Final Report for the Department of

Trade and Industry

Analysys

Sophisticated broadband
services

11 June 2005

Sophisticated broadband services

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Contents

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0 Executive summary

This document is the first report of the study commissioned to Analysys by the Department of Trade and Industry (DTI) to examine the market for sophisticated broadband services across the G7[1], Australia, Ireland, South Korea and Sweden. This report summarises Analysys's findings on the performance of these countries regarding both the availability (coverage) and usage of sophisticated broadband services. The availability (coverage) data is estimated at the end of the first quarter of 2005. The usage data is estimated to the end of 2004.

The coverage findings are based on a sample of 211 fixed and mobile broadband infrastructure operators identified across the 11 countries under study. Coverage results are provided for asymmetric, symmetric and mobile technologies.

The usage findings are based on estimates produced by Analysys through reference to free, publicly available data sources.

Two further reports will be produced as part of the study: one in October 2005 and the second in April 2006.

0.1 Fixed coverage

Exhibit 0.1 below shows the availability of 1, 2, 4 and 8Mbit/s *asymmetric* services in each of the countries included in the study. This chart (and similar ones later in the report) is ranked on the availability of 1Mbit/s services.

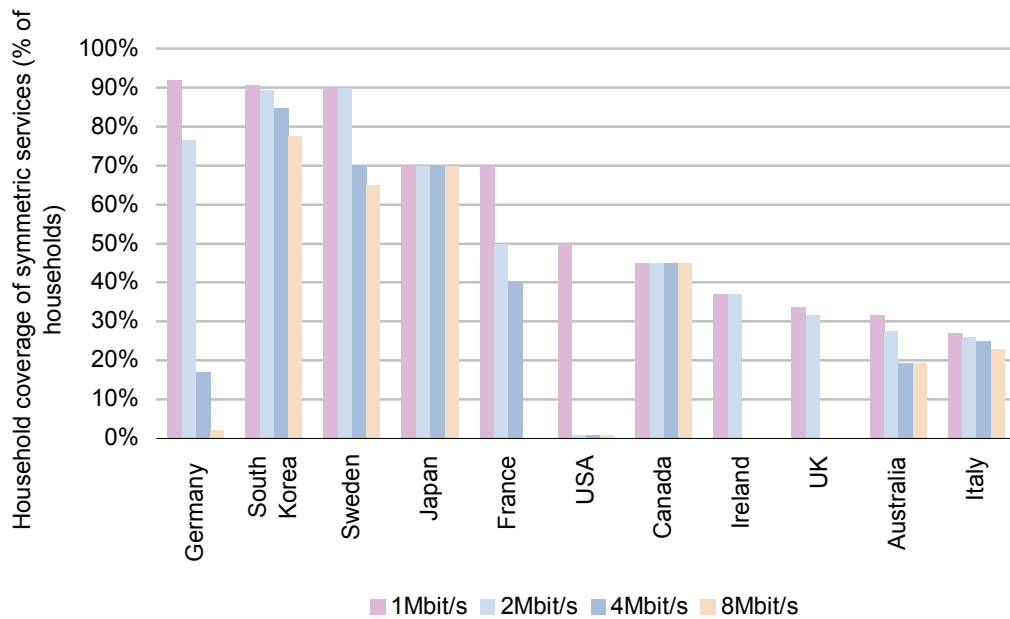[1] Canada, France, Germany, Italy, Japan, UK and US
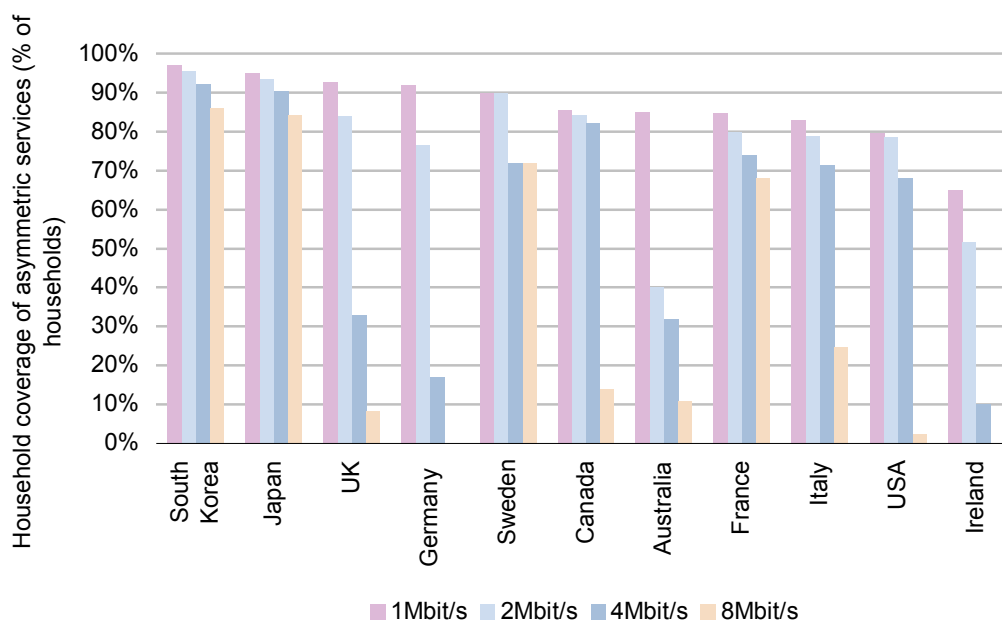
Exhibit 0.1: *Availability of asymmetric sophisticated broadband services by country, Q1 2005 [Source: Analysys]*

As can be seen from the chart above, the UK performs well in terms of the availability of 1 and 2Mbit/s services, but is currently not matching the performance of other countries included in the study in terms of 4 and 8Mbit/s availability[2]. Continuing investment in local loop unbundling by the likes of Bulldog, Easynet and Homechoice, along with other companies which have announced an interest such as Tiscali and Wanadoo, should increase the availability of higher-speed services in the UK in the next one to two years. In addition, any speed increases introduced by ntl and Telewest would have an immediate impact on the availability of higher-speed services, as well as encouraging the DSL operators to further increase the speeds on offer.

The availability of 1, 2, 4 and 8Mbit/s *symmetric* services in each of the countries included in this study is shown in Exhibit 0.2 below.

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[2] Bulldog has supplied a list of 400 exchanges for use in this report. These exchanges will be enabled by the middle of May 2005. It is not possible to extract only those exchanges which were enabled as of the end of March 2005 from this list and the results quoted herein therefore include all 400 exchanges. As a result, coverage attributable to Bulldog may be slightly overstated

Exhibit 0.2:   *Availability of symmetric sophisticated broadband services by country, Q1 2005 [Source: Analysys]*

As can be seen from the chart above, the UK is towards the bottom of the rankings on the availability of symmetric broadband services[3]. It is expected that this will rise with the increasing interest in local loop unbundling and further service developments from BT. The launch of 4Mbit/s or higher symmetric services by either BT or the local loop unbundlers would have an immediate impact on the availability of such services.

0.2   Mobile coverage

We also provide details on the current level of 3G availability and the penetration of public WLAN hotspots across the countries included in this study. Future versions of this report will include data on 'nomadic' wireless solutions such as WiMAX as they become available.

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[3]   SDSL and fibre-to-the-building (FTTB) services targeted at SMEs and residential users. This excludes leased lines and similar bespoke services

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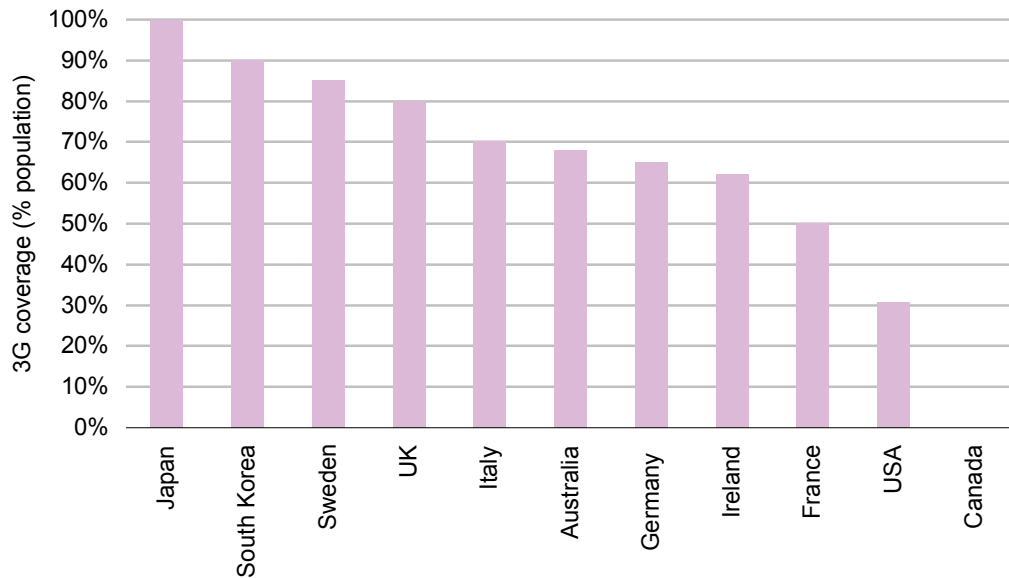
0.2.1   3G coverage

Exhibit 0.3:   *3G coverage, Q1 2005 [Source: Analysys][4]*

Japan and South Korea lead the way in the availability of third generation mobile services, as well as leading the pack in higher-speed broadband coverage. There are currently no 3G services available in Canada. The high coverage in Japan and South Korea can be attributed to a number of factors, including the early launch of 3G services in these two countries and the high population density. South Korea may also have benefited from the award process, whereby contestants had to place bids for licences within a price range specified by the government. This may have left more funding available for network rollout than would have been the case had the licences been awarded at much higher prices.

3G licences often contain coverage requirements which must be met as a condition of the licence. For example, the Swedish licences originally contained a requirement for 99.98% population coverage by the end of 2003. This target has not been met and the regulator,

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[4]   No services have been launched thus far in Canada

PTS, has reiterated the requirement for this coverage level to be reached and has allowed the operators to share infrastructure and utilise 3G roaming to achieve this aim.

By comparison, the German 3G licences contain coverage conditions of 50% of population by the end of 2005, with operators allowed to share the passive components of their infrastructure.

0.2.2   Public WLAN
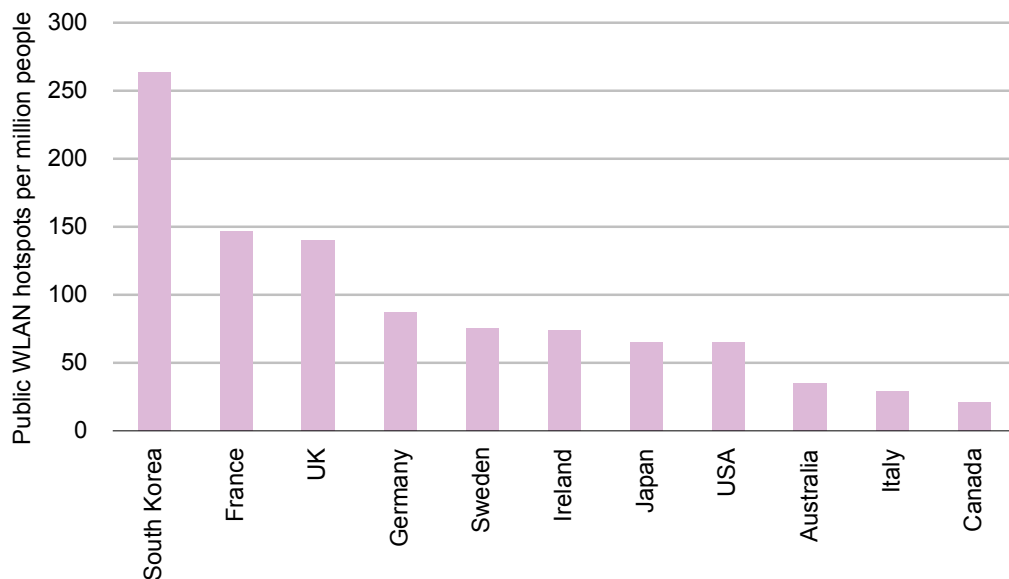
Exhibit 0.4:   *Public WLAN hotspots per million people, Q1 2005 [Source: Analysys, Informa Telecoms]*

The availability of public WLAN hotspots is considerably higher in South Korea than in any of the other countries included in the study on a per-capita basis, with France and the UK leading the group behind South Korea. The UK's figures are boosted by The Cloud's strategy of adding WLAN capability to many of its terminals in pubs and restaurants. As of the end of 2004, around 5000 WLAN hotspots were operated by this company.

0.3 Initial coverage conclusions

Exhibit 0.1 and Exhibit 0.2 above show that, unsurprisingly, the countries which have historically been viewed as broadband leaders (Japan, South Korea and Sweden) can also be considered as such regarding the availability of higher speed asymmetric and symmetric services. Following a rapid increase in the coverage of 512kbit/s broadband in the UK over the last two to three years, it is evident that the country is currently behind in terms of the availability of 4Mbit/s and higher asymmetric services, as well as in the overall availability of symmetric services. In the short to medium term, it is likely that this picture will improve in the UK as local loop unbundlers and the cable operators demand higher product specifications. Indeed, BT has announced that 1300 exchanges will be enabled for SDSL by the end of March 2006, up from 300 at the end of March 2005.

It is unlikely, in the short term, that the UK will be able to match the performance of Japan, South Korea and Sweden in terms of higher-speed broadband availability as these countries have benefited from a number of factors which are not directly applicable to the UK:

- government financial support for supporting network investment
- very favourable demographics for network roll-out – specifically, a high proportion of multi-dwelling units (MDUs)
- a national culture of high-technology adoption and usage, and a comfort with new technology.

In terms of mobile and wireless local area network (WLAN) coverage, the UK is towards the top of the rankings thanks, in part, to the relatively early launch of 3G. True 'nomadic' wireless, where users can access high-speed services while on the move, is still to emerge; this may form a more compelling product than 3G for some users, though this very much depends on location and tariffs.

The next iteration of this study will be published in October 2005.

0.4 Initial usage conclusions

Exhibit 0.5 below shows the UK's position, relative to the other countries covered by this study, for each of the indicators of Internet usage by broadband businesses (i.e. businesses with broadband Internet connections). Countries are ranked according to usage by broadband businesses.

It would appear that the UK is doing reasonably well in comparison with other countries. It is in the top half of the table for all metrics except paying government online. It seems that the increased availability of broadband, combined with the UK government's efforts to stimulate ICT usage, have had an impact on usage.

Rank	Ordering online	WLAN	VoIP	Paying government	Ecommerce revenue
1	Sweden	**UK**	Ireland	Sweden	South Korea
2	Australia	Sweden	South Korea	France	Canada
3	Canada	Germany	Japan	Ireland	Ireland
4	US	Ireland	**UK**	South Korea	**UK**
5	**UK**	Italy	Sweden	Australia	US
6	Germany	Australia	France	Canada	Sweden
7	Ireland	US	Australia	**UK**	Italy
8	Italy	Canada	US	Italy	Japan
9	France	Japan	Canada	US	Australia
10	Japan	France	Italy	Germany	Germany
11	South Korea	South Korea	Germany	Japan	France

Exhibit 0.5:   *Summary ranking of business indicators, 2004 [Source: Analysys]*

Drawing detailed conclusions from the residential indicators is more problematic, due to the paucity of good source data, and the consequently high degree of estimation required to create them. The results must be treated with caution. Countries are only included in the summary table in Exhibit 0.6 below if they were able to produce a reasonable estimate, so not all eleven countries are represented for each indicator.

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Rank	Downloading TV, video and movie clips	Use of online gaming	Use of VoIP	Ecommerce spend	Teleworking
1	France	South Korea	Japan	**UK**	US
2	Australia	Sweden	Italy	Germany	Australia
3	US	Japan	France	France	Sweden
4	**UK**	Australia	Sweden	Italy	Japan
5	Germany	US	South Korea	US	Canada
6	Italy	Canada	US	Canada	Germany
7	South Korea	Italy	Ireland	Japan	**UK**
8	Sweden	France	Germany	Ireland	Ireland
9	Japan	Germany	**UK**		Italy
10		**UK**	Australia		France
11		Ireland	Canada		

Exhibit 0.6: *Summary ranking of residential indicators, 2004 [Source: Analysys]*

The UK appears in the bottom quartile for Internet gaming and use of VoIP; the third quartile for teleworking; the second quartile for TV, video and movie clip downloads; and is top of the group for ecommerce spend per Internet user.

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1 Introduction

The Department of Trade and Industry (DTI) has commissioned Analysys to examine the market for sophisticated broadband services across the G7, Australia, Ireland, South Korea and Sweden.

Over the past three years, the availability of 'basic' broadband services (i.e. a minimum 512kbit/s downstream service) has grown to over 80% in 10 out of the 11 countries included in this survey. This, combined with falling prices, has led to growing interest in both the availability of higher-speed broadband services and the usage to which individuals and organisations are putting their Internet connections – for example, use of voice over IP (VoIP), making purchases over the Internet, online gaming, and downloading of TV and video. This study examines the market for higher-speed broadband services and usage of selected types of Internet-based content.

During a series of meetings between Analysys, the DTI and the Broadband Stakeholder Group (BSG)[5], it was agreed that both the **coverage** and **usage** of sophisticated broadband will be tracked during the study, covering the following areas:

- **fixed coverage –** the availability, by downstream speed, of asymmetric and symmetric fixed broadband services (including fixed wireless access (FWA))
- **mobile coverage –** the availability of 3G mobile services, WLAN hotspots and other emerging mobile or nomadic technologies (such as WiMAX)
- **usage –** the take-up of key broadband-enabled applications and general Internet usage.

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[5]   The meetings were held on 7 February, 10 March and 23 March 2005

This document is the first report of this study and summarises Analysys's findings on the market for sophisticated broadband services. Two further reports will be produced as part of the study: one in October 2005 and the second in April 2006.

The remainder of this document is structured as follows:

- Section 2 – outlines the methodology that we have adopted for the coverage section of the study.

- Section 3 – presents our findings on the availability (coverage) of sophisticated broadband services across the 11 countries under study.

- Section 4 – presents our findings on the usage of sophisticated broadband services in the countries under study and the methodology employed; it also contains two short trends analysis pieces focusing on the state of a particular service and discussing market developments.

2 Coverage of sophisticated broadband services – methodology

Given the relative paucity of detailed and up-to-date broadband coverage information by speed available in the public domain, we have adopted a combined survey and desk research approach. We have identified a number of large[6] and small fixed broadband infrastructure operators in each of the countries under study; additionally, for each of the 11 countries the mobile operators have also been identified. As shown in Exhibit 2.1 below, we have targeted a total of 211 operators, which are broken down into: 58 large fixed operators, 101 small fixed operators and 52 mobile operators/mobile operator groups.

Country	Fixed operators (large)	Fixed operators (small)	Mobile operators	Total
Australia	2	13	6	21
Canada	7	12	5	24
France	9	9	3	21
Germany	5	15	4	24
Ireland	4	12	3	19
Italy	3	8	4	15
Japan	6	4	3	13
South Korea	2	0	3	5
Sweden	5	10	4	19
UK	4	13	5	22
USA	11	5	7	23
Groups			5	5
Total	**58**	**101**	**52**	**211**

Exhibit 2.1: *Number of broadband infrastructure fixed and mobile operators identified in each of the countries under study [Source: Analysys]*

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[6] More than 100 000 subscribers, with the exception of Ireland where we included eircom, ntl, Esat and Chorus

For the large fixed infrastructure operators, we initially adopted a survey approach. As shown in Exhibit 2.2 below, out of the 58 large fixed operators identified, we contacted a total of 57; of these, 29 have returned coverage information to us, 10 operators refused to participate in this study, and the remaining 19 operators have not supplied any data.

Country	Operators targeted	Contacts identified	Data received	Refusals	No data supplied
Australia	2	2	0	0	2
Canada	7	7	2	3	2
France	9	9	2	2	5
Germany	5	5	0	0	5
Ireland	4	4	3	0	1
Italy	3	3	2	0	1
Japan	6	5	3	1	2
South Korea	2	2	2	0	0
Sweden	5	5	3	2	0
UK	4	4	4	0	0
USA	11	11	8	2	1
Total	**58**	**57**	**29**	**10**	**19**

Exhibit 2.2: Number of broadband infrastructure large fixed operators by country [Source: Analysys]

For small operators, we initially carried out desk research on the 101 operators targeted, of which a total of 25 were identified as offering services which could be considered of interest to this study (for example, if they offered speeds in excess of those provided by the large operators, or if their footprint was complementary to the larger operators). Out of the 21 small operators for which contacts were identified, we have received data from 10 of them.

Country	Operators targeted	Operators researched	Identified as interesting	Contacts identified	Data gathered
Australia	13	13	7	6	4
Canada	12	12	3	0	0
France	9	9	3	3	1
Germany	15	15	1	1	0
Ireland	12	12	6	6	2
Italy	8	8	3	3	1
Japan	4	4	0	0	0
South Korea	0	0	0	0	0
Sweden	10	10	1	1	1
UK	13	13	1	1	1
USA	5	5	0	0	0
Total	**101**	**101**	**25**	**21**	**10**

Exhibit 2.3:   *Number of broadband infrastructure small fixed operators by country [Source: Analysys]*

Where large fixed operators have not supplied coverage information, we have estimated coverage levels using publicly available data. This estimation process is less preferable than sourcing the data directly from the operators and the results for any countries where this approach has been required for the bulk of operators (in Germany, for example) are subject to lower levels of confidence.

The data sources we have used for this estimation process include:

- operator Web sites
- press coverage
- industry resources/Web sites
- technological limitations of different technologies (for example, see Section 2.1)
- underlying demographic data

As would be expected from such an exercise, the accuracy of any such estimations is heavily dependent on the amount and quality of the available source data.

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In the case of mobile operators, we adopted a very similar methodology to that used for fixed operators. A total of 52 mobile operators/groups were identified; a summary of the response rate broken down by country is provided in Exhibit 2.4 below.

| Country	Operators targeted	Data from ARL	Number contacted	Data received	Refusals
Australia	6	1	3	0	1
Canada	5	3	4	0	0
France	3	3	3	0	0
Germany	4	1	2	0	0
Ireland	3	0	2	0	1
Italy	4	0	1	1	0
Japan	3	0	3	1	0
South Korea	3	0	2	0	0
Sweden	4	0	3	1	1
UK	5	3	3	0	0
USA	7	0	6	3	1
Groups	5	0	3	0	1
Total	52	11	35	6	5

Exhibit 2.4:   *Number of mobile operators by country [Source: Analysys]*

Data regarding 3G coverage on these operators was, where available, drawn from mobile operator profiles held by Analysys Research. Where this data was not available, we contacted individual mobile operators, or multi-national groups such as Vodafone, requesting information on their coverage levels.

In summary, there are some gaps in the data that is available in the public domain. In these cases, we have had to make estimates based on our own experience. However, over time, we would expect the amount of estimation to reduce, both as more services become available and operators publicise their coverage more.

2.1 Technical limitations of DSL technologies

ADSL is currently the most widespread DSL variant for broadband, and in the near future we expect ADSL2+ to be the most used for higher-speed broadband. Exhibit 2.5 shows the maximum downstream speed achievable using these two variants of DSL by line length, and shows that ADSL and ADSL2+ offer similar speeds where the line length is over 3km, with ADSL2+ offering considerably higher speeds below this distance. Other variants, such as VDSL, offer even higher downstream speeds, but over much shorter distances.
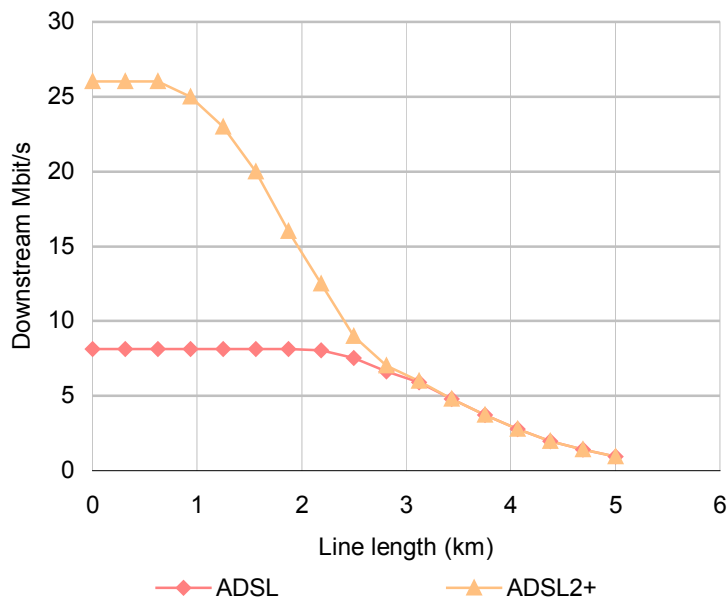
Exhibit 2.5:

Maximum downstream speed of ADSL and ADSL2+ by line length [Source: Analysys]

The variation of performance with distance has implications for end-users and reduces the size of the addressable market for a given speed. To interpret this fully the distribution of line lengths is needed.

2.2 Distribution of line lengths

Exhibit 2.6 below shows the distribution of the length of the incumbent's copper lines across a number of countries, ranked in order of increasing line length. Each individual exchange will have its own distribution of line lengths and this chart can only be used as an indication of the correction factor that will need to be applied to coverage statements due to technical limitations. For example, consider the case in which an organisation enabled

sufficient exchanges in the UK with ADSL2+ to cover 50% of PSTN lines. The lines enabled by this organisation would not all be of 2km length or less, and so a correction factor would need to be applied to estimate the actual coverage of 15Mbit/s services (the maximum speed available over a 2km copper line).
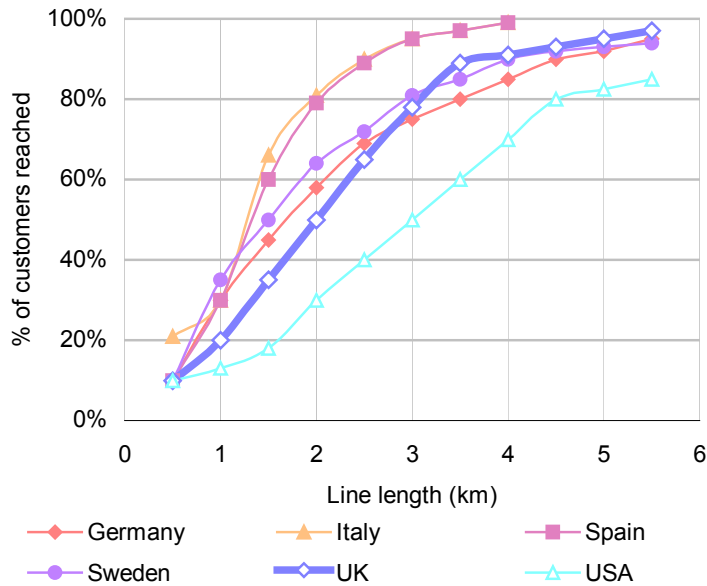
Exhibit 2.6:

Distribution of copper line lengths [Source: IEEE, Telefónica]

The chart above can therefore be combined with Exhibit 2.5 to give an indication of the *theoretical distribution of maximum speed* (excluding issues of line material and quality of installation) using ADSL2+ and ADSL technologies that can be achieved in the UK, as shown in Exhibit 2.7 below. This shows that, for example, ADSL2+ technology could potentially offer approximately 15Mbit/s to 50% of lines compared to 8Mbit/s via ADSL. It also clearly shows that ADSL is limited to around 8Mbit/s downstream, whereas ADSL2+ offers up to 26Mbit/s but can only serve a relatively small number of lines to this speed.
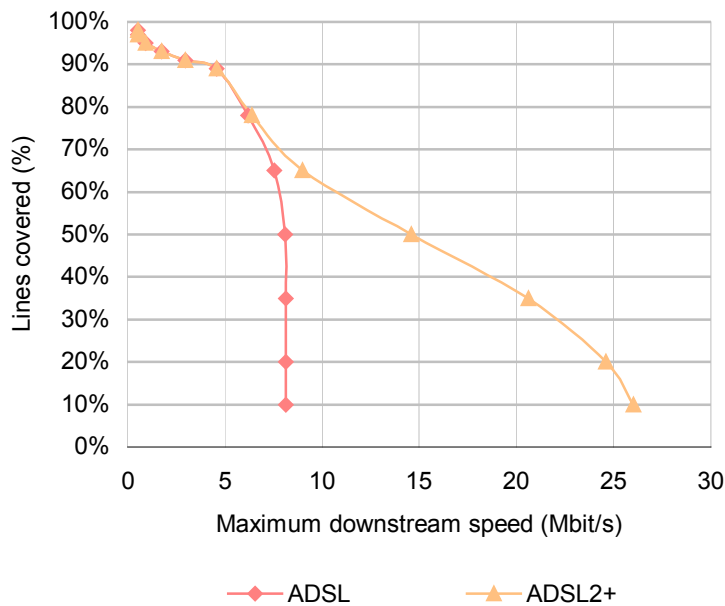
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Exhibit 2.7:

Theoretical distribution of maximum ADSL2+ and ADSL speeds in the UK [Source: Analysys, IEEE]

2.3 UK-specific analysis

For the UK we provide a regional breakdown on the results in addition to the national picture. This has been calculated using a sophisticated geographic analysis by post-sector and exchange area.

For asymmetric and symmetric xDSL coverage, we have combined lists of enabled exchanges by operator,[78] products available from each operator, number of households for each exchange area, and estimations on the average percentage of households connected to an enabled exchange that can actually receive a service of a given speed (i.e. line length limitations) to calculate servable households per exchange by downstream speed.

For cable modem services, we have combined availability by post-sector, the number of households per post-sector and products offered by each of the cable network operators to calculate servable households by post-sector by downstream speed.

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7 Sources: individual operators and www.samknows.com

8 Bulldog has supplied a list of 400 exchanges for use in this report. These exchanges will be enabled by the middle of May 2005. It is not possible to extract only those exchanges which were enabled as of the end of March 2005 from this list and the results quoted herein therefore include all 400 exchanges. As a result, coverage attributable to Bulldog may be slightly overstated

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We subsequently generated the set of all areas where post-sectors and exchange areas overlapped; we then combined this with the data sets on servable households by xDSL and cable modem to arrive at the final result.

FWA services in the UK contribute little incremental coverage to that provided by xDSL and cable modem, and operate at speeds comparable to these two technologies.

Analysis

3 Coverage of sophisticated broadband services – results

This section presents our findings on the availability (coverage) of sophisticated broadband services across the 11 countries under study.

The following three areas have been examined:

- **asymmetric technologies** – specifically those that are mass-marketed to residential and business customers and are not bespoke. Included in this category are ADSL, ADSL2+, VDSL (where affordable) cable modem and fixed wireless access (FWA); excluded are leased lines, LES (LAN extension services) and similar products

- **symmetric technologies** – specifically SDSL and fibre-to-the-building (FTTB) services targeted at SMEs and residential users

- **mobile/nomadic technologies** – including 3G, WLAN and emerging wireless technologies such as WiMAX.

We have excluded from our analysis those services that are available everywhere to allow the results to show differentiation in coverage between countries. Therefore, satellite services have been excluded from the asymmetric technologies and leased-line services from the symmetric technologies.

In most markets, asymmetric services are targeted mainly at residential customers, with symmetric services targeted at businesses. This approximation is not valid when specific asymmetric services are offered to businesses but not to residential users or where fibre-to-the-

home (FTTH) services are offered as a mass-market proposition to residential customers (for example, by Fastweb in Italy or Yahoo! and NTT in Japan). For countries where this is the case, we have indicated the coverage of such services in the detailed country sections, enabling the reader to estimate the impact for each country. The countries which Analysys expects would show noticeable variation should such symmetric services be included in the asymmetric measure (to better approximate residential coverage) are Italy, Japan, South Korea and Sweden.

Mobile/nomadic technologies complete the overall picture by giving an indication of how ubiquitous broadband access is (for example, is it available even when someone is travelling?).

The three definitions above allow for the inclusion of technologies which might emerge over the duration of the study, which is due to end in April 2006.

In each of the following sections, we give details on the current (end of February/March 2005) coverage of asymmetric and symmetric broadband services by downstream speed for each of the countries included in the study. We also briefly list the data that we have received from operators and the estimations that have been required to arrive at a national picture (a summary of the response rate for large and small operators is shown in Exhibit 2.2 and Exhibit 2.3 above).

For the UK, we have provided tabular results containing coverage data for each of the UK regions. These have been generated using exchange-by-exchange data on availability of services where such data exists, along with post-sector level information on the availability of cable modem services (FWA services add a small incremental amount of coverage to that provided by xDSL and cable modem).

As would be expected, any estimations will mean lower levels of confidence in the results but, over time, we would hope that the need for estimations will decrease as more operators publish data on the availability of higher-speed services.

3.1   Interpretation of the results

The results contained in the following sections show the coverage of asymmetric and symmetric broadband services by downstream speed. For example, a bar at 2Mbit/s shows the percentage of households covered by a service of *2Mbit/s or higher*.

This study reports on the 'headline' speed of broadband products and takes into account technical limitations. For example, Tiscali France offers ADSL2+ services up to 20Mbit/s services in 146 exchanges (connecting 20% of national households). Technical issues with xDSL technologies result in the actual availability of the maximum 20Mbit/s being less than the 20% of households connected to the exchange. We report the coverage level taking into account such technical limitations.

However, this study does *not* take into account contention and network performance issues, although from the end-users' perspective, this can be significant – see, for example, Exhibit 3.1 below, which shows that a user who could theoretically receive 20Mbit/s is unlikely in practice to achieve this.
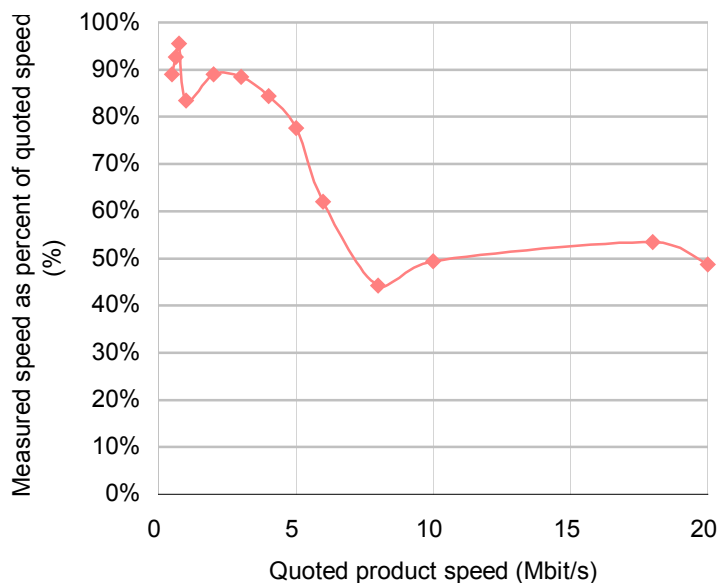
Exhibit 3.1:

Measured downstream speed versus quoted speed, France, 15 March 2005 [Source: Analysys, www.grenouille.com]
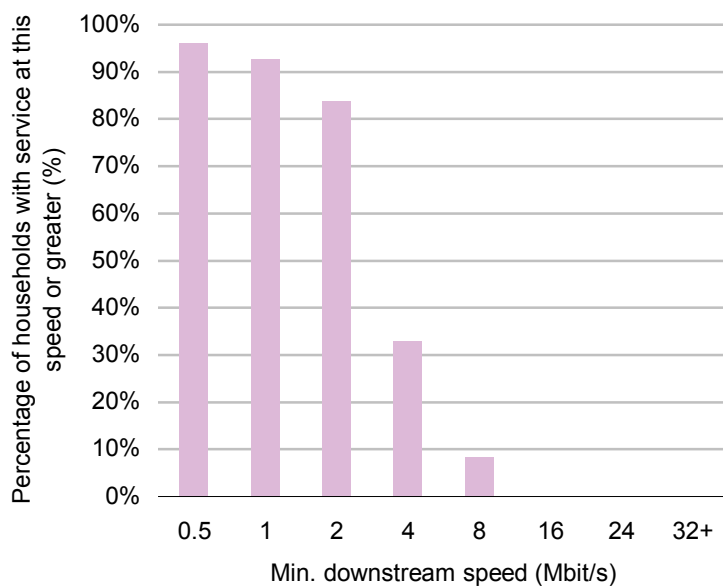

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3.2 United Kingdom

In the UK, broadband is primarily available through xDSL and cable modem. As of the end of March 2005, BT offered ADSL and SDSL services up to 2Mbit/s, with ADSL available from 4428 exchanges (out of a total of approximately 6000) and SDSL from 300. The two main LLUB operators are Bulldog and Easynet: as of March 2005, Bulldog had unbundled around 300 exchanges[9] and offered ADSL at 4Mbit/s and SDSL at 2Mbit/s; meanwhile, Easynet had unbundled 232 exchanges and offered ADSL at up to 8Mbit/s and SDSL at 2Mbit/s.

The two remaining fixed broadband operators, ntl and Telewest, offered up to 3Mbit/s and 4Mbit/s cable modem services respectively.
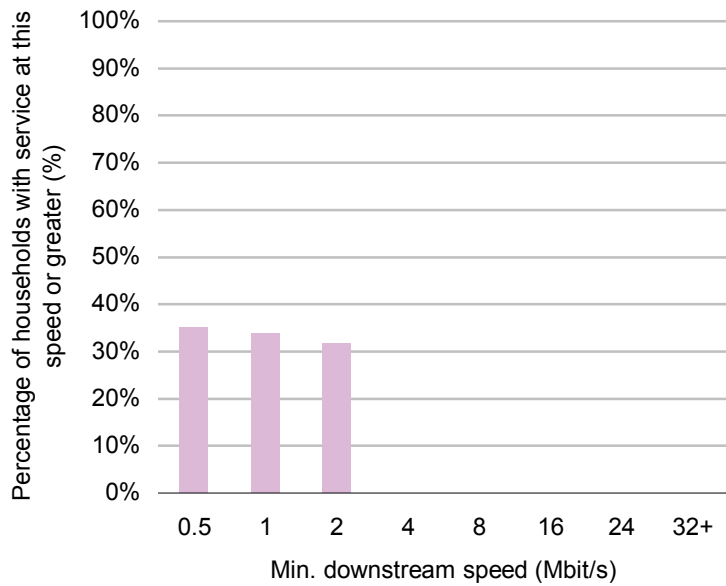
Exhibit 3.2 and Exhibit 3.3 below respectively illustrate the coverage of asymmetric and symmetric services in the UK.

Exhibit 3.2:

UK asymmetric

coverage, Q1 2005

[Source: Analysys]

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[9]   Bulldog has supplied a list of 400 exchanges for use in this report. These exchanges will be enabled by the middle of May 2005. It is not possible to extract only those exchanges which were enabled as of the end of March 2005 from this list and the results quoted herein therefore include all 400 exchanges. As a result, coverage attributable to Bulldog may be slightly overstated.

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Regional coverage

Exhibit 3.4 and Exhibit 3.5 below show the household coverage by downstream speed of asymmetric and symmetric services in the UK in each of the UK regions.

	0.5	1	2	4	8	16	24	32+
East Midlands	96%	92%	84%	16%	5%	0%	0%	0%
East of England	96%	92%	84%	19%	5%	0%	0%	0%
London	100%	96%	88%	64%	25%	0%	0%	0%
North East	100%	96%	87%	28%	6%	0%	0%	0%
North West	99%	95%	87%	37%	8%	0%	0%	0%
Northern Ireland	100%	96%	85%	0%	0%	0%	0%	0%
Scotland	89%	86%	78%	37%	4%	0%	0%	0%
South East	98%	94%	84%	24%	9%	0%	0%	0%
South West	94%	91%	80%	25%	5%	0%	0%	0%
Wales	92%	89%	78%	8%	0%	0%	0%	0%
West Midlands	96%	93%	85%	51%	8%	0%	0%	0%
Yorkshire and Humberside	95%	91%	83%	37%	7%	0%	0%	0%
National	96%	93%	84%	33%	8%	0%	0%	0%

Exhibit 3.4:   *Coverage of households by minimum downstream speed for asymmetric services, Q1 2005 [Source: Analysys]*

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	0.5	1	2	4	8	16	24	32+
East Midlands	26%	25%	23%	0%	0%	0%	0%	0%
East of England	26%	25%	23%	0%	0%	0%	0%	0%
London	78%	75%	70%	0%	0%	0%	0%	0%
North East	13%	12%	12%	0%	0%	0%	0%	0%
North West	41%	39%	37%	0%	0%	0%	0%	0%
Northern Ireland	0%	0%	0%	0%	0%	0%	0%	0%
Scotland	32%	31%	29%	0%	0%	0%	0%	0%
South East	35%	34%	32%	0%	0%	0%	0%	0%
South West	19%	18%	17%	0%	0%	0%	0%	0%
Wales	15%	14%	13%	0%	0%	0%	0%	0%
West Midlands	41%	39%	37%	0%	0%	0%	0%	0%
Yorkshire and Humberside	29%	28%	26%	0%	0%	0%	0%	0%
National	35%	34%	32%	0%	0%	0%	0%	0%

Exhibit 3.5:   *Coverage of households by minimum downstream speed for symmetric services,*
Q1 2005 [Source: Analysys]

As can be seen from Exhibit 3.4 above, the availability of asymmetric services of 4Mbit/s and above is markedly lower than the availability of those between 2 and 4Mbit/s. In particular, there are no such services in Northern Ireland and 4Mbit/s is only available to 8% of households in Wales. The fact that there are no services available above 8Mbit/s is because ADSL2+ has not been rolled out (and bespoke[10] fibre build is excluded from the analysis).

As shown below in Exhibit 3.6, coverage of basic 512kbit/s asymmetric services is primarily from BT, with the cable modem operators and local loop unbundlers also providing coverage, although these operators currently offer higher-speed services than BT.

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10   That is, offered specifically at the request of individual customers; it is likely to be priced at a premium

	BT	Easynet	Bulldog	ntl	Telewest
East Midlands	96%	11%	21%	51%	0%
East of England	94%	10%	17%	39%	9%
London	99%	49%	76%	23%	30%
North East	100%	12%	3%	26%	23%
North West	99%	16%	33%	33%	21%
Northern Ireland	100%	0%	0%	36%	0%
Scotland	88%	7%	26%	15%	25%
South East	97%	18%	26%	33%	5%
South West	94%	9%	14%	10%	20%
Wales	92%	0%	12%	26%	0%
West Midlands	96%	17%	30%	15%	40%
Yorkshire and Humberside	93%	14%	23%	19%	27%
National	96%	17%	29%	27%	18%

Exhibit 3.6: *Availability of 512kbit/s asymmetric services by region and broadband infrastructure operator (% of households), Q1 2005 [Source: Analysys]*

3.3   Australia

The majority of lower-speed coverage in Australia is provided by the incumbent (Telstra) through both DSL and cable modem, with higher-speed services being provided by Singtel Optus' cable modem services and a number of local loop unbundlers (e.g. iiNet); FWA providers such as BigAir and Access Providers offer some symmetric coverage.

The coverage of asymmetric and symmetric services in Australia is shown Exhibit 3.7 and Exhibit 3.8 respectively.
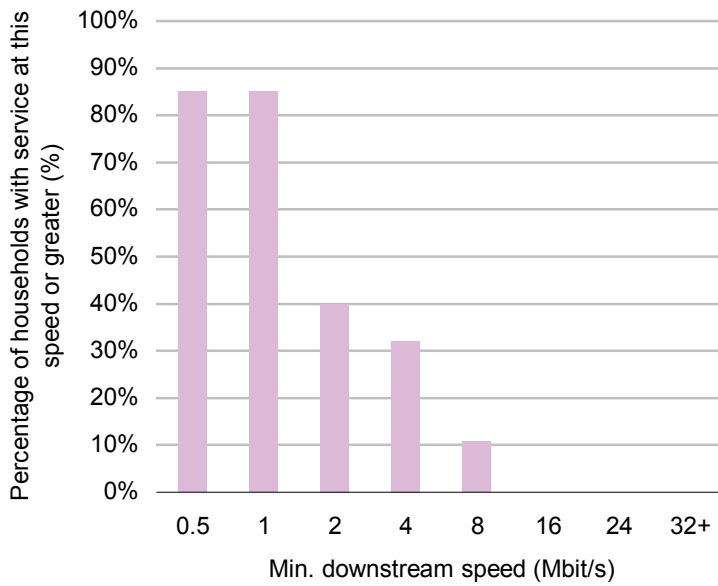
Exhibit 3.7:

Australian

asymmetric

coverage, Q1 2005
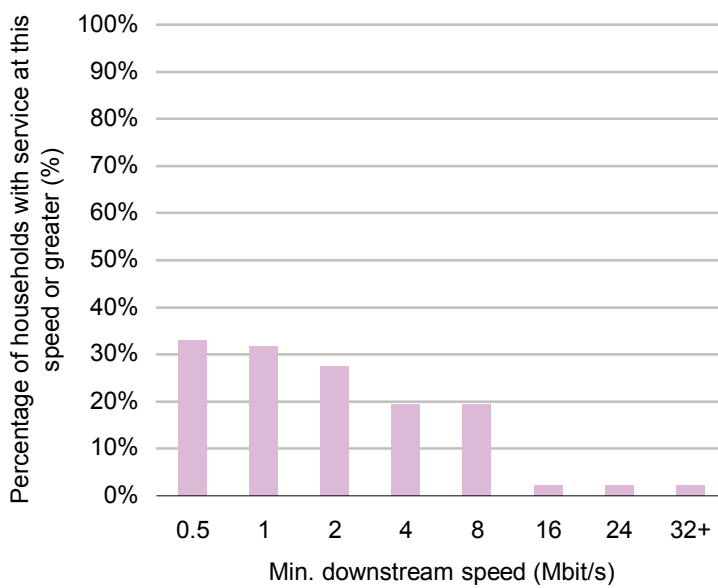
[Source: Analysys]

Exhibit 3.8:

Australian

symmetric

coverage, Q1 2005

[Source: Analysys]

Data gathered and estimations

Telstra's ADSL services, available at speeds of up to 1.5Mbit/s, cover 85% of Australian premises, with its cable modem service passing around 2.5 million homes (34%) and running at

'uncapped' downstream speeds. Given the small amount of press coverage afforded to Telstra's cable modem service, we expect that the service typically runs at speeds comparable to the company's ADSL service and coverage overlaps completely with ADSL.

Singtel Optus offers 'uncapped' asymmetric cable modem services over its cable network (covering 1.4 million households – 19% of the Australian total) which run at around 3.5Mbit/s[11]. The company's ADSL services currently overlap with Telstra's and runs at speeds of up to 1Mbit/s.

iiNet, which recently acquired OzEmail, offers ADSL at speeds of up to 8Mbit/s; it has installed DSLAMs in 89 exchanges across Australia[12] and plans to target over 200 by the end of 2005. Analysys estimates that these exchanges cover approximately 18% of households, with technical limitations of ADSL restricting actual availability of 8Mbit/s services to lines under 2km in length. We have assumed a 50% overlap with Singtel Optus' cable network.

Primus offers ADSL up to 6Mbit/s and has installed DSLAMs in around 200 exchanges – with an additional 100 over the next year – and is planning on upgrading these to ADSL2+. The company expects to cover 50% of the Australian population once this upgrade is complete. Analysys therefore estimates that Primus currently covers 35% of the Australian population, although much of this will overlap with competitors such as iiNet.

Agile Communications offers ADSL2 services running at up to 12Mbit/s in four exchanges (Meningie, Tailem Bend, Exhibition and Waymouth).

PowerTel offers SHDSL services up to 2Mbit/s and 10 and 100Mbit/s symmetric Ethernet services to businesses[13]. As of the end of February 2005, PowerTel had enabled 120 exchanges, which Analysys estimates equates to 25% of businesses and households.

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[11] Source: Singtel Optus' Web site: *"downloading a 2MB song file will take: 5 seconds with the uncapped speed of Cable broadband; 35 seconds at 512kbps with DSL broadband"*

[12] As of January 2005, Telstra had enabled 851 exchanges (Source: Factiva)

[13] For this reason, its asymmetric coverage has been excluded from the asymmetric measure for Australia

Analysys

Symmetric services are also available via Access Providers and BigAir, which offer up to 8 and 10Mbit/s respectively. Analysys estimates that the combined coverage of these operators is 18% of Australian households (50% of Sydney and Melbourne).
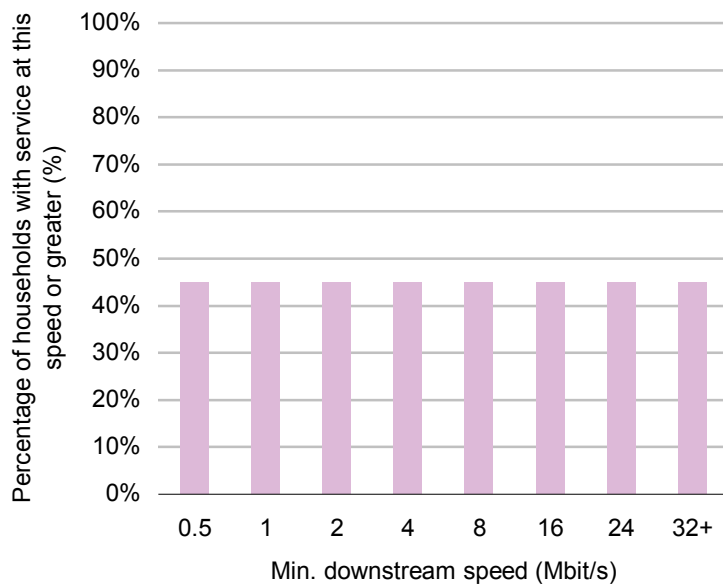
3.4 Canada

Higher-speed services in Canada (4Mbit/s and greater) are primarily offered by the cable network operators, with a number of FWA operators such as Alternative Broadband and TeraGo offering symmetric services. Coverage details for these FWA operators are not available and the results in this section are subject to a lower level of confidence.

Exhibit 3.9 and Exhibit 3.10 below illustrate the respective coverage of asymmetric and symmetric services in Canada.
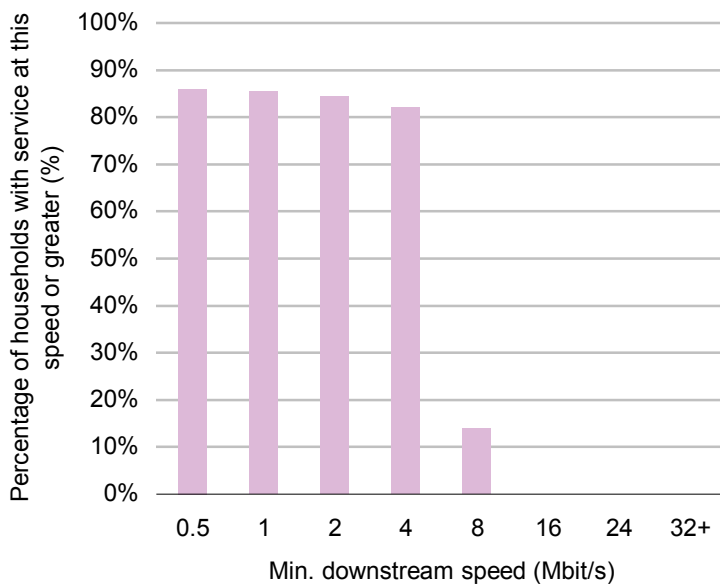
Exhibit 3.9:

Canadian asymmetric coverage, Q1 2005

[Source: Analysys]

Data gathered and estimations

Bell Canada provides ADSL services up to 3Mbit/s to customers in Ontario, Quebec and Atlantic Canada. As of the end of 2003, the company served 78% of lines passed in Ontario and Quebec and 65% of homes in Atlantic Canada. The company currently offers ADSL services to 82% of telephone customers in Ontario. Bell Canada has not supplied any further information.

Aliant provides ADSL services in Atlantic Canada (Newfoundland, Nova Scotia, Prince Edward Island and New Brunswick – 7.6% of the Canadian population), offering up to 3Mbit/s; it aims to cover 79% of households in the region by the end of 2005, up from 72% at the end of 2004.

TELUS offers ADSL services up to 2.5Mbit/s to households in Alberta, British Columbia and Eastern Quebec (4Mbit/s to businesses). Analysys estimates that its 2.5Mbit/s service is available to 13% of Canadian households, with the 1.5Mbit/s service available to 16% of households.

FCI Broadband offers up to 8Mbit/s ADSL in the Greater Toronto area. More precise coverage data is not available and we have assumed that the company covers 50% of Greater Toronto, which is equal to 6.5% of Canadian households.

For cable modem services, Rogers Cable offers up to 5Mbit/s to 26% of the Canadian population (96% of the 3.2 million homes passed in Ontario, New Brunswick and Newfoundland). Cogeco Cable passes 1.43 million homes in Ontario and Quebec, of which 87% were cable modem capable, resulting in 10% of Canadian households being able to receive Cogeco's cable modem services up to 10Mbit/s. Shaw Cable passes 3.2 million homes in Alberta and British Columbia and thereby covers 27% of Canadian households. Vidéotron passes 24 million homes in Quebec (20% of Canadian households) and offers services up to 6.5Mbit/s.

Alternative Broadband and TeraGo offer symmetric FWA services across Toronto, Markham, Mississauga, Richmond Hill, North York, Rexdale, Brampton, Barrie, London, St. Catherines, Windsor, Winnipeg, Calgary, Kelowna and Victoria (Alternative Broadband) and British Columbia, Alberta, Manitoba, and Ontario (TeraGo). Neither of the two companies provides more accurate coverage information; both offer services up to 100Mbit/s. We have assumed that 50% of the population in the areas listed above are covered, equating to a total of 45% of the Canadian population. As a result, this estimate is subject to a lower levels of confidence.

As of November 2004, 86% of the Canadian population had access to broadband[14].

3.5   France

Local loop unbundling (LLUB) has proved popular in the French broadband market, with a number of operators launching services that offer speeds 'up to' (*'jusqu'a'*) a particular speed. In these cases, the subscriber receives the highest downstream speed available, up to a maximum limit, given their line characteristics. It is often the case that the line can support a higher speed than the user receives due to 'designed-in' contention. This study reports the maximum possible speed excluding this contention, rather than that actually experienced by end-users as this is dependent on the individual service provider.
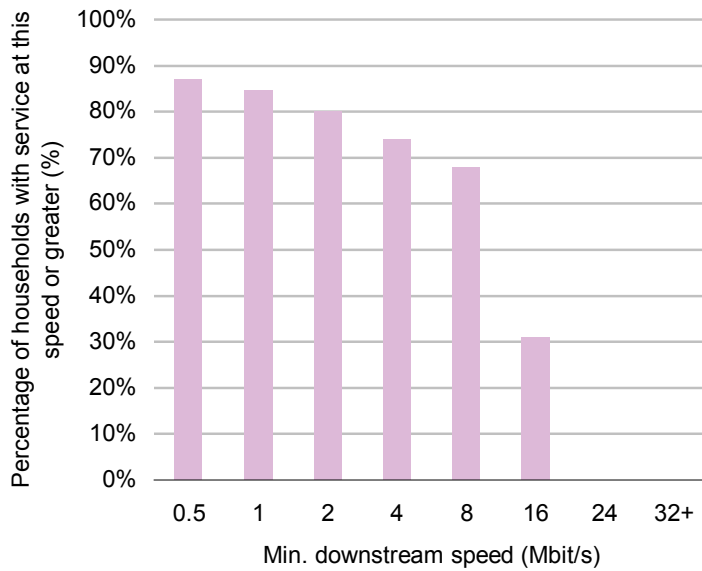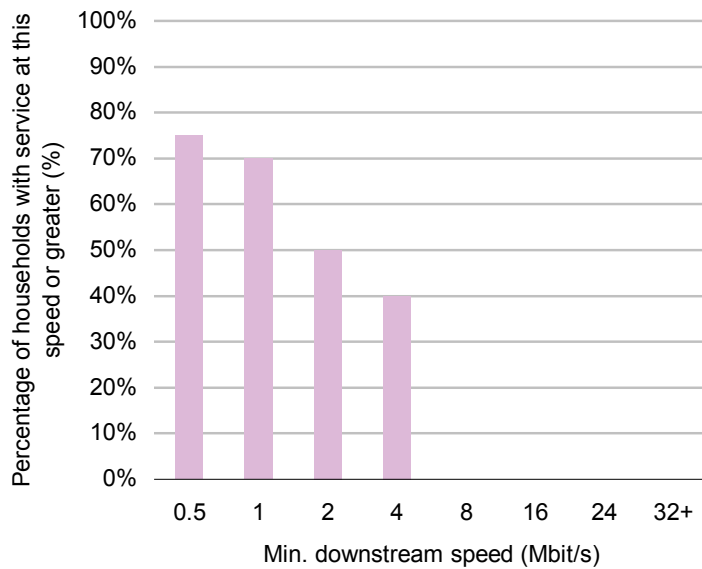
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[14]   Source: Canadian Radio-television and Telecommunications Commission

In addition, the cable network operators offer high-speed broadband services up to 20Mbit/s.

The coverage of asymmetric and symmetric services in France is shown Exhibit 3.11 and Exhibit 3.12 respectively.

Exhibit 3.11:

French asymmetric

coverage, Q1 2005

[Source: Analysys]

Exhibit 3.12:

French symmetric

coverage, Q1 2005

[Source: Analysys]

Data gathered and estimations

As of the end of April 2004, France Telecom covered 82% of the French population and expected to reach 95% by the end of 2005. Analysys estimates that, as of the end of March 2005, France Telecom covered 90% of French households with 512kbit/s ADSL services, up to line-length limitations. The company offers ADSL services up to 8Mbit/s and symmetric services up to 4Mbit/s.

AFORM (the Association Française des Opérateurs de Réseaux Multiservices) reported in June 2004 that there were 8.9 million households marketable by the French cable operators, of which 6.34 million (71%) were cable modem enabled (25% of French households).

NC Numericable (which passes 1.7 million Internet-capable homes out of 2.31 million total marketable homes) and France Telecom Cable offer services up to 20Mbit/s (1.53 million marketable homes – Analysys estimates that 1.1 million of these are cable-modem capable), while Noos and UPC offer services up to 10Mbit/s. There are also a number of smaller cable network operators in France offering cable modem services (for example, Est Vidéocommunication) that account for less than 10% of the total marketable homes. The cable networks of these operators do not overlap.

LLUB has proved popular in France, with 45% of households and 50% of businesses connected to unbundled exchanges as of the end of December 2004[15]. Free (part of the Iliad group) has 'more than 1000 unbundled local areas'[16] and offers ADSL2+ services up to 20Mbit/s. Exact details on the number of lines connected to unbundled exchanges is not available. AOL France offers 4 and 5Mbit/s services in unbundled areas but, again, the number of exchanges is not available.

Tiscali France offers 6 and 20Mbit/s services in 146 exchanges (connecting 20% of national households) and overlaps completely with Free. Cegetel, on the other hand, offers 8Mbit/s services to most of the Ile-de-France and Paris areas, along with some other areas

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[15]   Source: ORTEL (Observatoire Régional des Télécommunications)

[16]   Source: www.iliad.fr

Analysys

of France, and is likely to also overlap on the whole with Free. Paris and the Ile-de-France and region of France cover 19% of the French population; we estimate that Cegetel connects a similar percentage of households, although not all will be able to receive the 8Mbit/s maximum speed.

neuf telecom offers up to 8Mbit/s services to '50% of Internet users and 66% of companies'[17].

3.6   Germany

We have received very few responses from German operators to our enquiries, and data on broadband coverage is hard to come by. The results in this section are therefore based on approximations using the small amount of data that is available and are subject to lower levels of confidence.

Exhibit 3.13 and Exhibit 3.14 below show the respective coverage of asymmetric and symmetric services in Germany.
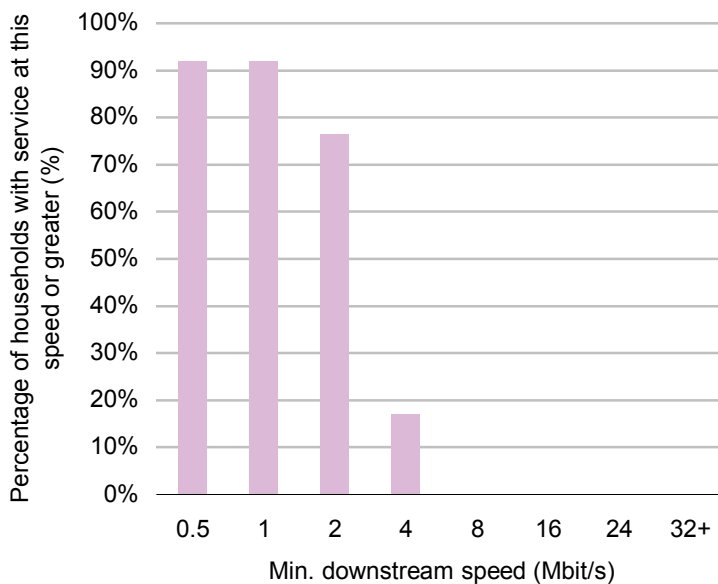
Exhibit 3.13: German asymmetric coverage, Q1 2005. NOTE: this chart is subject to a lower level of confidence [Source: Analysys]

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17   Source: www.neuf.com
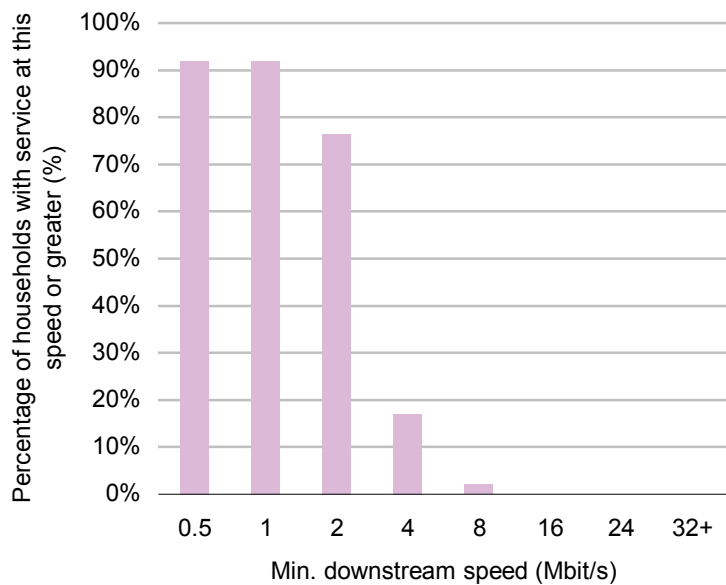
Exhibit 3.14:

German symmetric coverage, Q1 2005. NOTE: this chart is subject to a lower level of confidence [Source: Analysys]

Data gathered and estimations

T-Online offers basic DSL to over 90% of German households at speeds of up to 3Mbit/s. The company also offers SDSL services up to 2Mbit/s.

Arcor, Versatel, QSC and Hansenet are all active in LLUB, offering ADSL services up to 4, 6, 4 and 5Mbit/s respectively, along with symmetric services of varying speeds (Hansenet offers SDSL up to 9.2Mbit/s). There is little in the way of coverage data available for these organisations. At the end of 2004, QSC was present in more than 70 cities[18] and planned to increase coverage by a further 10 by mid-2005. The 70 most populous cities in Germany account for just under 30% of the German population[19], although it is unlikely that QSC will cover this high a proportion of the German population. Hansenet operates in the Hamburg area of Germany and Telecom Italia, its parent company, has announced plans to increase Hansenet's footprint. Hamburg's population is approximately 2% of the German total.

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[18]   Source: QSC annual report

[19]   Source: www.citypopulation.de

Analysys

Analysys estimates that local loop unbundlers in Germany are present in exchanges covering 20% of the German population. This estimate, however, is subject to a lower levels of confidence.

3.7 Ireland

The Irish broadband market has had a slow start, with little investment from eircom until recently and a low percentage of the cable networks being upgraded to offer cable modem services. FWA provides a significant amount of coverage.

The coverage of asymmetric and symmetric services in Ireland is shown in Exhibit 3.15 and Exhibit 3.16 respectively.
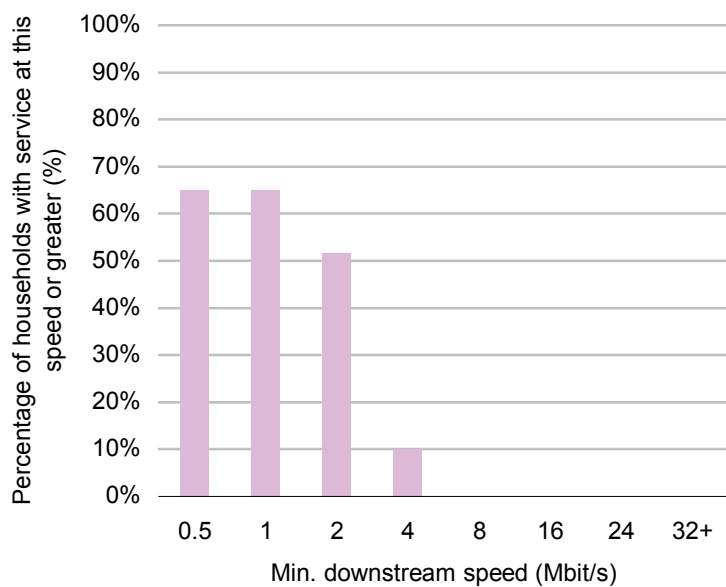
Exhibit 3.15:

Irish asymmetric

coverage, Q1 2005
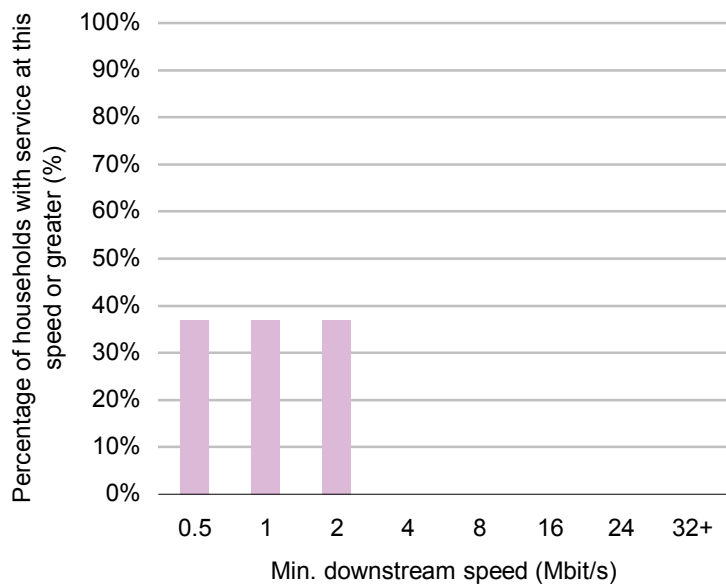
[Source: Analysys]

Exhibit 3.16:

Irish symmetric

coverage, Q1 2005

[Source: Analysys]

Data gathered and estimations

According to ComReg, eircom has enabled exchanges covering approximately 80% of the Irish population and aims to cover 90% by March 2006. The company offers 1 and 2Mbit/s ADSL services and has previously said that 76% of enabled lines are capable of supporting 256–512kbit/s services[20]; applying this percentage, we see that eircom can currently supply ADSL to 61% of the Irish population.

Esat BT offers ADSL services over unbundled local loops, as well as wholesaling eircom's products up to 1Mbit/s and has unbundled around 40 exchanges out of 1000 in Ireland. Leap Broadband offers ADSL and SDSL services over unbundled local loops up to 2Mbit/s, as well as wireless symmetrical services in Dublin, Cork, Limerick and Galway up to 2Mbit/s. Digiweb offers ADSL services over unbundled local loops up to 4Mbit/s, while Smart Telecom has begun a programme of unbundling exchanges and offers 2Mbit/s ADSL services. In both cases, coverage data is not available.

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[20]   Source: eircom 20-F SEC filing for the year ending March 2004, http://investorrelations.eircom.net/pdf/eircom_form20f_2004.pdf
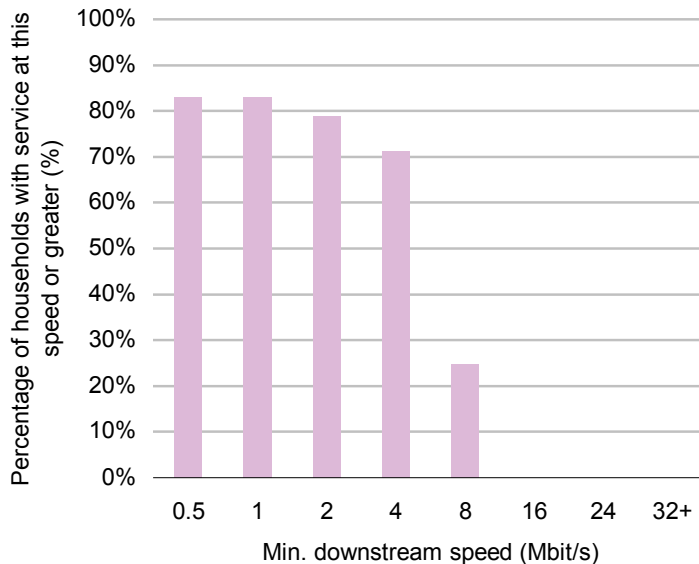
Analysys

A number of other FWA operators are active in the Irish market offering symmetric services up to 3Mbit/s, although, as is the case for most of the Irish market, coverage information has been scarce. Irish Broadband covers 30% of Irish households (including Dublin, Cork, Galway, Waterford and Limerick). Nova Networks operates in Cork city and its suburbs. Analysys estimates that up to 37% of Irish households can receive FWA services.

Cable networks, operated by ntl and Chorus, offer broadband to approximately 8% of the Irish population[21]. This coverage overlaps with eircom's DSL footprint.

3.8   Italy

The Italian market has provided a case study for FTTH in the form of Fastweb. ADSL speeds on offer have historically been low, but towards the end of March 2005, both Telecom Italia and Fastweb increased their maximum ADSL speeds from 1.28 to 4Mbit/s and from 4 to 6Mbit/s respectively.
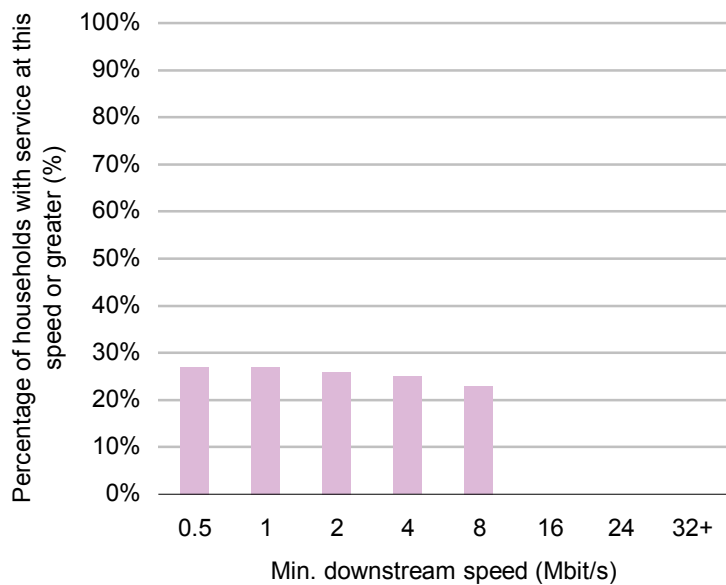
Exhibit 3.17 and Exhibit 3.18 below show the respective coverage of asymmetric and symmetric services in Italy.

Exhibit 3.17:

Italian asymmetric coverage, Q1 2005

[Source: Analysys]

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21   Source: ComReg

Analysys

Exhibit 3.18:

Italian symmetric

coverage, Q1 2005

[Source: Analysys]

Data gathered and estimations

Telecom Italia had enabled exchanges covering 83% of Italian households by the end of 2004 and aims to increase this to 91% by the end of 2005. The company offers ADSL services up to 4Mbit/s, with the highest speed available to 85% of connections. The company also offers symmetric HDSL services to businesses, running at up to 8Mbit/s[22]. There are no coverage figures for this service, but based on the UK ratio of asymmetric and symmetric coverage – and making some upward adjustment for the shorter average line length in Italy than in the UK, we estimate that this service is available to 25% of Italian households/businesses. In addition, the 8Mbit/s service will not be available to the full footprint.

Fastweb has unbundled exchanges covering 11.5% of the population and offers ADSL services of 6Mbit/s, along with symmetric FTTH services of 10Mbit/s to a further 6.5% of the population. Wind is also active in unbundling, having unbundled 488 exchanges by the end of April 2004 and offers 4Mbit/s services on these unbundled exchanges. There are no coverage statistics available on Wind but, during 2004 when Fastweb was rumoured to be

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22   Source: www.191.it; *Interbusiness Liberty* product

considering acquiring Wind, it was stated that the combined coverage of the two organisations would be 30% of the Italian population.

Tiscali has unbundled exchanges serving 30% of the Italian population and offers ADSL services up to 12Mbit/s.

3.9   Japan

VDSL and FTTH are the main access technologies in Japan, with some cable modem coverage providing overlapping coverage. The broadband providers in Japan do not provide a breakdown of their coverage levels by speed.

The coverage of asymmetric and symmetric services in Japan is illustrated in Exhibit 3.19 and Exhibit 3.20 respectively.
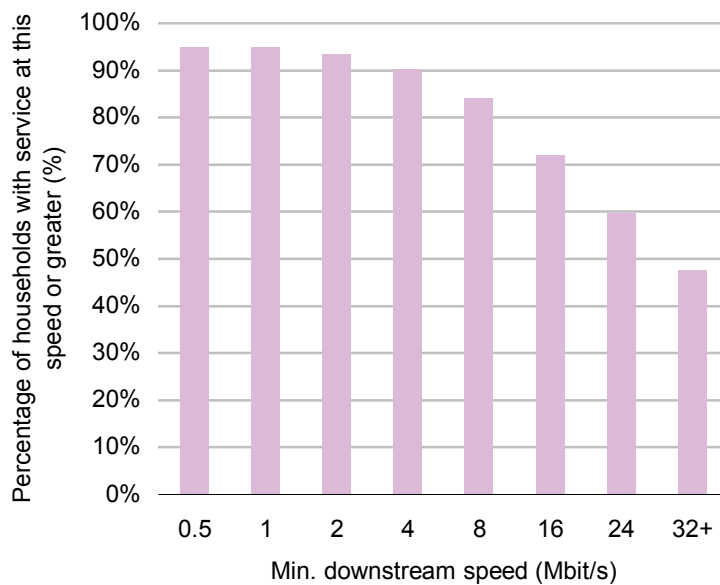
Exhibit 3.19:

Japanese asymmetric coverage, Q1 2005
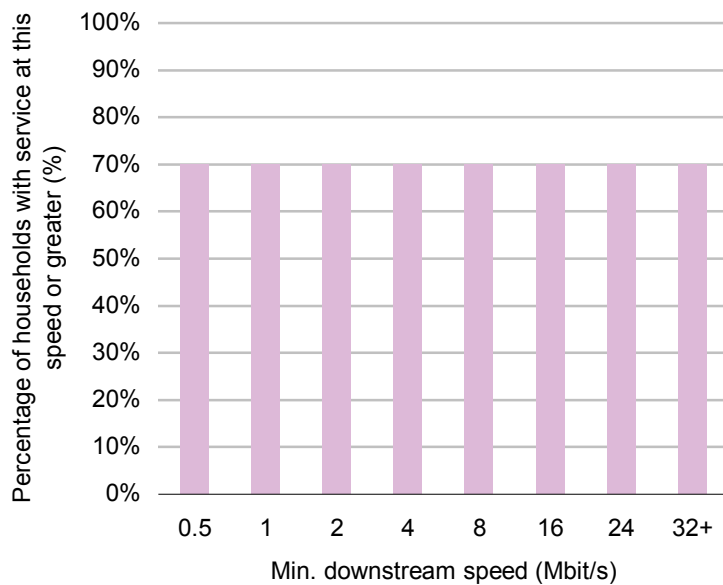
[Source: Analysys]

Exhibit 3.20:

Japanese

symmetric

coverage, Q1 2005

[Source: Analysys]

Data gathered and estimations

In Japan, fibre extends closer to the customer than in many other countries and, due to the short length of copper to the end-user, it can support much higher speeds than would otherwise be the case.

According to a survey released by the Ministry of Internal Affairs and Communications in December 2004, broadband is not available to 11.5% of Japanese municipalities. These municipalities are mainly in rural and mountainous areas and are not heavily populated, so the corresponding number for the percentage of population not covered is much lower.

NTT states that it offers VDSL broadband services to more than 95% of Japanese households at up to 50Mbit/s, but does not split this coverage down by speed. Similarly, Yahoo! states that it can serve 90% of telephone lines with VDSL services up to 50Mbit/s, but does not provide a breakdown by speed. It should be noted that the performance of VDSL falls off very much more rapidly than other DSL variants such as ADSL and ADSL2+ and Exhibit 3.19 shows a conservative estimate of this in Japan given the short line lengths.

Analysys

Symmetric services, particularly FTTH, are widespread in Japan, with NTT stating that it covers approximately 70% of households with 100Mbit/s fibre services. It is likely that symmetric DSL-based services are also available from NTT, but we have found no evidence to support this at this point.
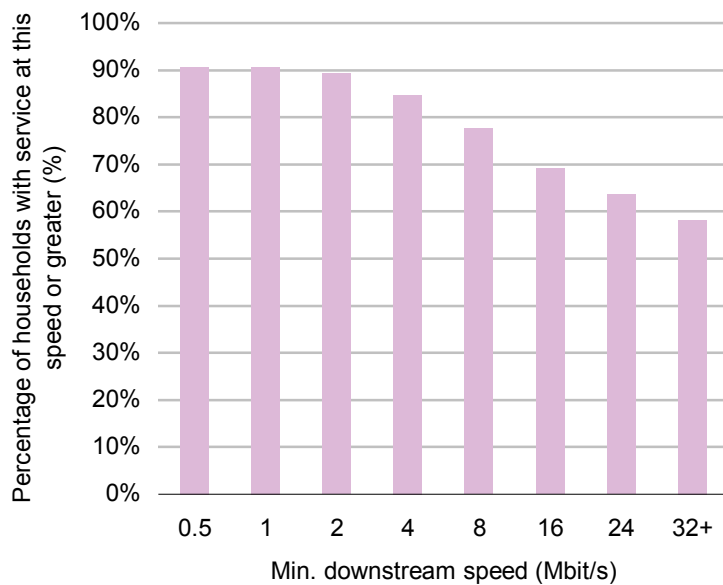
3.10 South Korea

Korea Telecom, Hanaro and Thrunet control around 90% of the South Korean broadband market. In February 2005, Hanaro acquired Thrunet.

Exhibit 3.21 and Exhibit 3.22 below show the respective coverage of asymmetric and symmetric services in South Korea.
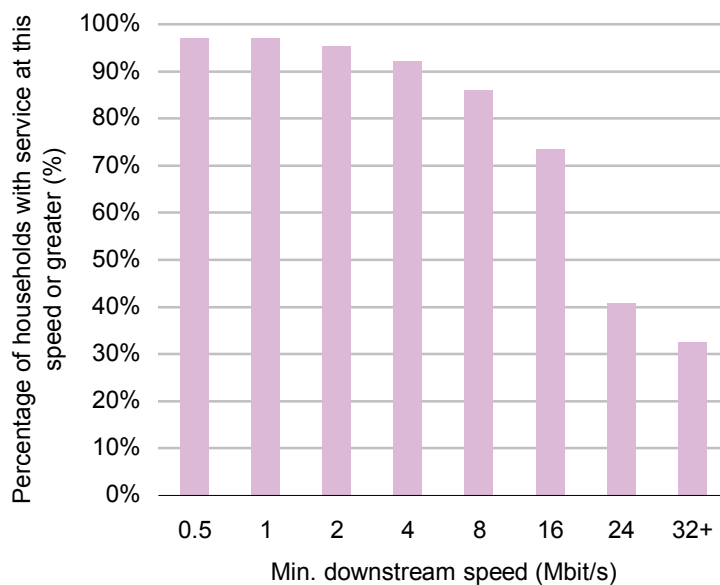
Exhibit 3.21:

South Korean asymmetric coverage, Q1 2005

[Source: Analysys]

Data gathered and estimations

Korea Telecom states that it covers 65% of the Korean population with its ADSL and VDSL services, running at up to 50Mbit/s. We assume that the company also offers symmetric DSL based services.

The combined Hanaro-Thrunet organisation passes 8.5 million households (50% of the national total), with its hybrid fibre coax network offering up to 10Mbit/s, in addition to offering ADSL and VDSL services (up to 20Mbit/s) to an unquoted number of households. It covers 4.4 million households (26% of the national total) with FTTH at 100Mbit/s and 160 000 households with FWA at 2Mbit/s.

Broadband availability in Korea was of the order of 97% as of the end of September 2004[23]. We therefore estimate that the ADSL and VDSL coverage of Hanaro-Thrunet is at least 32% which, combined with Korea Telecom's stated 65% coverage, reaches a 97% total.

In South Korea, as is the case in Japan, fibre extends closer to the customer than in many other countries. xDSL technologies can therefore support much higher speeds than in other countries.

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23   Source: Ovum

3.11 Sweden

ADSL2+ and VDSL services in Sweden, combined with FTTH availability from B2 Bredbandsbolaget and high-speed services available from the cable network operators, contribute to Sweden's high availability of sophisticated broadband.

Exhibit 3.23 and Exhibit 3.24 below show the respective coverage of asymmetric and symmetric services in Sweden.
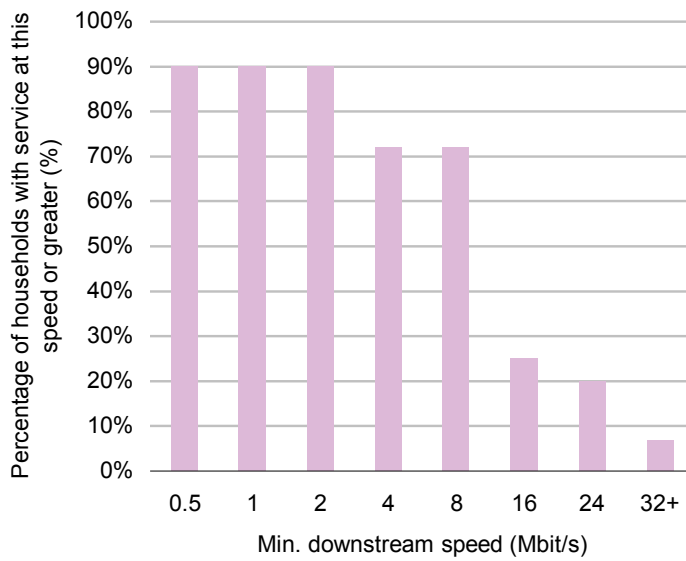
Exhibit 3.23:

Swedish asymmetric coverage, Q1 2005
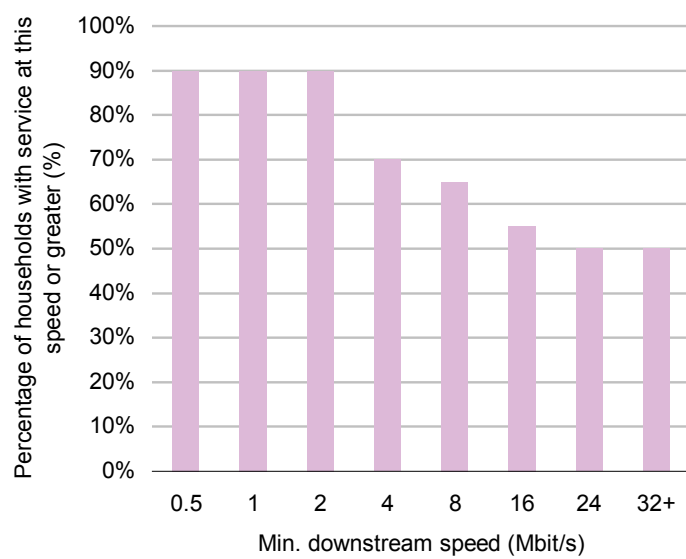
[Source: Analysys]

Exhibit 3.24:

Swedish symmetric coverage, Q1 2005

[Source: Analysys]

Data gathered and estimations

TeliaSonera offers ADSL, ADSL2+ and Ethernet services up to 24Mbit/s to the Swedish population, with 90% of households being able to receive services up to 2Mbit/s, falling to 20% for 24Mbit/s. The company's coverage overlaps 60% with competitors such as Telenor, Song and B2 Bredbandsbolaget.

B2 offers ADSL, VDSL, Ethernet and FTTH services running up to 100Mbit/s. FTTH is available to 300 000 households (7% of the national total).

Song Networks offers ADSL and ADSL2+ services to approximately 30% of the Swedish residential market.

In addition to xDSL and fibre providers, cable network operators such as comhem, UPC and Tele2 offer cable modem services up to 8Mbit/s to 33%, 6.6% and 7.6% of households respectively.

Based on information from contacts within the Swedish telecoms industry, around 50% of Swedish businesses have access to symmetric services, with fibre available on most business parks of an average size or greater. SDSL is widely available in Sweden. We have estimated fibre availability at 50% of households, with SDSL services available on a comparable basis to ADSL.

3.12 US

Both DSL and cable modem services offer high-speed services in the US, with DSL typically running up to 3Mbit/s (although Covad offer 6Mbit/s ADSL services). Cable modem services are available up to 10Mbit/s, although the available speed depends on the network.

Asymmetric and symmetric coverage in the US is respectively shown in Exhibit 3.25 and Exhibit 3.26 below.
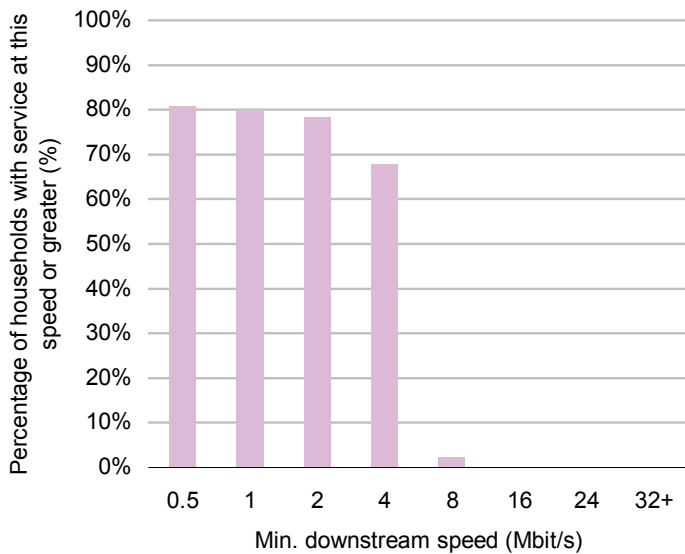
Analysys

Exhibit 3.25:

US asymmetric

coverage, Q1 2005
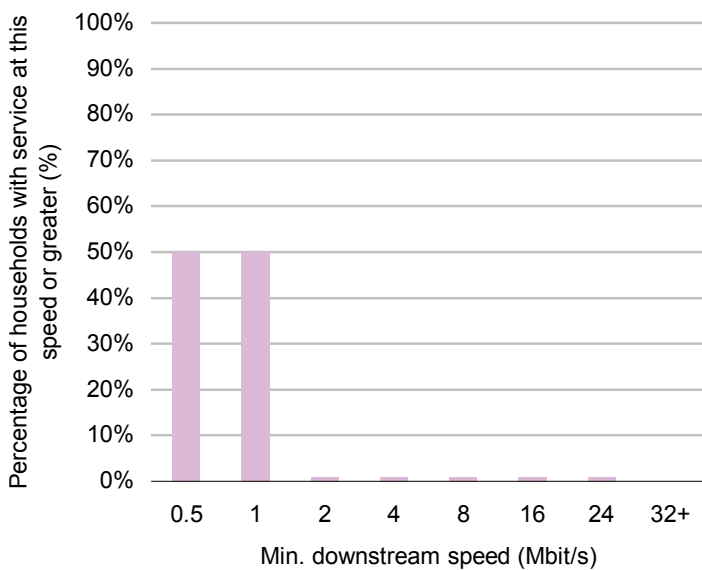
[Source: Analysys]

Exhibit 3.26:

US symmetric

coverage, Q1 2005

[Source: Analysys]

Data gathered and estimations

DSL services are available from a wide range of ILECs and CLECs, with a number of cable network operators offering cable modem services. The ILECs are: Bellsouth; Qwest; Verizon; and SBC.

Bellsouth offers ADSL services up to 3Mbit/s and symmetrical services to businesses up to 1.5Mbit/s. Analysys believes that the company's footprint contains 16.3 million homes, of which 80% are DSL enabled. Through the use of remote terminals, Bellsouth has been able to bring 80% of its DSL-enabled customers within range of 3Mbit/s services.

Verizon's network passes 34 million homes (31% of national total) and ADSL reach is approximately 80% due to line length/quality issues, resulting in ADSL coverage of 25% from Verizon with speeds up to 3Mbit/s. The company also offers symmetric services through both FTTH (passing 1 million homes, which is 1% of the US total) at 30Mbit/s and by 'tuning' ADSL lines to offer symmetric services up to 1.5Mbit/s.

SBC offers ADSL services up to 3Mbit/s to 33% of the US population, as well as symmetric services up to 1.5Mbit/s.

Qwest offers DSL asymmetric services up to 1.5Mbit/s to 6.6 million households (6% of national households) and has 15.5 million access lines in service.

Covad offers ADSL services up to 6Mbit/s to 50% of national households, although this will be affected by line-length limitations, and also offers SDSL services up to 1.5Mbit/s over the same footprint.

Comcast offers cable modem services up to 4Mbit/s to 40 million homes (36%). RCN offers cable modem services up to 10Mbit/s over its network. The number of homes passed is not available. Analysys estimates that RCN's network passes less than 3% of US households. Similarly, Mediacom, which passes 2.7 million homes, can provide cable modem services of up to 3Mbit/s to less than 3% of US households.

Cox Communications' cable network can provide cable modem service up to 5Mbit/s to 9.4% of US households, with its network completely overlapping with DSL coverage from the ILECs and CLECs.

Charter Communications offers cable modem services up to 3Mbit/s to 10% of US households, while Time Warner passes 19 million homes (17%), although not all of these may be able to receive their 6Mbit/s cable modem services.

Analysys

4 Usage of sophisticated broadband services – results

This section contains the 2004 results for sophisticated broadband usage in the countries under study. The following indicators are covered, with definitions for each indicator available in the results section below:

- business indicators
    - broadband businesses ordering online
    - use of Wireless LANs
    - use of VoIP
    - broadband businesses transacting with government online
    - ecommerce revenue

- residential indicators
    - downloading TV, video and movie clips
    - use of online gaming
    - use of VoIP
    - ecommerce spend
    - teleworking

The results for all of these indicators are based on estimates produced by Analysys through reference to free, publicly available data sources. The indicators have been estimated as at the end of 2004. Estimations will be made for mid-2005 in the next iteration, and for the end of 2005 for the third iteration of this report.

The residential indicators have been chosen following a BSG Metrics Group survey and approval of the choices by the DTI.

In addition to this, the final report contains two short trends analysis pieces focusing on the state of a particular service and discussing market developments. In this iteration of the report, the following are included:

- Does a correlation between higher service usage and broadband penetration exist?
- A review of recent developments in VoD.

4.1 Methodology for business indicators

The business indicators specifically look at usage by businesses with broadband, compared with usage by businesses with narrowband Internet access to see if there are discernible differences in usage or take-up patterns. A broadband business is defined as a business with at least one Internet connection that is faster than 256kbit/s. Businesses that have leased lines and fibre connections are therefore included, along with those that use mass-market broadband services based on cable modem, Ethernet or xDSL.

The indicators are based primarily on analysis of survey data collected for previous iterations of the *Business in the Information Age* study, undertaken by the DTI. As such, they are based on survey data covering all the countries addressed by this study. The numbers of responses in individual countries are sometimes quite small. For instance, while the average number of respondents per country claiming narrowband was 214 in 2002, by 2004 this had dropped to an average of 177 per country, and in Korea in 2004 the number of respondents using narrowband Internet in 2004 was only 10. Consequently, in these cases a higher error margin applies.

Exhibit 4.1 and 4.2 below show the number and percentage of respondents to the *Business in the Information Age* study in 2004 who had either narrowband or broadband access. The total number of companies surveyed includes those without access to the Internet. In the UK, 2716 interviews were conducted in total, and 500 interviews were conducted in each of the other countries.

Analysys

	Broadband respondents 2004	Narrowband respondents 2004
UK	1052	904
Australia	180	153
Canada	208	133
France	193	146
Germany	191	71
Ireland	195	141
Italy	216	89
Japan	219	73
South Korea	302	10
Sweden	252	82
US	213	144
Average	**293**	**177**

Exhibit 4.1: Sample sizes for the most recent study [Source: Analysys]

	Broadband respondents	Narrowband respondents
UK	39%	33%
Australia	36%	31%
Canada	42%	27%
France	39%	29%
Germany	38%	14%
Ireland	39%	28%
Italy	43%	18%
Japan	44%	15%
South Korea	60%	2%
Sweden	50%	16%
US	43%	29%
Average	**43%**	**22%**

Exhibit 4.2: Implied broadband and narrowband penetration [Source: Analysys]

The results in this study are not presented in the same way as in the *Business in the Information Age* study. In that study, the phrase '30% of businesses' meant businesses representing 30% of *employees* in the country. In this study, '30% of businesses' means 30% of all entities, irrespective of the number of employees they represent. This approach maximises the likelihood of identifying compatible data sets for other countries during the study period as other sources we have found are not presented in the same way as the *Business in the Information Age* study.

Analysys

In addition to showing usage as a percentage of broadband and narrowband businesses, many of the business indicators show usage or take-up as a percentage of all businesses. This means take-up as a percentage of all businesses that participated in the survey, irrespective of whether they had an Internet connection or not.

4.2   Methodology for residential indicators

For the residential indicators, very few data sets specifically cover broadband usage, with most data sets covering general Internet usage (i.e. both narrowband and broadband). Therefore, the residential indicators included within cover both narrowband and broadband usage. We would expect that broadband-specific data sets will become available over the duration of the study as broadband continues to increase its share of Internet connections; these will be incorporated as and when they are published.

Extensive effort has been invested to identify sources of data to underpin the residential Internet usage analysis. There are no single sources that provide all of the data sets for any one country, nor are there any metric-specific data sources that address all the countries covered by this study. Moreover, data sources often only cover a single year, or a single project, and have not been repeated. Data sets available also tend to lag the market by around a year (in other words, the latest studies reference surveys conducted in mid-2004). As a result, Analysys has been required to normalise the different data sets to ensure (as far as is possible) that they cover the same things, and to create some estimates to fill gaps in the data.

The following rules have been used for normalisation and estimation:

- where possible, we have only used sources that are underpinned by a programme of primary market research, and ideally we have only used market research results based on reasonable numbers of responses (always over 250 responses per country, often over 1000 responses per country)

- where no relevant survey data exists for a particular metric in any given country, we have left a gap rather than attempt to estimate a number through comparison with other markets

- we have used linear interpolation to fill small numbers of gaps (one or two missing points) in historical time series

- where historical data exists – but no recent data does (e.g. for 2004 or Q1 2005), we have estimated by extrapolation, using the following processes:

    - historical growth rates have been continued in linear fashion
    - the resulting outputs have been compared with
        o more complete data series for peer countries that historically have had a similar level of usage for that metric at an equivalent point in their development
        o reference indicators for the country (such as the recent growth of Internet usage and current levels of Internet penetration)
        o where appropriate, the initial linear extrapolation highlighted above has been adjusted following the comparison process

- where two data sources apparently contradict one another, we have investigated whether:

    - there are definitional differences (e.g. video download *versus* streaming TV and video over the Internet). If this is found to be the case, we have selected the data set that most closely matches the definition of the indicator included in this study. We have used an average score if the definitions of both data sets appear valid
    - there are sampling differences underlying the data set (e.g. the exclusion of certain age groups). In these cases we have used the data with the most comprehensive survey sample
    - there are computational/base differences (e.g. the results have been calculated as a proportion of population, all Internet users, regular Internet users, all households, etc.). In these cases, we have recalibrated the outputs

There is very little survey data available for one of the metrics used, this being take-up of VoIP. The results for this metric are based upon Analysys's estimates derived from operator data, information from regulators and Analysys's research into the development of the supply side of each country market.

Due to the fact that the estimates have been created by pulling together results from a wide range of studies and surveys, it is not possible to express the expected accuracy of the results in terms of a percentage error margin. We have therefore devised a colour coding mechanism for the residential usage charts, which provides information about the quality of the underlying information. The colour coding shows comparative confidence levels.

Analysys

Those with the highest confidence levels do not necessarily have a small margin for error, but they are those data points that we believe are the most reliable.

Colour coding on residential chart	Comparative confidence
Full colour bar on chart	Highest confidence: based on one or more reliable, reasonably current data points, or extrapolation based on reliable series of historical data points. Some normalisation may have been required
Hashed bar on chart	Mid-range confidence: extrapolation or estimation based on a number of historical data points, possibly from different sources. Normalisation likely to have been required
Empty boxed bar on chart	Least confidence: substantial extrapolation has been required to estimate from old or sparse data, or performance has been estimated from similar countries

Exhibit 4.3: Colour coding scheme used for charts [Source: Analysys]

4.3   Results for business indicators

4.3.1   Sources used

The data for the business indicators has been drawn from the survey responses underlying the *Business in the Information Age* study and aggregated together to a greater level of detail than that contained in the original study. This ensures a consistent set of data points for this iteration of the study. Alternative data sets will be used should the *Business in the Information Age* study not be repeated in the future.

The sample sizes for all business-related charts – with the exception of the chart for ecommerce revenue which has a separate sample size table below – are as follows:

⦿ Analysys

Country	Broadband businesses	Narrowband businesses
UK	1052	904
Ireland	195	141
France	193	146
Germany	191	71
Italy	216	89
Sweden	252	82
US	213	144
Canada	208	133
Japan	219	73
Australia	180	153
South Korea	302	10

*Exhibit 4.4: Sample sizes for business metrics [Source: Analysys]*

4.3.2   Broadband businesses ordering online

Definition

The percentage of all broadband businesses in a country that, in the last year, have ordered goods or services from their suppliers using the Internet (irrespective of whether payment was made over the Internet, or whether invoicing was managed separately).

Results and comments
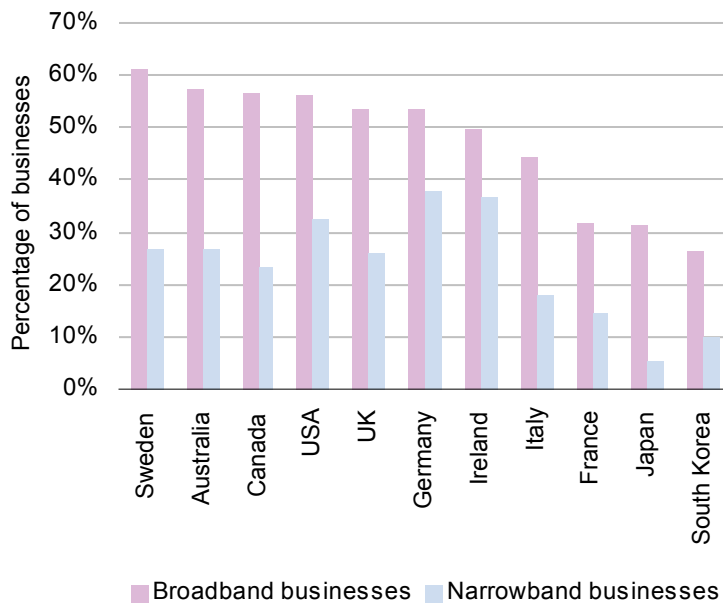
Analysys

As can be seen from Exhibit 4.5 above, seven of the countries covered by this study show that more than 50% of broadband businesses order online. Japan and South Korea are at the bottom of the ranking. One might expect that in countries with higher broadband penetration – such as Japan and South Korea – the broadband-using population would include a higher proportion of late broadband adopters (those that have only recently taken broadband). These late adopters might typically be reluctant to use their broadband connections for little more than emailing and Web browsing. This would mean that although a country has a lot of broadband companies ordering online, that country gets a low score when the indicator is expressed as a percentage of all broadband Internet users.

This data is derived entirely from the source data used in the *Information in the Business Age* study, with no estimations required.

Analysys

4.3.3   Use of WLAN

Definition

The percentage of all broadband businesses in a country that, at the year end, have at least one private WLAN hotspot. This excludes businesses that merely allow their employees to make occasional use of public WLAN services.
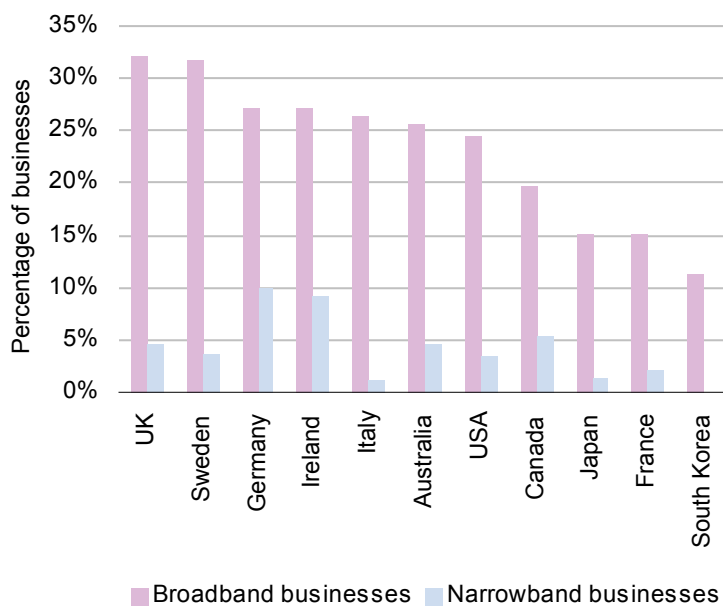
Exhibit 4.6: Percentage of broadband and narrowband businesses with a WLAN in 2004 [Source: Analysys]

Japan, France and South Korea are at the bottom of the ranking for the percentage of broadband businesses using private WLANs.

This data is derived entirely from the source data from *Information in the Business Age*, with no estimations required.

4.3.4   Use of VoIP

Definition

The percentage of all broadband businesses in the country that, at the year end, were using IP telephony services. The measure includes occasional use as well as use across a sub-set of company sites. It includes voice over broadband solutions delivered by public network operators and also business site-to-site calling over the private corporate network. The measure excludes use of free PC-based software products that enable PC-to-PC calling.

Results and comments
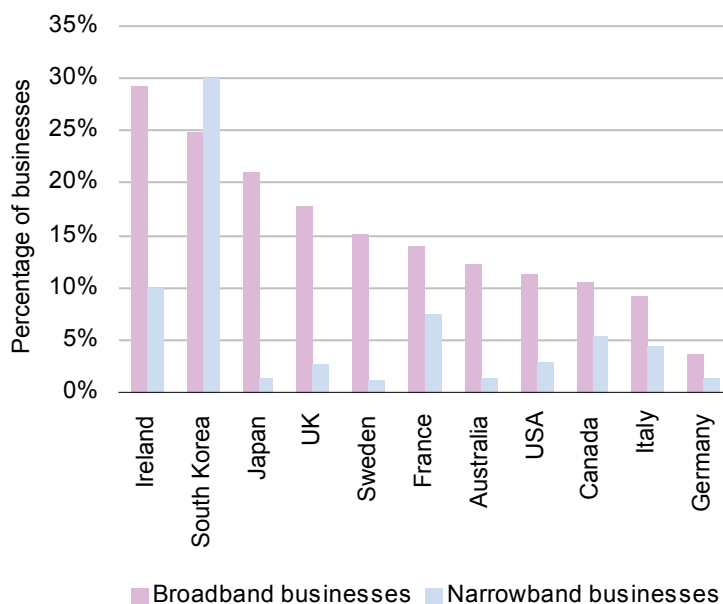
Exhibit 4.7:
Broadband and narrowband businesses using VoIP, 2004
[Source: Analysys]

Ireland tops the ranking for the percentage of broadband businesses using VoIP. This may be partially due to the relatively low take-up and availability of mass market broadband in Ireland, combined with above-average mass market broadband prices. As a result, mass market broadband businesses in Ireland will tend to be more technologically literate than, for example, mass market broadband businesses in the UK or Sweden, where overall take-up is much higher.

South Korea, where the broadband market is much more mature and where penetration rates have grown rapidly, enjoys a business base which is quick to take advantage of new

technologies – this is a reflection of the cultural attitude in South Korea towards the early adoption of emerging technologies. The narrowband result shows that all Internet users are interested in new services, even in the relatively limited number of locations where broadband is not available.

This data is derived entirely from the source data from *Information in the Business Age*, with no estimations required.

4.3.5   Broadband businesses transacting with government online

Definition

The percentage of all broadband businesses in a country that have made online tax or other financial payments to public authorities within the last year. This measure excludes businesses that only make payments by BACS (bankers automated clearing system).

Results and comments
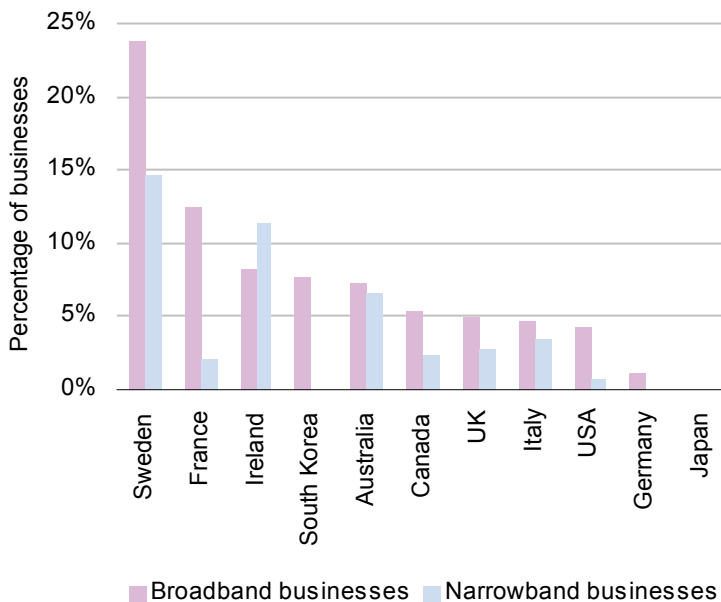
Exhibit 4.8:

Percentage of broadband and narrowband businesses making tax and other payments to public authorities over the Internet, 2004

[Source: Analysys]

Surprisingly, given the high level of broadband availability, Japan is ranked last in terms of businesses making payments to public authorities over the Internet, with none of the survey respondents (219 broadband, 73 narrowband) answering the question positively. It may be the case that the Japanese government does not have the processes in place to allow businesses to make such payments, although there may be the capability to submit tax forms without submitting an online payment.

On the other hand, broadband businesses in France, where ecommerce spend by residential users is low as a result of attitudes to personal credit card usage (see Exhibit 4.14), appear to be amongst the most willing to pay their government online, in contrast to the narrowband picture. This may reflect a more structural difference in attitudes to online commerce between early adopters in France (broadband businesses) and those who are behind on the technology curve (narrowband businesses).
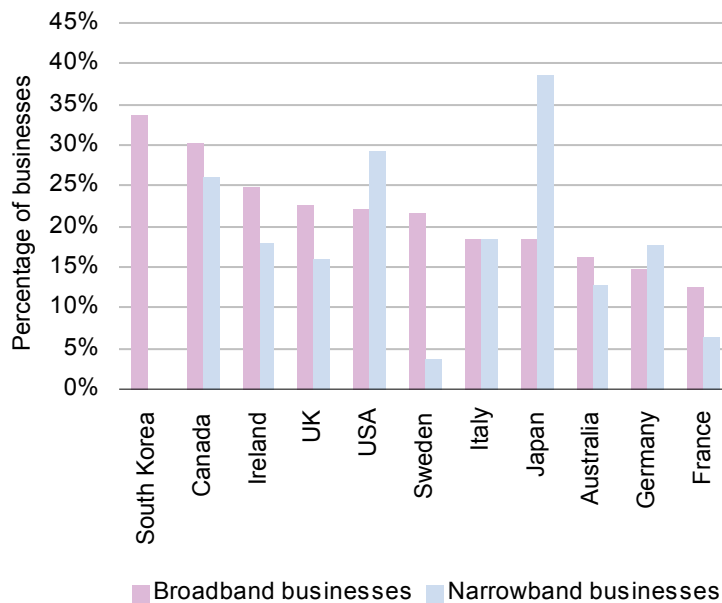
This data is derived entirely from the source data from *Information in the Business Age*, with no estimations required.

4.3.6 Ecommerce revenue

Definition

For all of a country's broadband businesses that take orders over the Internet, the average of the total annual value of orders received via the Internet expressed as a percentage of each entity's total annual order volume. This includes all orders irrespective of whether payment is made over the Internet, or invoiced separately.

Results and comments

The survey results show that businesses that sell products and services online now generate significant proportions of their total order value over the Internet. Looking across the countries at businesses with broadband, those selling online generated a simple average of 21% of all orders over the Internet in 2004. Looking at broadband businesses, South Korean companies enjoyed the highest success online, while the French and German companies suffered from national reticence to use credit cards.

The results for this chart need to be treated with caution because sample sizes are sometimes very small. For instance, the Japanese data shows a very high percentage of all orders generated online (nearly 40%), but only six respondents out of the Japanese sample of 500 interviewees stated that they used narrowband, and that they sold goods or services online. Three interviewees reported that a very high percentage of their sales were generated online (in one case 80% of orders were generated online).In such a small sample, extreme responses have a dramatic impact on the output results. For this reason, close attention should be paid to the sample sizes shown on the chart. Exhibit 4.10 below shows the sample sizes for this metric.

Country	Broadband businesses	Narrowband businesses	All businesses
UK	263	155	630
Australia	52	41	113
Canada	62	23	68
France	35	12	138
Germany	54	12	127
Ireland	38	35	181
Italy	49	17	134
Japan	74	6	116
South Korea	110	3	150
Sweden	102	10	150
US	74	25	174

Exhibit 4.10: *Number of respondents that said they sold goods and services online [Source: Analysys]*

## 4.4 Results for residential indicators

4.4.1 Downloading TV, video and movie clips

Definition

The percentage of all people in a country that have downloaded one or more TV, video or movie clips over the Internet within the last year. Includes individuals irrespective of whether the content is paid for or free. The metric is expressed as a percentage of Internet users and as a percentage of total national population.

Results and comments
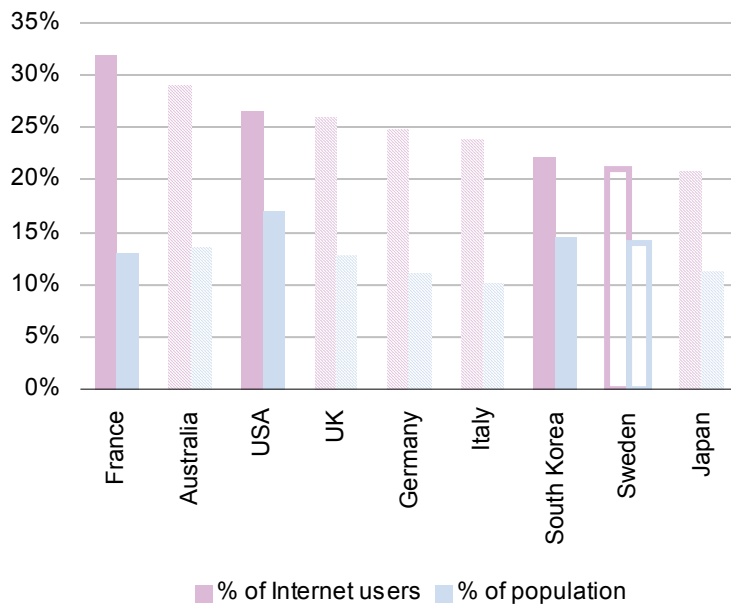
Exhibit 4.11:

TV, movie or video

clip downloading

[Source: Analysys]

At first glance, it seems surprising that, when measured as a percentage of Internet users, TV, movie or video clip downloading is low in Japan, Sweden and South Korea in comparison with the other countries. As with other metrics, however, we believe that measuring usage amongst Internet users masks a saturation effect. We believe that those users who would download large volumes of movies and video clips form a core group within the early adopter segment. The Internet penetration in these three countries is high so many later adopters, who use the Internet for more practical purposes such as sending emails and searching for goods and services, but who do not download moves and video clips, are reducing the countries' scores. This view is borne out by the fact that when plotted against percentage of population, South Korea and Sweden are second and third respectively; Japan is also much higher up the rankings.

France is high in comparison with other countries when looking at usage amongst Internet users. The French data, which is based on an ART survey conducted in mid-2004, includes downloading of video clips, etc. over peer-to-peer networks. It is possible that other surveys did not capture the effect of the peer-to-peer phenomenon (for instance, because of the way questions were phrased, or because they were conducted a little earlier in time). We might expect to see swift growth in other countries appearing as later data sets are published.

It should also be noted that it is possible that the difference between countries in this metric falls within the possible margin of error. Substantial normalisation was required to produce this

metric and data for 2004 for Sweden was created by extrapolating from 2002 survey results. Our estimates could under-represent the popularity of movie clips downloading in the context of the growth of peer-to-peer file sharing.

Finally, Sweden, Japan and South Korea come top of the table of the next metric, online gaming, when usage is measured amongst Internet users. It is possible that Internet and video clip downloading competes with gaming for leisure time amongst Internet users.

Sources used

A wide range of sources were used to populate this metric. These included national surveys commissioned by regulators and statistical offices into household use of the Internet, and published survey results from one-off surveys undertaken by commercial third-party information providers. Most data sources covered a single country, and they often measured slightly different service sets (e.g. inclusion of TV, or viewing of movies only), and slightly different periods of time (e.g. use in the last month *versus* use in the last year). Estimation was therefore required to normalise the results. A single source from the Motion Picture Association of America was informative as, although its data only covered film downloads, it did cover many countries covered by this study and was based on a survey conducted in 2004.

4.4.2   Use of online gaming

Definition

Percentage of all Internet users in a country that have played an online game during the last year. Games are defined in their broadest sense to include massive multi-player online games, multi-player online console or PC games. It excludes games that are downloaded and played offline, as well as online gambling.
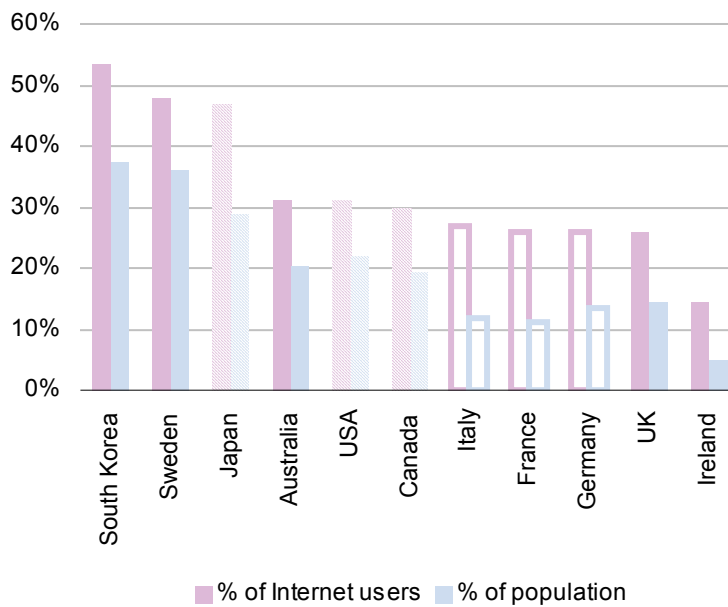
Results and comments

South Korea has a very large online gaming market. This is reflected by the very high score, which appears in spite of the high levels of Internet usage in the country. In other words, late adopters are big gamers as well as early adopters. This is also true in Japan and Sweden. All three markets have high levels of broadband penetration, which is advantageous for serious online gamers. The lack of broadband penetration in Ireland could explain the low popularity of online gaming in that country.

Sources used

A wide range of sources were used to populate this metric. These included national surveys commissioned by regulators and statistical offices into household use of the Internet, as well as published survey results from one-off surveys undertaken by commercial third-party information providers. Most data sources covered a single country, and they often measured slightly different service sets (e.g. people who visited an online gaming site versus people who regularly play online games), and slightly different periods of time (e.g. use in the last three months versus use in the average week). Estimation was required to normalise the results. Many data points for 2004 (for Canada, France, Germany, Italy and Japan) were created through extrapolation from earlier data points.

⦾ Analysys

4.4.3 Use of VoIP

Definition

Percentage of people in a country that, at the year-end, were using paid-for VoIP services for personal purposes. The measure includes occasional use, use of an indirect access service for long-distance or international telephony, or use of a voice-over-broadband solution. The measure excludes use of free PC-based software products that enable PC-to-PC calling. It excludes use through work.

Results and comments
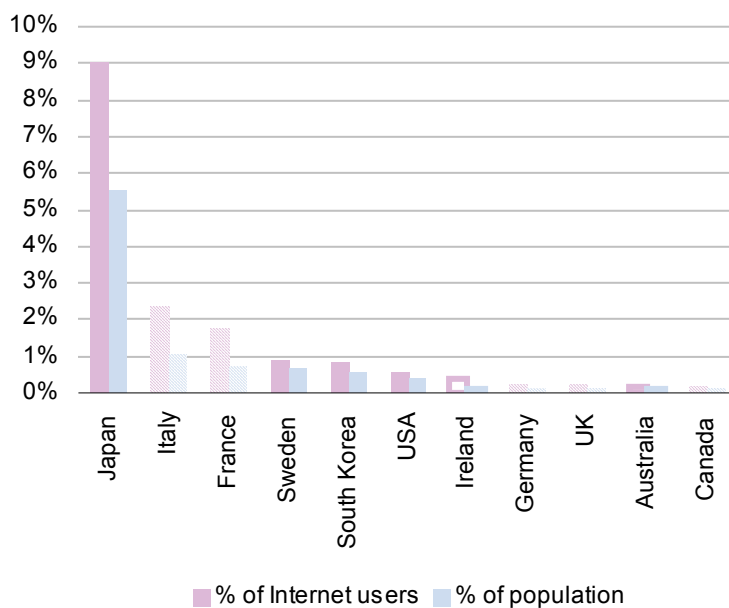
Exhibit 4.13:

Use of VoIP services by residential consumers [Source: Analysys]

There has been a flurry of VoIP activity across a number of countries in 2004 and early 2005. A number of new indirect telephony providers have emerged (such as Gossiptel, which launched services in the UK in 2004, and Annatel, which has launched services in France and the UK – and plans to follow with services in Germany and Italy – at the end of April 2005). Vonage has moved into Europe from the US, where it had signed up an estimated 400 000 customers by the end of 2004. At the same time, cable operators and LLU operators without significant PSTN customer bases have been talking about (or have been introducing) voice-over-broadband services.

By the end of 2004 Japan remained by far the biggest consumer in the VoIP market and Yahoo was by far the biggest player. It has enjoyed strong growth by persuading over 90% of its broadband customers to take up IP telephony by undercutting PSTN tariffs. In Italy, Fastweb has a significant number of voice-over-broadband customers, as does Free in France.

Sources used

There is very little survey data available for residential use of VoIP. The results for this metric are based upon Analysys's estimates derived from operator data, press reports, information from regulators and Analysys's research into the development of the supply-side of each country market.

4.4.4 Ecommerce spend

Definition

Average annual consumer ecommerce spend per Internet user per country. The metric includes consumer spend on all types of products and services. It excludes business-to-business ecommerce spend. Spend is defined as the total value of goods and services ordered over the Internet, measured in GBP.

Results and comments
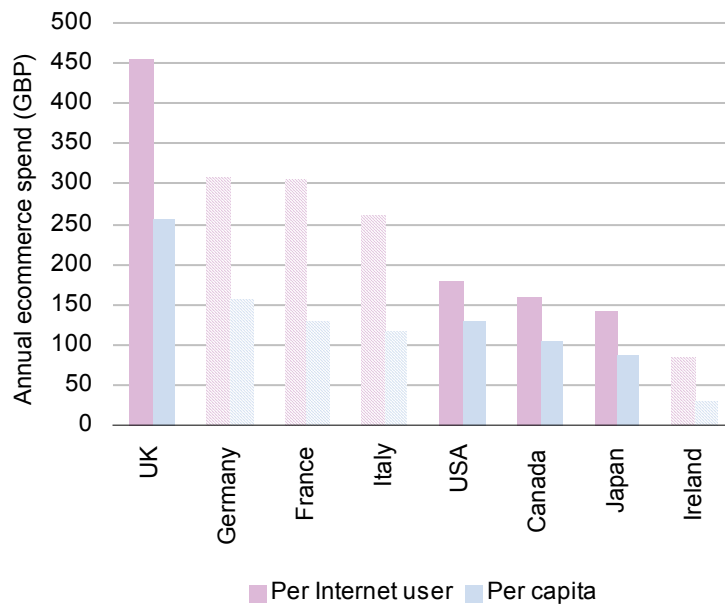
Exhibit 4.14:

Average annual

ecommerce spend

per Internet user

and per person,

2004 [Source:

Analysys]

The results suggest that the UK is a long way ahead of the other countries in terms of spend per Internet user. The results are in fact so far ahead that we have been concerned that we are understating the other markets in some way, or overstating the UK. The 2004 numbers are extrapolated from figures for 2003, published by the UK's national statistics office, which showed a doubling of national ecommerce spend from GBP6.4 billion in 2002 to GBP11.4 billion. We assumed a 30% growth in 2004.

There is evidence to suggest that there has been some dramatic recent growth in the UK ecommerce market, and that 30% might be on the conservative side. A recent survey commissioned by ISP Pipex found that out of 500 people surveyed in the UK, 51% of men and 43% of women purchased goods online in March 2005, and that the average spend level in March (i.e. for one month only) was GBP127 per capita.

A possible explanation of the disparity between UK numbers and numbers for other countries could be the inclusion of travel purchases (i.e. flights and hotels) in the UK number which are not always included by other countries. Another difference could be the inclusion of transactional volumes on eBay (often excluded, or limited to eBay's retained revenue).

It is also possible, given the methodology used, that a recent worldwide boom in ecommerce has not been captured by our estimates. This will become clear when and if further data sets become available for future updates for other countries.
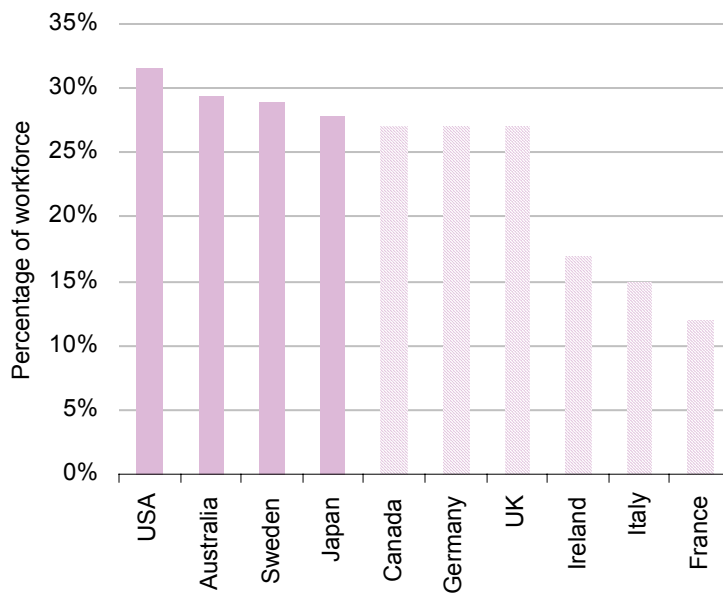
Analysys

Sources used

We have predominantly used figures for business-to-ecommerce trade published by individual statistical bodies of the different countries (for example, the US Department of Commerce, or the Korean Ministry) and figures published by Eurobarometer, the programme of surveys of consumer behaviour run by the EU.

The source data sets typically provide time series data for 2000 to 2003. Most statistical authorities have yet to publish information for 2004, so 2004 results have been estimated from previous growth trends.

4.4.5   Teleworking

Definition

Percentage of all working people that, at the year-end, regularly or occasionally work remotely from home. It includes mobile or remote workers (e.g. travelling salesmen, or project managers that work on client sites). Regularly or occasionally does not necessarily mean every week, but it does exclude individuals who have only done it once or twice, as an exception to the norm. It also includes people for whom home is the typical place of work. It includes people whether or not they use an Internet connection to do their work from home.

Results and comments

We believe there has been a substantial increase in teleworking in the last couple of years as a result of increased Internet usage and, more importantly, wider availability of broadband services. However, while many governments tracked teleworking during the period 1999 to 2002 (particularly those in the EU, driven by European initiatives to measure the phenomenon), few have continued to measure it. Good data sets exist for most countries up to 2002. Beyond that point, only Australia, Ireland, Sweden, the UK and the US have produced any statistics. Some others – the EU for instance – have tracked the number of companies that permit teleworking.

Estimates for 2003 and 2004 have therefore been produced by extrapolating from historical numbers – and benchmarking results against known country growth rates – and growth of home Internet usage. They have also been compared with changes in the numbers of companies stating that they permit teleworking, where data has been available, although the relationship is loose. There is no indication about what proportion of any firm's workforce is permitted to work from home.

Although they must be treated with caution, as our methodology could be underestimating teleworking, our estimates do suggest that it is much less prevalent in Ireland, France and Italy than in other markets. In France and Italy, we would speculate that cultural/social

elements are discouraging home working – in France, for example, regulation is designed to keep more people in work by ensuring they do not work too long. The work-life balance advantages often associated with home working would be less compelling. Average time taken to get to and from work is also likely to be a factor.

Sources used

The teleworking results are based on data drawn from a number of sources including national statistical offices of Australia, Canada, Ireland, Sweden and the UK, teleworking associations (for Japan and the US) and European Union data. We have been unable to obtain any useful source data for South Korea which has therefore not been included in the analysis.

4.5 Trends analysis articles

This final section of this report contains two short trends analysis pieces. One considers whether there is any correlation between broadband penetration and higher service usage; the other focuses on the state of the market for video-on-demand (VoD) services and discusses recent market developments.

4.5.1 Is there a correlation between broadband penetration and higher service usage?

Much has been made of the requirement for countries to invest in broadband communications infrastructure, and to promote its usage. Increased take-up of broadband access services is expected to stimulate usage of advanced Internet content and applications by consumers and by businesses, thus changing individuals' behaviour, creating new industries, or increasing productivity in existing industries. However, data to prove the theory is hard to come by. Many economists now acknowledge that ICT, and hence broadband, are important drivers of economic growth. However, we should be careful not to expect too much too soon. Studies in the US[24] have shown that the full benefits of ICT often take five to seven years to be realised. Furthermore, many of the challenges faced

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[24]   Brynjolfsson and Hitt (2003)

with delivering economic benefits from ICT are organisational and cultural in nature, rather than relating to the hardware, software or communications technology itself.

Analysys has undertaken a brief investigation to see if there is any kind of connection between take-up of broadband services, and usage of various types of Internet service. During the course of the data collection exercise undertaken to estimate usage metrics for this study, we identified a couple of sources of data that seem to suggest that broadband users do tend to use the Internet differently to, and more than, dial-up Internet users.

Statistics published by USC Annenberg School Center for the Digital Future[25] as part of the World Internet Project show that broadband consumers in the US have different usage patterns to dial-up users across a range of service types, with broadband users typically spending a greater proportion of their online time on more advanced activities. Exhibit 4.16 below shows an extract from the findings (more detail can be found in the original study).

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[25]   "*The Digital Future Report: Surveying the Digital Future – Ten Years, Ten Trends*" September 2004. Based on a survey of over 2000 households in the US, including users and non-users
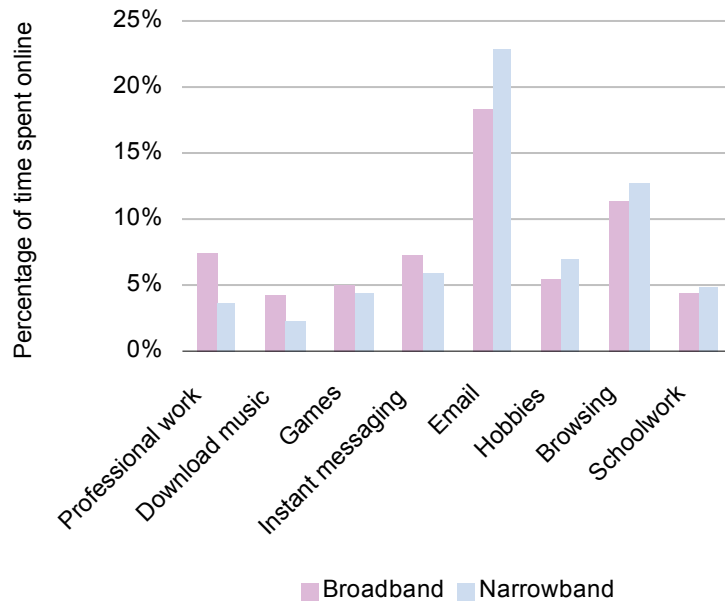
Exhibit 4.16:

Comparison of broadband and narrowband usage in the US [Source: USC Annenberg School Center for the Digital Future]

A survey conducted by OFCOM[26] in the UK showed that broadband consumers typically use a wider variety of services than narrowband users. For instance, 51% of broadband users in its survey stated they download music, versus 22% of narrowband users. 71% of broadband users stated they purchased goods over the Internet versus 51% of narrowband users. A higher percentage of broadband than narrowband users claimed to use every single one of the 16 different content, service and usage types tested by the study.

Of course, this does not necessarily mean that wider take-up of broadband means greater Internet usage by any one individual. It could simply mean that the early adopters of broadband were those individuals that were already the heaviest users, and that they migrated quickly to broadband to take advantage of the greater utility it offered.

To examine this in more detail, we have plotted adoption levels (as a proportion of population or businesses) or spend levels for each of the metrics estimated in the usage section of this report against broadband penetration of population or businesses in each country for 2004.

26   Source: OFCOM: Strategic Review of Telecommunications Phase 2 consultation document, Annex M: Consumer Research
http://www.ofcom.org.uk/consult/condocs/telecoms_p2/tsrphase2/AnnexM.pdf

In a few instances, there seems to be a weak correlation between broadband take-up and usage. For instance, as Exhibit 4.17 below shows, there seems to be a connection between usage of online gaming and broadband penetration.
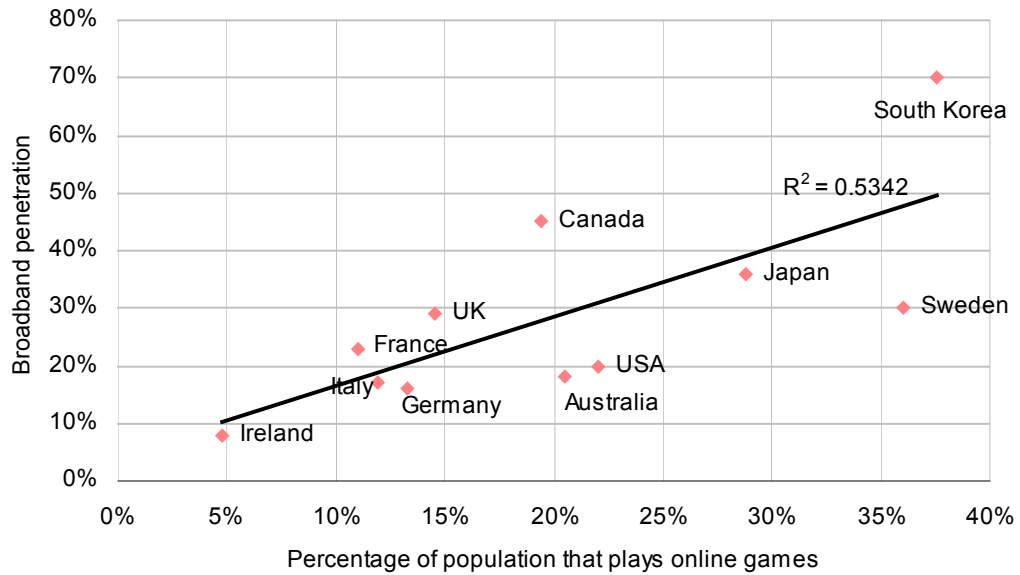

Exhibit 4.17: *Proportion of population that plays online games plotted against broadband penetration [Source: Analysys]*

There also seems to be a weak link between consumer ecommerce spending per head of population and broadband take-up, as shown in Exhibit 4.18.
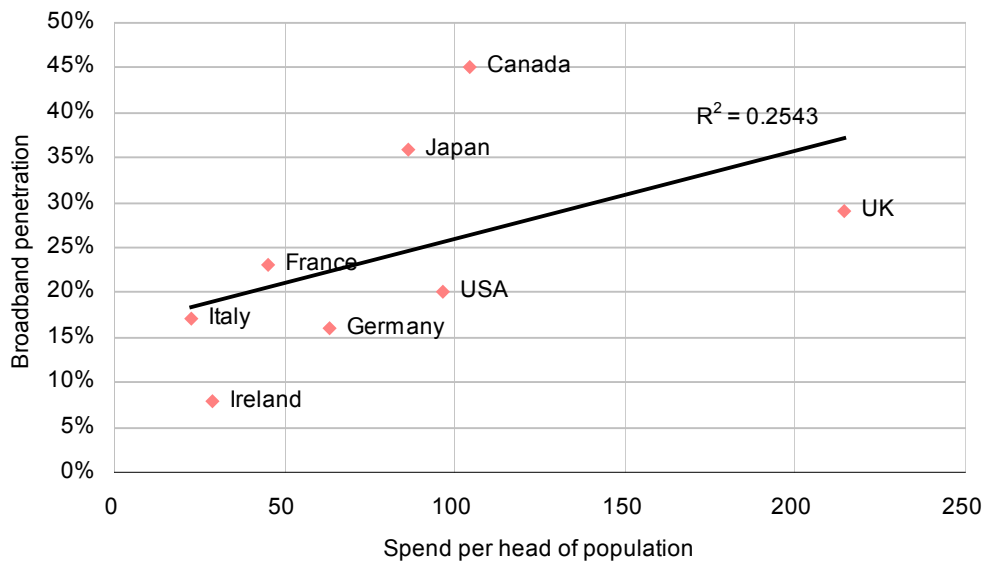
Exhibit 4.18: *Consumer ecommerce spend per capita (GBP) plotted against broadband penetration [Source: Analysys]*

Looking at the business indicators, the only metric that showed some connection with broadband adoption was use of VoIP by businesses. Ireland is an interesting outlier. Many businesses claim to be using VoIP despite the low penetration of mass market broadband. Many of those that have other high-speed access solutions (such as leased circuits or fibre) are experimenting with VoIP.
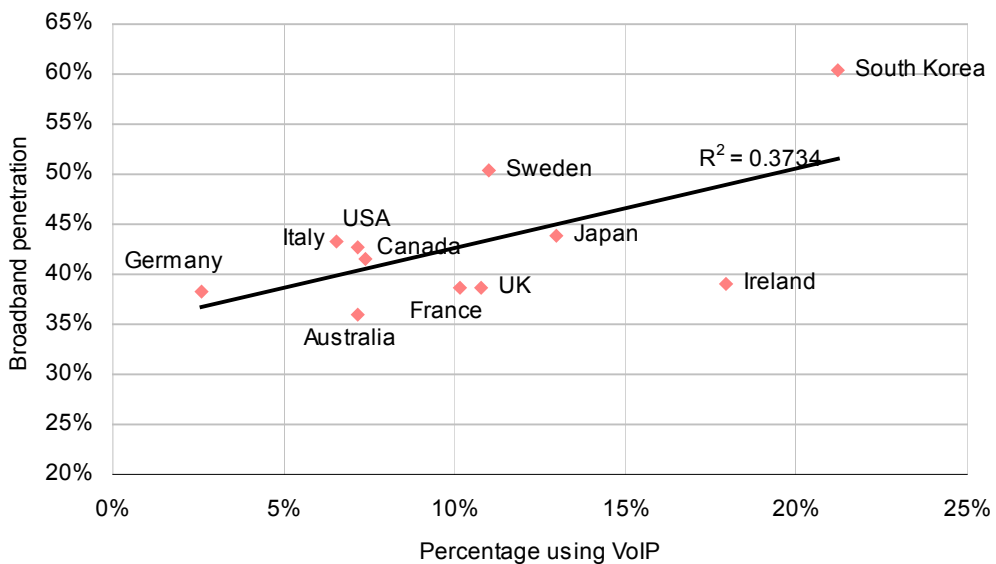
Exhibit 4.19: *Use of VoIP by businesses plotted against business broadband penetration [Source: Analysys]*

While these three cases showed some connection between Internet usage and broadband take-up, no obvious link emerged for the other usage metrics collected as part of this study. For instance, there was no significant correlation between the number of businesses making online payments to government (excluding payment by BACs) and business broadband penetration.
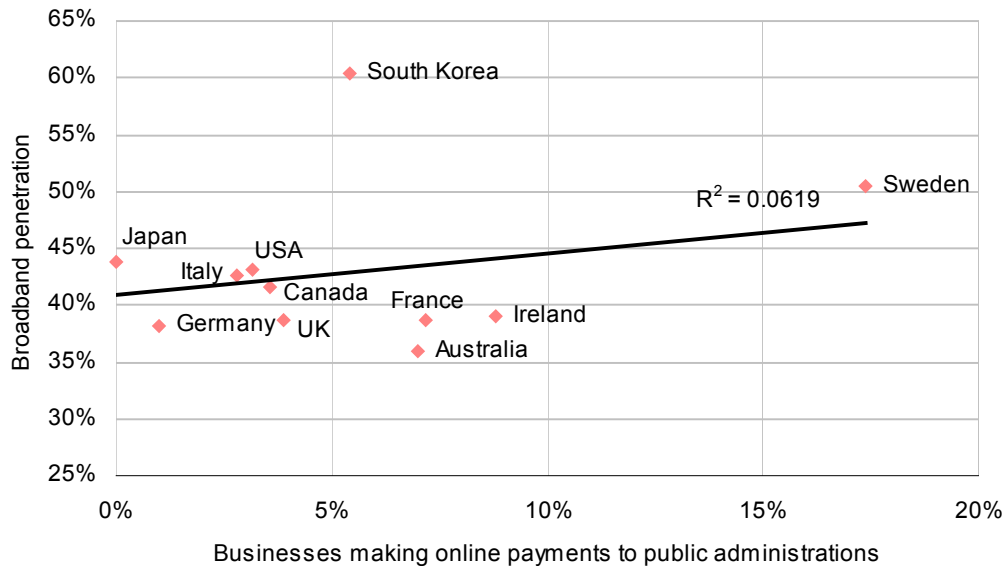
Exhibit 4.20: *Business making online payments to governments plotted against business broadband penetration [Source: Analysys]*

There could be a couple of reasons for the lack of significant correlation for other metrics. It might simply be that other stronger factors are masking any impact broadband penetration might be having. For instance, cultural emphasis in some countries on face-to-face relationships in the business-to-business market could prevent broadband take-up from driving the number of businesses ordering online. It is also possible that the degree of estimation, and the margins for error in the underlying metrics, are masking trends while adoption levels are relatively low.

Our conclusion is that there is evidence that take-up of broadband is changing behaviour, and that it is encouraging usage of more advanced services. We would also argue that there is weak evidence of a correlation between levels of usage and broadband penetration. However, further work needs to be undertaken using more statistically robust data sets (not available for this study) to draw any definite conclusions.

4.5.2 Video-on-demand: is the UK behind the rest of the world in terms of service deployment?

After a substantial prelude, video-on-demand (VoD) is becoming more widespread in Europe and is now starting to be taken seriously by its consumers. In contrast, North America has been supplying VoD over its long-established fibre-to-the-home (FTTH) network architecture for close to five years. Upgrades and rollouts of networks able to deliver triple-play offerings (voice, cable- or IP-TV, and Internet access) have facilitated the spread of VoD in Europe and the US.

In this article, Analysys considers whether players in the UK market have been matching the effort being put behind VoD in other countries, or whether the UK has fallen behind the rest of the world in terms of service development.

Recent worldwide VoD developments

After many years of promises, the increased availability of broadband access has meant that fully interactive TV and video can now realistically be offered by service providers over the PSTN. Moreover, competition is forcing many fixed network operators to develop a triple-play offering just to keep up with rivals, and it increasingly seems that standard "pushed" TV – delivered over CATV or IP networks – may no longer be sufficient for an effective market offer. VoD is distinguished from IP-TV in two ways: choice (a large directory of video content available to view) and time (on-demand access to video any time).

There have been rapid developments in the VoD market worldwide in recent months, though service providers tend to publicise the increasing availability of VoD services rather than the number of VoD users (where there is very little information).

In Europe, the Swedish market is a particular hotspot of activity right now. In February, TeliaSonera and the media group Bonnier both introduced new TV-via-broadband services reaching around twenty Swedish cities; both feature on-demand films. Stockholm-based UPC launched 'Arrivo OnDemand', a VoD service for its digital TV customers in May 2004. FastTV launched a VoD service in Helsingborg in February, in conjunction with SF Anytime. SF Anytime also supplies VoD for TeliaSonera and Bredbandsbolaget,

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and has signed distribution agreements with Fox and Warner. In an interview in the press, it said in January that it had over 100 000 customers.

France and Italy have also experienced a number of developments regarding innovative services: for instance, innovative triple-play offerings have paved the way for VoD services from France Telecom (priced at around EUR5 per film) and Italian broadband service provider FastWeb (priced at EUR2–5 per film). Since December 2003, subscribers to France Telecom's digital TV service 'MaLigne tv' have had access to VoD. By the end of Q3 2004, it had 161 000 TV and video customers using VoD, and it expects to be able to offer its MaLigne tv service to over ten million French households by Q2 2005. The innovative ISP Free, which has built significant broadband market share on the basis of low price, high-speed DSL Internet access (bundled with telephony and TV content), is reported to have plans to add VoD services shortly. In Italy, FastWeb launched VoD over fibre in March 2001 and VoD services over DSL in August 2003. German ISP T-Online International AG launched Germany's principle VoD service, Vision on TV, for PCs in November 2003 and extended its service to TV in March 2004. Films are priced from EUR1.90 to EUR4.00 (dependent on release date).

In North America, VoD over digital cable lines is now widely available in the US. Leading suppliers were trialling VoD during 2000 and services began to be available thereafter (see Exhibit 1 below), and innovative non-film VoD services including music video and video-IM services have also been introduced in the last few months. VoD arrived in Canada during Q4 2002; leading providers include Cogeco Cable systems, Rogers Cable, and Shaw Communications. While these operators have several hundred thousand digital cable customers each, there is little information on take-up of VoD services.

Leading American VoD supplier	VoD launch date	Notes
Adelphia Communications (due to be acquired by Time Warner and Comcast)	December 2003	Serves customers in 31 states
Charter Communications (Charter on Demand)	May 2000	12 million digital video homes passed by end 2004
Comcast (ON DEMAND)	2001	Offers VoD bundled along with its digital cable service in 62 markets to 93% of its customers
Time Warner Cable	Trial launch 2000, commercial launch in some areas in 2001	Now supplies VoD in all of its operating regions

Exhibit 4.21:   Details of leading US VoD suppliers [Source: Analysys Research, 2005]

There have also been VoD developments in countries outside North America and Europe with high levels of DSL, cable and fibre penetration. In Australia, VoD has been comparatively slow to start. Australian start-up telecoms operator TransACT launched VoD in March 2001 in three suburbs of Canberra, and it announced a content deal in January 2005 with Anytime – a distributor of Hollywood movies – to extend its VoD content. Its network is based on a FTTH architecture and 12 000 of its 16 000 broadband subscribers around Canberra have VoD access. ISP Internode expects to provide VoD in 2006 on the back of a video-capable (ADSL2) network rollout in Sydney, Melbourne, Adelaide and Brisbane.

South Korea boasts the highest broadband penetration rate in the world and has become the third largest cable market in the Asia-Pacific region (after China and India). VoD has been established for some time in South Korea. CJ CableNet's established "Hello D" interactive service offers consumers access to VoD films and a "series-on-demand" option providing episodic television programmes. The company has 1.2 million subscribers in total.

Thrunet, which provides DSL and cable modem broadband access services and has recently been acquired by Hanaro, has offered foreign and domestic films on demand via its Korea.com portal since September 2000. In South Korea, major TV channels quickly put their content online (major soaps are online next day) for streaming over broadband networks.

Moves by telecom operators in South Korea to develop some TV services may be hampered by a policy and regulation review by the Korean Ministry of Information and Communication. News reports from South Korea in February this year suggested that the Government was concerned about the impact that such services would have on the country's cable operators; the Minister was reported as saying that telecoms operators would be permitted to offer only VoD services (but not other "Web TV" services).

The Japanese VoD market has been established for some years: in March 2003, Softbank launched its 'BB Cable TV' offering VoD in 23 areas of Tokyo. There has also been much activity recently. Jupiter Telecommunications launched commercial on-demand services in the Tokyo area in February of this year, and plans to make the service available to all its digital subscribers in Kansai, Kyushu and Sapporo within six months. In addition, a further three cable companies (KDDI Corporation, Starcat Cable and KMN Corporation) have announced trials of VoD over cable from June this year.

VoD in the UK

Although not as well established as the US or Japan, the UK is fast catching up with the rest of Europe in terms of VoD service offerings. In addition to current VoD providers, new on-demand services are expected from BT and the BBC this summer. Telewest and ntl have just launched a true VoD service – ntl describes its service as a live trial, but is expecting to increase the availability of the service to other areas soon. Films cost between GBP2 and GBP4, music videos cost GBP0.20, and adult content costs from GBP7.

VideoNetworks and Kingston Communications have been supplying VoD services in the cities of London and Hull respectively for some time.

UK VoD provider	Service name	Launch date	Area covered	Details of service
Kingston Communications	Kingston Interactive Television	October 2003	Hull area	Provided by Blockbuster, 100% coverage within Hull
VideoNetworks	Homechoice	May 2004	London area	GBP2.00–3.50 per film per 24 hours; features on-demand trailers
Telewest	Movies on demand	January 2005	Bristol	Provided by FilmFlex
ntl	On demand & Video Jukebox	January 2005	Swansea, Cardiff and Glasgow	GBP2.00 to 3.50 per film per 24 hours and provided by FilmFlex, music videos from GBP0.20 to GBP0.50 each, cartoons GBP0.75 and adult content GBP7.00 per item.

Exhibit 22: *Key UK VoD providers [Source: Analysys Research, 2005]*

While access to VoD services in the UK is geographically restricted at present to a few cities, in this respect the UK is little different to most of the other European countries examined. Even in Sweden, Italy and France where the most innovative interactive video and VoD services have been developed, availability is patchy. There seem to be fewer rollouts in the UK than in other markets, and certainly there is less fibre deployment to the home compared with countries like Sweden and Italy. In terms of availability, the US, Canada, South Korea and Japan are leading the way in the VoD market – in the US and Canada this appears to be through cable operators rather than DSL providers.

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However, in the UK, as with these other European countries, significant players are now ramping up investment in networks, content and service marketing:

- BT announced in March that it would be trialling 8Mbit/s DSL services in Q2 2005, in response to development of video services, and also said in February that VoD services were being tested but were at an early stage, with service launch several months away.

- The BBC plans to introduce an on-demand video service for recently broadcast content, based on its Interactive Media Player (iMP) that currently offers on-demand radio content, and a service to allow consumers to create their own content archive for VoD. These are scheduled for launch in the summer of this year. It has also provided VoD content via Kingston Communications' Kingston Interactive ADSL-based service.

Is the UK behind?

The imminent arrival of new services from these two major UK players (one being the dominant DSL provider and the other the biggest broadcaster and a major content owner), together with the recent launch of true VoD services over cable and DSL in major cities, suggests that the UK is not far behind other countries in the development of VoD services.

Analysys expects that the next 12 months will see a step change in the availability of VoD services in the UK, and development of content-based stimuli to the market, but it remains to be seen how these services will be embraced by consumers. Evidence from more developed markets of take-up and profitability is difficult to come by, and the availability of competing technologies that offer services that are similar from the users' perspective (such as PVRs, near-VoD services like Sky, and existing digital cable offerings) may mean that uptake may be slow.

In conclusion, we do not believe that the UK is significantly behind other countries in VoD, but the future for the success of such services cannot be taken for granted.