

# The European Internet Report

## Multi-Industry Overview



**Déjà Vu?**

Internet usage ramped quickly in the US... now it's happening in Europe

- The Internet will transform the economics of European business
- We look at leading companies across 12 industry sectors
- Profiles of large-cap Internet stocks, developing Internet stories and smaller "pure plays"

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Vertical Portal - News

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Nettavisen

Vertical Portal - News

Nettavisen's mission is to be Norway's leading Internet news provider. Being an Internet-only newspaper, Nettavisen maximises the benefits of the Internet by providing continuously updated news, customised content, search features, and archiving functions. The editorial staff creates original content for categories such as domestic and international news, sports, business and entertainment. Nettavisen had approximately 300,000 unique visitors per week in Q1 99. Nettavisen also owns shopping and recruiting vertical portals. The company is privately owned by employees and various Norwegian investors.

www.nettavisen.no – Nettavisen Homepage



www.nettbasar.no – Nettbasar Shopping



www.nettjobb.no – Nettjob Online Recruiting



www.nettavisen.no/tvguide – Nettavisen TV Guide



www.nettavisen.no/sport – Nettavisen Sports



Immobilien Scout

Vertical Portal - Real Estate

Immobilien Scout is a provider of services for the real estate market in Germany. The company facilitates both property sales and lettings via its call centers and, increasingly, its website. The company was launched in the Berlin market in October 1998 and is currently rolling out its services in other metropolitan areas in Germany and, later, Europe. Immobilien Scout generates revenues from advertising and may in the future also charge transaction fees. The company has teamed up with several strong partners (Metro Group and DePfa/Bauboden, Europe's largest mortgage bank with a significant portfolio of managed flats), and continues to attract independent property agents as well as consumers to its service. Other backers include tbg and Wellington Finanz.

www.immobilienscout.de – Immobilien Scout Homepage



www.immobilienscout.de – Immobilien Scout Listing Information



www.immobilienscout.de – Immobilien Scout Search Information



www.immobilienscout.de – Immobilien Scout Contact Information



www.immobilienscout.de – Immobilien Scout Philosophy





**Tornado-Insider.com**

*Vertical Portal - Ventures*

Tornado-Insider.com is a magazine and online venture that seeks to facilitate the development of fast-growing European companies. The company issued the first edition of its monthly magazine in April 1999 and launched its website in May 1999. Tornado-Insider.com targets entrepreneurs, providers of growth capital, financial and other intermediaries, and other parties interested in the development of high-growth Europe. The company intends to build its website into a key information portal for these parties. The company is privately funded by former technology industry executives and other industry participants.

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## Appendices

## Appendix I-a:

## Internet Forecasts

## Internet Penetration in Europe

Steve Winram/Michael Steib

## Investment Summary

- **The number of adult Internet users in Europe should increase by almost 200%**, from 34 million in 1998 to 100 million in 2003, according to our new model of European Internet penetration.
- **Digital technology, higher access speeds, 'free' access and improved content could all drive early European adoption**, at a rate faster than that seen in the US.
- **30% penetration rates in Europe are achievable**, in our view — Nordic rates are this high already.
- **We expect dialing up from home to remain the most popular method of connecting with the Internet**, although cable modem and mobile will account for an increasing share of users, on our forecasts. We look for about 4 million broadband users in Europe in 2002.
- **Around 12% of European adults (34 million people) use the Internet**, compared with about 32% (64 million) in the US, on consensus estimates for 1998.

## Estimates of European Internet Users

Estimates of the number of Internet users in Europe show penetration of around 12% of a universe of all adults in 1998, suggesting a base of some 34 million users. This compares with about 64 million in the US, a penetration rate of about 32% of all adults. We shall see later that survey data suggest that 22.1% of the European (adult) population claim to use the Internet.

This would amount to approximately 60 million European users, and is a prime example of the way in which survey-based data tend to overstate usage.

There are other distortions in the estimates. Some result from varying definitions of online access. In France, for example, there are about 7 million users of Minitel (a screen-based device that allows the user to interrogate databases to obtain information, but is *not* the Internet). These users are routinely included in estimates of online market penetration. Our penetration estimates exclude Minitel users in France. This is a controversial step, as some commentators suggest that Minitel will become web-enabled. Other problems include the definition of users and their frequency of use, alluded to above. Despite these contradictory figures, the conclusion that European Internet penetration currently stands at around a third of US penetration, 11-12% of the adult population, feels about right.

## Europe — 30% Penetration a Reality

**The Nordic markets stand out easily as leading the way in Europe**, with Internet penetration rates among all individuals of more than 30% for Sweden, Finland and Norway. We estimate that PC penetration of homes in these markets exceeds 40% on average; the inclusion of work-based access would considerably increase the overall proportion.

## These markets are also a prime comfort factor for our

Table 1

## Estimates of US Internet Users, Year-End 1997 and 1998

Source	Definition	1997	1998
Intertek	US Total Population	63.0	N/AV
Intelligence	US Adults 16+	62.0	72.6
Relevant Knowledge	N.A. Adults 12+	55.4	57.0
Nielsen Media	N.A. Adults 18+	52.0	58.0
Fund/SVP	US Adults 18+	41.5	75.0
e Stats	US Adults 18+	28.0	47.0
Computer Industry Almanac	US Population	55.2	76.5

N.A. = North American

N/AV = not available

Source: e Stats

**belief that 30% penetration rates (the present rate in the US) are easily achievable for the European market**

The factors that have driven penetration to these levels — relatively high GDP, liberalised telecoms markets, high PC penetration — imply that equivalent penetration rates are attainable in the major markets of France, Spain, Italy, Germany and the UK.

The mid-tier markets, with medium penetration rates of 8-14% of the population (Germany, the UK, Benelux) should catch up fast. Markets such as Spain, France and Italy, where penetration lags, have also begun to see rapidly increasing interest in, and growth of, the Internet.

Looking further out, penetration estimates reach as high as 70% of the population. We believe the widespread availability of Internet access at the workplace is itself a sufficient condition for penetration to reach more than 50% of the population.

Ultimately, we believe, almost total saturation will come about as a result of the inclusion of Internet access in television sets. The early signs are that new digital television platforms are prepared to offer at least some Internet functions, such as e-mail. In the longer term, we believe these platforms will want to embrace the Internet, not least to capture audiences that might otherwise migrate to the Internet if the access technologies remain distinct.

We have deliberately steered away from a country-by-country approach in this report, principally because we believe the Internet is a truly international medium.

However, the process of customer acquisition will probably remain a national occupation, and it is worth looking at those markets with the greatest potential for penetration in proportionate and absolute terms. We describe the key drivers of Internet adoption for the main countries in the section entitled 'The Major European Internet Markets'.

Table 2

**Internet Penetration in Europe, 1998**

	Internet Users (m)	Total Population (m)	Proportion of Population <sup>1</sup> (%)
Austria	0.54	8.1	6.7
Belgium	0.79	10.2	7.7
Denmark	0.95	5.3	18.0
<b>Finland</b>	<b>1.57</b>	<b>5.1</b>	<b>30.8</b>
France	2.79	58.6	4.8
Germany	7.14	82.1	8.7
Greece	0.24	10.5	2.3
Ireland	0.26	3.7	7.1
Italy	2.14	57.6	3.7
Netherlands	1.96	15.3	12.8
<b>Norway</b>	<b>1.34</b>	<b>4.4</b>	<b>30.5</b>
Portugal	0.26	10.0	2.6
Spain	1.98	39.3	5.0
<b>Sweden</b>	<b>2.58</b>	<b>8.8</b>	<b>29.3</b>
Switzerland	1.00	7.1	14.1
UK	8.10	58.1	13.9
<b>Europe</b>	<b>33.6</b>	<b>384.2</b>	<b>8.8</b>

1. Based on the total population, including children

Source: Computer Industry Almanac

Table 3

**Internet Penetration<sup>1</sup>: Estimates Compared**

	1996	1997	1998	1999E	2000E	2001E	2002E
<b>US Internet Penetration (million)</b>							
Jupiter	36.9	49.1	63.2	75.9	87.4	98.9	116.1
IDC	23.2	38.7	51.6	66.5	84.3	N/AV	N/AV
Computer Industry Almanac	35.4	55.2	76.5	102.5	133.5	N/AV	N/AV
Average Estimate	31.8	47.7	63.8	81.6	101.7	N/AV	N/AV
Proportion of US Adult Population (%)	15.9	23.8	31.7	40.8	50.9	N/AV	N/AV
<b>European Internet Penetration (million)</b>							
EITO	17.9	23.9	31.5	40.9	52.9	66.7	N/AV
Computer Industry Almanac	13.2	20.5	33.6	48.4	83.9	N/AV	N/AV
Datamonitor	N/AV	22.0	38.0	53.0	64.0	N/AV	78.0
Morgan Stanley Dean Witter	N/AV	22.4	33.6	48.0	63.8	75.8	91.0
Average Estimate	15.6	22.1	34.2	47.6	66.1	71.3	84.5
Proportion of European Adult Population (%)	5.4	7.6	11.9	16.5	23.0	24.8	29.3

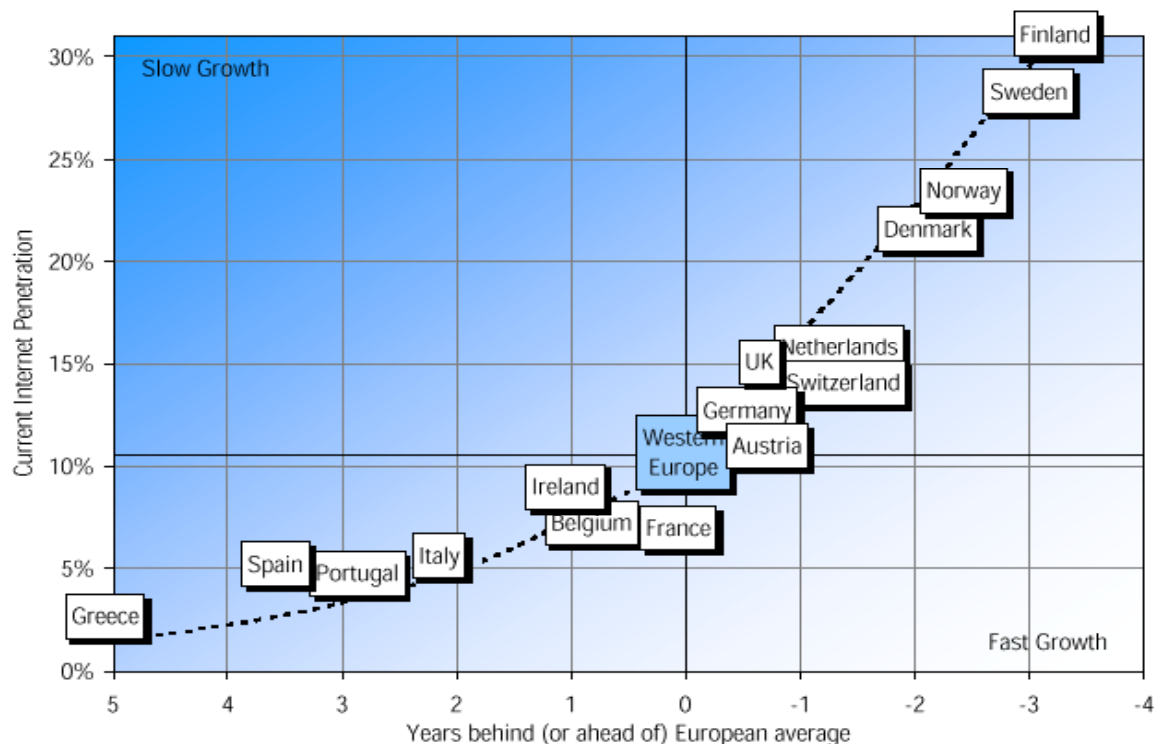
1. Defined as individuals accessing the Internet at least monthly

E = Morgan Stanley Dean Witter Research Estimates

N/AV = Not Available

Source: Various, Morgan Stanley Dean Witter Research

Figure 1

**Web Users as % of Population**

Source: IDC December 1998

**Forecast Internet Penetration in Europe**

We have chosen to look at the penetration of potential access technologies — dial-up, cable and mobile devices. We have assembled a range of market forecasts, and found that all of them point to rapid escalation of Internet penetration.

**Cable Infrastructure Is Widespread**

More than a quarter of European households are connected to cable TV, a figure that is forecast conservatively to rise to over 30% by 2001. Some European markets, such as Belgium and the Netherlands, already have cable in more than 90% of homes. This, admittedly, is also the most dated infrastructure in Europe, and most of it will require upgrading to allow cable modem access. Nevertheless, all the estimates below are for broadband cable, capable of use for Internet access and television transmission. The difficulties associated with route and branch cable technology, and the problems that it creates for Internet access, are dealt with in detail elsewhere in this report.

The cost of upgrading Europe's cable infrastructure will be substantial in those markets where cable was laid primarily for TV distribution, and not telephony as in the UK (for example UPC, which passes 3.6 million European homes, estimates its total upgrade cost at €430 million). However, the cost of upgrading could well be funded by cash from sources such as Microsoft, which has recently made investments of \$800 million in NTL and UPC and acquired 29.9% of Telewest as part of its strategy to acquire Internet access technology.

Table 4

**Western European ISDN Market: Forecast Growth by Product Segment**

	1996-2000E (%) CAGR
ISDN Connections	27.0
ISDN Router Shipments	45.0
ISDN BRI Client-to-LAN B Channels	51.0
RAS (Remote Access Server) Concentrator B Channels	64.0

Source: European Information Technology Observatory, 1998

Table 5

**European Penetration Forecasts: Cable TV**

Homes (%)	1997	1998	1999E	2000E	2001E
Belgium	94.0	94.0	94.0	94.0	94.0
Germany	56.0	57.0	58.0	59.0	60.0
France	11.0	12.0	14.0	16.0	18.0
Netherlands	94.0	95.0	96.0	96.0	96.0
Norway	40.0	42.0	43.0	44.0	44.0
Spain	0.0	2.0	3.0	5.0	8.0
Sweden	40.0	40.0	41.0	41.0	41.0
UK	10.0	12.0	15.0	17.0	18.0
<b>Total Europe</b>	<b>26.0</b>	<b>28.0</b>	<b>29.0</b>	<b>30.0</b>	<b>31.0</b>

*E = Morgan Stanley Dean Witter Research Estimates*

*Source: Zenith Media — percentage of TV households*

**Digital Television**

Digital television, by virtue of its channel capacity, is also capable of supporting Internet access. In the UK, where digital terrestrial has been launched already, penetration forecasts are as high as 34% for DTH/terrestrial combined. This will also become a significant market in other European countries. We further address the potential of TV to drive Internet access below.

**Mobile Telephony to Reach 50% Penetration**

Mobile telephony has provided one of the great growth stories in European markets, with penetration running at more than 30% in all the key markets.

We do not suppose that more than a small percentage of the current installed base of mobile phone users will become web-enabled, either through laptop PCs, handheld PDAs or a new generation of smart phones. A more cost-conscious consumer is currently driving mobile penetration, and revenue per head is falling. However, if only 10% of the current European installed base migrate to high-end web-

Table 6

**European Penetration Forecasts: Interactive Digital TV**

(% of homes)	1999E	2000E	2001E	2002E	2003E
Germany	1	2	4	5	6
France	10	12	13	14	15
Italy	2	3	4	5	5
Spain	4	6	7	8	8
UK	3	13	21	29	34
<b>Europe</b>	<b>2</b>	<b>4</b>	<b>7</b>	<b>9</b>	<b>12</b>

*E = Morgan Stanley Dean Witter Research Estimates*

*Source: Morgan Stanley Dean Witter Research*

Table 7

**European Penetration Forecasts: Mobile GSM Phones**

(%)	1997	1998	1999E	2000E	2001E
Germany	10.3	17.9	26.0	34.0	41.1
Italy	20.3	34.8	42.7	49.6	56.4
Norway	39.7	47.6	54.0	59.2	63.8
Spain	11.0	17.6	24.7	30.6	35.8
Sweden	38.3	52.5	61.0	68.5	74.2
France	10.1	18.0	24.6	29.6	34.0
UK	14.8	22.8	32.7	40.6	48.1

*E = Morgan Stanley Dean Witter Research Estimates*

*Source: Morgan Stanley Dean Witter Research*

enabled devices, this alone would add 12 million individuals to the universe of web users.

**PC Penetration Over 30%**

Such is the focus on other technologies that PC penetration is almost becoming the forgotten component of Internet growth. However, the PC is likely to remain the principal means of Internet access over the medium term. Jupiter estimates that home penetration of PCs will exceed 50% of homes by 2002.

**Forecasts**

The difficulties of estimating Internet penetration aside, most estimates agree that, from a base of about 34 million European users at the end of 1998, penetration will almost double over the next two to four years to 64 million users (22% penetration). We believe that, by 2003, 100 million European adults (35%) will be regular Internet users.

Table 8

**European Penetration Forecasts: PCs in Homes**

(%)	1997	1998	1999E	2000E	2001E	2002E
Denmark	45	45	50	50	55	60
Finland	44	44	50	56	63	69
France	22	24	26	28	31	34
Germany	37	41	46	52	58	65
Italy	18	19	20	22	23	25
Netherlands	45	49	53	58	64	70
Norway	40	47	53	53	60	67
Sweden	44	47	53	56	62	68
UK	31	35	39	44	49	55
<b>Average</b>	<b>31</b>	<b>34</b>	<b>37</b>	<b>41</b>	<b>46</b>	<b>51</b>

*E = Jupiter Estimates. Source: Jupiter*

### **The MSDW European Internet Penetration Model**

In order to estimate the penetration of the Internet in Western Europe, we have (for reasons explained above) focused on estimating the number of Internet users in Europe rather than online households or Internet connections made.

One key variable in this approach is the overlap between Internet access at home and at the office or educational institution. All macro-economic or demographic assumptions originate from publicly available sources.

We have made the following assumptions for non-business use (all figures compare 1998 and 2004 estimates).

- Households with PCs to rise from 29% to 48%.
- Households with dial-up modems to rise from 10.9 million to 46.6 million (7.5% of households to 31.2%).
- Households with broadband Internet access (cable or XDSL) to rise from 50,000 to 18.8 million (virtually 0% of households to 9%).

- Individual users accessing the Internet via mobile to rise from virtually zero to 15.4 million.
- Internet users per household to rise from 1.2 to 1.4.

We have then eliminated the overlap of home users and mobile subscribers by assuming that 20% of all GSM subscribers would also take up the additional Internet services offered by mobile operators.

In order to estimate access to the Internet from the office or university, we have assumed that currently 28% of all employees and students have direct access to the Internet and that this percentage will rise to 70% by 2004.

In a final step, we have eliminated the double-counting for home and business access. We assume that the average user currently accesses the Internet from 1.26 locations (based on IDC estimates), and that this figure would rise to 1.43 locations by 2004 because both home and business access to the Internet will be rolled out more broadly.

Table 9 provides the detailed forecast model.

Table 9

**European Internet Penetration Model**

	1997	1998	1999E	2000E	2001E	2002E	2003E	2004E
<b>1. Home/Private Internet Access Assumptions</b>								
<b>Total Population in Europe (m)</b>	<b>384.2</b>	<b>386.6</b>	<b>387.2</b>	<b>387.8</b>	<b>388.3</b>	<b>388.9</b>	<b>389.5</b>	<b>390.1</b>
<b>Adult Population (m)</b>	<b>288.0</b>	<b>288.4</b>	<b>288.9</b>	<b>289.3</b>	<b>289.7</b>	<b>290.2</b>	<b>290.6</b>	<b>291.0</b>
Growth (%)		0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Total Households in Europe (m)</b>	<b>145.0</b>	<b>145.6</b>	<b>146.1</b>	<b>146.7</b>	<b>147.3</b>	<b>147.9</b>	<b>148.5</b>	<b>149.2</b>
Growth (%)		0.4	0.3	0.4	0.4	0.4	0.4	0.4
Average Household Size in Europe	2.7	2.7	2.7	2.6	2.6	2.6	2.6	2.6
Internet Users per Household	1.1	1.2	1.2	1.3	1.3	1.4	1.4	1.4
<b>Dial-Up</b>								
Households with Dial-Up Connections (m)	7.3	10.9	16.4	24.0	31.8	38.5	42.6	46.6
Individual Users Accessing via Dial-Up Adult Population (%)	8.0 3	13.1 5	19.7 7	31.2 11	41.3 14	53.8 19	59.7 21	65.3 22
<b>Cable Modem &amp; xDSL</b>								
Households Internet Access via Cable Modems & xDSL (m)	0.0	0.0	0.2	2.0	4.0	8.0	10.4	13.4
<b>Total Households (%)</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1.0</b>	<b>3.0</b>	<b>5.0</b>	<b>7.0</b>	<b>9.0</b>
Individual Users Accessing via Cable & xDSL (m)	0.0	0.0	0.2	2.6	5.2	11.2	14.6	18.8
<b>Wireless</b>								
<b>Digital Mobile</b>								
Telephone Subscribers (m)	47.0	82.3	116.6	145.9	172.2	195.4	211.1	219.5
Adult Population (%)	16.3	28.5	40.4	50.4	59.4	67.3	72.6	75.4
Subscribers to Internet Services (%)	0.0	0.0	0.0	3.0	4.0	5.0	6.0	7.0
Individual Users Accessing via Mobile (m)	0.0	0.0	0.0	4.4	6.9	9.8	12.7	15.4
<b>Total</b>								
Gross Internet Users (m)	8.0	13.1	19.9	38.1	53.4	74.8	86.9	99.4
Overlap Home vs. Mobile Access (%)	0	0	0	20	20	20	20	20
Net Internet Users (m)	8.0	13.1	19.9	30.5	42.7	59.9	65.5	79.5
Adult Population (%)	3	5	7	11	15	21	24	27
<b>2. Business Internet Access</b>								
Employees with Internet Access (%)	19	28	40	50	55	60	65	70
Total European White-Collar Workers (m)	103.0	104.0	106.0	107.0	108.0	109.0	105.0	110.0
Employees with Internet Access (m)	19.6	29.1	42.0	53.0	58.9	64.8	70.9	77.0
<b>3. Overlap Home vs. Business Access</b>								
Access Locations per User	1.23	1.26	1.29	1.31	1.34	1.37	1.40	1.43
<b>4. Total Internet Users</b>								
<b>Adult Population (%)</b>	<b>8</b>	<b>12</b>	<b>17</b>	<b>22</b>	<b>26</b>	<b>31</b>	<b>35</b>	<b>38</b>

Source: Morgan Stanley Dean Witter Research Estimates

## Appendix I-b:

### Internet Forecasts

## The Major European Internet Markets

Steve Winram/Michael Steib

### Investment Summary

- **Adoption patterns and speed vary considerably among European countries**, even though use of the Internet is increasing rapidly.
- **Nordic countries have adopted the web faster than the rest of Europe** High PC penetration rates, advanced telecoms infrastructure reflect the US experience.

### No Homogeneous Pattern

**Patterns of Internet adoption across European countries differ widely** Within Europe, there is no homogeneous pattern and no single reason for different adoption rates. Every country has its own growth factors and obstacles.

The general issues affecting pan-European Internet growth are summarised in Table 1. A Forrester Research survey carried out in 1998 among European Internet users showed that telecom de-regulation was perceived to be the major factor driving Internet growth at the beginning of 1998. Over time, the survey indicated that Internet users expect to become less concerned about this issue. The survey also showed that, at the time of the interviews in 1998, people were concerned about infrastructure and regulatory issues, but expected these to be resolved over time, when 'soft' factors such as multilingual content and people's general attitude towards technology will become more important factors for Internet growth.

**Although use of the Internet is increasing rapidly, adoption patterns and speed vary considerably** among European countries. In terms of Web access and usage, the Nordic countries are clearly ahead of the rest of Europe, the UK, the Netherlands and Germany form a second tier, and the rest of Europe lags behind. This part of the report offers explanations for the factors that drive and impede Internet growth and opportunities in the major European countries.

Tables 2-3 show a number of statistics that we believe affect Internet penetration in the major European countries.

It is evident immediately why the use of the Internet has taken off much more rapidly in the US than in Europe: the IT sector overall represents a much more significant portion of GDP than in Europe as a whole and the penetration levels of PCs (the most widely used access device) are far greater in the US.

**The latter point also explains why the Nordic countries have been faster than the rest of Europe in adopting the web** as a way to communicate, do business and be entertained, as PC penetration there is above the EU average. There is evidence to suggest that this creates a chain reaction, as consumers start to buy PCs primarily to be able to use the Internet. Another important factor is the telecommunications infrastructure, which in the Nordic countries generally is more advanced than in some of their larger neighbours: the percentage of digital main lines that form the backbone of the Internet, and which are the key to speedy data transmission, is significantly above the norm. The only outlier is France, which invested early in digital lines in order to promote the Minitel.

In terms of the more sophisticated access technologies, the Nordic countries have also been at the forefront of adopting mobile telephony, with penetration rates significantly higher than in the rest of Europe. It is probably no coincidence that the two proponents of the European digital mobile standard (GSM) are based in the countries with the highest mobile penetration: Ericsson of Sweden and Nokia of Finland.

Table 1

### Issues Affecting European Internet Growth

(% of Respondents)	1998	2001E
Telecom De-Regulation	68.0	18.0
Attitudes to Technology	45.0	25.0
Infrastructure	44.0	21.0
Multilingual and Multicultural Demands	33.0	26.0
Access Cost	28.0	9.0
EU Regulatory Environment	20.0	16.0
National Regulatory Environment	19.0	18.0
PC Penetration	19.0	10.0

*E = Forrester estimates*

*Source: Forrester*

### Country-by-Country Background

While we have set ourselves the objective of treating the Internet not as a national but a pan-European phenomenon, it is important to highlight the main drivers of Internet growth and the main obstacles to its more rapid spread in individual countries.

#### Germany

##### Germany is the largest economy and the largest telecommunications and Internet market in Europe

Despite some very negative public debates about security in the early days, the Internet market has developed strongly,

due partly to new government policies aimed at promoting e-commerce. Germany has had a strong online community for quite some time, due to the presence of T-Online, Deutsche Telekom's online service provider, which now has over 3,000,000 subscribers. An increasing amount of retail shopping and banking is done over the Internet.

Germany's communications infrastructure is characterised by a high proportion of fibre optic and broadband cable. Eastern Germany has the most modern telecom network in the world, as it has been re-built from scratch since unification. The telecoms market is one of the most competitive in Europe, with 200 operators owning a telecom licence.

Table 2

### Demographic Overview and IT Penetration by Country, 1997

	Population (000)	Households (000)	IT Spending/GDP (%)	PC Penetration <sup>1</sup>	PC Penetration <sup>2</sup>
Western Europe	384,473	153,740	2.34	55	18
Germany	82,200	37,339	2.13	51	22
France	58,500	23,545	2.51	54	18
UK	58,900	24,600	3.36	57	22
Italy	57,380	20,482	1.45	46	10
Spain	39,280	12,160	1.41	50	8
Belgium & Luxembourg	10,603	4,265	2.38	52	15
Denmark	5,280	2,403	2.96	68	34
Finland	5,130	2,130	2.64	63	29
Netherlands	15,700	6,489	2.92	64	30
Norway	4,400	2,035	2.65	110	36
Sweden	8,900	4,078	3.45	85	35
Switzerland	7,100	3,007	3.19	83	34
US	270,933	101,042	4.53	105	47

1. Business PCs per 100 white-collar workers.

2. PCs per 100 people

Source: EITO, IDC, OECD, The Economist

Table 3

### Telecommunications Penetration per Country, 1997

	Main Telecom Lines per 100 People	Mobile Subscribers per 100 People	CATV Subscribers/ Households (%)	Digital Main Lines/ Total Main Lines (%)	Internet Users/ Population (%)
Western Europe	52.0	14.2	28.2	95.4	8.8
Germany	55.2	10.0	49.5	100.0	8.7
France	57.7	9.9	9.8	100.0	4.8
UK	53.6	14.2	9.8	97.0	13.9
Italy	44.6	20.4	0.3	93.5	3.7
Spain	40.4	11.0	13.5	80.7	5.0
Belgium & Luxembourg	47.6	9.9	88.7	78.9	7.7
Denmark	62.9	28.2	43.3	85.4	18.0
Finland	55.8	49.1	39.1	100.0	30.8
Netherlands	56.5	10.8	89.2	86.8	12.8
Norway	60.9	38.3	35.8	60.9	30.5
Sweden	68.5	35.8	47.5	99.0	29.3
Switzerland	66.2	14.7	79.5	79.5	14.1
US	64.4	55.3	65.0	85.6	36.0

Source: EITO, IDC, Computer Industry Almanac

### Characteristics and Drivers

- Largest telecom and Internet market in Europe.
- Complete telecom liberalisation.
- Over 200 telecom service providers.
- Interconnection disputes between Deutsche Telekom, AOL and other telecom operators regarding access fees to the DT network.
- Largest ISDN market in the world.
- Digital cable TV lagging behind (only available in two German states); Deutsche Telekom and o.tel.o (now part of Mannesmann) are the biggest operators in terms of the number of subscribers.
- Kirch, CLT-Ufa and Deutsche Telekom joint venture to develop digital cable TV.
- Deutsche Telekom owns the largest cable network company with 12 million subscribers, but has said it will break it up and sell it.

### The UK

**The telecoms market in the UK was the first in Europe to be liberalised** The regulator, OFTEL, decided from the beginning to encourage competition at the infrastructure level, which resulted in the emergence of up to 150 service providers, most of which own some form of infrastructure. This is an entirely different approach to that of regulation in Continental Europe, where competition exists primarily at the 'front end' through a very competitive re-seller market, while the PTT retains ownership of the infrastructure. The UK Internet market is moving rapidly, however, with non-telecom ISPs such as Dixons, Virgin and Tesco providing free access to the Web. Another significant factor that should drive Web usage is the high penetration of digital mobile telephony and cable television. BT is probably the most 'transformed' of the former public telephone companies, partly because it has been privatised longer than its European competitors. Its February 1999 announcement that it will team up with Microsoft to develop mobile Internet access technologies shows that it is positioning itself for future growth more aggressively than its peers.

### Characteristics and Drivers

- There is strong overall market growth, but price erosion in fixed-line telephony.
- Even faster growth in mobile telephony is resulting in the highest non-Scandinavian penetration.
- There is fiercely competitive Internet access — the free-access model was pioneered in the UK.
- Cable TV networks have mostly been upgraded to two-way communication, because they were designed originally for telephony as well as television.
- The English language has helped the UK benefit from the entire Internet, not just from local content.
- The UK has a fiercely competitive telecoms market overall; more than 30% of households have a real choice of telecom operator, which is unique in Europe.
- BT still has a 90% share of local traffic, but, due to the emergence of alternative infrastructure-based carriers, its long-distance share has been reduced to 62%.
- ISDN lines contributed to most of the increase in the number of business lines in 1997 and 1998.

### France

**France zoomed into cyberspace in the early 1980s with its Minitel terminals** As a result, French consumers and businesses have been more sceptical about the merits of the Internet. Minitels are easy-to-use terminals attached to a telephone, which offer access to some 25,000 databases containing services such as telephone directories, train timetables and bill payment schemes. Despite its antiquated navigation software, it has managed to retain some 17 million users because of its simplicity, its use of the French language and its bill payment features, which are more complicated to use than those of the Internet. More recently, however, there are signs that Internet growth will accelerate. In order to promote the Internet, the French government has planned an initiative to provide online services to all schools by 2000. A new regulatory authority has been set up (*Autorité de Régulation des Télécommunications*, or ART), whose mission includes providing a level playing field for new entrants in the telecoms market.

### Characteristics and Drivers

- A mobile phone services and equipment boom in 1998 is generally expected to continue.
- Demand for ISDN and network services is generally expected to increase.
- The government granted several fixed-line and mobile licences in 1997 and 1998, and is considering proposals for competition in local services.
- Minitel continues to be popular.
- There is high penetration of digital telephony.
- The cable TV network is partly owned by France Télécom.

Suez Lyonnaise and Vivendi are the other two major cable operators.

### Nordic Countries

**The Nordic countries have generally been early adopters of technology**, and data presented in this report indicate that they are clearly ahead of the rest of Europe in terms of embracing the Internet. This is due to factors such as early liberalisation of the telecoms market and high GDP. High mobile phone penetration (due to geography and demographics) should foster use of mobile Internet access, not least because Nokia and Ericsson, the two leading GSM manufacturers, are based in these countries.

### Characteristics and Drivers

- The highest mobile penetration in Europe.
- Mobile growth continues to be strong, despite competition.
- High PC penetration.
- High GDP per capita.
- Competitive telecom services market.

### A Case Study: A Wireless World — Is This What Cyberspace Looks Like?

Bill Gates once described the Nordic countries in Europe as a “test-lab for new technologies” because of what he considered a unique platform for technology pilot schemes: small countries with high GDPs and highly-skilled people with a friendly attitude towards new technologies. Not surprisingly, these characteristics have, as we outline in this report, led to these countries leading the way in terms of GSM penetration, PC penetration and Internet usage. Nokia and Ericsson, two of the world’s leading wireless equipment manufacturers, are based there.

It is therefore not surprising that this “test-lab” generates highly-advanced Internet applications, some of which may take off faster in Europe than in the US given Europe’s high GSM penetration. We cover the Wireless Application Protocol (WAP) and other next-generation technologies extensively in this report. One application of WAP was announced recently by Nokia, Visa International and MeritaNordbanken: wireless secure payment systems. The three companies have joined forces to launch a service to MeritaNordbanken’s customers that enables them to make payments via their mobile phone for purchases over the Internet or at retailers’ points of sale. The project will be

started later this year in Finland and Sweden and broad commercial availability is planned for early 2000.

The potential applications are unlimited: using for example a Nokia 7110 phone (Nokia’s first fully WAP-compliant handset), customers will be able to virtually jump the queues at retail check-outs, at train ticket sales offices and post offices; they will be able to order theatre tickets online while on the road without having to wait in call queues; and they will be able to purchase a can of coke at vending machines without searching for spare change.

At the same time, Ericsson has announced a new solution called WebOnAir that increases the speed of wireless download of web pages to mobile phones and lap top computers by up to four times. This represents a breakthrough in the convergence of wireline and wireless Internet access, particularly for graphics-intensive sites, which is expected to further increase the market for wireless IP services. Mannesmann is the first operator to install WebOnAir.

Technology applications like these may appear to be gimmicks now, but they may also change the way we work, the way we obtain information and the way we shop. In that case, the test-lab comparison is clearly dated.

## Appendix I-c:

### Internet Forecasts

## Internet Penetration by Country

### Investment Summary

- We estimate that Internet penetration in 2000 will be highest among the Nordic Countries — Finland,

Sweden and Norway, and Denmark.

- We estimate that Internet penetration in 2000 will be lowest in Greece, Portugal and France.

Table 1

### The European Internet Market: Penetration by Country

	1995	1996	1997	1998	2000E
<b>Austria</b>					
Population (estimated m)	8.00	8.05	8.09	8.13	8.15
Computers in Use (million)	1.33	1.63	1.98	2.36	3.27
Internet Hosts (000)	59.00	95.00	125.00	170.00	350.00
Internet Users (000)	201.00	304.00	375.00	544.00	1,575.00
Internet Users/Hosts	3.40	3.20	3.00	3.20	4.50
Internet Users/1,000 People (%)	2.50	3.70	4.60	6.60	19.30
<b>Belgium</b>					
Population (estimated m)	10.09	10.12	10.15	10.17	10.19
Computers in Use (million)	1.89	2.18	2.51	2.90	4.06
Internet Hosts (000)	34.60	75.70	123.00	225.00	490.00
Internet Users (000)	118.00	242.00	381.00	788.00	2,352.00
Internet Users/Hosts	3.40	3.20	3.10	3.50	4.80
Internet Users/1,000 People (%)	1.10	2.30	3.70	7.70	23.00
<b>Denmark</b>					
Population (estimated m)	5.24	5.27	5.30	5.33	5.37
Computers in Use (million)	1.31	1.54	1.82	2.11	2.75
Internet Hosts (000)	58.20	124.00	193.00	280.00	560.00
Internet Users (000)	204.00	420.00	656.00	952.00	1,904.00
Internet Users/Hosts	3.50	3.40	3.40	3.40	3.40
Internet Users/1,000 People (%)	3.80	7.90	12.30	17.80	35.40
<b>Finland</b>					
Population (estimated m)	5.09	5.11	5.13	5.15	5.17
Computers in Use (million)	1.32	1.61	1.93	2.28	2.97
Internet Hosts (000)	225.00	325.00	510.00	605.00	850.00
Internet Users (000)	731.00	975.00	1,275.00	1,573.00	2,508.00
Internet Users/Hosts	3.25	3.00	2.50	2.60	2.95
Internet Users/1,000 People (%)	14.30	19.00	24.80	30.50	48.50
<b>France</b>					
Population (estimated m)	58.00	58.26	58.52	58.80	59.13
Computers in Use (million)	9.98	11.74	13.70	16.02	21.84
Internet Hosts (000)	160.00	250.00	405.00	620.00	1,450.00
Internet Users (000)	544.00	800.00	1,296.00	2,790.00	8,700.00
Internet Users/Hosts	3.40	3.20	3.20	4.50	6.00
Internet Users/1,000 People (%)	0.90	1.30	2.20	4.70	14.70
<b>Germany</b>					
Population (estimated m)	81.34	81.50	81.67	82.08	82.08
Computers in Use (million)	14.20	16.33	18.90	22.02	30.58
Internet Hosts (000)	534.00	838.00	1,220.00	1,660.00	3,350.00
Internet Users (000)	1,869.00	2,765.00	4,148.00	7,138.00	21,775.00
Internet Users/Hosts	3.50	3.30	3.40	4.30	6.50
Internet Users/1,000 People (%)	2.20	3.30	5.00	8.60	26.50

(Continued...)

Table 1 (Continued)

**The European Internet Market: Penetration by Country**

	1995	1996	1997	1998	2000E
<b>Greece</b>					
Population (estimated m)	10.46	10.53	10.60	10.66	10.75
Computers in Use (million)	0.51	0.64	0.79	0.95	1.40
Internet Hosts (000)	9.90	19.20	34.00	66.00	150.00
Internet Users (000)	35.00	63.00	116.00	238.00	615.00
Internet Users/Hosts	3.50	3.30	3.40	3.60	4.10
Internet Users/1,000 People (%)	0.30	0.60	1.00	2.20	5.70
<b>Ireland</b>					
Population (estimated m)	3.56	3.58	3.60	3.62	3.65
Computers in Use (million)	0.67	0.80	0.94	1.10	1.49
Internet Hosts (000)	16.90	31.00	46.60	66.00	135.00
Internet Users (000)	59.00	102.00	158.00	264.00	648.00
Internet Users/Hosts	3.50	3.30	3.40	4.00	4.80
Internet Users/1,000 People (%)	1.60	2.80	4.40	7.20	17.70
<b>Italy</b>					
Population (estimated m)	56.83	56.82	56.80	56.78	56.69
Computers in Use (million)	6.70	7.86	9.25	11.01	17.48
Internet Hosts (000)	84.80	180.00	304.00	510.00	1,250.00
Internet Users (000)	297.00	594.00	1,034.00	2,142.00	7,500.00
Internet Users/Hosts	3.50	3.30	3.40	4.20	6.00
Internet Users/1,000 People (%)	0.50	1.00	1.80	3.70	13.20
<b>The Netherlands</b>					
Population (estimated m)	15.48	15.57	15.65	15.73	15.88
Computers in Use (million)	3.32	3.87	4.55	5.35	7.44
Internet Hosts (000)	196.00	310.00	450.00	595.00	1,210.00
Internet Users (000)	666.00	992.00	1,350.00	1,964.00	4,235.00
Internet Users/Hosts	3.40	3.20	3.00	3.30	3.50
Internet Users/1,000 People (%)	4.30	6.30	8.60	12.40	26.60
<b>Norway</b>					
Population (estimated m)	4.35	4.37	4.39	4.42	4.46
Computers in Use (million)	1.13	1.35	1.63	1.93	2.55
Internet Hosts (000)	99.00	197.00	347.00	420.00	565.00
Internet Users (000)	347.00	650.00	1,076.00	1,344.00	2,119.00
Internet Users/Hosts	3.50	3.30	3.10	3.20	3.75
Internet Users/1,000 People (%)	7.90	14.80	24.50	30.40	47.50
<b>Portugal</b>					
Population (estimated m)	9.91	9.92	9.92	9.93	9.90
Computers in Use (million)	0.74	0.90	1.09	1.30	1.81
Internet Hosts (000)	13.10	30.00	48.00	64.00	185.00
Internet Users (000)	46.00	99.00	163.00	256.00	925.00
Internet Users/Hosts	3.50	3.30	3.40	4.00	5.00
Internet Users/1,000 People (%)	0.40	0.90	1.60	2.50	9.30
<b>Spain</b>					
Population (estimated m)	38.98	39.03	39.08	39.13	39.21
Computers in Use (million)	3.47	4.16	5.03	5.96	8.06
Internet Hosts (000)	60.00	127.00	205.00	380.00	950.00
Internet Users (000)	210.00	445.00	923.00	1,976.00	5,225.00
Internet Users/Hosts	3.50	3.50	4.50	5.20	5.50
Internet Users/1,000 People (%)	0.50	1.10	2.30	5.00	13.30

(Continued...)

Table 1 (Continued)

**The European Internet Market: Penetration by Country**

	1995	1996	1997	1998	2000E
<b>Sweden</b>					
Population (estimated m)	8.80	8.84	8.87	8.89	8.94
Computers in Use (million)	2.19	2.70	3.29	3.95	5.15
Internet Hosts (000)	168.00	273.00	388.00	560.00	1,070.00
Internet Users (000)	655.00	1,092.00	1,785.00	2,576.00	4,280.00
Internet Users/Hosts	3.90	4.00	4.60	4.60	4.00
Internet Users/1,000 People (%)	7.40	12.30	20.10	28.90	47.80
<b>Switzerland</b>					
Population (estimated m)	7.14	7.19	7.23	7.26	7.29
Computers in Use (million)	1.50	1.79	2.14	2.55	3.45
Internet Hosts (000)	96.30	153.00	216.00	295.00	630.00
Internet Users (000)	337.00	504.00	724.00	1,003.00	2,520.00
Internet Users/Hosts	3.50	3.30	3.35	3.40	4.00
Internet Users/1,000 People (%)	4.70	7.00	10.00	13.80	34.50
<b>The UK</b>					
Population (estimated m)	58.49	58.67	58.83	58.97	59.25
Computers in Use (million)	12.62	14.51	16.54	19.05	26.21
Internet Hosts (000)	507.00	820.00	1,195.00	1,760.00	3,550.00
Internet Users (000)	1,927.00	3,280.00	4,900.00	8,096.00	17,040.00
Internet Users/Hosts	3.80	4.00	4.10	4.60	4.80
Internet Users/1,000 People (%)	3.20	5.50	8.30	13.70	28.70

Source: Computer Industry Almanac

## Appendix I-d:

### Internet Forecasts

## Regional Host Growth on the Internet

Table 1  
Regional Host Growth on the Internet – Jan 1995 to Jan 1999

	Jan-95	Jan-96	Jan-97	Jan-98	Jan-99	Jan 1999 Y/Y Growth Rate (%)
North America <sup>1</sup>	3,364,988	6,426,293	10,714,233	21,462,464	31,607,737	47
<b>Western Europe</b>	<b>985,156</b>	<b>1,958,864</b>	<b>3,077,493</b>	<b>4,526,859</b>	<b>6,362,633</b>	<b>41</b>
Asia/Pacific	339,369	727,540	1,512,664	2,426,612	3,262,055	34
Eastern Europe	34,808	71,666	184,783	284,610	435,209	53
Africa/Middle East	42,934	83,490	152,774	212,984	292,610	37
Latin America	11,772	48,239	135,561	196,662	424,263	116

1. North America includes all .us and .ca top-level domain names as well as all .com, .net, .edu, .org, .gov, and .mil top-level domain names.

Note. Network Wizards' methodology for data collection changed starting with the January 1998 survey.

Source: Network Wizards (www.nw.com)

Investment Summary 'Network Wizards' survey of Internet hosts (or computers connected to the Internet) indicates strong growth in European Internet usage.

**Europe is the second largest source of Internet users in the world** Western Europe is the second largest region in the world in terms of Internet hosts, which are computers connected to the Internet (via full or part-time, direct or dialup connections). As of January 1999, 6.4 million hosts were in Western Europe, compared to 3.3 million in the Asia/Pacific region. The number of Internet hosts in North America is approximately 31.6 million. This number includes hosts with .com, .edu., .org, .mil, and .net domains (domains are the names representing any record that exists on the Internet) which likely inflates the number of North American hosts. However, we believe that a large percentage of these domains are North American-based.

Growth in Internet hosts has been particularly strong in Eastern Europe (up 53% Y/Y to 400K), while Western Europe has also shown strong growth (up 41% Y/Y).

Table 2  
Top 20 Internet Geographic Domains – Jan 1999

Rank	Domain Code	Country	Total No. Hosts	Percent of Top 20	Jan 99 Y/Y Growth Rate
1.	JP	Japan	1,687,534	14%	44%
2.	US	United States	1,562,391	13%	45%
3.	UK	United Kingdom	1,423,804	11%	44%
4.	DE	Germany	1,316,893	11%	32%
5.	CA	Canada	1,119,172	9%	33%
6.	AU	Australia	792,351	6%	19%
7.	NL	Netherlands	564,129	5%	48%
8.	FI	Finland	546,244	4%	21%
9.	FR	France	488,043	4%	46%
10.	SE	Sweden	431,809	3%	35%
11.	IT	Italy	338,822	3%	39%
12.	NO	Norway	318,631	3%	11%
13.	TW	Taiwan	308,676	2%	75%
14.	DK	Denmark	279,790	2%	76%
15.	ES	Spain	264,245	2%	56%
16.	CH	Switzerland	224,350	2%	95%
17.	BR	Brazil	215,086	2%	84%
18.	KR	Korea	186,414	2%	53%
19.	BE	Belgium	165,873	1%	89%
20.	RU	Russia	147,352	1%	57%

The United States Domain Code does not include Domain codes ending in: .com, .net, .edu, .org, .mil.

Source: Network Wizards (www.nw.com)

**The largest European countries in terms of Internet users are the UK and Germany** Over 15 European countries now have over 100,000 Web hosts, with the largest host countries being the UK (1.4 million), Germany (1.3 million), the Netherlands (600K), Finland (500K) and France (500K). Among these countries, annual growth in

Internet hosts has been strongest in the Netherlands (up 48% Y/Y to January 1999), France (up 46%) and the UK (up 44%).

Network Wizards, the source of this data, is a leading authoritative source on Internet usage, having conducted a twice-yearly Domain Survey over the last several years.

## Appendix I-e:

### Internet Forecasts

## Who Uses the European Internet?

Steve Winram/Michael Steib

### Investment Summary

- **Survey data of Internet usage need to be treated carefully**, as they can overstate actual usage significantly.
- **Younger people use the Internet more than older people**, providing a sound foundation for future Internet growth. Older people use the Internet more than might be expected intuitively though.
- **High income households are more likely to use the Internet than low income households** 50% of Internet users are in the high income bracket.
- **Multiple access to the Internet is critical to understanding its capability** The ability to use it at both home and work differentiates it from other media.
- **Surveys indicate that Internet usage affects TV watching the most** TV and Internet technologies are converging, however.

### A Qualitative Understanding Is Important

The statistics of Internet market size and growth are critical to assessing its impact on telecommunications providers and on the software and hardware supplier markets. Qualitative analysis of the impact of the Internet on broader behaviour amongst consumers and business users is equally important in understanding how purchasing behaviour may evolve, and how media consumption and media spending habits may change.

This section looks at the existing state of knowledge about Internet users in Europe. Who they are, how old or young they are, where they access the Internet, the time they spend doing so, the substitution effects of using the Internet, what consumers buy on the Internet and how much they spend.

In the previous section, we estimated that about 34 million European adults, or approximately 12% of the adult population, use the Internet. This compares to a 36% penetration rate amongst US adults.

The aim of this section is to look at behavioural attributes of net users, not to produce estimates of market size. The survey data on which these data are based systematically overstate Internet usage. A recent study by Continental Research, for example, found that 25% of UK adults claim ever to have used the Internet. Current users (defined as those who use the Internet once a month or more often) make up only 16% of the population. Survey data could therefore exaggerate actual usage by up to 50%.

### What Is Internet Usage?

Internet usage is defined here as usage of the Internet by an individual at least quarterly, excluding the use of e-mail.

Access to the Internet takes place in different locations: home, work, educational institutions and other locations (such as Internet cafés). The IDC survey of May 1998 concluded that 22.1% of the European population covered in its seven-country survey access the Internet at least quarterly, but this global estimate should be treated as a base only for comparison, and not as an estimate of the number of European Internet users. On a pan-European basis (using our 16-country definition), this equates to a user population of 63 million adults, which is clearly too high. For benchmark comparisons, though, the figure is useful.

### Demographics

#### Gender

Males are the dominant users of Internet technology, at 64% of respondents surveyed in the IDC report, a finding corroborated by Continental Research's February 1999 survey of the UK. This implies that about 30% of all men claim to use the Internet in Europe, compared with 16% of women. Research points to the fact that, as Internet usage and penetration grows, the proportion of women using the Internet increase (in Sweden the split is 60:40, for instance).

#### Age

As in the US, the survey's findings on the age profile of European Internet users does not support the popular image

of young, single, male participants, but show that 64% of surveyed users are aged 25 or more. This reflects the increasing importance of access via the workplace. Indexing users against population, however, age profiles still show that the young are the heaviest users of the Internet.

In the IDC study, some 50% of 15- to 19-year olds claimed to be Internet users, compared with the benchmark 22.1% of the adult population. Usage remains above average in the age groups from 20 to 39. In the 40 to 54 age range, the claimed population of users remained surprisingly high at 20% plus (again bearing in mind the benchmark 22.1% of the adult population who claim to be users). Thereafter, usage amongst the population tails off rapidly. Two useful results come from this analysis. Usage amongst older age groups is greater than might intuitively be expected, and the high level of usage among younger age groups should provide the engine for future Internet growth as they take their Internet usage into their own homes and the workplace. Precedents in other media include commercial radio in the UK, where there is a significant bias to listening amongst the young.

**Class and Income**

The IDC household survey examined respondents by three income groups: \$0-25,000, \$25,000-50,000 and \$50,000+. The survey found that individuals living within high-income households are about twice as likely to be Internet users (37%) as individuals living in medium-income households

(19%), and nearly three times as likely as low-income households (13%), compared with the benchmark penetration of 22.1% of all individuals.

Put another way, 50% of Internet users belong to households in the higher income bracket. While none of these results may be regarded as surprising, they confirm the broad demographic profile of Internet users as one likely to be attractive to vendors of services and goods and to advertisers.

**Internet Access Locations**

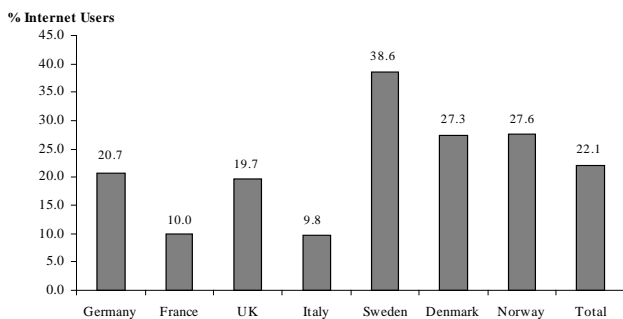
The home is the primary location for Internet access, followed by work and educational establishments.

Just under half of European Internet users, 47.9%, access the network from home, slightly over 40% from work and 28.8% via an educational institution. In the Continental Research study for the UK, only 52% of respondents were reported as gaining access from home, 32% from work and 24% from educational institutions.

Converting IDC's base of 22.1% of individuals who are Internet users reveals that only 10.6% of the statistical population are home users and that 9.0% access the Internet via work.

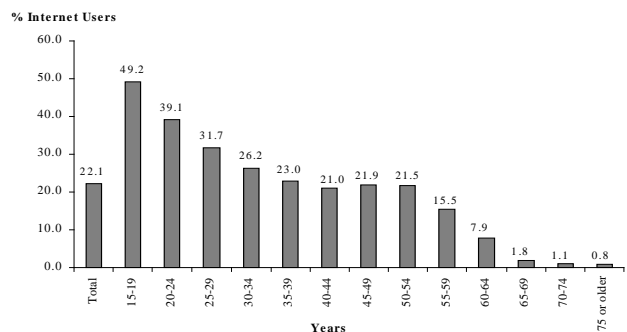
The country differences noted earlier are also present here, with people in Nordic countries being bigger users at work and at home than in France or Italy.

Figure 1  
**European Internet Users by Country, May 1998**  
(% of Respondents)



Source: IDC European Internet Household Survey, May 1998

Figure 2  
**European Internet Users by Age Group, May 1998**  
(% of Respondents)



Source: IDC European Internet Household Survey, May 1998

Table 1

**European Internet Users by Household Income and Country, May 1998**

(% of respondents)	Germany	France	UK	Italy	Sweden	Denmark	Norway	Total
Low Income	15.0	4.0	10.0	4.0	32.0	13.0	16.0	13.0
Medium Income	17.0	8.0	15.0	11.0	33.0	22.0	26.0	19.0
High Income	30.0	22.0	38.0	25.0	51.0	41.0	45.0	37.0
<b>Total Sample</b>	<b>21.0</b>	<b>10.0</b>	<b>20.0</b>	<b>10.0</b>	<b>39.0</b>	<b>27.0</b>	<b>28.0</b>	<b>22.0</b>

Source: IDC European Internet Household Survey, May 1998

Table 2

**Locations Used by Europeans to Access the Internet, by Country, May 1998**

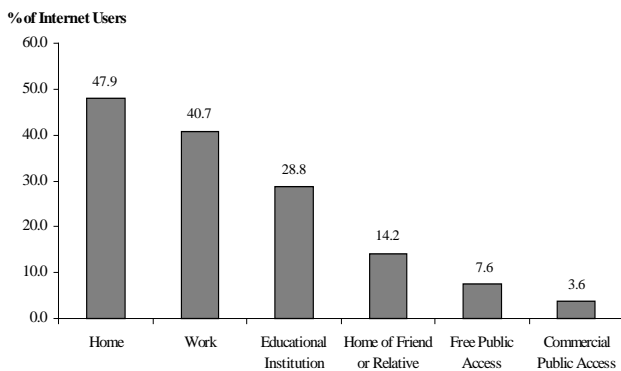
(% of respondents)	Germany	France	UK	Italy	Sweden	Denmark	Norway	Total
Home	10.0	4.0	10.0	3.0	23.0	12.0	12.0	11.0
Home of Friend or Relative	2.0	3.0	3.0	2.0	4.0	4.0	4.0	3.0
Work	10.0	4.0	8.0	3.0	17.0	9.0	11.0	9.0
Educational Institution	3.0	3.0	6.0	2.0	11.0	10.0	9.0	6.0
Free Public Access	1.0	2.0	2.0	0.0	2.0	4.0	1.0	2.0
Commercial Public Access	0.0	2.0	1.0	1.0	1.0	0.0	0.0	1.0
Any Location <sup>1</sup>	21.0	10.0	20.0	10.0	39.0	27.0	28.0	22.0

1. The columns add up to more than the 'any location' values because users have multiple access locations

Source: IDC European Internet Household Survey, May 1998

Figure 3

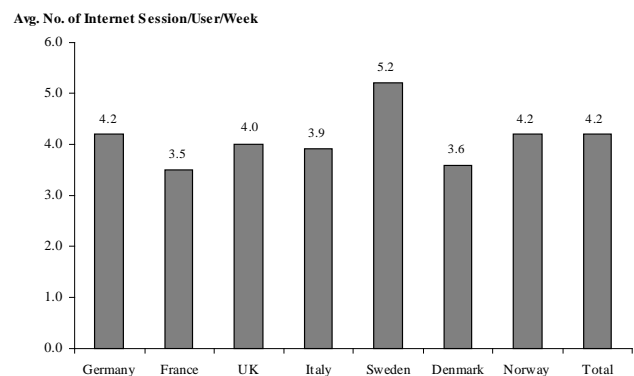
**Locations Used by Europeans to Access the Internet, May 1998**



Source: IDC European Internet Household Survey, May 1998

Figure 4

**Average Number of Internet Sessions per Week in Europe, By Country, May 1998**



Source: IDC European Internet Household Survey, May 1998

Multiple access to the Internet is critical to understanding the Internet's capability. The ability to use the Internet at both home and work is an important differentiator from other media. It will also be a core influence on the nature and type of purchasing decision that the Internet could be used for. The majority of users, 66%, access the Internet from only one location, but 26% have two access points and 8% use three or more. This is one of the primary reasons why quantifying Internet penetration in the general population is so difficult.

In the Continental Research survey, it is interesting to note that, among regular users, the proportion accessing the Internet from more than one location dropped from 35% in 1997 to 13% in 1998.

### Frequency of Use

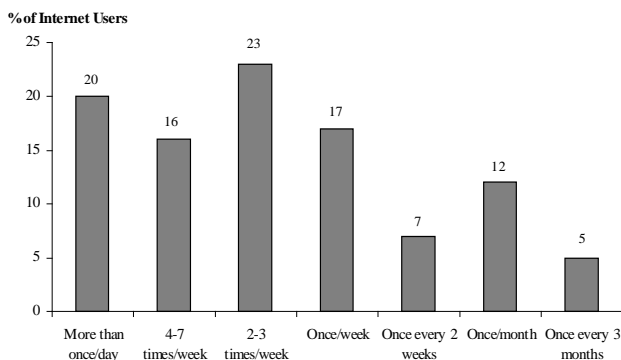
The average European user accesses the Internet around 4.2 times a week, according to IDC. Heavy users access the net more than once a day (that is to say, more than seven times a week), 20% claim to be heavy users (more than once a day) and 39% access the Internet between twice and seven times a week.

The Continental Research survey for the UK found a similar usage pattern, with approximately 60% of respondents claiming to access the Internet once a week or more.

Internet usage is influenced heavily by the access location. Those who access the Net at work do so far more frequently than others. Ratings, Inc. shows that the average web user spends over 16 hours a month online.

Figure 5

### Internet Usage Frequencies in Europe, May 1998



Source: IDC European Internet Household Survey, May 1998

### The Impact of Internet Usage on Other Activities

One of the most critical effects of Internet usage is the time it takes away from other activities. Evidence from the US is building a picture of high levels of usage. Data from Net Ratings Inc. shows that the average web user spends over 16 hours a month online.

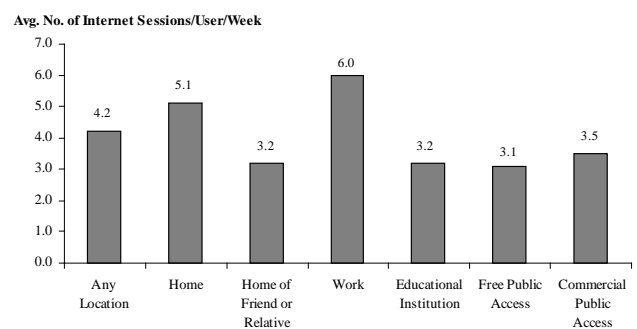
The average time spent per Internet session is 35 minutes, during which time the average user looks at approximately one page a minute. Evidence of these levels of usage is backed up by AOL, which now has over 18 million subscribers. During the third quarter of 1998, AOL reported that its average user was online for 47 minutes, up from 40 minutes in the third quarter of 1997.

Continental Research's study shows that television viewing is the activity most at risk from Internet usage. A massive 34% of respondents to Continental's survey reported that they were watching less television as a result of using the Internet. Video watching is the activity next most affected, down 22% according to this survey. Interestingly, there appeared to be a positive correlation between Internet usage and radio listening.

In the US, the information technology consultancy Yankee Group has also found a negative correlation between Internet usage and television viewing. According to its survey, the percentage of consumers characterised as moderate to heavy viewers (those watching six or more hours of TV per day) declined steadily among homes using computers and the Internet.

Figure 6

### Average Number of Internet Sessions per European User per Week by Access Location, May 1998



Source: IDC European Internet Household Survey, May 1998

While 32% of US households fall in the moderate to heavy viewer category, the percentage falls to 27% in homes with PCs and to 26% among online subscribers. The proportion of daily PC users claiming to be heavy TV viewers drops to 17%. Among homes reporting daily Internet usage, the proportion falls again to 9%.

Media Metrix, a US measurement company, found that, out of 35 million US households with Windows PCs, 17.3 million have a TV set in the same room. And 16.4 million households (95% of the subset) claim to have the TV on at the same time as the PC.

This obviously begs interesting questions about whether people want to be near the TV set when they are accessing the web. It is possible that the impact of Internet activity on TV viewing will endure only while the Internet is not available on the TV. Equally, the increasingly TV-like attributes of the Internet could pull the other way.

### Commerce: Net Transactions and Expenditure

The IDC survey found that a relatively small proportion of the European population actually used the Internet for buying goods and services — only around 12% of Internet users.

Since only 22% of Europeans are currently users, this means that only about 2.7% of Europeans use the Internet for shopping or purchasing.

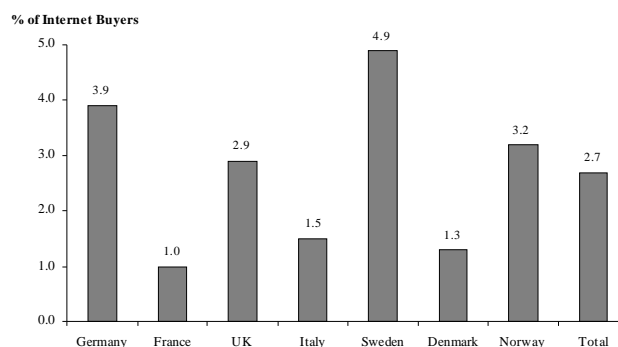
### Average Spending Per Buyer

Table 4 brings out two points. First, the average European Internet purchaser is older than the average Internet user. Second, he or she spends about \$219 a quarter on products or services. In fact, 55% of users claim to spend between \$25 and \$250 per quarter over the Internet. This high-end usage could reflect the purchase of computer equipment or airline tickets.

The survey shows that the home is the location of choice for Internet shopping. Around 17% of home users are buyers, but only 12.1% of the total Internet population.

Figure 7

### Percentage of All Respondents That Are Internet Shoppers, by Country, May 1998



Source: IDC European Internet Household Survey, May 1998

Table 3

### Impact of Internet Usage on Other Behaviour

(%)	Time Spent Since Started Using the Internet			Net Change
	More	Less	Same	
Watching TV	11.0	34.0	55.0	-23.0
Watching Videos	5.0	27.0	68.0	-22.0
Making Phone Calls	15.0	34.0	51.0	-19.0
Sleeping	9.0	24.0	67.0	-15.0
Reading Magazines	9.0	23.0	68.0	-14.0
Reading Newspapers	19.0	14.0	68.0	5.0
Listening to the Radio	25.0	13.0	63.0	12.0

Source: Continental Research

Table 4

**Internet Buyers' Characteristics, by Country**

	Internet Buyers as a Proportion of:		Average Age of:		Average No. of Internet Sessions per Week		Average Spent on Internet Shopping in the Past 3 Months (\$)
	Internet Users (%)	All Respondents (%)	Internet Buyers (years)	All Internet Users (years)	Internet Buyers	All Internet Users	
Germany	18.7	3.9	35.5	33.8	5.1	4.2	187
France	10.0	1.0	37.6	30.7	4.3	3.5	36
UK	14.6	2.9	38.1	34.9	7.0	4.0	419
Italy	15.3	1.5	40.3	33.0	4.4	3.9	97
Sweden	12.7	4.9	35.4	34.9	7.5	5.2	140
Denmark	4.7	1.3	35.9	31.4	7.5	3.6	244
Norway	11.7	3.2	31.6	31.4	6.6	4.2	354
<b>Total</b>	<b>12.1</b>	<b>2.7</b>	<b>35.7</b>	<b>33.1</b>	<b>6.4</b>	<b>4.2</b>	<b>219</b>

Source: IDC European Internet Household Survey, May 1998

## Appendix II-a:

### Internet Structure

## European Internet Infrastructure

Steve Winram/Michael Steib

### Investment Summary

- **Telecoms operators, alternative network operators and other Internet Service Providers (ISPs) own and manage the Internet** infrastructure in Europe.
- **We estimate there are over 3,000 ISPs in Europe**, including international backbone ISPs, national ISPs and regional and consumer ISPs.
- **European ISP revenues are forecast to grow at a CAGR of 30% to 2004**, when they could reach \$22 billion.
- **Backbone services revenues could more than triple to \$6.1 billion in 2002**, compared with \$2.0 billion in 1998, according to Datamonitor.
- **European backbone infrastructure is under-developed at present** A group of new network operators (alternative network operators, to distinguish them from the PTTs) are rapidly building new high-speed/broadband capacity. This group, together with the PTTs, stands to be a major beneficiary of growth in data and Internet traffic.
- **Competition to supply corporate Internet users is well developed**, but access to the consumer, via the local loop, is still dominated by the PTTs.

### Definitions

We define the Internet **backbone** as a number of linked high-speed networks through which data are transmitted (routed) using the Internet protocol, or IP. We define the **local loop** as the link for the consumer or corporate end-user to a central switch, which in turn is connected to the backbone, either directly or through further network connections.

An ISP is defined as any business that offers consumers and corporations access to the Internet. For consumers and small businesses this is via dial-up and cable modems and, in the future, via wireless and xDSL technology. Large corporations will be typically lease dedicated lines. We also refer extensively to PTTs (Public Telephone & Telegraph) — the actual and former national telecoms operators that dominate voice and telephony traffic.

### Internet Infrastructure

Telecommunications and cable companies, together with some of the large Internet Service Providers (ISPs), for the most part own the basic backbone infrastructure, of wires, fibre-optic cables and routing and switching equipment that forms the physical manifestation of the Internet. This section provides an overview of the Internet infrastructure and of the providers of access to the Internet, on both the corporate and the consumer side.

#### Internet Protocol (IP) Technology

IP-based packet switching technology is increasingly replacing the conventional, circuit-switched network technology that is used for voice traffic. Circuit-switched networks provide a link between two nodes through a modem for simple voice transmission. Packet switching, which is the distinctive characteristic of IP, is a transmission method that simultaneously routes and transmits packets of data from many different customers so as to optimise the use of the line.

A particularly long message may be broken up into several pieces ('packets') that travel separately to the receiving end, where they are reassembled automatically. IP-based data are spreading all over Europe, in particular in metropolitan areas with a high concentration of businesses, such as the City of London, where companies such as COLT Telecom and Energis are building high-speed fibre-optic networks.

IP is a network access standard that enables efficient communication across data networks regardless of what hardware, software and other protocols are in use. The key reason for the adoption of IP is its ability to be carried by technologies such as ATM, cable and xDSL. While there are still few truly pan-European IP network service providers, the trend is clearly in that direction. For example, Hermes Europe Railtel, owned by GTS and the Belgian national railway company uses their existing extensive infrastructure to offer data communication capacity on a backbone that is based increasingly on IP network technology.

## The Infrastructure in the US

Following the separation of long-distance and local telecommunication operators after the break-up of AT&T in 1984, the bulk of the traditional US infrastructure is generally owned and managed by the Regional Bell Operating Companies (RBOCs) and the long-distance operators, such as AT&T and Sprint. These networks for the most part use the standard circuit-switching technology that is used for voice and analogue transmission. Since the early 1990s, a significant number of companies have built IP-based networks that are more suitable for data communication in general and Internet traffic in particular. This market is very much an oligopoly: a handful of operators dominate the market, operate the vast majority of the backbone capacity and act as ISPs to multinational companies.

The key backbone players are WorldCom/UUnet, Sprint and Cable & Wireless (following its acquisition of MCI's IP network in the US, which MCI had to sell in order to obtain approval of the merger with WorldCom).

WorldCom/UUnet is perceived as a major threat by US and European telcos, due to the advanced technology on which its networks are based and its aggressive expansion strategy. In 1997, it acquired ANS from AOL, and therefore now transmits the majority of all AOL and CompuServe Internet traffic.

Cable & Wireless took a significant step towards achieving global coverage through the acquisition of MCI's US network, despite recent disputes about key customers. It already has an established Internet business in Asia through the operations of HongKong Telecom and Optus in Australia.

Sprint operates a large US IP-based network, into which Deutsche Telekom and France Telecom tap, via the Global One alliance.

Table 1

### Leading Holders of Market Share of Global Backbone Traffic, 1998

Company	(%)
WorldCom/UUnet	30.0
Sprint	18.0
C&W/MCI	10.0

Source: Datamonitor

## European Internet Infrastructure

The infrastructure that allows the Internet to function is owned and managed by global and national telecoms operators, by new entrants ('alternative network operators') and increasingly by other ISPs. These companies offer international and national backbone capacity, regional networking and local-area access.

ISPs provide Internet access solutions in the widest sense. Their clients are typically companies and consumers that want to use the web as a communication tool. In addition to providing access, the larger players in particular offer a range of value-added services, ranging from web-hosting to advertising services, e-commerce, messaging services and maintenance.

We estimate there are 2,000 ISPs in western Europe, mostly privately held. Note, though, that the situation is changing all the time and that it is impossible to provide a precise figure. The vast majority are small operators that focus on consumers in a particular region or even a single city. Each major country typically has a handful of national ISPs, of which the PTT is usually one of the biggest, and about 100 to 200 smaller regional ISPs. A more recent phenomenon is the emergence of non-traditional ISPs, such as retailers, newspaper publishers and banks. In addition, there are a few pan-European ISPs that either own or lease Europe-wide networks in order to cater to the largest companies within the region. In most cases, these service providers offer Managed Network Services to multinational corporations, with Internet access just one of the services that they provide.

**International Backbone ISPs** either (in the case of some PTTs and large ISPs) have their own backbone capacity, or they lease major trunk lines from the PTTs or other long-distance network capacity providers. They provide dedicated fixed-line (as opposed to dial-up) services to large multinational companies, and they rent capacity to regional and consumer ISPs. Their individual networks are interconnected at Network Access Points (NAPs), of which there are approximately 20 in Europe. The European NAPs are currently much smaller in traffic capacity than the US NAPs. Only in the UK and in Scandinavia do larger NAPs exist, and even they have only about 10% of the capacity of US NAPs.

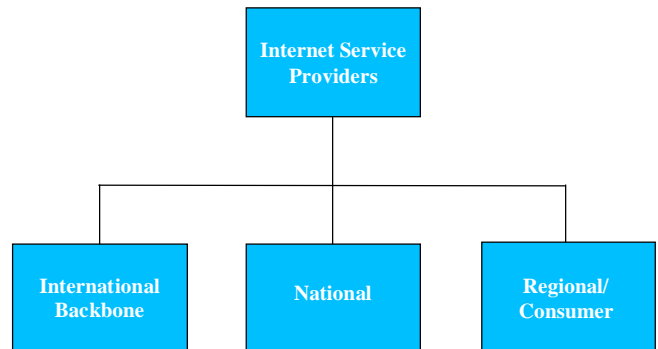
Companies in this group include BT, Global One/Sprint, AT&T Unisource, C&W (through MCI's former network), WorldCom/UUnet, EUnet, Infonet and Equant. The non-PTT companies in this group derive the bulk of their revenues from Managed Network Services. Most of the European providers have to connect to one of the large US players, such as WorldCom/UUnet, Sprint or C&W, for global access and even for faster intra-European data transmission.

**National ISPs** provide Internet access and network capacity within countries, and connect to an international ISP for global or international Internet access. They generally provide companies with leased-line or digital services and small ISPs with network capacity, and they interconnect to an NAP which in turn is connected to the backbone. A number of PTTs fall into this group, as do some alternative network operators such as Energis in the UK.

**Regional and Consumer ISPs** lease lines from a backbone or national ISP, and provide dial-up services to consumers

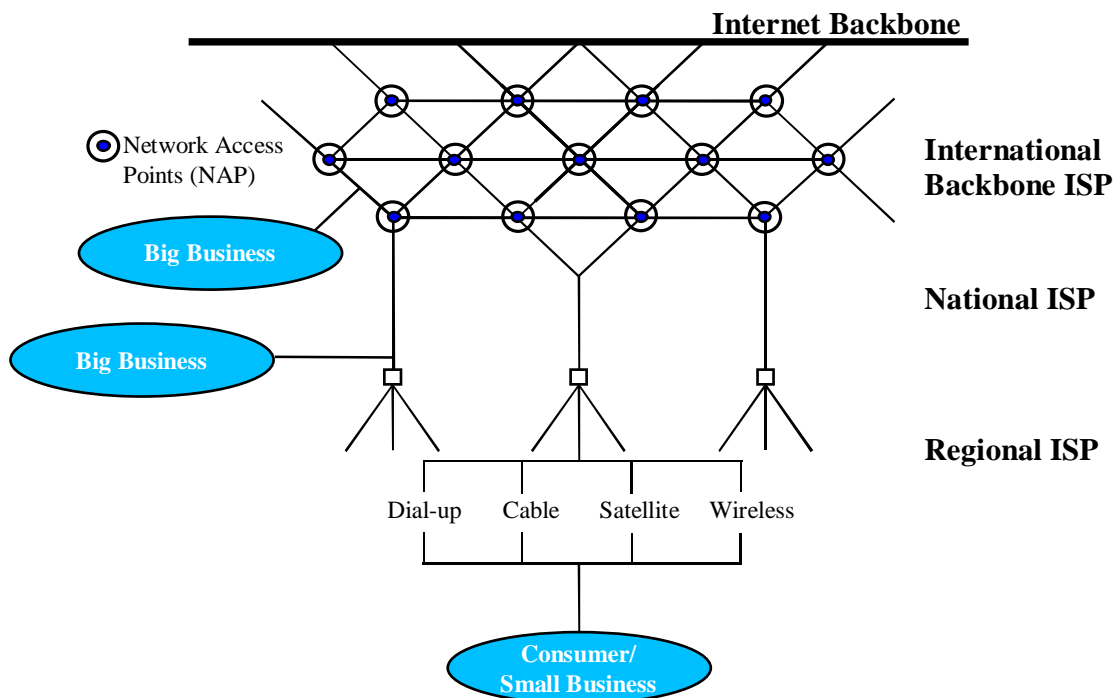
and small businesses to enable them to access the local ISP network through their telephone line, cable modem or wireless technology. One example out of many in this group is Virgin Net.

Figure 1  
**Classification of ISPs**



Source: Morgan Stanley Dean Witter Research

Figure 2  
**Description of the European Internet Infrastructure**



Source: Morgan Stanley Dean Witter Research

### Significant Growth of the ISP Market

With the overall growth of Internet usage, European ISP revenue is forecast to grow rapidly, and IDC forecasts that it will grow at a CAGR of 30% until 2004. Frost & Sullivan estimates that access providers' revenues will grow from \$3 billion in 1997 to \$22 billion by 2004, also a compound annual growth rate of 30%. The major drivers of growth are generally expected to be as follows.

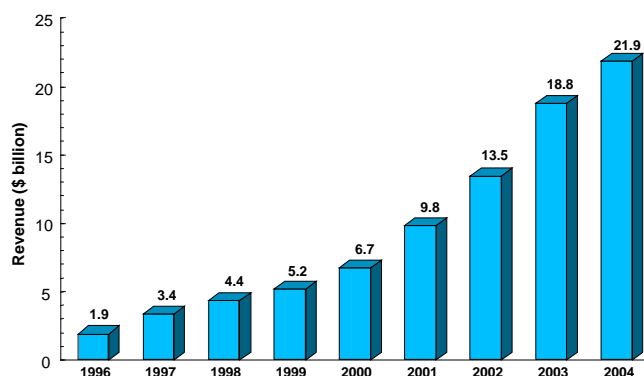
- Increasing demand for value-added services, such as web-hosting, messaging services, electronic commerce and virtual private network solutions.
- Increasing PC penetration and higher processing power, but also de-emphasis of the PC as the main access device.
- Lower access costs, due to the liberalisation of telecom services in general.
- Improved network efficiency and reliability.

### Backbone ISPs: Major Players and Developments

The bulk of the Internet infrastructure is still owned by the national telecom operators — in most countries, the PTTs. Increasingly, however, these are being challenged by new entrants. These are global operators, generally joint ventures between established and/or emerging telecom operators. The bulk of Internet data traffic is routed through the backbone using the Internet Protocol.

Figure 3

#### European ISP Revenue Forecasts



Source: Frost & Sullivan

### Major International Backbone ISPs in Europe

#### AT&T Unisource Communications Services

This Dutch-based company is a joint venture between AT&T and Unisource (itself a joint venture between Telia of Sweden and Swisscom), which provides international voice, data and messaging services in Europe. In countries where the joint-venture partners do not own infrastructure and marketing capability themselves, services are provided by partner companies, such as Mannesmann Arcor in Germany and Siris in France. The network is based on switching centres in seven countries in Europe. The company currently has approximately 3,000 customers. It is also a member of the WorldPartners Association, which includes KDD of Japan and Singapore Telecom.

#### KPN/Qwest/EUnet

The EUnet group consists of 28 operating companies providing Internet services in 42 countries. The group is made up of subsidiaries, franchisees and business partners. The network centre is based in the Netherlands. The group provides network services to over 450,000 customer sites in the form of local customer, infrastructure provision and Internet access. Its proprietary network is a major component of the European Internet. It also has a high-speed transatlantic link to the US with a current capacity of 72Mb/sec. The company was acquired by **Qwest Communications Inc.** in 1998. Qwest has also acquired Xlink Internet Service GmbH, Germany's second largest corporate ISP, which has a 13% market share among large corporations, according to nettraffic.de, and will fold Xlink into the EUnet organisation. In addition, since being taken over by Qwest, EUnet has formed a joint venture with **KPN**, the Dutch telecom operator, to build and operate a high-capacity, pan-European fibre optic network based on the IP standard and spanning 9,100 miles.

#### Global One

This joint venture between Deutsche Telekom, France Télécom and Sprint aims to provide global telecom services to multinational companies. The company is currently deploying an ATM backbone with switching centres in 50 countries that will enable it to enhance its backbone and dedicated access services with value-added services such as web-hosting, security services and content management.

### Infonet

Infonet is owned by a consortium of national telecom operators around the world, and aims to provide global network services to companies that operate on a global scale. The company provides connectivity, Internet, intranet, remote access, e-commerce and enterprise systems services. It has a turnover of approximately \$440 million, a presence in 59 countries and a network in 180 countries.

### WorldCom/UUnet

WorldCom's acquisition of the much larger MCI in 1997, after a fierce bidding contest with BT, created one of the few truly global data communications and voice traffic carriers. WorldCom has to date focused primarily on the provision of intranets and virtual private networks, while UUnet, another company within the group, has focused on providing major corporations with access to the Internet via WorldCom's infrastructure. The group has announced recently that it will combine all of its Internet-related activities under the UUnet name. Although the merged entity had to sell MCI's network in the US to Cable & Wireless as part of the merger, the company is estimated by Dataquest to have a 30% share of the backbone market. AOL and CompuServe, which between them have approximately 20 million subscribers worldwide, route the majority of their traffic through WorldCom lines following WorldCom's acquisition of ANS, formerly AOL's network. The group's European network now provides direct multi-megabit connections between the major economic regions in Europe.

### Hermes Europe Railtel

A member of the Global TeleSystems Group (GTS), Hermes Europe Railtel provides high-speed crossborder managed transmission services to operators and providers of telecoms services across Europe. Transmission speed is up to 155 Mbps. The Belgian national railway company, SNCB, owns a 6.9% minority stake. In June 1998, the company acquired Ebone, a major Internet backbone provider in Europe.

### Global Crossing

The company utilises a network of undersea digital fibre-optic cables and associated terrestrial capacity to provide global long-distance telecommunications services. The

company recently acquired the Global Marine subsidiary of Cable & Wireless and is in the process of merging with Frontier Telecom in March 1999 in a transaction valued at \$11 billion. Global Crossing provides a transatlantic link for numerous European telecoms operators, such as Deutsche Telekom, Telia and Swisscom.

### Viatel

Headquartered in New York, Viatel is an international telecoms company with network points of presence in European cities. Its pan-European network, Circe, has been extended recently and now covers all major European countries.

### Carrier 1

The company provides international telecom services to telecom operators, ISPs and international companies in Europe. It was formed in conjunction with Primus Venture Partners in 1998 to capitalise on IP opportunities across Europe.

From a service perspective, players that own infrastructure rather than having to lease access to it seem to be particularly well positioned to take advantage of the trend to growth of access revenues. These companies should be able to achieve the best prices (with margins 10% better than for leased-access companies, according to Datamonitor). In addition to having lower costs, their revenues should be higher, as they can lease capacity to other ISPs. As a result, we expect significant consolidation among the ISPs, similar to the trend in the US, in a bid to provide seamless networks.

Table 2

#### Worldwide Backbone Services Revenues by Market

(US\$ million)	1998	1999E	2000E	2001E	2002E
<b>Europe</b>	<b>2,000</b>	<b>2,900</b>	<b>4,200</b>	<b>5,300</b>	<b>6,100</b>
US	3,900	4,500	5,300	6,200	7,100
Rest of the World	2,400	3,000	3,800	5,000	6,300
<b>Total</b>	<b>8,300</b>	<b>10,400</b>	<b>13,300</b>	<b>16,500</b>	<b>19,500</b>

Source: Datamonitor

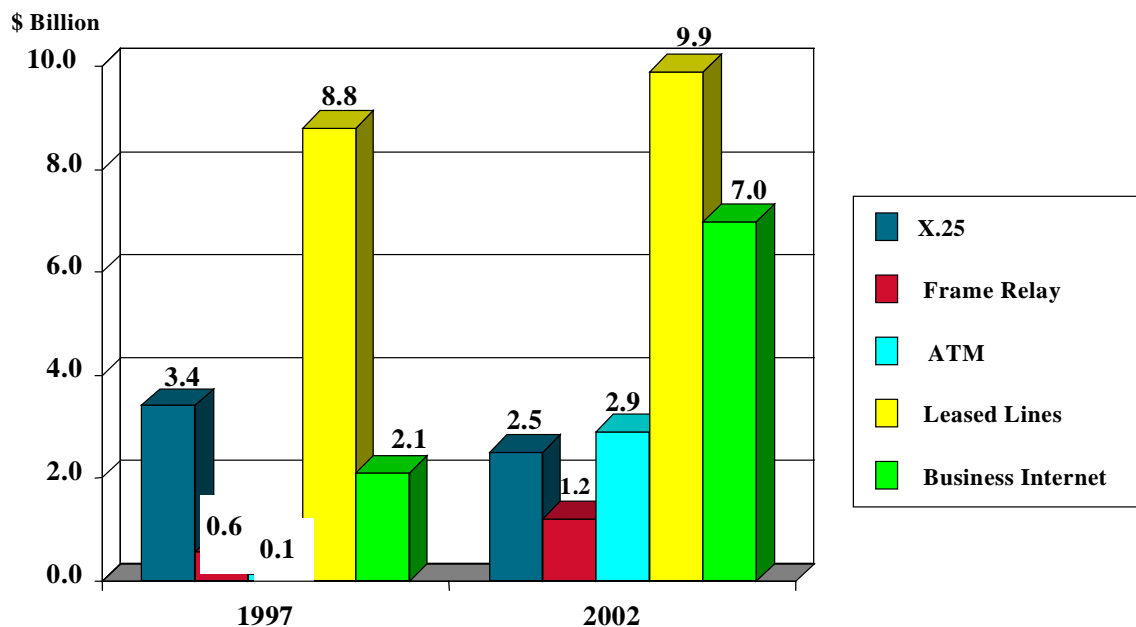
Table 3

**Major European High-Speed Backbone Networks**

Network/Operator	Size/Reach	Comment
Global One WorldCom/UUnet	20,000 km, 16 countries 20 European cities by 2000	Mainly leasing capacity from local providers Metropolitan networks joined in Germany, France and UK, invests \$1 billion per annum
Global Crossing BT	13 European cities linked to US and Asia by late 1999 UK, Germany, Italy	Claims speed of more than 1,000 Gbit/sec Will create fibre-optic link with joint-venture partners across Europe
Hermes Euro Railtel/Ebone	34 cities in 15 countries	155 Mbit/sec in Europe, 622Mbit/sec trans-Atlantic
Viatel Carrier 1	Focus on SME market in Europe Launched in six countries	Launch in 1999 Partnership with Metromedia in Germany
C&W KPN Qwest	Plans for European network linking 40 cities in 13 countries Europe-wide network aimed at ISPs	Lines leased from Hermes and Global Crossing Investment of \$700m, functional in 1999, acquired EUnet in 1998
Infonet	180 countries worldwide	Owned by consortium of national telecom operators
ATT/Unisource	Pan-European network	Global partnership with World Partners

Source: Datamonitor, Morgan Stanley Dean Witter Research

Figure 4

**IP vs Traditional Data Services, W. Europe**

*By 2002 IP services revenues will be greater than  
Managed X.25, frame relay and ATM services*

Source: IDC 1998

### Expected Growth Attracts New Entrants

As IP technology is becoming increasingly the standard for new, modern networks and replacing circuit-switched systems, opportunities open up for a range of data networking equipment and services companies.

As mentioned above, most European operators, and in particular most of the PTTs, still need to connect to one of the large US backbone players, even for intra-European traffic. This is due to the high prices that the former monopolies charge for cross-border links. We believe this represents a serious obstacle to the development of the Internet in Europe. Only once the networks listed in Table 3 are operational will there be a true European backbone, and this should bring costs down. At present, however, most of the European Internet traffic still travels via the US (according to Datamonitor, some European backbone providers have routes as 'thin' as 2 Mb/s, which would be overwhelmed by a single cable modem, while US backbone networks typically operate at 622 Mb/s and are expected to double in bandwidth each year). European bottlenecks occur at three points: country to country, backbone to backbone and Europe to US. The major pan-European high-speed networks (existing and planned) are listed in Table 3.

### National Service Providers: Major Players and Developments

The European part of the Internet infrastructure is highly fragmented, for historical reasons such as the dominance of the national PTT companies of the voice and data communication services market by virtue of their former monopoly positions.

#### PTTs

The PTTs have enjoyed monopolistic positions for long periods during which taxpayers' money was used to fund the building of their networks. The vast resources required to build and maintain the physical infrastructure of a national telecommunications network, and the desire to provide a universal service to everyone at the same cost, were seen as justification for a monopolistic market

structure. They were generally vertically fully integrated — that is, responsible both for the operation of networks and for the provision of services. On 1 January 1998, the European Union liberalised the European telecommunications services market by requiring all member states to remove all remaining restrictions on the provision of competitive telecommunications services, including voice telephony. This enabled alternative carriers to compete 'freely' with the PTTs. In addition, most PTTs have been at least partially privatised in order to expose them to the new competitive environment.

The European telecom services sector can now be divided into two groups of companies: the PTTs (often referred to as the 'incumbents') and the alternative service providers, which in turn can be either network operators or service providers or both.

### National Alternative Network Providers

Alternative network operators use their existing infrastructure (for instance, the rights of way owned by a utility company) to provide data communication capacity. The most important companies in this category are listed below. Alternative service providers lease network capacity from the PTTs. Most of them focus on marketing and servicing network capacity. Examples in this group are First Telecom, Mobilcom and re-sellers such as Esprit and Tele2-Europe. Despite the large number of competitors and the low barriers to entry in this market, some of these players have enjoyed considerable success as a result of focused marketing strategies.

Not surprisingly, this new competition has been met with stiff resistance by the PTTs. In almost every country there are continuing debates about the interconnect charges that the new entrant has to pay in order to obtain access to the network. Most alternative network operators own their long-distance networks, but other new entrants have to connect at some point to the PTTs for access to the end user, in particular the consumer. Most of these new entrants focus on the backbone — that is, on the long-distance transmission of data — but for obvious reasons depend largely on the PTTs for connection to the end user.

Table 4

**Selected National Alternative Network Operators**

Country	Company	Comment
Germany	VIAG Interkom	Backbone operator based on utilities infrastructure
	Mannesmann Arcor	Mannesmann and Deutsche Bahn infrastructure; recently acquired o.tel.o
UK	Colt	Local digital fibre optic networks in 12 cities
	Energis	Based on National Grid infrastructure; acquired Planet Online and provides infrastructure for Dixons Freeserve
Pan-Europe	Equant	Former airline reservation system network
	Hermes Europe Railtel	Owned by GTS, comprises Belgian and Swiss railway infrastructure and has recently acquired pan-European re-seller Esprit

Source: Morgan Stanley Dean Witter Research

Table 5

**European PTTs: Slowly Conceding Market Share**

(%)	Year De-Regulated	Market Share in Long Distance Traffic Lost After Deregulation				
		Year 1	Year 2	Year 3	Year 4	Year 5
British Telecom	1991	11.0	14.0	17.0	19.0	21.0
France Télécom	1998	5.0	8.0	11.0	15.0	N/AV
KPN	1997	4.0	8.0	16.0	24.0	32.0
Telefonica	1998	3.0	7.0	15.0	22.0	N/AV

N/AV = Not available

Source: Morgan Stanley Dean Witter Research Estimates

This is not to say that the dominance of the PTTs necessarily obstructs more widespread use of the Internet. However, as in other segments of the telecoms market, such as mobile telephony, increasing competition should offer choice to customers and ultimately drive down prices, resulting in higher penetration rates.

The PTTs have responded to the new competitive threat by upgrading their networks from analogue and digital trunk lines to high-speed fibre optic cables, and by forming global alliances in order to be able to offer seamless services to multinational companies.

Most of the European PTTs derive only a small portion of their current revenues from data and Internet traffic, and therefore have a lot of potential to increase the use of their

networks by attracting more Internet-related demand. Due to the per-minute charges that they receive from Internet users, they are keen to increase Internet activity. On the other hand, as Table 8 illustrates, the alternative carriers, such as Equant and Energis, already focus heavily on data and Internet traffic.

Table 6

**Global Telecommunications Alliances**

Alliance	Consisting of:
Global One	Deutsche Telekom, France Télécom, Sprint
AT&T Unisource	AT&T, Telia, Swisscom
BT/AT&T	Cross-border traffic alliance

Source: Morgan Stanley Dean Witter Research

Table 7

**Selected European PTTs**

Company	L12M Revs. <sup>1</sup> (\$m)	Data & Internet/ Total L12M Revs. <sup>1</sup> (%)	Potential in Five Years (%)
British Telecom	27,683	14.0	30.0
KPN	2,459	10.0	40.0
Telefonica	17,706	7.0	30.0

1. 1998 estimates

Source: Morgan Stanley Dean Witter Research

### Regional and Consumer ISPs: Players and Developments

We believe there are two principal trends in this market. The first is the battle for subscribers, which is dividing into two models, the free access and the subscription model. The second is escalating costs of subscriber or customer acquisition. We believe this will lead to a process of rapid consolidation among players in what is currently a highly fragmented market.

There are more than 2,000 ISPs in Europe, the vast majority being consumer-orientated start-up companies. Typically, the PTTs operate a consumer ISP using the local loop infrastructure to provide access services. Unlike the US RBOCs, the European telecom operators generate additional per-minute revenues from the Internet. This explains why they are keen to be the dominant ISPs in their markets.

Increasingly, new entrants are emerging to challenge the PTTs on their remaining home turf, the local loop. This is particularly the case in major business areas such as the City of London, and in countries with high cable penetration, where cable television companies such as UPC, NTL and PrimaCom are well positioned to exploit their connections with the consumer to offer Internet access, and at the same time to provide high-speed data communication through their high-bandwidth fibre-optic cable networks.

For the vast majority, however, the 'last mile' is still very firmly in the hands of the PTTs (even in the UK, which long operated a regulated duopoly between BT and Mercury and which was the first market to be de-regulated), and the PTTs operate the dominant consumer ISP in most countries except the UK.

Table 8

**Selected Alternative Carriers**

Company	L12M Revs. <sup>1</sup> (\$m)	Data & Internet/ Total L12M Revs. <sup>1</sup> (%)	Potential in Five Years (%)
Cable & Wireless	13,450	12.0	40.0
Colt	359	25.0	40.0
CWC	4,346	21.0	35.0
Energis	468	49.0	55.0
Equant	706	98.0	100.0
NTL	661	8.0	35.0
Telewest	931	5.0	35.0

1. 1998 estimates

Source: Morgan Stanley Dean Witter Research

Table 9 provides estimated subscriber numbers for selected consumer ISPs. For dial-up customers these figures are difficult to assess, given the different ways in which ISPs calculate their figures. Many include numbers of users on free trials or estimates for connections with multiple users. The situation is further confused by the free ISPs, which claim to remove users who do not use their accounts.

### Regional and Consumer ISPs: a Large, Fast-Growing and Competitive Market

As we have shown, the European Internet market is large and growing rapidly. As a result, this market has attracted a large number of competitive entrants. Due to the quickly escalating cost of subscriber acquisition, players with competing businesses fight for market share. Six major groups of companies are competing currently, or could do so, for the leading consumer ISP and portal positions in each country:

- the online services arms of the former telephone monopolies;
- independent online service providers (OSPs), such as AOL;
- free access providers;
- cable and other companies that can provide advanced Internet access technologies;
- Internet portals; and
- Internet service providers (ISPs).

Table 9

**Major European Consumer ISPs and Subscriber Numbers**

Country	ISP	Subscribers 1997	Subscribers 1999
Germany	T-Online	1,500,000	3,000,000
	AOL	380,000	940,000
	Germany.Net	300,300	629,000
	CompuServe	N/AV	230,000
	Primus Online	N/AV	180,000
France	France Telecom/Wanadoo	105,000	460,000
	AOL/CompuServe	60,000	300,000
	Club Internet (Lagardere)	55,000	200,000
	Infonie	52,000	110,000
UK	Freeserve (Dixons)	0	1,500,000
	AOL/CompuServe	207,000	675,000
	Line One/BT Internet	95,000	260,000
	Demon Internet (Scottish Telecom)	130,000	250,000
	TescoNet	N/AV	200,000
	Virgin Internet	90,000	140,000
Scandinavia	Telia (Sweden)	N/AV	450,000
	Tele2 (Sweden)	N/AV	400,000
	Telenor Nextel (Norway)	N/AV	250,000
Netherlands	World Online	N/AV	300,000
	World Access/KPN	N/AV	200,000
Spain	Iddeo/Retevision	N/AV	100,000
	Olé	N/AV	100,000

N/AV = Not Available

Source: IDC, company data, Internet Magazine

**Domestic Telecoms Companies**

At present, the dominant ISPs in most European markets are the online service providers owned and operated by the major domestic telecoms companies. Examples are Wanadoo in France, T-Online in Germany and Videotex Nederland in the Netherlands. Due to their status as former monopolies, the telcos have large existing subscriber bases and access to the largest telephone networks in their home markets. Some of these operators, most recently T-Online, have attempted to bundle their online service offerings with a local Internet access service.

**Online Service Providers**

The dominant European player in this category is AOL Bertelsmann, currently the dominant European online service provider. AOL Bertelsmann is the number two ISP in each of its key markets (Germany, France and the UK).

A number of other OSPs have good market positions in selected markets (such as World Online in the Netherlands and Scandinavia Online in the Nordic region).

**Free Access Model**

The pricing structure of the European telecom industry differs from country to country. In the UK, interconnection charges tend to be higher than on the Continent, which has facilitated the emergence of the Freeserve free Internet access model. Freeserve was launched in 1998, by the UK electronics and PC retailing market leader, Dixons. Freeserve has gained more than 1.5 million registered users by offering Internet access where the consumer is billed only for the local loop telephone charge. Freeserve operates this service in conjunction with the UK alternative telecom provider Energis, which pays Freeserve a percentage of its revenues. In addition, Freeserve is generating revenues

from commerce, advertising and a helpline charged at premium telephone rates.

Other service providers (including those launched by non-traditional market participants such as Tesco and Virgin) have launched competing services, and there have been some trials with 'real' free Internet access offerings using 0800 numbers (for example, Tempo in the UK). The April 1999 edition of *Internet Magazine* lists 15 UK ISPs that offer free access, making this the standard in the UK. Other estimates name over 50 free ISPs in the UK. Providers have now started to launch Freeserve-type services in other European countries, such as Talkline and Mannesmann Arcor in Germany and World Online/TF1, Libertysurf, Lokace Online and Free in France.

These developments certainly pose a competitive threat to all other access providers. However, as the success of AOL in the US shows, price is not the only critical factor in attracting and retaining subscribers. They are prepared to pay a premium for high-quality content, ease of use and, importantly, speed. It remains to be seen whether providers of free services will be able to obtain the network capacity and access speed to fulfil subscribers' increasing demands.

Table 10

### Free Access ISPs in the UK

ISP	Web Page	Telecom Partner
Bigwig.net	<a href="http://www.bigwig.net">www.bigwig.net</a>	Telewest, Tele Global & Cable & Wireless
BT ClickFree	<a href="http://www.btclickfree.com">www.btclickfree.com</a>	BTnet
Cable & Wireless	<a href="http://www.cwcom.net">www.cwcom.net</a>	Cable & Wireless
CallNet	<a href="http://www.callnetuk.com">www.callnetuk.com</a>	Cable & Wireless
CurrantBun (NewsCorp)	<a href="http://www.currantbun.com">www.currantbun.com</a>	BTnet
Connect Free	<a href="http://www.connectfree.net">www.connectfree.net</a>	Telinco
Free-Online	<a href="http://www.free-online.net">www.free-online.net</a>	Force 9
Free4all	<a href="http://www.free4all.co.uk">www.free4all.co.uk</a>	Cable & Wireless
FreeDotNet	<a href="http://www.thefree.net">www.thefree.net</a>	WorldCom
Freeserve	<a href="http://www.freeserve.net">www.freeserve.net</a>	Energis
FreeUK	<a href="http://www.freeuk.net">www.freeuk.net</a>	Colt Internet
Freezone Internet	<a href="http://www.freezone.co.uk">www.freezone.co.uk</a>	Telinco, Internet Alliance
IC24 (Mirror)	<a href="http://www.ic24.co.uk">www.ic24.co.uk</a>	Cable & Wireless
Exchange	<a href="http://www.iax.net">www.iax.net</a>	NTL Internet
TescoNet	<a href="http://www.tesco.co.uk">www.tesco.co.uk</a>	BTnet
The Mail	<a href="http://www.themail.co.uk">www.themail.co.uk</a>	Nildram/Telinco
UK Fantastic	<a href="http://www.ukfantastic.net">www.ukfantastic.net</a>	Cable Internet
Virgin Net	<a href="http://www.virgin.net">www.virgin.net</a>	NTL Internet
X Stream	<a href="http://www.x-stream.com">www.x-stream.com</a>	COLT Internet

Source: *Internet Magazine*, April 1999

## Broadband Access

The development of broadband access technologies, including cable Internet access services, advanced telephone-based services (xDSL) and other digital broadcast, satellite and wireless services, is expected to lead to significant increases in access speed, and thereby to big changes in the online service provider market.

Broadband over cable is currently the most widely deployed and used of these technologies in Europe, in particular in the UK and the Benelux countries. At present, it is not clear whether regulators will allow other ISPs access to the networks of cable operators that have entered into exclusive agreements with or have their own cable portals.

In general, however, beneficiaries of the substantial increases in network bandwidth are likely to be cable portals such as chello (owned by UPC), NTL, CWC and @Home Networks, as well as OSPs that offer high-speed solutions and web portals that offer broadband content.

## Internet Portals

All ISPs compete with a large number of Internet portals for advertising and commerce revenues. The key competitors are the local European operations of the major US portals (Yahoo!, Excite, Infoseek, Alta Vista and so on), most of which have already launched or are expected to launch local-language sites. Some of these companies have teamed up with European telecoms companies to offer Internet access packages. For instance, Yahoo! Deutschland recently announced an agreement to offer an Internet access service in co-operation with Mannesmann Arcor, and Excite has teamed up with Retevision in Spain.

## Independent ISPs

There is a large number of ISPs, most of which are targeting the consumer or SoHo (Small Office/Home Office) markets. Several of these ISPs have been acquired by telecoms companies with greater financial and marketing resources. For example, Planet Online by Energis and Demon Internet by Scottish Telecom. We believe these markets will continue to consolidate.

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