upstream from the consumer) that is available, price comparisons presented are viewed in the context of the bandwidth provided.

3.6 Oftel, in its review of the fixed narrowband wholesale exchange line market proposed defining a broadband internet service using three characteristics. The proposed three characteristics for categorising services as broadband are:

- the service is always-on, ie no dial up is required. This feature allows the user to maintain a permanent connection to the network so allowing real time delivery of services such as e-mail;
- it is possible to use both voice and data services simultaneously, whether they are provided together, for example over the same access route, or separately, perhaps using more than one access route; and
- it has a faster downstream speed than a dial up connection.

3.7 Oftel's proposed market definition considers that the Internet access speeds that are currently attainable over a dial up connection are: 56kbit/s over an analogue line; 64kbit/s over an ISDN 2 channel and 128 kbit/s over two bonded channels of an ISDN2 line.

3.8 It is Oftel's view that it is necessary for all of these characteristics to be present simultaneously for an Internet access service to be defined as broadband.

3.9 There are a wide range of services that are marketed as 'broadband' both in the UK and elsewhere. In particular there is increasing availability of “entry level” services with downstream speeds in the range 128kbit/s to 256kbit/s. In monitoring take-up, Oftel includes all always-on services with downstream speed of 128kbit/s and above. This is consistent with the approach taken elsewhere and hence aids international comparisons.

3.10 In comparing residential prices, two baskets are considered, as in the June 2003 report. These are:

- an "entry level" broadband basket, in which the user requires a downstream speed of at least 128kbit/s
- a "higher speed" broadband basket in which the user requires a downstream speed of at least 257kbit/s.

3.11 The “entry level” basket satisfies all three criteria for broadband. However, the ”higher speed” basket remains a relevant comparison as:

- availability of services below 257kbit/s is often relatively limited - most services targeted at residential customers have speeds in the region of 500kbit/s;
- speeds above 256kbit/s allow different content such as streaming video to be accessed; and
- it allows for better comparability with earlier reports.

3.12 For business users the lowest speed basket remains at 257kbit/s, due to the low number of business services with speeds below this.

3.13 This chapter covers:

- a summary of the methodology used;
- results for a range of residential and business baskets, showing:
  - price indices and detailed results; and
  - price movements over the period August 2001 to February 2003;
- conclusions.

3.14 Detailed results for the packages are shown in Annex F and G and sensitivity analysis in Annex H.

Methodology

3.15 The basic methodology is as used in past studies and the details are not repeated here. The methodology takes into account any one-off charges for connection or modem purchase and it is assumed these costs will be written off over three years. Results are presented for two market segments: residential and business.

3.16 It is noted that there is not necessarily a clear dividing line between residential and business services. A significant number of home workers and small businesses may well find a service, aimed primarily at residential consumers, adequate for their needs.

3.17 As in the June 2003 study, price comparisons are presented for both DSL and cable modem services taken together, and for DSL services only. Cable modem services are expected to provide a close substitute for DSL services, especially for residential consumers.

3.18 Price comparisons are presented alongside comparisons of bandwidth. Care needs to be taken in interpreting the results – there are a number of factors which will affect the actual speed experienced by the user when using the service and it has not been possible to take these into account. In particular the “contention ratio” (the ratio of the potential maximum demand to the actual bandwidth) will be an important contributor to the speed obtained in practice. However, this information is not readily available other than in the UK.

3.19 Further information on methodology is presented in Annex C.

Results for residential users

Price index

3.20 Tables 3.1 and 3.2 below show the results for the price level, price index and (downstream) bandwidth provided for residential services. All these measures are constructed using the average of the two lowest priced residential offers from different operators/service providers included in this study, in each country (it is not possible to include all service providers and this study may not represent the cheapest deals available in every case). Results are presented both with, and without, cable modem offers included.

Table 3.1: Results for price level, price index and (downstream) bandwidth for “higher speed” residential broadband services.

	Include cable modems			Exclude cable modems		
	Price level £/month	Price index	Bandwidth kbit/s	Price level £/month	Price index	Bandwidth kbit/s
France	22	98	512	22	98	512
Germany	31	136	768	31	136	768
Sweden	20	89	512	24	104	506
UK	23	100	512	23	100	512
US	29	126	1,134	29	126	1134

3.21 From Table 3.1 it is seen that as at August 2003 for “higher speed” broadband services (i.e. services with speeds in excess of 256 kbit/s):

- when cable modems are included:
  - UK prices are similar to France, cheaper than Germany and the US and only in Sweden are prices cheaper;
  - the speed offered in the UK is comparable to all countries except the US which offer higher speed services; and.
- when cable modem services are excluded (i.e. a comparison of DSL services only):
  - UK prices are similar to France and Sweden and cheaper than Germany and the US; and
  - the speed offered in the UK is comparable to all countries except the US which offer higher speed services.

Table 3.2: Results for price level, price index and (downstream) bandwidth for residential “entry level” broadband services

	Include cable modems			Exclude cable modems		
	Price level £/month	Price index	Bandwidth kbit/s	Price level £/month	Price index	Bandwidth kbit/s
France	19	92	128	19	85	128
Germany	28	138	768	28	126	768
Sweden	18	87	381	23	104	381
UK	21	100	331	23	100	384
US	29	140	1,134	29	128	1134

3.22 From Table 3.2 it is seen that as at August 2003, for “entry level” broadband services with speeds in excess of 128kbit/s:

- when cable modems are included:
  - prices in the UK are significantly cheaper than Germany and the US and more expensive than Sweden and France;
  - the speed offered in the UK is faster then France, similar to Sweden and slower than Germany and the US; and
- when cable modem services are excluded (i.e. a comparison of DSL services only):
  - UK prices are cheaper than Germany and the US, similar to Sweden and only in France are prices cheaper; and
  - the speed offered in the UK is faster then France, similar to Sweden and slower than Germany and the US.

3.23 The “entry level” basket shows France compares favourably to other countries included in the benchmark, as there are more low speed services available. In Sweden and the UK there is only one low speed service available and in the US the low speed services do not feature as one of the cheapest two. In Germany there is only one low speed cable service and this has not been included in the benchmark due to very limited availability.

3.24 Since the last benchmark the UK's relative position for the "higher speed" broadband basket has improved against all countries except France. For the "entry level" basket the UK's position has deteriorated against all countries except the US.

Price trend

3.25 A summary of the price changes since February 2003 is provided in Table 3.4 for both the "higher speed" residential broadband basket and the "entry level" broadband basket. Price changes are presented in real terms.

Table 3.3: Percentage change in price levels between February 2003 and August 2003 – residential services

	"Higher speed" broadband services (i.e. 257kbit/s and above)		**"Entry level" broadband services** (i.e. 128kbit/s and above)	
	Including cable modems	DSL only	Including cable modems	DSL only
France	-16%	-16%	-15%	-17%
Germany	-2%	-2%	2%	0%
Sweden	-1%	1%	-12%	0%
UK	-10%	-14%	3%	-6%
US	-8%	-8%	-8%	-8%

3.26 Table 3.3 shows:

- for "higher speed" broadband services;
  - overall, prices in the UK dropped by 10-14%. This is due to a review of the service providers included in the benchmark;
  - prices dropped in France and the US due to service providers reducing monthly fees; and
  - prices in Germany and Sweden are similar to those in February 2003.
- for "entry level" broadband services
  - prices in the UK increased when cable modem services were included (this is due to NTL increasing the speed and price of its entry level service) and decreased for DSL only;
  - when cable modems were excluded prices in France, Sweden and the US all decreased (in France and the US this is due to lower priced DSL charges and in Sweden due to the introduction of a new entry level cable service); and
  - prices in Germany are similar to February 2003.

3.27 Price developments in the "higher speed" broadband basket (including cable modem and excluding cable modem) over the research period October 2000 until February 2003 are depicted in figures 3.1 and 3.2. There was a change in methodology in February 2003 (raising the minimum speed from 129kbit/s to 257kbit/s) and February 2003 results are shown on the basis of both approaches.

Figure 3.1: " Higher speed" residential broadband (including cable modem) price developments since October 2000

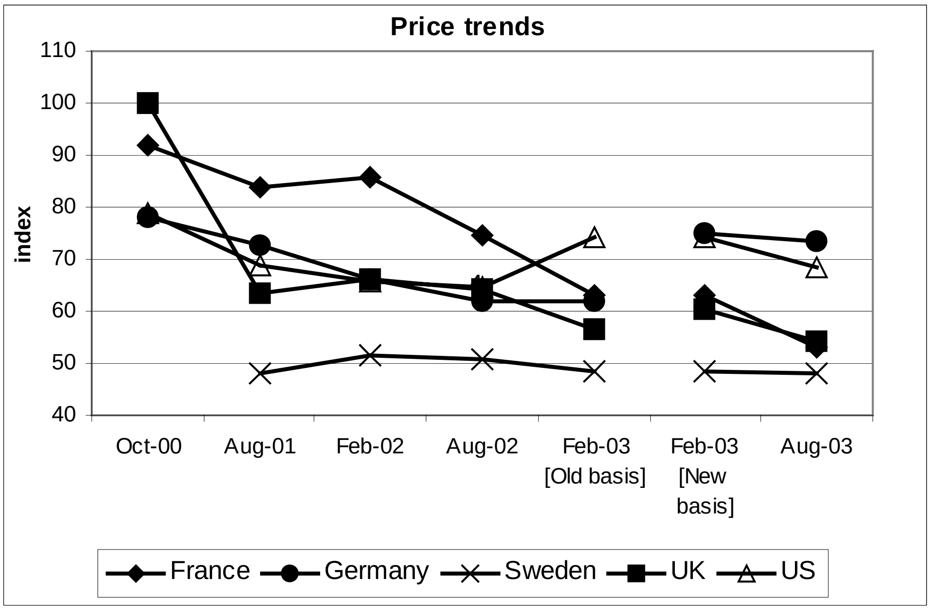
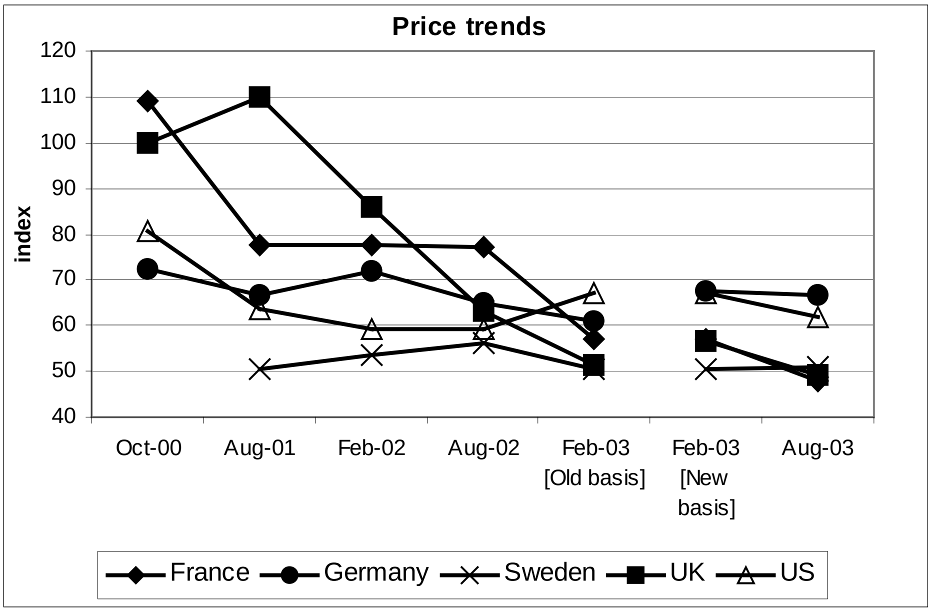


Figure 3.2: "higher speed" residential broadband, DSL only price developments since October 2000



3.28 Figures 3.1 and 3.2 show:

- prices have converged over the period October 2000 to August 2003;
- UK prices have dropped from being some of the highest to among the lowest over the period; and
- Sweden has consistently been among the lowest prices over the period, especially when cable modems are included.

Results for business users

Price index

3.29 Table 3.4 below shows the results for the price level, price index and bandwidth provided for business services. All these measures are constructed using the average of the two lowest priced business offers (from different operators/service providers considered in this study) in each country.

Table 3.4: Results for price level, price index and bandwidth for business broadband services (cable modem services included)

	Minimum bandwidth of 257kbit/s			Minimum GM bandwidth of 500kbit/s			Minimum GM bandwidth of 1000kbit/s		
	Price level £/month	Price index	Bandwidth - DS kbit/s	Price level £/month	Price index	Bandwidth - GM kbit/s	Price level £/month	Price index	Bandwidth - GM kbit/s
France	26	93	512	53	84	512			
Germany	32	114	768	37	59	578	273		1662
Sweden	31	112	762	31	50	564	112		1006
UK	28	100	512	62	100	503			
US	46	164	1,070	54	86	699	67		1080

Note: DS = downstream, GM = geometric mean

3.30 From Table 3.4 it is seen that as at August 2003:

- for the most basic services available to business (i.e. where the business has a minimum bandwidth requirement of 257kbit/s):
  - prices in the UK are cheaper than all other countries except France; and
  - the speed in the UK is generally comparable to France, Germany and Sweden and the US offer higher speed services.
- for business services where a minimum *geometric mean (*i.e. square root downstream bandwidth x upstream bandwidth) bandwidth of 500kbit/s is required:
  - the UK is more expensive than all other countries with France and the US approximately 15% cheaper and Germany and Sweden up to 50% cheaper; and
  - speed is broadly comparable in all countries.
- for business services where a minimum *geometric mean* bandwidth of 1000kbit/s is required:

- services are now available in all countries but there is only one service on offer in the UK and France; and
- prices in Germany are much more expensive than Sweden or the US.

3.31 The results can also be run excluding cable modems. Fewer cable modem services are available to business than residential and generally the cheapest DSL services are cheaper than the cheapest cable modem services. The only country in which a cable modem service features in the index is Sweden – excluding cable modem services, therefore, has a negative effect on relative prices in Sweden.

3.32 Since the last benchmark, the UK's relative position for basic business services has improved against all countries except France. Prices in the UK have dropped as a result of the inclusion of a new service provider and prices in the other countries remaining relatively stable. In France prices have dropped significantly since the February 2003 benchmark and this is due to price reductions of LLU operators.

3.33 When there is a minimum bandwidth of 500kbit/s, the UK's relative position has improved since February 2003. The UK is still the most expensive country but it is now closer in-line with the US and France.

Price trend

3.34 A summary of price changes since February 2003 is provided in Table 3.6. Price changes are presented in real terms.

Table 3.6: Percentage change in price levels between February 2003 and August 2003 – business services.

	Minimum bandwidth of 257kbit/s	**Minimum GM bandwidth of 500kbit/s**	**Minimum GM bandwidth of 1000kbit/s**
France	-52%	-4%	
Germany	6%	0%	-18%
Sweden	-1%	-13%	24%
UK	-13%	-37%	
US	-1%	0%	-10%

3.35 Table 3.6 shows:

- for the most basic services available to business (i.e. where the business has a minimum bandwidth requirement of 257kbit/s):
  - UK prices dropped by 13%, this is a result of the revision of included service providers;
  - prices in France dropped significantly and this is due to price reductions by LLU players; and

  - prices in Sweden and the US are similar to February 2003 and prices in Germany increased slightly.
- for business services where a minimum *geometric mean* bandwidth of 500kbit/s is required:
  - prices in the UK dropped by 37% as a result of retail prices adjusting to the wholesale price cuts and the revision of included service providers; and
  - prices dropped in Sweden and France. Price falls in Sweden are due to the availability of new services at cheaper prices; and
  - prices in Germany and the US have not changed since February 2003.
- for business services where a minimum *geometric mean* bandwidth of 1000kbit/s is required:
  - prices in Germany and the US dropped (this was due to new services available at cheaper prices) and prices in Sweden increased.

3.36 Price developments over the research period October 2000 until August 2003 are depicted in figures 3.4 and 3.5.

Figure 3.4: Business broadband price developments since October 2000 (minimum speed 257kbits)

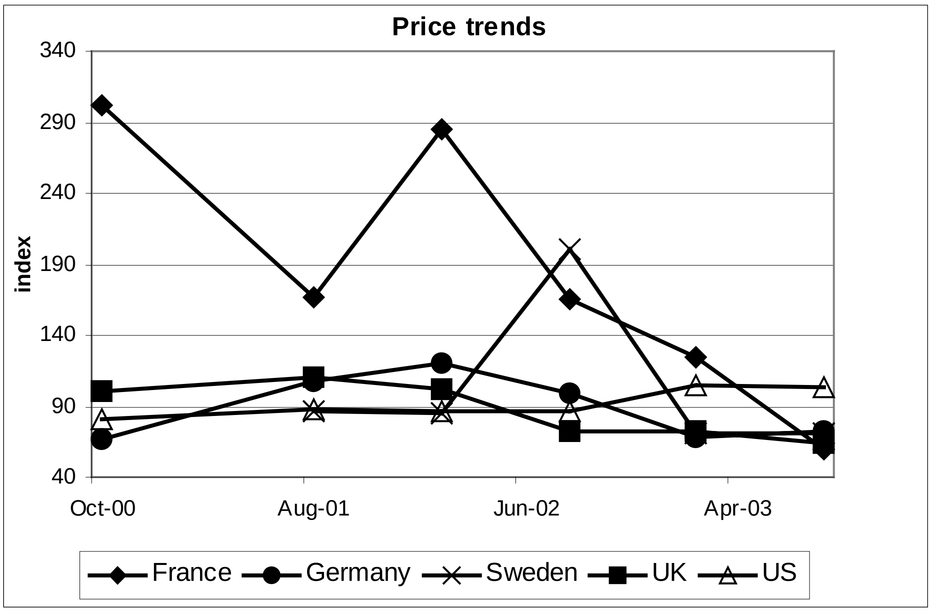
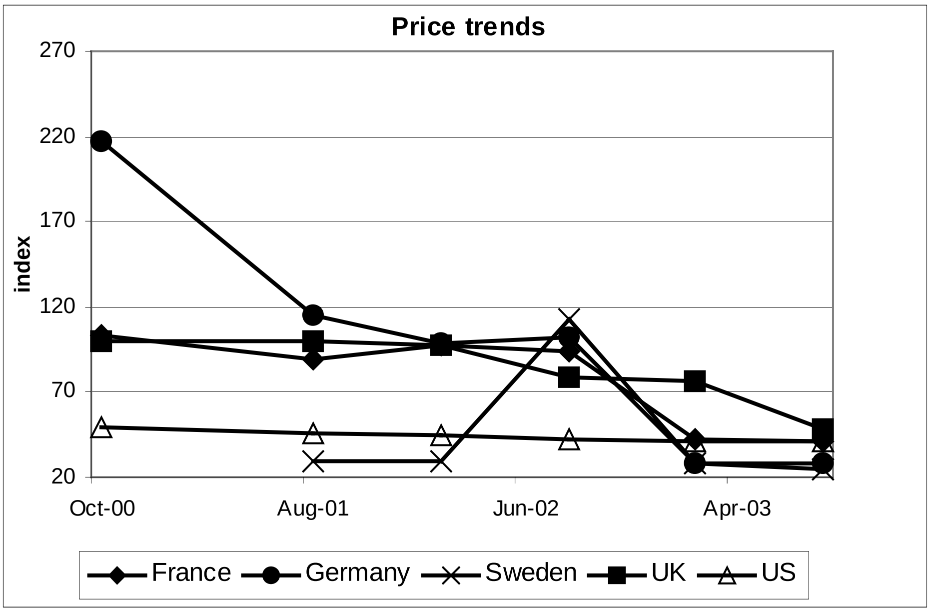


Figure 3.5: Broadband price developments since October 2000 (minimum GM speed 500kbit/s)



3.37 Figures 3.41 and 3.5 indicate there has been a convergence in prices over time.

Conclusions

3.38 Price comparisons have been presented for two residential baskets: “higher speed” broadband services (i.e. a minimum speed of 257kbit/s) and “entry level” always-on services (i.e. a minimum speed of 128kbit/s). For both baskets, when cable modems are included, prices in France and Sweden are slightly cheaper and when DSL only is compared, only in France are prices cheaper than the UK. Compared to the last benchmark, UK prices for the “higher speed” broadband basket have improved against all countries except France and prices are below average for both baskets.

3.39 For business services, the UK’s relative position at August 2003 varies according to the speed requirements of the end user. For a "low" speed broadband service UK prices have improved against all countries except France and are below average. For a "mid" speed service, prices in the UK are still the most expensive but the UK's relative position has improved against all other countries, due to wholesale price cuts feeding through to retail prices.

3.40 A number of sensitivity tests have been run and these illustrate that changes in assumptions can have an impact on the results for an individual country, but do not alter the overall conclusions regarding the UK’s relative position.

Chapter 4

Internet Access – consumer choice for dial-up and broadband

Introduction

4.1 This chapter brings together the results from the previous two chapters and allows a comparison between countries of the range of consumer options for accessing the Internet.

4.2 The chapter includes:
- a comparison of the types of package available in each country, highlighting the key similarities and differences;
- a comparison of the price range for particular package types; and
- a comparison of the relative prices of dial-up and broadband in each country.

Cross country comparison of dial-up and broadband options

4.3 Consumers are faced with a wide range of options regarding their Internet access. These options may include:
- **pay-as-you-go dial-up***,* with a per minute charge for time spent on-line - this may be the local call charge or may be determined by the ISP;
- **dial-up with bundled minutes** - a dial-up package with a subscription that includes a certain number of minutes to be used at any time of the day, with per minute charging beyond the inclusive allowance;
- **partially unmetered dial-up** - a dial-up package with a subscription that allows "unlimited" dial-up time at certain times of day (e.g. evenings and weekends) for a flat fee (may be subject to "fair use", or have a high usage limit, e.g. 150hrs), with per minute charging at other times of day
- **unmetered dial-up** - "unlimited" dial-up time for a flat fee (this may be subject to a "fair use" limit);
- **"entry level" broadband services** (with downstream speeds typically starting from 128kbit/s)- these may be "flat-rate" or may include charges per GByte downloaded; and
- **broadband** (with downstream speeds typically starting from 500kbit/s) - higher speed, unlimited time, always-on services - these may be "flat-rate" or may include charges per GByte downloaded.

4.4 Earlier chapters have focussed on the cheapest solutions for consumers, given a certain usage profile (reflecting time spent on-line, amount downloaded and the need for speed). This chapter explores further the choices available to consumers in terms of package type and the range of prices.

4.5 The following table provides a description of the types of package available in each country, and an indication of the range of price for each package type.

Table 4.1: Qualitative comparison of service availability and price

	France	**Germany**	**Sweden**	**UK**	**US (CA/Ohio)**
Pay as you go - no subscription					
Available	Yes	Yes	Yes	Yes	No - ISP subscription applies, but with inclusive minutes (starting from $5/month - includes 3 hours)
Relationship with cost of local call	France Telecom has a different Internet rate	ISPs set their own rates	The same as Telias local call cost	Some ISPs use BT local call rate, others set own rate	ISP sets per minute charge - this is in addition to local telco rates (local calls are either charged per min or flat rate)
Typical prices (i.e. price range for comparable products)	2 cents (1.4 pence) per min all day	Between 0.8-2 cents (0.5-1.4 pence) per minute + call set-up fee	Telia between 11.5-23kr (0.8-1.7 pence) per minute + set-up fee	BT between 1-4 pence per minute	An example is 3.3 cents (2.2 pence) per minute all day
Comment: UK prices are mid-range among European countries - US subscription element makes them relatively expensive for very low usage					
Bundled minutes/ Partially unmetered					
Available	Yes - bundled min	Yes - bundled min	Bundled minutes starting to be offered	Yes - partially unmetered	Yes - bundled min
Description	E.g. Wanadoo packages have from 5 to 100 hrs per month included	E.g. T-online packages have from 30 to 120 hrs included	Some ISP's offer bundled minutes, e.g. Spray offers 20 to 70 hrs. Telia only offer pay as you go.	Packages allow "unlimited" access at restricted times (either evenings & weekends or peak (there may be limits - e.g. 150hrs)	Packages with bundled minutes available e.g. AT&T offer 8 to 150hrs. (note these are ISP minutes - local telco charges also apply)

	France	**Germany**	**Sweden**	**UK**	**US (CA/Ohio)**
Comments	The UK is the only country to have unlimited access at specific times. In some countries consumers will have to know their usage fairly precisely (and not vary this too much from month to month) to get the best deal. E.g. in France per minute rate outside the inclusive allowance is relatively high.				
Unmetered					
Available	Yes - but not available from Wanadoo	Yes - but a limited number of ISPs offer this. Not available from T-Online	no	Yes - widely available	Yes - widely available (user also pays local telco charges)
Typical price per month (residential)	£18 (2 companies)	£18 (2 companies)	none	£10 - £16 (range of companies)	£13-£15 (range of companies)
Typical price per month (business)	£12 (1 company)	No comparable services	none	£12-£20 (range of companies)	£13-£15 (range of companies)
Comments	Only in the UK and US are packages widely available				
"Entry level" broadband					
Speed for "entry level" packages	DSL: 128kbit/s available from a number of ISPs (also a 64kbit/s cable service available)	Cable: 128kbit/s very limited availability	Cable: 250kbit/s & DSL: 250kbit/s Both available from one operator	Cable: 150kbit/s from NTL. There is also a limited 150kbit/s DSL offer from Tiscali.	DSL: 144kbit/s & 192kbit/s available a number of operators (expensive as symmetrical)
Are there restrictions on download?	No	Yes - 0.5GB	No	No	No
Availability	Cable availability is limited, DSL more widespread	Cable only - very limited availability	DSL widespread and cable modem more limited	Only in NTL area	
Price compared to dial-up	128kbit/s cheaper than unmetered + 2nd line (64kbit/s is cheaper than unmetered)	Cheaper than dial-up for usage>20hrs	Cheaper than dial up for usage>20hrs	More expensive than dial-up, but cheaper than unmetered dial-up + 2nd line	
Typical price per	DSL: £18-£26	Cable modem: £24	Cable modem: £18	Cable modem: £19	DSL: £35

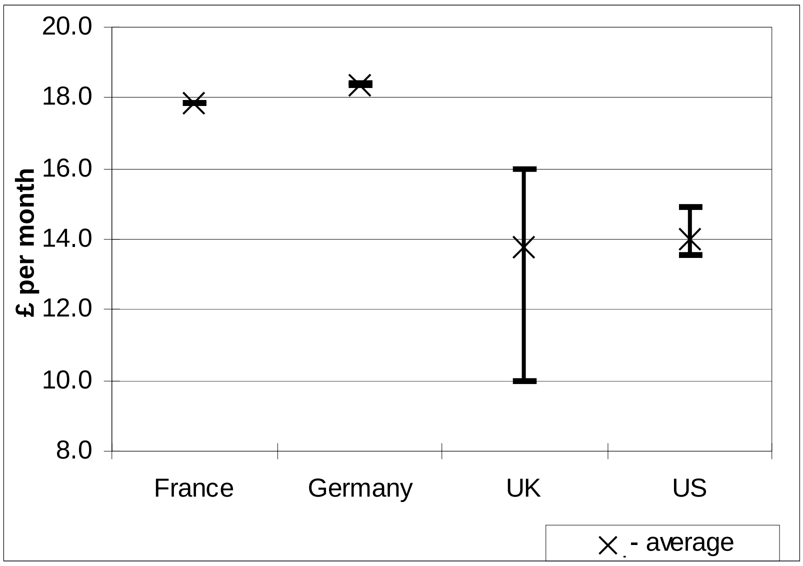
	France	Germany	Sweden	UK	US (CA/Ohio)
month (this includes a proportion of one-off fees)	(64kbit/s cable modem: £17)		DSL: £23		
Comments	For France, Germany and Sweden, some ”entry level” broadband packages are cheaper than dial-up for heavy usage. Some of the cheap “entry level” broadband packages have limited availability. In the UK ”entry level” broadband is cheaper than dial-up plus a second line				
Broadband (>256kbit/s)					
Speed for residential broadband packages	512-1024	768-2300	500-2500	500-2000	384-3000
Are there restrictions on download?	No limit on DSL. Some limit on cable modem services (between 0.5-3GB)	Yes. Between 1 & 5GB for DSL and 0.5-1.5GB for cable modem	Yes there is one limited DSL service - 10 GB included	No	No limit on DSL one timed cable modem service
Typical prices (this includes a proportion of one-off fees)	CM: 512k £31-34 1000k £41 DSL: 512k £21-36 1000k £27-59	CM: 1000k £35 DSL: 768k £31-36 1000k £41-47	CM: 500k £18-25 1000k £26-28 DSL: 500k £23-29 >2000k £35	CM: 500k £26 1000k £36 DSL: 500k £22-32 1000k £48-64	CM: 1000k £34-36 DSL: >500k £28-43 >1500k £30-48
Price compared to entry level	Some services cheaper then “entry level”	Cable modem £9 difference	“Entry level” same price as 500k DSL and cable modem	Cable modem £7 difference	Some services cheaper then “entry level”
Speed for business broadband packages	512-2000 (limited availability of higher speed services)	384-6016 (SDSL services also available at various speeds)	500-4000 (limited availability of higher speed services)	500-8000 (limited availability of higher speed services)	384-7000 (limited availability of higher speed services)
Amount of data downloaded included in the basic price	No limit	Between 1 and 5 GB	No limit	No limit	No limit
Typical prices (this includes a	DSL: 500k £20-26	DSL: 768k £26-33	CM: 1000k £28	DSL: 500k £27-86	CM: over 1000k £59-62

	France	Germany	Sweden	UK	US (CA/Ohio)
proportion of one-off fees)	1000k £23-96	1500k £36-38	DSL: 500k £35-37 1000k £62-71 2000k £106-119	1000k £57-127 2000k £72-157	DSL: 384k £57-145 786k £91-207 1500K £43-287
Comments	There are a wide variety of packages available in all countries. Germany, Sweden and the US have more availability of higher speed ADSL and SDSL services.				

Price spread

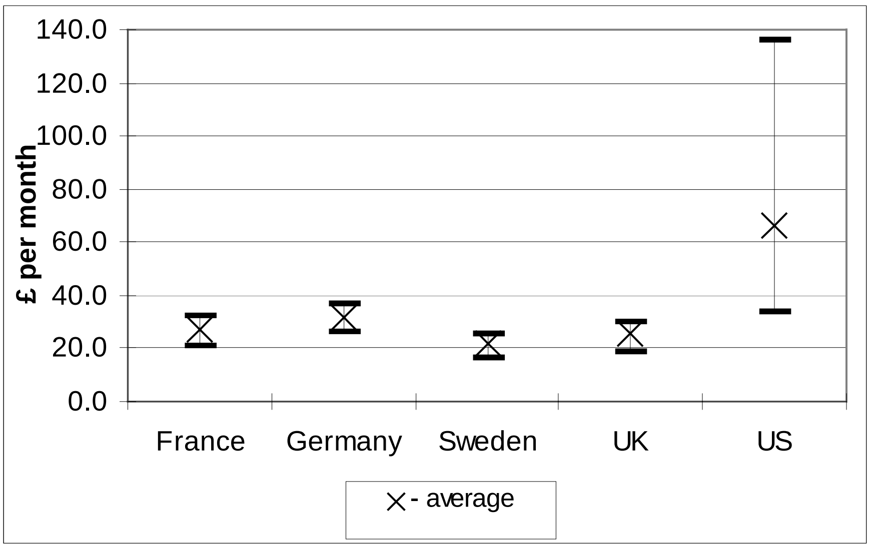
4.6 Figures 4.1 and 4.2 show the range of prices available for residential unmetered dial-up and broadband services. For metered services and partially unmetered services such a comparison is not possible due to the differences in service type offered in each country. Similar comparisons of business services are not possible due to the smaller number of packages offered.

Figure 4.1: Prices available for unmetered access



Based on only 2 companies in France and Germany and a range of companies in UK and US.

Figure 4.2: Prices available for "higher speed" residential broadband packages



* This comparison is based on services between 500kbit/s and 768kbit/s

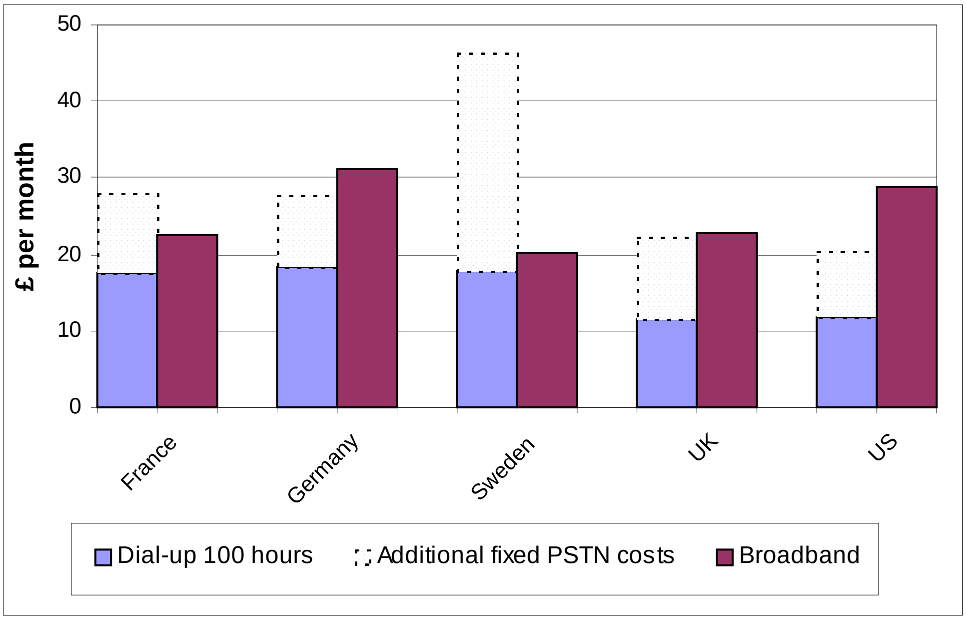
4.7 These figures show that:

- For unmetered services;
  - there are more services available in the UK and US than elsewhere; and
  - the UK has a greater range as well as the cheapest prices
- For broadband services;
  - the US has the widest range in price; and
  - the range in the European countries is very similar.

Comparison of dial-up and broadband pricing

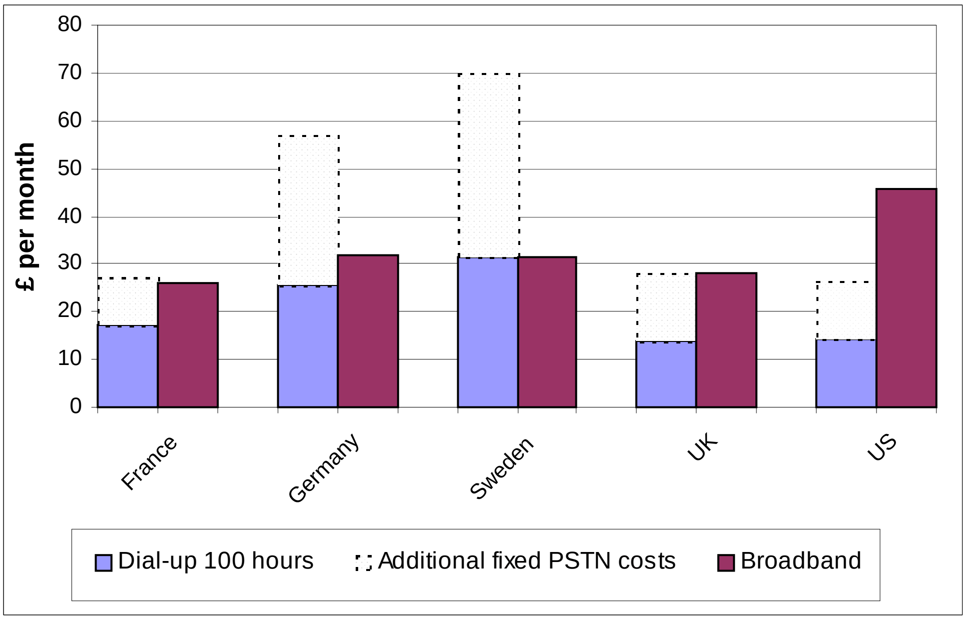
4.8 Figure 4.3 shows comparisons of the cost of “higher speed” residential broadband (i.e. a minimum speed of 257kbit/s) to the cost of “unmetered” dial-up Internet access (based on the average of the two cheapest in both cases). In countries where unmetered access is not available, the cost used is for 100 hours access. Dial-up costs are shown both with and without the additional cost of the fixed line.

Figure 4.3: Comparison of broadband and dial up cost per month for residential users



4.9 The equivalent table for business consumers is shown in figure 4.4 (using the "low" speed basket).

Figure 4.4: Comparison of broadband and dial up cost per month for business users



4.10 Figures 4.3 and 4.4 highlight the fact that for both residential and business consumers in Sweden and business consumers in Germany where dial-up unmetered Internet access is not available, broadband is a cost effective alternative for high usage customers. For UK and US residential and business consumers dial-up is cheaper than broadband, even when the cost of the fixed PSTN lines is included. This is also true for German residential consumers. In France dial-up services are cheaper then broadband, unless the cost of the fixed PSTN line is included when they become more expensive.

Conclusions

4.11 The discussion in this chapter illustrates that there are generally a wide range of Internet access packages available. Comparing between countries, some key differences are:

- for dial-up:
  - Sweden has a very limited range of dial-up package types (the vast majority are metered);
  - France and Germany have a lot of packages with bundled minutes - the consumer has to know their usage, and not vary usage much from month to month, to get the best deal;
  - US packages always have a subscription charge, meaning low usage consumers pay a relatively high amount; and
  - the UK has wider availability of unmetered packages, and these become cost-effective at lower level of usage, than the other European countries. Unmetered off-peak packages (or peak packages) are seen in the UK but not elsewhere.

- for broadband:
  - there are a wide range of different packages in Germany, Sweden and the US - but some of these have limited availability, particularly in Germany; and
  - the range of speeds available is increasing, for both low and higher speeds.

4.12 The relative prices of dial-up, dial-up plus a dedicated fixed line and broadband differ by country, and by sector. While generally dial-up is cheaper than broadband, in several cases dial-up is more expensive than broadband.

Chapter 5

Broadband take-up and availability

Introduction

5.1 This section compares take-up, availability and rollout plans for broadband service. This is based on data from OECD, ECTA, Point-Topic, regulators and service providers for the period June 2002 (except where stated).

Take-up of Internet

5.2 Table 5.1 provides an overview of the total Internet penetration in all countries provided by Nielsens Netrating and also the penetration figures provided by an alternative source in each country. As indicated in the table, reporting methods are not consistent.

Table 5.1 Internet penetration by country

	August 2003 (Nielsens Netratings)*	**Alternative source**	**Source & date**	**Reporting method**
France	32%	41%	Mediametrie; July 2003	Internet penetration per population (over 11 years)
Germany	47%	53%	Seven 1 Interactive; August 2003	Internet penetration per population
Sweden	68%	66%	PTS; December 2002	Internet penetration per population
UK	48%	50%	Oftel; Aug 2003	Internet penetration per household
US	64%	N/A	N/A	

**Active users as a percentage of population*

5.3 Table 5.1 shows that:

- figures presented by Nielsens are similar to the figures published by the alternative source in each country;
- Sweden and the US have the highest Internet penetration;
- the Internet penetration in the UK and Germany is similar; and
- France has the lowest penetration.

Overview of broadband options

5.4 Table 5.2 provides an overview of the main options available to consumers regarding types of broadband product and providers.

Table 5.2: Summary of Broadband options

Country	Overview of services/providers
France	**DSL:** DSL products are mainly provided on the basis of France Telecom's products. End users can either buy a full ADSL product from an ISP (who uses France Telecom wholesale inputs to provide service) or they can buy ADSL access from France Telecom with an ISP service bought separately (with the ISP providing transport based on France Telecom wholesale inputs). The former "resale" option (which is self-install) is more popular. Wanadoo, France Telecom's ISP, has a large proportion of the ADSL market, estimated at 86% at the end of June 2003. LLU started to make a big impact in the second half of 2002 and approximately 83,400 unbundled loops, 96% which are shared access, are being used to provide DSL services to both businesses and consumers at the beginning of August 2003.
	Cable modem: France Telecom owns and operates the second largest cable network and had approximately 21% share of the cable modem market at the end of June 2003. NOOS, the largest cable operator, had an estimated 51% market share at June 2003.
Germany	**DSL:** Deutsche Telekom is by far the biggest provider of DSL services. An end user purchases a DSL product directly from Deutsche Telecom ("T-DSL"), but must then purchase an ISP service as well to obtain internet access. T-online, Deutsche Telekom's ISP, provides service to a large percentage of those end users using T-DSL. Other products are available from providers such as QSC, who provide DSL services over local loops both directly to end users and on a wholesale basis to other providers. Approximately 6-7% of DSL lines are provided via LLU or direct build.
	Cable modem: The development of cable modem services in Germany has been relatively slow. In 1999 Deutsche Telekom decided to sell its cable interests in nine regions and completed the sale in March 2003. The delay in the sale of Deutsche Telekoms cable assets has held back the development of cable modem services and at the end of June 2003 there were approximately 64,600 subscribers.
Sweden	**DSL:** Telia is the largest provider of DSL services, with around 75% of subscribers at end June 2003.
	Cable modem: Telia has recently merged with Sonera and a condition was set that Comhem, Telias cable arm, had to be sold. Comhem has the largest cable Internet market share with approximately 45% at the end of December 2002.
	Other: Ethernet LANs or so called "property networks" also represent a relatively large proportion of broadband connections (estimated at approximately 19% at the end of June 2003) and this has brought

	additional competition to the market.
UK	**DSL:** DSL products are mainly provided on the basis of BT's wholesale products. These are provided to all service providers on the same basis, and BT Openworld has approximately 50% market share. Kingston is the sole provider in the Hull area. LLU has yet to have a big impact. Over 7600 local loops are being used to provide DSL service to business consumers as of the end of September 2003.
	Cable modem: NTL and Telewest provide cable modem services that are available to approximately 45% of households. Between them they account for approximately 50% of broadband end users at the end of June 2003.
US	**DSL:** DSL services are provided by a variety of service providers. The largest providers are regional bell operating companies (RBOCs - local incumbents). New entrants (such as Covad, offering services over leased local loops) had a market share of around 6% at June 2003, this is similar to its market share at the end of December 2002. DSL services are estimated to be available to over 60% of US homes at the end of 2002.
	Cable modem: the four largest cable companies are Time Warner, Comcast, Cox and Charter. Together they account for around 78% of the cable modem market. Cable modem services are available to around 80% of US homes by the end of 2002.

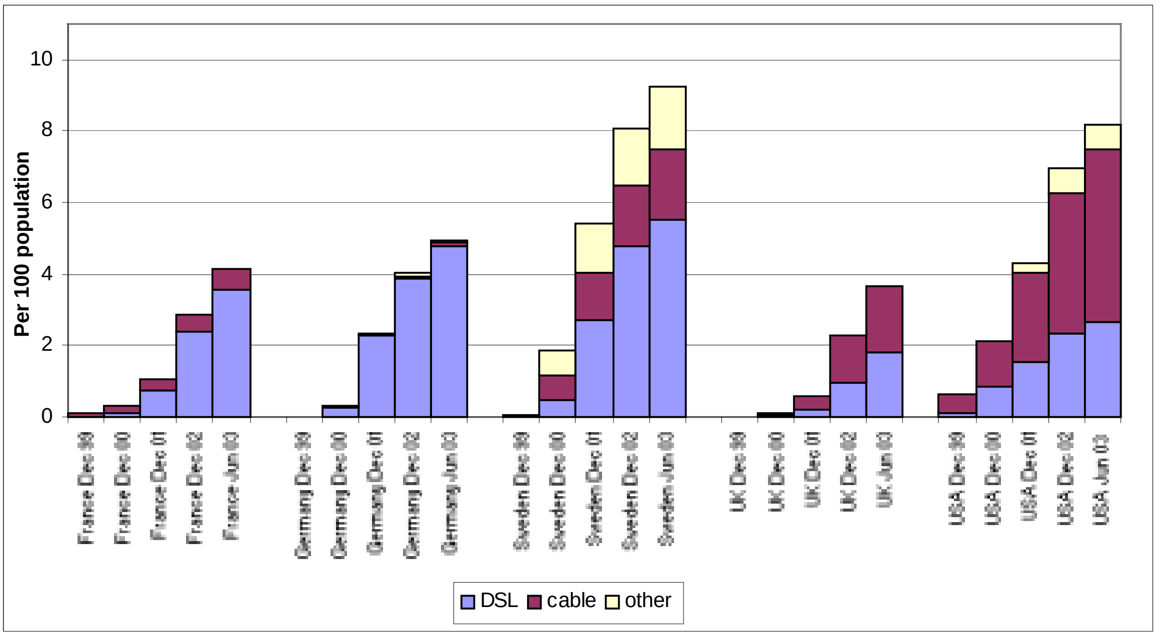
Source: OECD, Oftel, regulators and service providers.
Further information on wholesale products is given in chapter 5.

Broadband take-up

5.5 It should be noted it is not possible to break down the take-up figures to show the “entry level” broadband services separately from “higher speed” services. Therefore for all countries take-up data is collected for services 128kbit/s and above.

5.6 Data on take up are presented as a percentage of population (using OECD population figures for 2001). In figure 5.1, broadband take up rates in each country is shown as at end 1999, 2000, 2001, 2002 and June 2003 (some June figures are estimates)

Figure 5.1: Broadband take-up per 100 population by country for end 1999, end 2000, end 2001, and end 2002 and June 2003.

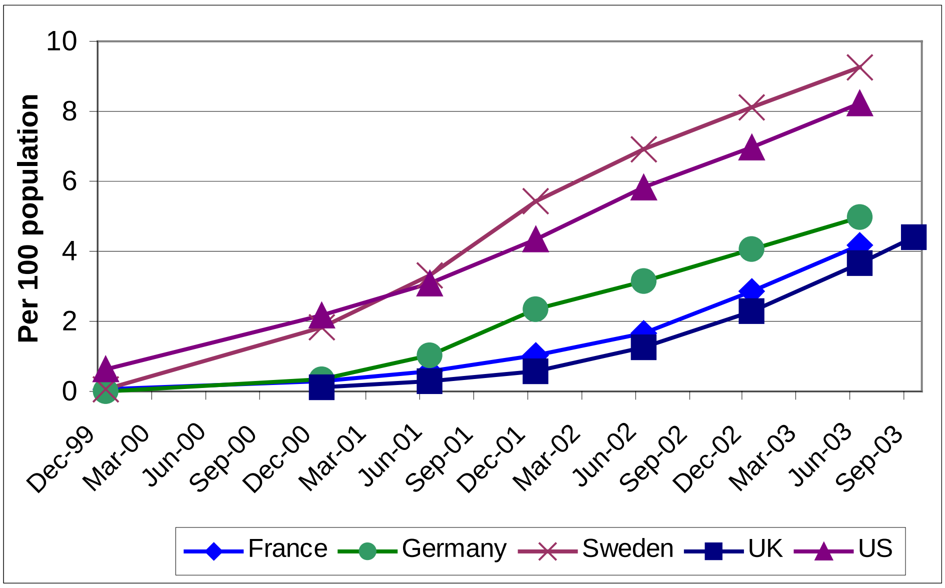


Source: OECD, ECTA, Point Topic, regulators and companies

5.7 While current levels of broadband take-up are below 10% of population in all of the countries benchmarked, take-up in the US and Sweden is markedly higher than in the other European countries. The increase in broadband take-up in the first half of 2003 is similar in most countries: the UK has the highest increase of 1.4 per 100 population, followed by France, the US and Sweden at 1.3, 1.3 and 1.2 percent respectively and in Germany 0.9 per hundred population.

5.8 An alternative way of viewing the data is shown in Figure 5.2. Here overall broadband penetration is shown over time. Some of the June data is based on estimates.

Figure 5.2: Broadband take-up over time



Source: OECD, ECTA, Point Topic, regulators and companies

5.9 This again illustrates that UK take-up is behind that in other countries. It is noted that all countries tend to show a period of relatively slow take-up initially, followed by acceleration in the take-up rate. Broadband services were launched later in the UK than in other countries and this later start should be borne in mind in viewing this chart. For the European countries, the current ranking of countries by penetration rate mirrors the ranking of date of launch of DSL by the incumbent operator.

5.10 Table 5.3 shows that percentage growth in subscriber numbers is slowing down in all countries, but remains highest in the UK.

Table 5.3: Broadband growth rates

	Second half of 2002 (Jun 2002 – Dec 2002)	First half 2003 (Dec 2003 – Jun 2003)
France	75%	45%
Germany	28%	23%
Sweden	17%	14%
UK	86%	60%
US	24%	18%

Source: OECD, ECTA, Point Topic, regulators and companies

Subscriber numbers by type of provider

5.11 Table 5.4 shows a comparison of the number of subscribers to broadband products (note the figures are approximate and may not always relate to precisely the same point in time).

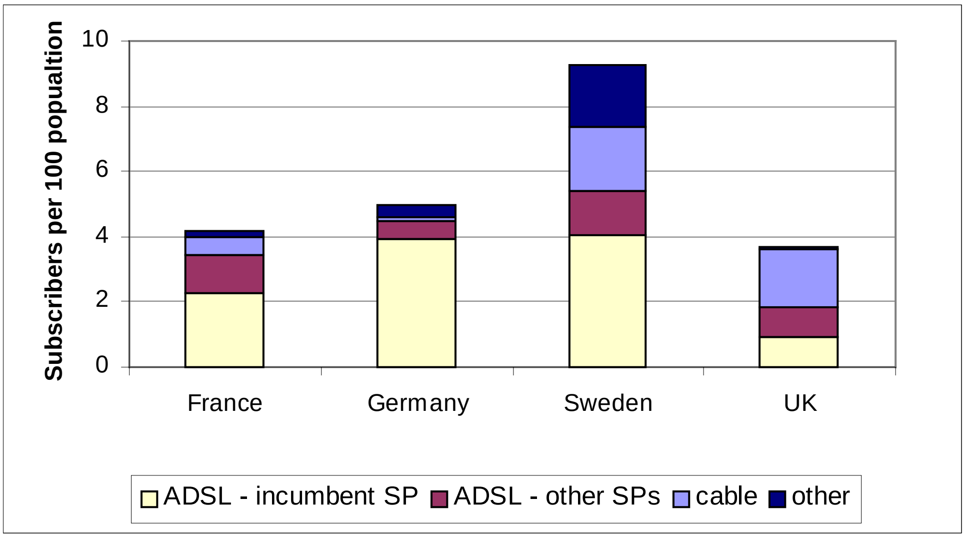
Table 5.4 - Take up of broadband services June 2003 (unless indicated)

	France	**Germany**	**Sweden**	**UK**	**US**
ADSL provided by service provider (SP) using incumbent network (Q4 2002)	2,037,000	3,700,000	479,000	1,090,200	7,122,800
% of consumers using SP of the incumbent for ADSL services	65% (approx.)	87% (approx.)	75% (approx.)	50% (approx.)	Not available
DSL provided over LLU or own build	83,400	250,000	14,100	5,600	453,000*
Total DSL end users per 100 population	3.58	4.80	5.54	1.83	2.66
Cable modem subscribers	336,700	64,600	175,000 (Est.)	1,098,300	13,800,000
Cable modem subscribers per 100 population	0.57	0.08	1.97	1.83	4.84
Alternative technologies	0	70,000	155,000 (Est.)	8,200	2,087,000 (Est.)
Total broadband subscribers	2,457,100	4,084,600	823,100	2,202,300	23,462,800
Total broadband subscribers per 100 population	**4.15**	**4.96**	**9.25**	**3.67**	**8.2**

Source: ECTA, Point Topic, regulators and companies
** figure for Covad, provides a lower limit to total figure*
Est. = Oftel estimate

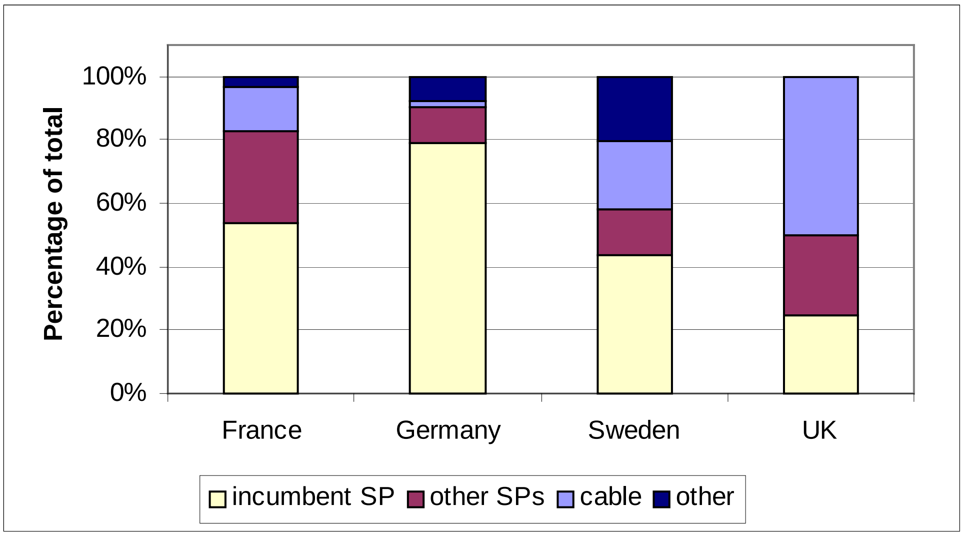
5.12 The subscriber numbers are also illustrated graphically in figures 5.3 and 5.4, focussing on subscriber numbers per 100 population and on the way the market is split between: DSL provided by the incumbent's service provider; DSL provided by other service providers using the incumbent's wholesale DSL products; cable modem services; and other broadband services (provided over unbundled local loops or own build).

Figure 5.3 - Subscriber numbers per 100 population



Source: OECD, ECTA, Point Topic, regulators and companies

Figure 5.4 - Split of broadband market by types of service provider (approx)



Source: OECD, ECTA, Point Topic, regulators and companies

5.13 The figures illustrate that the incumbent's service provider dominates the broadband markets in France, Sweden, and particularly Germany. This is not the case in the UK.

5.14 The UK market is more competitive than other European countries both in terms of infrastructure competition (from cable modems) and service provider competition (BTOpenworld's market share of the ADSL market is lower than Wanadoo's, T-Online's and Telia's).

5.15 While Germany has a higher number of broadband subscribers, not all of these have unmetered access (approximately half use a metered package or a package with a limited number of included hours).

Availability and roll-out

5.16 Comparisons can also be made of the extent to which services are available. Figures are shown in table 5.5 for DSL coverage at the end 2002 together with forecasts for the future.

5.17 The figures in the table show that roll out in the UK is ahead of the US and behind Sweden, Germany and France. These figures should be treated with caution, as they are not provided on a comparable basis. Limited information is available for Sweden.

Table 5.5: DSL coverage

DSL coverage	2001	2002	2003	2004	2005
France (% of lines)	66	74			90
Germany (% of lines)	80	90			
Sweden (% of lines)	70	75			
United Kingdom (% of lines)	60	66	80*	90**	
United States (% of lines)* **	50	62	65		

Source: OECD, companies
Figures for 2003 and 2004 are predications of DSL coverage except where stated
**The UK reached 80% of the population by September 2003*
***Subject to trigger levels being met.*
****some carriers may have higher availability in their own service areas such as Bell South with 70%.*

5.18 For some countries these figures are not representative of the actual number of households that can receive services. Due to technical limitations of ADSL, for example distance from the exchange and age and condition of lines, not all people living within an upgraded exchange area can receive DSL services. For example, in the UK 80% of people live in areas with upgraded exchanges, but approximately 3% of people in each exchange area cannot get the service. This means that ADSL is currently available to 78% of UK households.

5.19 BT launched a web-based ADSL registration scheme in summer 2002. This scheme sets a demand level for each exchange and if the number of consumers requesting an interest in getting ADSL services exceeds the level set for the exchange, then BT will upgrade the exchange. On 9 September 2003, BT announced it had brought broadband services to exchanges serving 80 per cent of all UK homes. It has committed to bring ADSL broadband to exchanges serving 90 per cent of UK homes when demand triggers are met.

5.20 On 24 September BT announced that, following successful trials, the reach of broadband in enabled exchanges would be extended to homes within approximately 6km line length of the exchange, subject to a line test. This move, extending the previous limit of approximately 5.5km line length, increases the proportion of people who can receive broadband in enabled areas from approximately 94 per cent to 97 per cent. This puts an estimated 600,000 new households in reach of ADSL.

5.21 In June 2003 France Telecom announced a pre-registration scheme similar to that in the UK. Once at least 100 customers have requested service in a given local area, France Telecom will equip the local exchange. The potential user demand will be evaluated in liaison with municipal authorities, and will be followed by pre-registration of connections by ISPs. When the number of confirmed requests reaches the threshold France Telecom will make a firm commitment to deploy services in a timeframe determined after a technical assessment by a France Telecom regional office.

5.22 Less information is available on the availability of cable modem services. Figures for network coverage of cable companies provide an indication of the potential availability, but current availability may be very different to this. The following figures provide an indicative comparison:

- in France 35 percent of households passed. Cable modem services became available in 1997 and cable modems are available to approximately 15 million inhabitants or 26% of households at March 2003;
- in Germany 83 percent of households passed. By mid 2002 cable modem services were available to approximately 4 percent of households;
- in Sweden 65 percent of households passed. Approximately 40% of the cable network has been upgraded;
- in the UK 51 percent of households passed. Cable modem services were available to around 45 percent of households as at December 2002; and
- in the US 97 percent of households passed. Cable modem services were available to around 81 percent of households by the end of 2002.

Conclusions

5.23 UK take-up for broadband is behind that in the other countries benchmarked, although this is at least partly explained by the later launch date in the UK and the availability of unmetered services. The percentage growth in subscriber numbers in the UK remains strong and the UK broadband market is more competitive in terms of service providers and infrastructure competition than France and Germany. These factors along with competitive broadband prices present a positive picture for broadband development in the UK and in the last six months the UK has reached penetration levels similar to France and seems to be catching up to Germany.

Chapter 6

Alternative broadband access technologies

Introduction

6.1 This chapter considers broadband services provided via "alternative" technologies including:
- broadband fixed wireless access (BFWA)
- WLANs (wireless local area networks)
- broadband satellite access;
- fibre to the home (FTTH);
- powerline; and
- mobile higher bandwidth access (3G).

6.2 In order to provide a complete picture of broadband services, these alternative technologies need to be considered in the benchmarking comparisons. However, in view of the early state of development for these services, and the small numbers of consumers taking up these services, it is appropriate to consider these services separately from the main comparisons of DSL and cable modem services. The approach taken in subsequent sections of this chapter is to:
- describe the technologies giving examples of countries where services are available, focusing on developments since the June 2003 report; and
- present some indicative prices for broadband satellite access and compare to prices for DSL/cable modem services.

Overview of Alternative Technologies

6.3 A brief overview of the different alternative technologies is given below, with country specific examples.

Broadband Fixed Wireless Access (FWA)

6.4 BFWA services are offered commercially in most countries covered in this report (using licensed spectrum).[3] However, generally there is little evidence of significant growth in services provided in this way.

6.5 In France, LDCom has a national licence and has coverage in 32 towns. Services are provided on a wholesale basis, with speeds ranging from 500kbits/ to 8,000kbits (symmetric or asymmetric) and are marketed as allowing high speed access services to be offered to businesses. LDCom lists clients of its wholesale service as being: operators such as Bouygues Telecom and Infoset; providers of integrated solutions such as ICT, Procal, Reseau Concept and Internet players such as Kosmos, Maporama, Teltrox and Topnet. However, there is little visibility of the end user services provided.

[3] Community networks (which generally use unlicensed spectrum are covered later in this chapter.

6.6 In Germany there is little visibility of services. Broadnet Mediascape still markets services under the name dataAirways and offers services from 2Mbit/s to 155Mbit/s. Most other licensed companies have ceased operation.

6.7 In Sweden, Telia has still not started to offer services. Wireless broadband services are available using WLAN technology through regional companies such as Firstnet and Powernet. These services are based on the unlicensed spectrum at 2.4Ghz. More information can be found below.

6.8 In the UK GX Networks has recently taken over Firstnet (the latest in a series of takeovers for this FWA network). GX Networks have indicated that in the short term they will be concentrating on increasing demand in existing areas, rather than extending their coverage. Prices start from £40 for residential service and £90 for business services, so are more expensive than DSL/cable modem. There are around 2,500 subscribers. Services are also available for business customers from Your Communications (these are low contention data services).

6.9 In the US, companies such as Teligent and XO continue to offer services to business, though little detail is provided on their web-sites. Regional companies such as Nucentrix and VIAccess offer residential service from just over £40 and £80 a month respectively and business service from just over £100 a month. Latest figures from the FCC indicate that there were 267,000 satellite plus fixed wireless access subscribers as at December 2002, an increase of 25% over the previous 6 months.

Wireless Local Area Network (WLAN)

6.10 In all countries benchmarked the regulator has amended the regulatory framework to permit commercial use of Wireless Local Area Network (WLAN) technology, such as Wi-Fi (IEEE 802.11b), which is used to provide FWA services in the 2.4Ghz license exempt band. Some countries are also in the process of opening or have opened the 5.8Ghz band for FWA services on a light-licensing basis.

6.11 WLANs are being used commercially to roll out community networks in rural areas as well as for use in Hotspots in public places. Typically operators are using Wi-Fi (IEEE 802.11b) technology to roll out services.

Community networks

6.12 In the UK there a number of community FWA networks operating in rural areas. Many community network providers are building out FWA networks in conjunction with the Regional Development Agencies (RDAs) who provide subsidies to rural communities. It is not known how many subscribers are connected through this method.

6.13 In Sweden there are also a number of WLAN networks. Two of the largest are Firstnet and Powercom. Powercom is a green field player and has built its network out to 14 communities including parts of Stockholm and Gothenburg. Powernet's prices start from around £31 for a 2Mbit/s residential service and £99 for a business service. Firstnet has also built a network out to a number of communities. Firstnet's prices start from around £24 a month for residential service between 500-1000kbit/s and £35 for a basic business service. Other network providers include Worldnet and GEAB. At the end of 2002 there were 2,900 WLAN subscribers in Sweden.

6.14 In the US there are over 170 WLAN operators. These operators offer localised services all over the US. There is no visibility of the number of network subscribers.

Hotspots

6.15 WLANs are also being deployed in public spaces. These so called "HotSpots" are found in locations such as coffee shops or airport lounges. These WLAN also use Wi-Fi (IEEE 802.11b), and allow users with a laptop/handheld device, with wireless capability, to log in to the WLAN for fast broadband access to the Internet. Broadband access in this way is likely to be complimentary to, rather than a substitute for, fixed broadband access at home or in the office.

6.16 Recent developments include:

- in August 2003 SBC announced it is going to build a Wi-Fi broadband network spanning 20,000 hotspots in 6,000 venues in the US. Called FreedomLink it will take three years to build and with Cingular SBC will offer an integrated Wi-Fi and 3G service in late 2004, or early 2005.
- In September 2003 BT announced it would provide wholesale Wi-Fi products across more than 400 locations by autumn 2003. There are now more than1800 hotspots in the UK and The Cloud, a Wi-Fi network wholesaler, has secured access to 7,000 more Hotspots sites. The biggest players in the UK are BT Openzone, Starbucks (T-Mobile) and Megabeam.
- TeliaSonera has developed a network that has more than 450 HomeRun spots in the Nordic region. Telia has also signed roaming agreements with Megabeam in Italy, BT Openworld in the UK and Metronet in Austria.

6.17 Wi-Fi being is also being used as part of a bundling strategy. Recent developments include:

- In the US Verizon is offering free roaming Internet service for its DSL subscribers.
- In the UK, BT is planning to offer a ”triple play" of a fixed broadband line, wireless home network and public Wi-Fi.
- In France and Germany, the incumbent service providers are packaging DSL services with Wi-Fi networking for the home. In Germany this has been extremely successful, T-Com started marketing Wi-Fi heavily at the end of

March 2003 and has sold 70,000 Wi-Fi devices. It sells about 10% of all T-DSL lines in the context of Wi-Fi marketing.

Broadband Satellite Access

6.18 Some satellites in orbit around the Earth can offer broadband services. For some services, data transfer is in one direction only ('one-way' satellite providing a broadband link downstream from the network to the end user, with the upstream link provided over a fixed PSTN/ISDN line). However other services provide a satellite return path ('two-way' satellite).

6.19 Services are available in all the benchmarked countries. Services are available nationwide (subject to "line of sight"), although take-up remains low. Overall, the range of services offered is similar to that presented in the June 2003 report. Details of prices/speeds are given later in this Chapter. There is relatively little information available on take-up:

- figures provided to Oftel by a selection of satellite providers in the UK suggest there are in excess of 5,500 subscribers;
- the FCC report a total of 276,000 satellite and fixed wireless subscribers to broadband services as at December 2002 (up 25% over the previous 6 months). Sales of Hughes Direcway satellite Internet service amount to around 166,000 subscribers at the end of June 2003;
- In Germany, at the end of 2002 there were less than 10 companies providing 2-way satellite to approximately 1000 end-users. For one-way services there were around 6 companies with in the region of 10,000 subscribers;.
- In Sweden there are two companies offering satellite services. Subscriber figures are not published but data from the PTS states there are 8,200 broadband subscribers that do not fall into cable, DSL, FTTH, Powerline or FWA and it is likely a proportion of these are satellite subscribers; and
- In France both one-way and two-way satellite services are available but subscriber figures are not known. France Telecom are planning to launch a new 2-way service in September 2003 - speeds will vary from 128 to 2000 kbit/s and prices will start at Euro 95 / month.

Fibre to the home or building (FTTH/FTTB)

6.20 FTTH (or FTTB) provides broadband services over an optical fibre link to the consumer's home (or building), replacing the conventional copper pair or coaxial cable.

6.21 In Sweden "fibre to the building" is already an important technology (LAN-Ethernet services are provided within the building to each home). There were over 126,500 lines at the end of 2002, equivalent to approximately 1 in 5 broadband lines, or 1.6 per 100 population. The main operator is B2. The price of services is comparable to prices for DSL or cable modem in Sweden, and speeds of up to 10Mbit/s are offered.

6.22 In the US there is also some FTTH. The FCC reports approximately 548,000 fibre lines as at the end of December 2002 (up 5% over the previous 6 months), accounting for approximately 3% of all high speed lines (i.e. those with speed greater than 200kbit/s in one direction), or 0.18 per 100 population. Fibre is mainly deployed to "green-field" sites However, SBC, Verizon and BellSouth have announced plans for fibre-to-the premise deployments beginning in 2004. The companies have recently issued a joint request for proposals to equipment vendors.

6.23 In the other benchmarked countries there is no significant FTTH.

Powerline

6.24 Powerline technology uses the electricity supply network to provide two-way broadband and phone connections by using filters that can separate the power supply flowing along the cable from communications signals.

6.25 Scottish Hydro-Electric and Southern Electric (both part of the Scottish and Southern Energy Group) in the UK are currently carrying out commercial trials in Winchester and Stonehaven (following earlier trials in Scotland). Prices start from £30 a month for a 1Mbit/s service.

6.26 Powerline services are offered in Germany, where there were around 7,000 subscribers at the end of December 2002. Two examples are main.net "Plus" offering services commercially in a number of towns in Germany and the energy group MVV Energie AG offering services (marketed as "Vype") with prices starting from Euro 15 plus 3.3 cents per MByte.

6.27 Powerline services are also available in Sweden through some of the regional power companies such as Enkom, Hjo Energi and Sydkraft Bredband. Prices range from £20-26 per month, with a set-up fee of between £114-210 and speeds ranging from 400Kbit/s to 2000Kbit/s.

6.28 In the US, the FCC launched a "notice of inquiry" into broadband over powerline systems in April 2003. The intention is to obtain information on a variety of issues related to broadband over power lines, to evaluate the current state of the technology and consider whether changes to regulation are needed to facilitate its development. Power line networks are being trialed in a dozen states around the US, with a number of new entrants into the market expected to spur renewed interest in the technology.

Mobile Higher Bandwidth Access (3G)

6.29 The Universal Mobile Telecommunication System ('UMTS') is a so-called "third-generation (3G) ", broadband, packet-based mobile radio system to be deployed in Europe, and throughout the world, for the transmission of text, digitised voice, video, and multimedia to mobile computer and phone users.

6.30 3G services were launched by Hutchinson 3G in the UK in March 2003 and in Sweden in May 2003, but are not commercially available in the other benchmarked countries (although some other operators are expected to launch by the end of 2003). Services offered by Hutchinson include:

- voice services;
- text / picture /video messages;
- e-mail;
- content such as news alerts/news clips, maps and location based services.

6.31 Services are charged on a per minute / message / content item basis, with packages offering bundles of these services also available.

6.32 These services are not directly comparable to DSL/cable modem services: they offer only limited access to the Internet (there is a range of "walled garden" content) but also additional functionality (such as location based services). The charging structure is also very different (i.e. on a usage basis, rather than unlimited). As with hotspots, these services are likely to be complimentary to, rather than a substitute for, fixed broadband access at home or in the office.

Price comparisons for satellite services - methodological issues

6.33 This report considers prices for alternative technologies separately to the price benchmarking undertaken for DSL/cable modem. This reflects the complex pricing structure for some of these products (particularly for one-way satellite service) which make like-for-like comparisons difficult.

6.34 Examples of some of the complexities that make comparing prices for these services difficult include:

- the ability to tailor packages by buying additional "burstable" and/or "guaranteed" speed;
- usage rates which may depend on the time spent on-line or the data volume downloaded, or a maximum amount of data that can be downloaded per month (this is also seen in some DSL/cable modem packages, but is more common with FWA/satellite);
- the ability to buy services with certain amounts of guaranteed speed or prioritised speed, with lower speeds outside the guaranteed amount; and
- services where speed differs by time of day, or where services can only be used off-peak.

6.35 Developing a basis for comparing prices on a like-for-like basis would in principle require more detailed user profiles than the ones used e.g. Chapter 3, with usage described in terms of a number of different variables (e.g. not only length of time on-line but the speed required for different periods, the time of day the service is used, and the usage of up and downstream links separately).

6.36 In this report indicative comparisons are presented using a simplified approach similar to that used in Chapter 3:

- price information is presented separately for one-way satellite and two-way satellite (although some indications of prices relative to DSL and cable modem are also presented);
- for one-way satellite figures are presented both with and without the additional cost of the return dial-up path taken into account;
- usage is defined as 100 hrs, and 1.2Gbyte per month for residential use and 3Gbyte per month for business as in Chapter 3; and
- a 3 year write off period for one-off costs is used (as in Chapter 3).

6.37 It is not possible to cover all companies offering these services and the services quoted provide examples of what is available.

6.38 In view of the above points, the price comparisons presented should be considered as "indicative" only.

Details of Broadband Satellite Access Services

6.39 This section looks at services provided using broadband satellite access in each country considering: the main service providers offering service and the main features of the services commercially available (price, bandwidth etc). Sources include the relevant country regulators and company web-sites. The main focus is on the providers of retail services to the end user.

6.40 A country by country overview is given, however, as some satellite services are offered across Europe (at either the wholesale or retail level), an overview of European services is also given.

6.41 Following the country specific overviews, summary charts showing indicative speeds and prices are presented.

Europe

6.42 The companies listed in table 6.1 offer wholesale broadband satellite access in Europe. Examples of ISP's using these wholesale services are also listed.

Table 6.1: European satellite wholesalers/retailers.

Wholesaler	Examples of ISPs using the wholesale service to provide a retail product
Gilat	Tiscali (several European countries), BT Openworld (UK)
Eutelsat	Aramiska (several European countries), Broadsat Opensky (several European countries), SkyDSL (several European countries), Satdrive (UK), I-Sat (UK)
Astranet	Europe-online (several European countries), Netsystems (several European countries), T-Online (Germany)
Hughes	Bridge Broadband (UK)
Sirius 2	IPviaSAT (UK), Swepet (Sweden)

6.43 As illustrated in table 6.1, in some cases ISP's offer service in one country only and in others ISPs offer services across a number of European countries. The distinction is not clear cut as an ISP may target consumers in a particular country, but be prepared to offer service to consumers in other countries. The intention in this report is to reflect the country/countries where services appear to be marketed.

6.44 Examples of ISPs found to be offering services in more than one of the benchmarked countries (as at August 2003) are as follows:

- Aramiska offer services in the UK and France (also services in Ireland, Spain and the Netherlands);
- Tiscalisat offer commercial services in Germany and Sweden;
- Europe on-line offer service in France, Germany and the UK; and
- Broadsat Opensky and offer services in France and the UK; and
- I-sat offer services in the UK and France.

6.45 The approach to pricing varies between operators:

- Aramiska offer a range of identical two-way services across Europe with prices quoted in both Euros and UK£ (prices are similar). Downstream speeds vary from 512 to 2000kbit/s and prices start from £99 Euro per month;
- Tiscalisat offer the same (two-way) service in Germany and in Sweden, although there appear to be greater payment options in Germany (allowing a trade off between one-off and monthly charges). Prices are quoted in the country's own currency and for the comparable service there appears to be some difference in price. The monthly price in Germany is 92 Euro/month for a downstream speed of 400kbit/s;
- Europe on-line offer identical one-way services and quote a single price in Euros starting at 9.99 Euro per month plus 0.044 Euro per minute for a downstream speed of 768 kbit/s;
- Broadsat Opensky offer identical one-way services with a single price in Euros starting at 22.50 Euro a month providing up to 300Mbyte/month guaranteed traffic with 150Mbyte/month at 400kbit/s average transfer rate; and

- I-sat offer a wider range of 2-way services in the UK and in France, but in both cases prices start from around £100 a month for a 512kbit/s service.

6.46 Examples of country specific retail service providers (i.e. in addition to the above) are given in the following sections.

France

6.47 Netsystem offer a 1-way service for 29 Euro a month (£21) with downstream speed of 300kbit/s. Satpro, which previously offered two-way services, are currently restructuring.

Germany

6.48 In Germany there are a number of other satellite providers including Deutsche Telekom who are offering a one way service ("T-DSL by Satellite") with downstream speed of 756kbit/s and monthly prices starting from 19.90 Euro/month with additional charges above 0.5Gbyte per month usage. An ISP charge is applicable on top of this (T-online are not offering a flat rate package for use with this).

6.49 Sky DSL are offering a range of one-way services with downstream speeds of up to 16,000kbit/s. The pricing structure is complicated with prices depending on the volume of traffic downloaded, the time of day the service is used and the "priority" chosen by the user (with higher priority giving a better chance of achieving a high speed). Services start from 7.50 Euro per month (£5.4) with additional charges per Gbyte for the lowest priority. The downstream speed appears very high for this price, however, there are no guarantees that this speed will be achieved in practice.

Sweden

6.50 A one-way service is offered by Swepet with downstream speed from 512 to 2000kbit/s and prices starting at 395Kr (£27) per month.

UK

6.51 There are a number of ISPs offering two-way service (in addition to those mentioned above) including: Bridge Broadband, BT Openworld and I-sat . Downstream speeds vary from 500 to 2000kbit/s and prices start from £60 a month.

6.52 There are a number of ISPs offering one-way service including SatDrive and IpviaSat. Downstream speeds vary between 400 and 4,000kbit/s and prices start from £9.99 (with additional charges to increase "priority") for speeds up to 4,000kbit/s (the speed seems high for this price, but there are no guarantees that this speed will be achieved in practice).

US

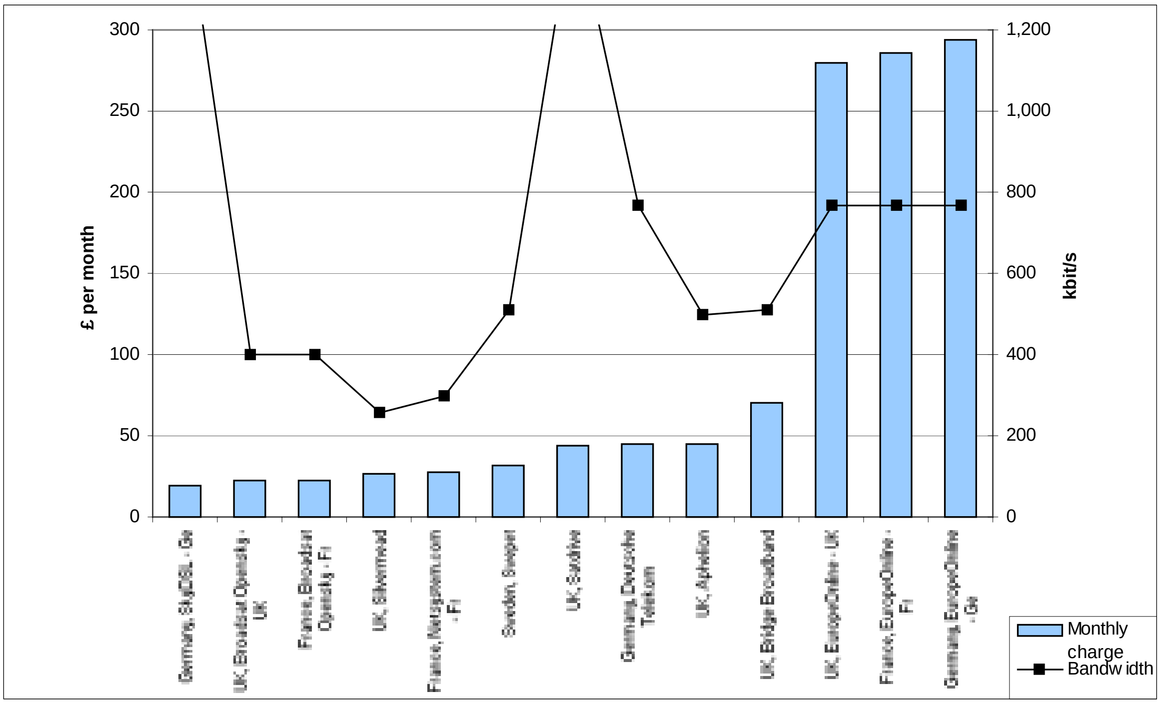
6.53 Starband and Direcway (offered through DirecTV) offer two-way service with downstream speeds in the range 500 to 1,000kbit/s and prices starting from $60 a month (£40).

Price and speed comparison

6.54 A price and speed comparison for the services mentioned above is given in figures 6.1 and 6.3. One- and two-way services are shown separately as these are not directly comparable.

6.55 For one-way services the lowest price offer from each service provider is included. The lower price offers often appear to be aimed at residential use. In some cases higher price offers (with greater speed, greater priority etc) are also available and seem to be aimed at business use. Prices are presented including VAT. In both the UK and Germany there are examples of services available at very low price for the lowest priority. The additional cost of upgrading half of the traffic to priority level 2 is included in the comparisons as it is expected this makes the services more comparable with the other services. In some cases installation and equipment costs were not available from the service provider and estimated costs have been included.

Figure 6.1: One-way satellite broadband access services in ascending order of price, with "speed" of service (downstream bandwidth) shown separately

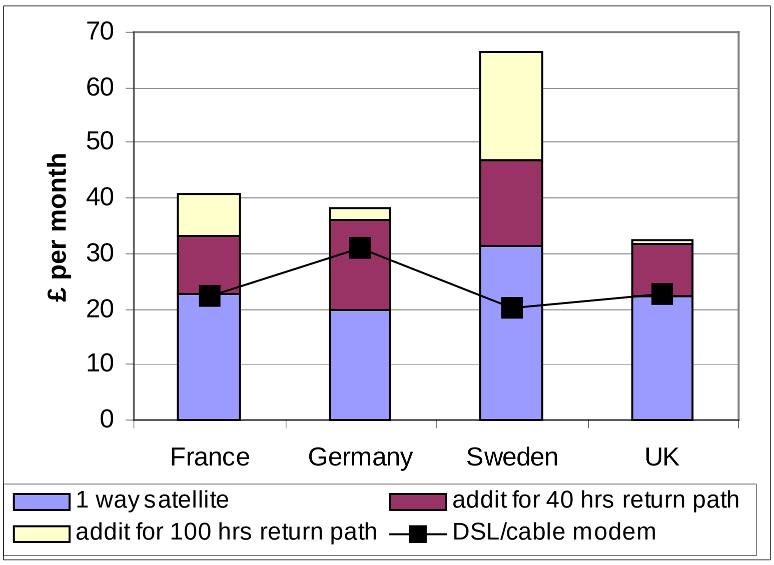


Prices as at Aug 2003
Note, Europe-online has a per min charge - the price shown reflects 100 hours use

6.56 Figure 6.1 illustrates the wide range of prices and speeds for which one-way satellite services are available in Europe. The results are very similar to the June 2003 report.

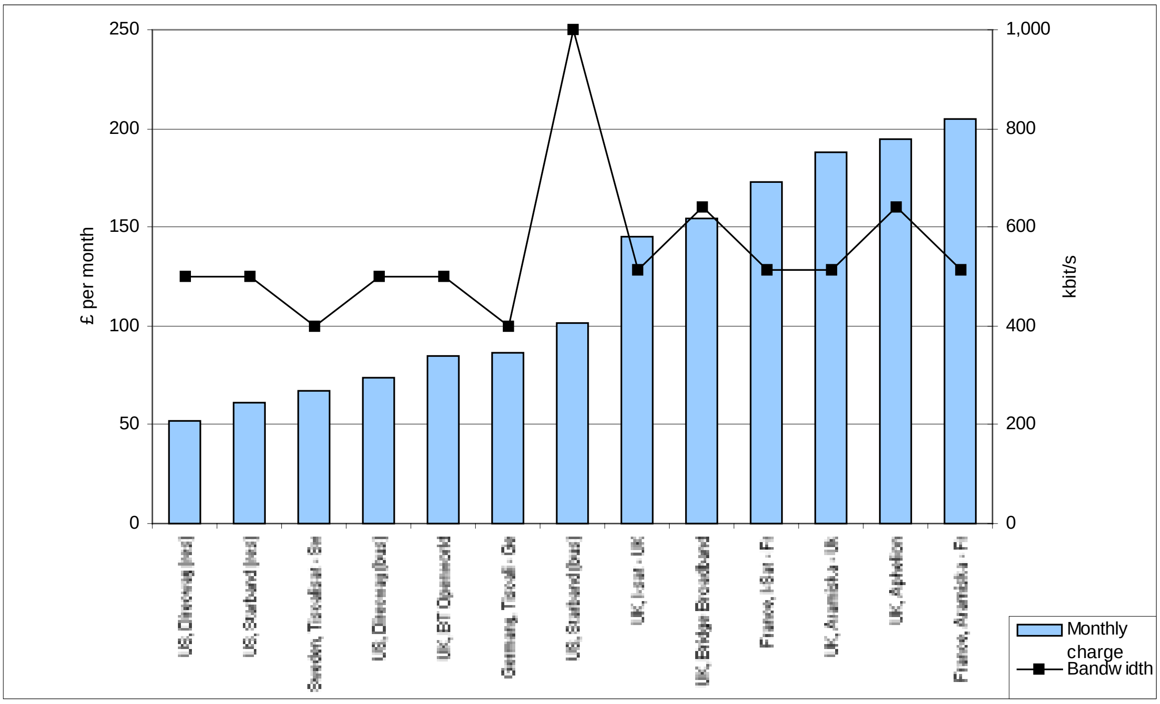
6.56 Figure 6.1 aims to show the minimum monthly spend, but service levels may be very different. In many cases there are limits to the services in terms of guaranteed traffic or speeds, or restrictions as to when the service can be used. In general, the price *excluding the dial-up return path*, is close to the cost of DSL or cable modem (except in Sweden where the satellite price is higher). The cost of dial-up access for the return path will vary according to how the user chooses to use their satellite link. It may be possible for users wishing to download large amounts of data at relatively infrequent intervals to spend relatively little time on-line with their dial up connection. However, to reproduce a service comparable to DSL or cable modem and avoid the need to dial-up/log out frequently, always-on dial-up access may be needed. To illustrate the relative costs, Figure 6.2 shows the cost of one-way satellite (cheapest offer per country) with the additional costs of 40hours/100hours off-peak dial up access shown on top. This is then compared to the cost of DSL/cable modem as calculated in Chapter 3. One-way satellite is likely to be more expensive than DSL/cable modem, especially when the costs of the return path are taken into account.

Figure 6.2: Comparison of lowest prices for one-way satellite services (including additional costs for the dial-up return path) with DSL/cable modem services.



6.57 For two-way services the lowest price offer from each service provider is included. Generally, these services appear to be aimed at business use. However, in the US the lowest price offers appear to be targeted at residential use (although business use seems to be allowed), and both lowest price residential and lowest price business packages are shown. Prices are presented excluding VAT.

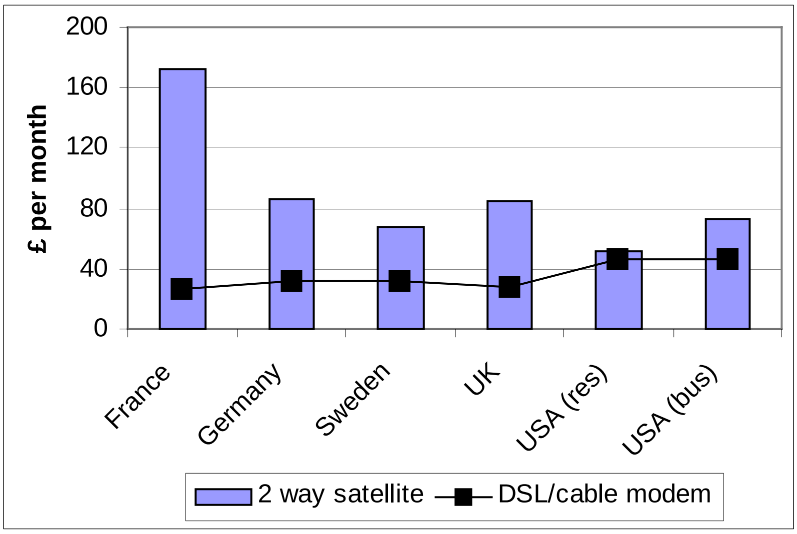
Figure 6.3: Two-way satellite broadband access services in ascending order of price, with "speed" of service (downstream bandwidth) shown separately



Prices as at Aug 2003

6.58 Figure 6.3 illustrates the relatively wide range of prices for two-way satellite services in the benchmarked countries. The results are very similar to the June 2003 report. Speeds for these services (which are the lowest price service by service provider) are relatively consistent, with most being offered at close to 500kbit/s downstream. The two US residential offers appear as the cheapest, but the business services offered by these service providers are more in line with average European prices. A comparison of the cheapest 2-way service available in each country with the cheapest business DSL/cable modem service is shown in figure 6.4. The price for a service is generally more expensive than for DSL or cable modem services.

Figure 6.4: Comparison of lowest prices for two-way satellite services with DSL/cable modem services.



Conclusions

6.59 The market for alternative broadband technologies is still very new. While BFWA and/or satellite services are offered in all of the benchmarked countries, subscriber numbers are still low. Prices for two-way satellite services are generally above prices for DSL and cable modem services, although it is unclear how much of this price difference can be attributed to differences in the service parameters (such as speed, contention ratio, web hosting, security etc). One-way satellite combined with unlimited dial-up access for the return path is likely to be more expensive than DSL or cable modem services, though a user who is able to severely restrict the time spent dialled-up might be able to keep their costs close to the cost of DSL or cable modem services. Some one-way satellite services have what appear to be particularly low prices, but these often have limits on guaranteed rates and traffic so it is unclear what level of service is experienced in practice. Results presented are similar to those in the June 2003 report.

Chapter 7

Wholesale inputs to Broadband market

Introduction

7.1 This chapter considers the wholesale products that sit behind some of the DSL retail services covered in Chapter 3. This helps to put BT's products (and their prices) in context and provides insight into the retail market for broadband. In particular comparisons are made of:

- wholesale DSL products offered by the incumbent operators in France and the UK; and
- local loop unbundling in each of the benchmarked countries.

7.2 The following comparisons only consider end-to-end products as these tend to be more widely used and these products have not changed since the last benchmark. Therefore, this chapter looks at the relationship between end-to-end wholesale products and retail prices in France and the UK. A fuller overview of the wholesale DSL products available from incumbent operators in France, Germany and the UK was included in the June 2002 report. In Germany the situation has not changed since the June 2002 report, and there are still no end to end wholesale DSL products.

7.3 Comparisons for unbundled local loops, as a means of providing broadband services, were considered in the June 2003 report and an update where information is available is presented here.

Incumbent wholesale and retail DSL products

7.4 This section describes developments in the types of wholesale product available in France and the UK and presents updated price comparisons:

- for end-to-end wholesale DSL products; - this comparison is unchanged since the June 2003 report and is not repeated here; and
- for the relationship between wholesale and retail DSL products.

7.5 The comparisons have been carried out with a view to:

- understanding the types of wholesale products available elsewhere, and the pricing of these products, to put BT's wholesale DSL products in context;
- understanding better the results presented in chapters 3 and 5 regarding retail prices and take-up; and
- allowing Oftel to assess the validity of claims made elsewhere regarding the relative pricing of BT's wholesale products.

7.6 Price comparisons presented here focus on end to end wholesale products (IPStream in the UK), as these continue to be most widely used. In both France and the UK wholesale products involving connecting at the ATM level (BT Datastream) are also available and are starting to be used by operators

Update on wholesale DSL in France

7.7 Since the June 2003 report there has been no changes to wholesale prices. This report will look only at the ISP "margin" between the retail and the wholesale prices.

Update on wholesale DSL in the UK

7.8 The June 2003 benchmarking report provided a summary of changes to BT's IPStream wholesale DSL products that were implemented in May 2003. Oftel subsequently conducted an investigation, following a complaint the price reductions resulted in a price squeeze between BT's IPStream and ATM Interconnection products. The result has been:

- on the 7th May BT reduced the cost of Datastream (an ATM interconnect product) by £0.70 per end user;
- on the 4th September BT further reduced the cost of Datastream by £0.50 per end user and raised the price of IPStream 2000 by £5 per end user; and
- on 4th September Oftel announced that, following these changes, there was no margin squeeze.

7.9 Prices at the 1st October have been collected and are expected to reflect these wholesale changes.

Comparisons of wholesale and retail DSL prices

7.10 Comparisons of wholesale DSL prices in the context of retail DSL prices have been updated. Figures 7.1 and 7.2 show the incumbents' retail price together with the wholesale price for residential and business products. This illustrates the ISP "margin". For the purposes of this comparison, BT Openworld's retail prices have been rechecked as at the 1st October 2003.

7.11 For residential services, there has been no change in BT retail prices since the June 2003 report and the ISP margin in France remains somewhat less than in the UK. This comparison, however, applies to the incumbents' ISPs only. In the UK a number of ISP's offer prices below BT Openworld's price, and the margin for these will be smaller. In France, other ISPs using France Telecom's wholesale service do not generally price much below Wanadoo.

7.12 For business services, the current retail price in France for a service providing 1Mbit/s downstream is significantly less than that in the UK and the wholesale price in the UK is significantly less than in France. While BT's new wholesale prices have had some effect on end user prices, prices in the UK are still more expensive than in France. The higher retail price in the UK is due to the higher ISP margin. It is difficult to draw any strong conculsions from these price comparisons, business prices may include a range of "add-on" services by the ISP resulting in higher retail prices and may mean the overall service in not directly comparable in the UK and France.

Figure 7.1: Comparison of residential end user prices and SP margin (UK£, excl VAT) - UK vs France

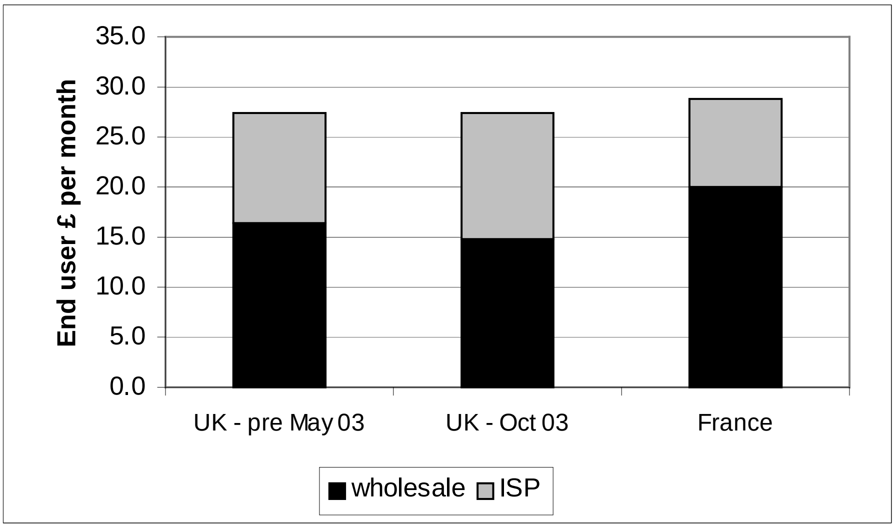
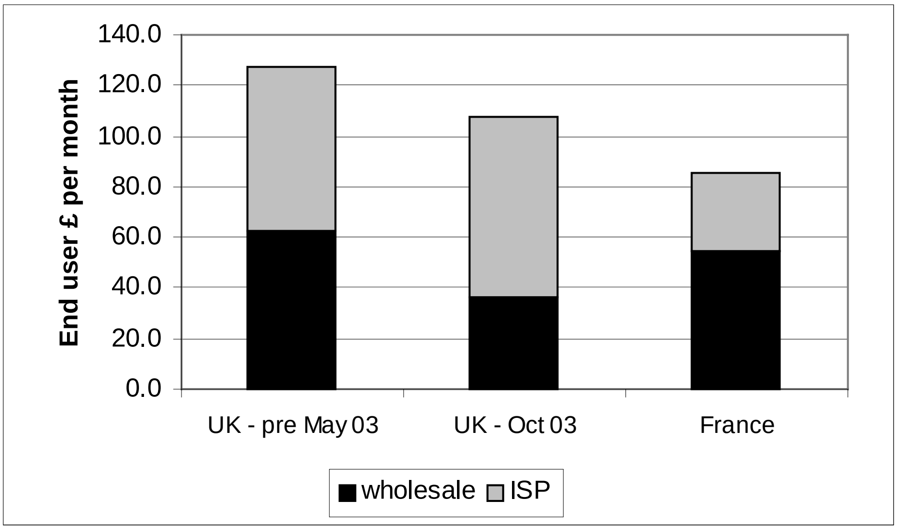


Figure 7.2: Comparison of business end user prices (1Mbit/s service) and SP margin (UK£, excl VAT) - UK vs France



Unbundled local loops

7.13 International comparisons for unbundled local loops are presented in this section. The key factors that are considered are:
- the price of unbundled local loops;
- the uptake of unbundled local loops; and
- the availability of services based on unbundled local loops as measured by the percentage of main distribution frames (MDFs) that have competing operators' equipment installed.[4]

7.14 Comparisons include both fully unbundled local loops and shared access (see glossary for definitions).

7.15 Unbundled local loops may be used to provide voice services as well as broadband services. In Germany and the US, both of which have a longer history of local loop unbundling (LLU) than the other benchmarked countries, the majority of unbundled loops are used for voice rather than DSL. The focus of this report is on provision of DSL.

7.16 Use of unbundled local loops is one way of providing broadband services. The comparisons presented in this chapter illustrate the relative importance of services provided in this way both within and between countries. They provide additional background to the retail broadband comparisons presented in chapters 3 and 5, and compliment the comparisons of wholesale DSL presented earlier in this chapter.

7.17 While for the purposes of this report LLU take-up is considered in the context of take-up of DSL and cable modem Internet services, a wide variety of DSL services can be provided over LLU. Services provided range from products aimed at residential/small business, which compete directly with incumbent based ADSL services, to more specialised SDSL services for larger businesses which, if the contention ratio is low, may provide a service similar to private circuits.

7.18 While uptake of LLU is currently low, it is expected to increase over time and it is intended to track take-up and monitor developments at both the retail and wholesale level.

7.19 A brief overview of developments in each country is given, followed by the quantitative comparisons.

[4] **Main distribution frame (MDF) -** the apparatus in the local concentrator (exchange) building where the copper cables terminate and cross connection to other apparatus can be made by flexible jumpers.

France

7.20 The number of unbundled loops used for DSL services was approximately 83,300 (split 80,300 shared access and 3,000 fully unbundled lines) at the beginning of August 2003. This is a big increase from the 18,500 as at April 2003. French prices for LLU are amongst the lowest in Europe.

7.21 Shared access is being used by operators such as Free and 9Telecom to provide ADSL services to residential and small business consumers. Both operators are offering a substantial reduction for residential service compared to other ISPs.

7.22 Full unbundling mainly used to provide SDSL and ADSL services to businesses. COLT Telecom is the largest operator in France using fully unbundled local loops, offering a range of services for businesses. The SDSL service range "InterAccess DSL", offers speeds of 180 to 1500kbit/s for the same price as ISDN. As at 1 April 2003, Colt claimed a total of 1,265 fully unbundled lines (78% of the total in France) providing services as follows: 1,040 for SDSL or ADSL; 112 for voice over DSL and 113 for leased lines using SDSL.

Germany

7.23 Local loop unbundling has been available since 1997 in Germany (the first European country to make LLU mandatory). The majority of unbundled loops are, however, used to provide voice services. In Germany there were approximately 250,000 unbundled lines at the end of June 2003, of which 230,000 were fully unbundled and 20,000 shared access.

7.24 QSC is the largest user of LLU for provision of DSL services. QSC use unbundled local loops to provide both wholesale and retail SDSL and ADSL services. QSC focuses on business customers, although residential services are also offered. A wide range of services are offered, including symmetric services with speeds from 128 kbit/s to 2.3 Mbit/s. QSC claim to offer service in more than 40 of the largest cities in Germany, reaching more than 20 million potential users (approximately 25% of the population). QSC had around 40,000 lines as at October 2002.

Sweden

7.25 In Sweden there were approximately 14,100 unbundled lines at the end of June 2003, of which 5,300 were fully unbundled and 8,800 shared access.

7.26 Song Networks is the most significant of those operators that offer DSL over unbundled local loops, although (in common with a number of other operators) they also provide broadband services over their own access network.

UK

7.27 The number of unbundled local lines was approximately 7,600 as at the end of September 2003, up from 2,250 as at December 2002. The loops are mainly used to provide SDSL and ADSL services to business, as well as video on demand.

7.28 Easynet claim to be the largest user of LLU, with around 90% of all unbundled lines in the UK (end December 2002) Easynet had unbundled in 81 exchanges by the end of 2002, and are aiming to unbundled another 75 by the end of 2003. Easynet offer a range of ADSL (up to 8Mbit/s downstream) and SDSL (up to 2Mbit/s) services over unbundled loops, on both a wholesale and retail basis.

7.29 Bulldog Communications, another operator involved in using LLU in the UK, is offering a range of DSL services to ISPs and residential consumers, including:
- ADSL and SDSL wholesale products for business users. Bandwidths offered go up to 4Mbit/s and both contended and uncontended products are available;
- ADSL resale products for business users. Bandwidths offered go up to 4Mbit/s and both contended and uncontended products are available; and
- a range of residential products, with speeds up to 4Mbit/s for off-peak use.

7.30 Wholesale DSL products over LLU lines are also available from Ednet, Thus and Tiscali.

USA

7.31 Local loop unbundling has been available for some time in the US, and is still mainly used for the provision of voice services. FCC figures for the number of unbundled local loops show that there were around 13.7 million of these at December 2003.

7.32 A number of operators provide DSL service using LLU, the main one being Covad. Covad offers a range of SDSL and ADSL services to business and residential consumers: symmetric service is available from 144kbit/s to 1,500kbit/s and ADSL services up to 1,500kbit/s downstream. The number of end users using Covad services was around 453,000 at June 2003, up 19 per cent from December 2002.

7.33 The total number of unbundled local loops used to provide DSL services is not known. The number of Covad subscribers provides a lower limit to this figure. Other operators providing service in this way are thought to mainly operate on a regional basis and to have much smaller numbers of customers.

Cross country comparisons

Price

7.34 For both fully unbundled local loops and shared access, the cost of monthly rental together with an element of the connection charge (spread over 36 months, consistent with the retail price benchmarking) was compared across the benchmarked countries in the December 2002 report, subsequent changes have been relatively small:

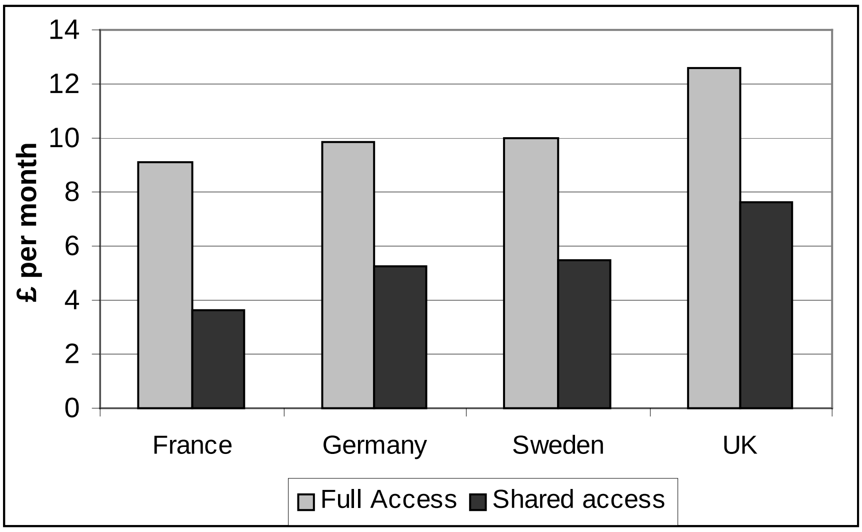
- German prices for fully unbundled loops have fallen; 20% reduction in the connection charge and 5% reduction in the monthly rental; and
- Average US prices have fallen by 10% since January 2002, but price falls have been smaller for some operators (eg no change in Ohio).

7.35 Figure 7.3 shows a comparison of the cost of fully unbundled local loops and shared access across all countries at August 2003. This indicates:

- price changes has had a small effect on Germanys position and for fully unbundled lines it is now cheaper than Sweden;
- prices in the UK are the most expensive for both fully unbundled and shared access; and
- prices in France are cheapest for both fully unbundled and shared access.

7.36 Figures for the US monthly charge for fully unbundled lines is also available. These show that the average across the US is close to the average for the European countries covered in this study. However, there is a wide range of charges when looked at on a state by state basis.

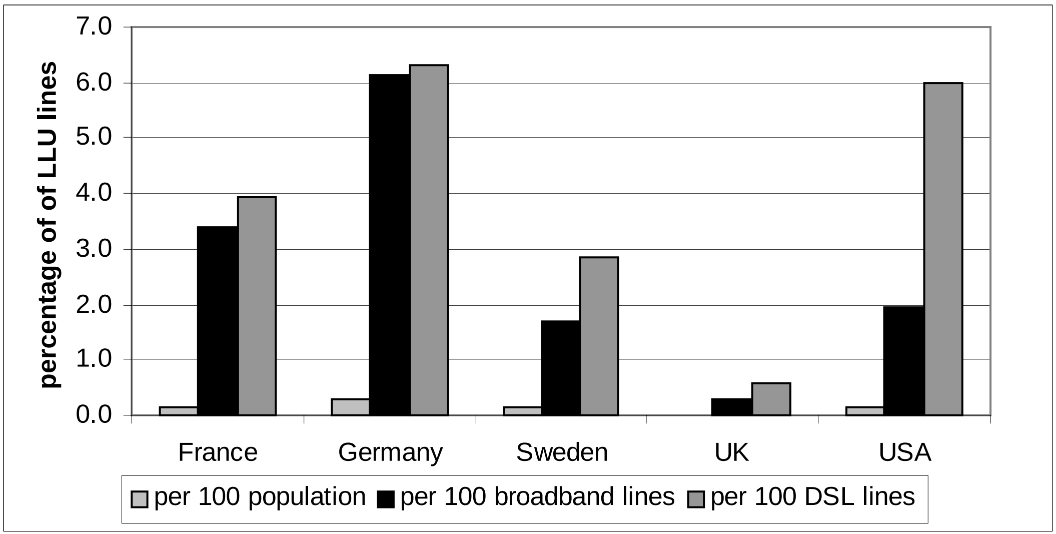
Figure 7.3 Price comparison of fully unbundled lines and shared lines – monthly charge (including an element of connection charge)



Uptake

7.37 Uptake figures for LLU are presented in figure 7.4 and are expressed per 100 population, per 100 broadband lines and per 100 incumbent DSL subscribers.

Figure 7.4: Uptake for LLU: number of LLU lines per 100 population, per 100 Broadband subscribers and per 100 incumbent DSL lines



LLU figures are for Q2 2003
US figure for LLU lines are based on Covad subscriber numbers -the total number for LLU will be higher than this.
Sources: ECTA, OECD, companies and regulators.

7.38 The figures for overall uptake of LLU per 100 population are extremely small everywhere. Expressed per 100 incumbent DSL lines, LLU uptake is around 6 per 100 in Germany and the US. These figures are also relatively small. The main change since the June 2002 report has been in France where there has been substantial growth in the number of shared access lines that are being used to provide services to residential and small business customers. However, these still only account for around 4 per 100 DSL lines in France.

Conclusions

7.39 The wholesale DSL price comparisons for the UK and France have been updated with new wholesale prices from BT since May 2003 and new retail prices as at 1st October 2003. On the basis of the new prices:

- for residential DSL services France Telecom's wholesale price is above BT's;
- for business DSL services with 1Mbit/s downstream, France Telecom's wholesale price is also above BT's; and
- the margin for the incumbent's ISP is greater in the UK than in France for both the residential and the 1Mbit/s business service.

7.40 LLU has been compared on the basis of a number of measures across the benchmarked countries. In all countries, DSL services over unbundled local loops are starting to be provided to end users, particularly business users, increasing the range of broadband services available (e.g. increasing the range of speeds and contention ratios available).

7.41 Take-up is currently low in Sweden and the UK, but is growing. In Germany and the US take-up is higher, accounting for around 6 per 100 incumbent DSL lines. The biggest change in the last 6 months has been in France where take-up of LLU (mostly shared access) has increased around 8 fold, although this still leaves France take-up of LLU below that in Germany and the US.

7.42 Take-up for LLU will be influenced by a number of factors, which will differ by country. These include the availability (and price etc) of wholesale DSL and/or DSL interconnection products from the incumbent operator, and the extent of competition from alternative networks (such as cable). Of the European countries, Germany has the greatest extent of LLU, but lacks wholesale DSL products and competition from other networks. In France, the recent high growth in the use of shared access may be influenced by the relatively low prices for this service. Overall, UK prices (both fully and shared access) are still shown to be somewhat higher than the other countries in this study.