International Broadband Market Comparisons

Update June 2005

Covering the period September 2004-March 2005

A Report for the Department of Trade and Industry

Contents

1. Executive Summary

The UK broadband market has continued to show positive signs of development over the six month period September 2004 to March 2005. Overall it is performing well against the other G7 countries, plus Australia, Ireland, South Korea and Sweden. There continues to be very little change in the ranking of the individual indices, with the exception of the market context index where the UK has moved into joint second place with Canada. This is mainly due to the increased take-up of broadband, digital TV and 3G. The overall mix of indices providing a rating of competitiveness and extensiveness continues to be very encouraging. The UK leads on extensiveness, primarily due to the much-improved coverage of DSL across the country to reach 97.4% of households, with cable and fixed-wireless access bringing the total reach to 97.7% .

The competitiveness index reflects performance on choice, price and regulation. The UK maintains its third position overall, behind Japan and Canada – although the US is gaining ground and has moved into joint third place alongside the UK. The improvement in the US score can mainly be attributed to falling prices. The regulatory picture has remained fairly constant over the preceding six months, with the only major activity being seen in the US over local loop unbundling (LLU) legislation, as well as pricing of LLU in the UK and Ireland. However, these developments do not change the regulation index scoring, and the UK retains its first position.

Choice has continued to improve slightly in many countries – although there have been no changes in country rankings. The UK's score has remained static as BT Wholesale hits the 5 million mark for broadband subscribers and whilst there is stiff competition in the retail market, BT's share of the wholesale market suppresses any growth in the choice index. The impact of LLU in the UK is still to be seen. Japan and France continue to be the most progressive countries currently in offering LLU opportunities for alternative operators.

The UK remains in fourth position in the price index – behind Japan, France and Canada. Despite continued improvements in pricing, the UK has been unable yet to catch these countries. Prices have continued to fall – particularly in terms of the installation fee as many operators have now waived this one-off charge. France has improved its score further still, due to many providers now offering free installation and equipment, as well as making further reductions on monthly fees. Japan retains its top position as probably the cheapest broadband market in the world, and it remains to be seen how long both Japan and France can sustain such competitive pricing. Canada too has substantially improved its score, as the competitive marketplace causes both cable and DSL providers to offer special discounts for customers who subscribe to more than one of their services.

The extensiveness index reflects the potential addressable market for broadband (the market context) and its availability. The former measures the potential market for broadband take-up by looking at use of services considered 'part way' towards

broadband (e.g. flat rate narrowband, ISDN, digital TV, 3G). The UK has improved its position here moving into joint second place with Canada, mainly as a result of its strong digital TV market as 62% of households now take-up the service, as well as emerging interest in 3G mobile services.

The UK continues to demonstrate a strong performance in the availability index keeping its first position. We have seen significant improvements due to BT removing any limit on the length of copper between exchange and end user that is viable for broadband provision. In addition, BT has continued to DSL-enable exchanges, which has meant that more communities now have access to broadband. Indeed, 97.7% household coverage of DSL in the UK at March 2005 now exceeds that in South Korea. BT's promise is of 99.4% coverage by Summer 2005, which if achieved, will see the UK consolidating its top position in the availability index. Japan has extended coverage to 95% of the country, according to NTT East and NTT West. France has moved into joint third position with Germany as it extends its coverage to 90% of households. The US and Ireland have also improved coverage with 89% and 74% availability respectively.

The combined score of market context and availability ensures that the UK maintains its top position in the extensiveness index, a position it is anticipated to keep over the course of the next year.

Take-up has been a major challenge for the UK, although we are now starting to see significant growth in subscriber numbers. This momentum is expected to continue to the end of the year – the UK experienced the greatest percentage point increase in its score among all countries under review. However, the UK remains in fifth place in the rankings even as it improves penetration to 29% of households. Other countries have also seen strong growth in take-up including France and Australia with 31% and 25% penetration respectively. Canada retains its first position among the G7 countries with 50% penetration. Although Canada is expected to keep this top position by the end of the year, the UK is expected to improve its position enabling it to move into third position with an estimated 39% penetration.

Going forward, if the UK is to improve its positioning among the G7, the focus must remain on competitiveness – primarily choice available to end users and to a certain extent price. The more choice of suppliers available, the greater the impact on pricing as well as service quality, so improving take-up. It is important that alternative operators are provided with opportunities to compete, offering customers a variety of different services from which to choose that will perhaps fit better with their own particular lifestyles. The UK is anticipated to retain its top position in the extensiveness index at the end of 2005.

2. Broadband market indices

Measuring success: key metrics

This Report, covering the period from October 2004 to March 2005, commissioned by the DTI from Ovum, continues the series of six monthly reports to benchmark the progress of the UK against certain key broadband enabled countries. It is in support of the Government's overarching objective for the UK to have the most extensive and competitive broadband market in the G7 by 2005.

For the previous International Broadband Comparisons Reports, broadband market indices were developed with Ofcom and the Broadband Stakeholder Group to measure and compare the attractiveness and performance of the broadband market across a range of countries. Ovum has used the same indices in analysing the findings for this March 2005 report.

The underlying principles used to develop the indices that comprise the broadband market index are:

- Simplicity: the index must be transparent and easy to explain and understand
- Quantifiable: the data to be used in the index must exist in a consistent manner across all the countries studied
- Realistic: it should give as realistic an impression as possible as to the status of broadband in a given country.

When dealing with any complicated, dynamic environment, measuring performance is never easy. Such difficulty is compounded when dealing with a market, which is developing, such as broadband. What will constitute success? Once measures of success have been decided, how should they be interpreted?

In these situations it is sensible to start from an end goal and work backwards. In the UK's case, the goal is to have the most extensive and competitive broadband market in the G7[1] by 2005. Therefore, extensiveness and competitiveness are clearly the two criteria that will need to be measured. These words do not naturally lend themselves to measurement in a simple fashion.

A consensus has emerged around a dashboard of six indicators. A range of indicators enables a deeper understanding of the relative strengths and weaknesses of each international market that cannot be attained from a single aggregated measure. A further advantage is that causes (e.g. regulation, competition) can be separated from effects (e.g. take-up) and analysed independently. This section presents definitions for each dashboard indicator and the rankings for the 11 countries studied.

[1] G7 countries are: Canada; France; Germany; Italy; Japan; the UK and the USA.

Definition of indices and country rankings

Six key measures of success have been identified: price, choice, regulation, availability, market context and take-up. These are calculated as indices between 0 and 1, where a high score represents a good performance. Weightings are attached to these different indices to produce extensiveness and competitiveness indices, against which countries can be ranked. All indices are defined so as to give a value between 0 and 1, so that the weightings applied to each index are transparent. All indices are calculated based on the situation at the end of March 2005.

1. Choice index

The choice index comprises three parameters:

- Infrastructure competition: sum of the squares of the top three infrastructure player market shares
- Infrastructure choice: proportion of households with a choice of terrestrial infrastructure operator
- Retail competition: sum of the squares of the top five retail ISPs market shares.

The scores and rankings for the choice index are provided in figure 2.1.

Figure 2.1: Choice Index at Q1 2005

	Q1 2005	G7 rank Q1 2005	Q3 2004	G7 rank Q3 2004	G7 rank Q1 2004
Japan	0.94	1	0.90	1	1
Canada	0.83	2	0.83	2	2
US	0.78	3	0.77	3	3
South Korea	0.70		0.70		
UK	**0.66**	**4**	**0.66**	**4**	**4**
Sweden	0.66		0.67		
Australia	0.59		0.58		
France	0.54	5	0.53	5	5
Germany	0.48	6	0.50	6	7
Italy	0.38	7	0.31	7	6
Ireland	0.19		0.32		

Source: Ovum

Since September 2004, choice of supply has improved slightly in most markets, however, there has been no change to G7 rankings. In Ireland, Eircom is now embracing broadband and has seen a significant increase in subscribers. As a result its broadband market share has risen considerably and Ireland's choice score has

fallen as a result. New entrants are starting to emerge, but have yet to make any substantial impact on Eircom's market share. The UK's score remains static as BT Wholesale hits the 5 million mark for broadband subscribers, keeping one step ahead of its competitors.

With the success of Yahoo! BB, a partnership between Softbank and Yahoo! Japan has become the largest LLU country in the world, further consolidating its position at the top of the table. Yahoo! BB plans to further improve its competitive position in the Japanese market with its purchase of Cable & Wireless IDC, enabling it to further challenge NTT and KDDI. Cable operators in Japan are matching DSL speeds and services, such as VoIP and TV, but growth is hampered by the limited cable coverage, currently at 66%. J-Com holds 24% of the cable market with the remaining market share dispersed among much smaller operators.

Both Germany and Sweden's score fell slightly. In the case of Germany, this is mainly due to Deutsche Telekom further extending its broadband market share. In Sweden, the consolidation of B2 and Bostream has impacted slightly on choice in the market.

With regard to the US, we take into account within the index the fragmented nature of the telecoms market, whereby competition is better viewed on a region by region basis rather than nationally. The US broadband market is dominated by ten players, six cable operators and four local phone companies, which between them have almost 90% of the market. However, each of the phone companies and each of the cable companies has a discrete geographic coverage area, so that in any given part of the country the market is largely fought over by one local phone company and one cable company, creating a series of local duopolies. Competition based on regulated access to networks is minimal, although a handful of players, mostly serving business customers, have made this their business.

Nevertheless, the market is looking healthy in the US, with a 7.5% growth in broadband subscribers between December 2004 and March 2005. The growth of DSL continues to outpace cable modem with a 10% growth between December 2004 and March 2005, compared to a 5.8% growth of cable modems. DSL providers are continuing to extend the footprint of DSL services, for example, Verizon extended its reach to include three new states in October 2004. Cable operators are losing subscribers to direct broadcast satellite. However, cable modems continue to remain the dominant broadband technology.

In some ways, the US may be seen as too competitive. US telecommunications regulator, the Federal Communications Commission (FCC) is currently experiencing some quandaries in regulating open access to networks. It has decided for the moment not to require fibre providers to open their networks. This might be negative in terms of competition, but the alternative is that if players are mandated to open up, they will refuse to cooperate or to invest at all.

Competition in South Korea remains intense although there has been no change to its score. SK Telecom and KT are investing heavily in WiBro, which will allow people on the move to remain connected to the Internet at the speed of current fixed terrestrial

broadband services. Hanaro originally said it would invest in WiBro also, but has since decided not to pursue it.

Although Italy has improved its score, it remains in last place among the G7 countries as Telecom Italia retains its stranglehold on the supply of broadband services, despite promising developments from competitors such as Fastweb. Uptake of LLU will continue, driven primarily by Fastweb, which continues to extend its footprint. Operators will also continue to push VoIP.

2. Price index

The price index is calculated as the price of the top 5 retail ISPs, weighted by market share. Prices used are for mainstream residential products and include connection fees amortised over a three-year period and are adjusted for purchasing power parity (PPP).[2] In order to give a value between 0 and 1 for this index a PPP price of USD200 or less (per year) is allocated a score of 1, with a PPP price of USD800 or more allocated 0. A linear scale is used between these points.

The scores and rankings for the price index are provided in figure 2.2.

Figure 2.2: Price Index at Q1 2005

	Q1 2005	G7 rank Q1 2005	Q3 2004	G7 rank Q3 2004	G7 rank Q1 2004
Japan	0.98	1	0.99	1	1
France	0.94	2	0.80	2	4
Canada	0.77	3	0.71	3	2
UK	**0.72**	**4**	**0.70**	**4**	**3**
Ireland	0.67		0.54		
Sweden	0.63		0.63		
Australia	0.63		0.58		
US	0.62	5	0.49	5	6
South Korea	0.53		0.51		
Italy	0.50	6	0.29	7	7
Germany	0.41	7	0.36	6	5

Source: Ovum

There have been significant improvements by many countries in the Price index, although little movement in rankings. As the markets get more competitive (and also

[2] Prices are converted from local currency to USD using the exchange rate from the same time as the PPP factors to ensure consistency.

as regulators step in to ensure reasonable rates on products such as local loop unbundling), prices are coming down quickly. Whilst this index is independent of speed (by taking the price of a product closest to 512kbps), service speeds in many of the countries under review are increasing (with 512kbps becoming in many cases the entry level service) whilst prices are staying static, including the UK, the US and France.

In the last report we highlighted that France had improved its position considerably after a spate of huge price cuts, moving above the UK and Canada as a result. France has continued to improve its score, with many providers now offering free installation and equipment, as well as making further reductions on monthly fees.

Although the UK remains in fourth position, price cuts have continued. All of the UK operators covered in the benchmark have now waived installation fees – either as a special promotion or as an ongoing offer.

In Canada, the competitive marketplace is causing both cable and DSL operators to offer special discounts for customers who subscribe to more than one of their services. The DSL operators offer packages that include high-speed Internet service, cellular and fixed services as well as long-distance calls. Cable operators offer TV, on-demand services and high-speed Internet. VoIP services are on the agenda of most of the major players. Many of the players have ongoing promotional offers, helping to drive down prices e.g. free first month (offered by Bell Canada) or discounted first 3 months (offered by Rogers Cable), or free installation and modems if, for example, Videotron equipment is installed.

Germany and Italy are again lagging behind the other G7 countries – although Italy has seen a significant improvement in its score, and as a result moves ahead of Germany. Italian broadband providers are now offering à la carte pricing including pay-as-you-go offers and flexible contract. The aim of this new pricing strategy is to drive value in broadband access services, combating commoditisation, maintaining ARPU and targeting different user segments with tailored broadband offerings. Contracts are more flexible and there are more usage-based tariffs.

Small changes in the price index score can in some countries be attributed to changes in the PPP rates, rather than changes in pricing of services: this is the case with Japan.

3. Regulation index

The regulation index compares and contrasts the broadband market actions taken by regulators in each country. The regulation index is based on simple, binary scores for the presence (or absence) of regulatory provision for:

- wholesale DSL
- wholesale cable
- local loop unbundling (LLUB) – mandated
- access upstream of MDF

- line sharing
- separation of network ownership.

The scores and rankings for the regulation index are provided in figure 2.3.

Figure 2.3: Regulation Index at Q1 2005

	Q1 2005	G7 rank Q1 2005	Q3 2004	G7 rank Q3 2004	G7 rank Q1 2004
UK	**1.00**	**1=**	**1.00**	**1=**	**1=**
US	1.00	1=	1.00	1=	1=
Canada	0.83	3	0.83	3	3
South Korea	0.83		0.83		
Ireland	0.83		0.83		
Japan	0.67	4=	0.67	4=	4=
France	0.67	4=	0.67	4=	4=
Germany	0.67	4=	0.67	4=	4=
Italy	0.67	4=	0.67	4=	4=
Sweden	0.67		0.67		
Australia	0.67		0.67		

Source: Ovum

There has been no change in the regulatory index over the last 6 months as a whole. However, there has been some discussion in a number of markets around the need to regulate change more rigorously. In Germany, we still see Deutsche Telekom as the dominant supplier. German telecommunications regulator RegTP has failed to issue an order for DT to provide bitstream products to those new entrants requesting access, and wholesale DSL prices are still not settled. RegTP is expected to amend the regulation on bitstream products, but this will not have an impact until the start of 2006 at the earliest. The German regulator has recently cut LLU monthly rental prices. Previously Germany had one of the highest LLU monthly rental fees in Europe. This price cut brings it into line with the European average.

4. Availability index

The availability index is a measure of the percentage of the population with access to a terrestrial broadband solution (naturally a value between 0 and 1).

The scores and rankings for the availability index are provided in figure 2.4.

Figure 2.4: Availability Index at Q1 2005

	Q1 2005	G7 rank Q1 2005	Q3 2004	G7 rank Q3 2004	G7 rank Q1 2004
UK	**0.98**	**1**	**0.94**	**1**	**3**
South Korea	0.97		0.97		
Japan	0.95	2	0.92	2	1
Germany	0.90	=3	0.90	3	2
France	0.90	=3	0.83	6	6
Sweden	0.90		0.85		
Italy	0.90	5	0.85	5	5
US	0.89	6	0.81	7	7
Canada	0.86	7	0.86	4	4
Australia	0.80		0.80		
Ireland	0.74		0.60		

Source: Ovum

Availability is steadily improving, particularly as incumbents enable the copper wire for DSL provision. In the UK we've seen significant improvements due to BT removing any limit on the length of copper between exchange and end user that is viable for broadband provision. In addition, BT has continued the DSL-enabling of exchanges which has meant that more communities now have access to broadband Indeed, availability of DSL in the UK now exceeds that in South Korea.

Conditions for DSL are relatively favourable in Germany, with an average copper loop length of 1.5 to 2 km. A high proportion of German telecom customers are using ISDN, which means that the lines are already well qualified for digital traffic and there is a good platform for self-installation. However, despite this, the incumbent continues to find it difficult to move its terrestrial standard T-DSL coverage beyond 90% for technical and economic reasons.

The cable modem market is still very small in Germany, but with new investment and consolidation of players, 2005 could be a turning point. However, the formidable costs of upgrade that are still to be faced and the incumbent's headstart mean that growth will be hard to win. Now that Deutsche Telekom has sold its stakes in cable networks, the sector has a second chance to make a broadband mark. An influx of investment and rapid consolidation means upgrading of networks for broadband should accelerate. However, the costs are daunting and any sustained recovery of the sector with regard to broadband will demand considerable long-term investment.

In Italy, Telecom Italia has rolled out DSL to cover 90% of the population, with mainly satellite plugging the 10% shortfall. Despite the fanfare around Fastweb's deployment of fibre for high bandwidth access, the vast majority of broadband deployment will be

focused on xDSL going forward. Fastweb has switched to xDSL for extending its footprint (although it will deploy fibre to business premises in some cases) and with LLU having proved a viable option, most competitors will take advantage of this in the short to medium term.

A major factor in the focus on xDSL and the higher than average speeds from providers is the shortness of loop lengths within Italy. The average loop length is 1.5 kilometres, and 50% of households are within 1 kilometre of the local exchange. The cable network in Italy covers only a few favoured areas so it cannot make a significant contribution to broadband.

Sweden has benefited from a proactive government and regulator promoting broadband, as well as a large proportion of the population living in multi-tenant units (MTUs) making it easier and cheaper to reach a large percentage of the population. Nowadays, the country's broadband coverage reaches almost 90% and there are only 10 municipalities, out of 283 in total that do not have infrastructure in place to support broadband services[3].

France has improved its position with regard to availability over the last 6 months – moving into joint third place with Germany. DSL services were available to almost 90% of the population in France at the beginning of 2005 according to France Telecom[4].

France Telecom has entered the third phase of its "Broadband for Everyone" plan. The programme, initiated in June 2003, has a goal of making broadband available to 95% by the end of 2005. To extend its coverage beyond 95%, France Telecom will probably need to seek external funding. Cable modem services are also available to around 33% of the country although this is unlikely to increase in the foreseeable future. FWA and satellite services are also available although the extent of roll-out remains small.

Assessing the availability of broadband continues to be difficult in the US due to the fragmented nature of the market. However, according to the National Cable and Telecommunications Association (NCTA), 88% of US homes passed by cable are able to receive broadband cable. DSL rollout varies by state and operator; overall it is estimated to have reached over 75% coverage. At a high level, it is assumed that most of the DSL enabled footprint is a subset of the cable one. Generally, major DSL providers would only go into non-cabled (predominantly rural) areas if they had good strategic reasons, and the cost-benefit was justified. However, we are starting to see few small independent phone companies in small towns, which are rolling out some form of DSL, including VDSL, because there is no cable coverage and therefore no competition. These are not yet considered to account for a large number of lines, but total broadband coverage is estimated at 89% to incorporate the additional areas covered by these small players.

[3] www.itsweden.com / 2005

[4] http://www.ofcom.org.uk/accessibility/rtfs/consultations/annexO.rtf , / http://www.art-telecom.fr/observatoire/blr/janvier05/deg170105-eng.pdf

According to Eircom, broadband coverage in Ireland, as of November 2004, stands at over 74% and is set to reach 80% by mid 2005, ensuring that every town in Ireland with a population over 1,500 will be connected to Broadband. Eircom also announced that it plans to achieve 90% broadband coverage in Ireland by March 2006 and is calling on Government to deliver the remaining 10% so that Ireland can have 100% Broadband availability by 2007.

In Japan, NTT East claims to have coverage of 95% and NTT West claims coverage of approximately 96%. A report produced in November 2004 by Ofcom, Strategic Review of Telecommunications, provides a comparison of broadband development in a number of countries. This report highlights that NTT now provides broadband services to over 95% of the country.

5. Market context index

Countries with a high penetration of services that are 'part way' towards broadband (i.e. flat rate narrowband, ISDN, digital TV, 3G) have a large pool of subscribers, who may quickly switch over to broadband given certain circumstances. Hence countries with high flat rate, ISDN, or DTV penetration could expect an accelerated growth in broadband penetration either: once broadband prices are close to flat rate prices; the applications for which broadband is essential increase in attractiveness; and/or digital TV becomes a competitive platform for broadband delivery. 3G provides an additional way of providing mobile broadband access, albeit at lower data rates/higher cost per Mbyte transferred. The Market Context index is calculated as a sum of the estimated percentage of households with DTV, ISDN, flat rate Internet subscriptions and broadband, plus 3G users. The total is divided by 200%.

The scores and rankings for the market context index are provided in figure 2.5.

Figure 2.5: Market Context Index at Q1 2005

	Q1 2005	**G7 rank Q1 2005**	**Q3 2004**	**G7 rank Q3 2004**	**G7 rank Q1 2004**
South Korea	0.79		0.75		
US	0.63	1	0.60	1	1=
UK	**0.58**	**=2**	**0.49**	**3**	**3**
Canada	0.58	=2	0.55	2	1=
Sweden	0.50		0.44		
Australia	0.49		0.40		
Japan	0.47	4	0.42	4	4
Germany	0.38	5	0.34	5	7
France	0.36	6	0.32	6	5
Ireland	0.32		0.30		
Italy	0.27	7	0.23	7	6

Source: Ovum

The key drivers of this particular index continue to be the substantial uptake of 3G in South Korea, with increasing penetration in Japan, the US and Canada. The reason Germany scores well is due mostly to its extensive ISDN penetration. The UK is still leading in digital TV with a penetration rate of 62% of households, but other countries such as the US, Canada and Sweden are now starting to close the gap – although the UK is still someway ahead. Markets such as Canada, Ireland and the US are expected to have 100% digital TV penetration by 2014 – the UK, along with Japan, South Korea and Sweden are expected to hit this target by 2015 (source: Informa Media, November 2004).

6. Take-up index

The take-up index is a measurement of household broadband penetration (resulting in a value between 0 and 1). To qualify as broadband, a service must be capable of delivering 'always-on' services to each individual at data rates above 128kbps.

The scores and rankings for the take-up index are provided in figure 2.6.

Figure 2.6: Take-up Index at Q1 2005

	Q1 2005	G7 rank Q1 2005	Q3 2004	G7 rank Q3 2004	G7 rank Q1 2004
South Korea	0.72		0.70		
Canada	0.50	1	0.45	1	1
Japan	0.41	2	0.36	2	2
Sweden	0.34		0.30		
US	0.33	3	0.29	3	3
France	0.31	4	0.23	4	4
UK	**0.29**	**5**	**0.20**	**5**	**5**
Australia	0.25		0.18		
Italy	0.23	6	0.17	6	6
Germany	0.19	7	0.16	7	7
Ireland	0.11		0.08		

Source: Ovum

As broadband availability is approaching 100% in many countries, the major focus is shifting towards increasing the take-up of broadband. 2004 was a key year for many countries in terms of broadband growth. In major markets such as France, the UK, Italy and Australia, growth was over 75%, meaning broadband penetration has reached the mass market.

France has been particularly successful in boosting growth; increased uptake of local loop unbundling and aggressive pricing from competitors saw nearly 100% market growth in one year.

The growth in take-up in the UK is driven by a combination of factors including:

- BT removing the 6km distance limit of ADSL, meaning that homes and businesses beyond 6km from an exchange could have access to broadband services
- reductions in pricing for shared LLU by both Ofcom and BT fuelled price cuts by ISPs
- the continuing DSL-enabling of exchanges meant more communities had access to broadband
- LLU by players such as Bulldog created competition at the higher speed broadband service.

Although the UK has not improved its position in terms of its ranking, it has experienced the greatest increase in its score since September 2005 of all countries and this momentum is set to continue.

The broadband market in South Korea is nearing saturation – this is evident in the lower growth in take-up over the last 6 months. Broadband players in South Korea have traditionally focused on the technology to drive growth – i.e. offering higher speeds for similar prices as lower speed services. The focus now must start to shift from an access price war towards increasing ARPU by segmenting their customer base, offering 'tiered' services and facilitating the provision of content and services.

Canada has seen substantial success to date with strong government-led initiatives to push it out to all. It has been more effective in this respect than other markets with major rural geographies such as the US and Australia, although all three are exploring the use of broadband satellite and wireless broadband to address this issue.

By end 2005, Japan aims to have 'always on' broadband connections to at least 30 million homes, and ultra high-speed access networks to at least 10 million homes. Japan's infrastructure is one of the most advanced in the world but as yet has not reached full utilisation. Japan came late to the broadband world, but subscriptions are now rocketing, due to pro-competitive polices. Another key driver for broadband growth is the availability of value added services including video on-demand, music on-demand, games on-demand, TV and others.

Comparisons

The UK's position has remained relatively static when comparing price against choice – as has Canada, Germany, Australia and Sweden.

France continues to demonstrate significant improvements in its price index, despite relatively low choice, but this is due to the ongoing aggressive price cuts. However,

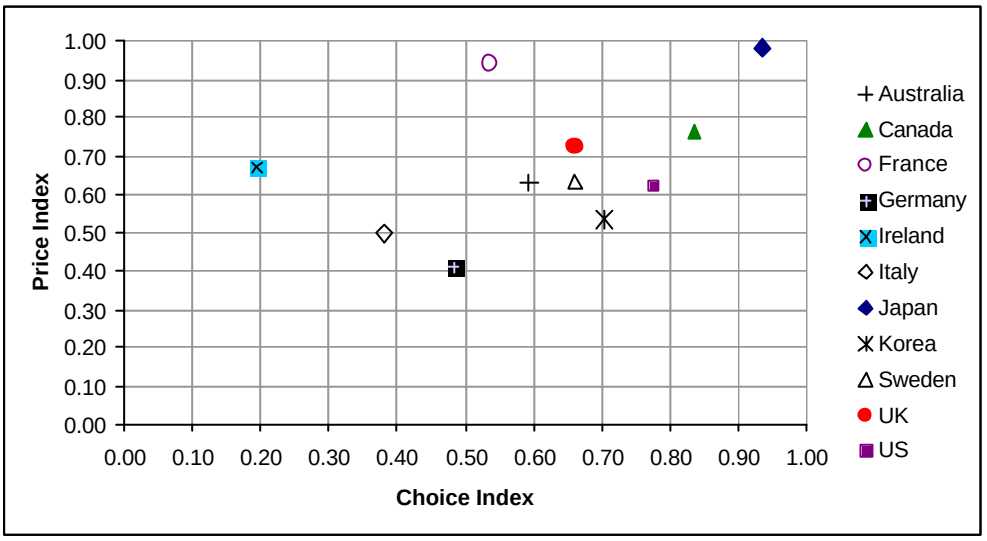
as yet, the anticipated impact of LLU in the market has yet to be reflected in the choice index.

Japan has further strengthened its position in terms of choice, whereas prices have remained static – although it is difficult to see how much lower they can go. In Ireland, Eircom has started to really push broadband services and has further strengthened its hold on the market, thus reducing its score in the choice index – however, pricing has improved.

Pricing in Italy has improved considerably, as innovative packages are introduced. Choice has also improved slightly as competitors in the market start to have an impact on Telecom Italia's stranglehold of the broadband market.

In South Korea, where the market is saturated, operators are starting to realise that they need to focus on halting the declining ARPUs through the provision of value added services, content and customer-focused pricing packages.

Figure 2.9: Choice versus price



Source: Ovum

The 2005 Government target

The UK Government target is to have the most competitive and extensive broadband network in the G7 by 2005. The target may therefore be broken down into the two factors – competitiveness and extensiveness – which combine to provide the overall market environment for broadband. We can define these two factors in terms of the relevant dashboard indicators as follows:

- *competitiveness* is defined as a composite measure of the market regulation index (a leading indicator), market choice, and price (a lagging indicator) – these are weighted: choice (3), price (3) and regulation (1)
- *extensiveness* is defined as a composite measure of market context and broadband availability – these are weighted availability (2) and market context (1).

Figure 2.10 illustrates the competitiveness index.

Figure 2.10: Competitiveness Index at Q1 2005

	Q1 2005	**G7 rank Q1 2005**	**Q3 2004**	**G7 rank Q3 2004**	**G7 rank Q1 2004**
Japan	0.92	1	0.90	1	1
Canada	0.80	2	0.78	2	2
UK	**0.74**	**=3**	**0.73**	**3**	**3**
US	0.74	=3	0.68	4	4
France	0.73	5	0.67	5	5
Sweden	0.65		0.66		
South Korea	0.65		0.64		
Australia	0.62		0.59		
Ireland	0.49		0.49		
Germany	0.48	6	0.46	6	6
Italy	0.47	7	0.35	7	7

Source: Ovum

As discussed above, there have been significant improvements in the pricing index by many players, and its high weighting results in improvements in the competitiveness index – particularly for the US and France.

Figure 2.11 illustrates the extensiveness index. Here we see the UK, as a result of improvement in availability to 97.7%, retaining its first position.

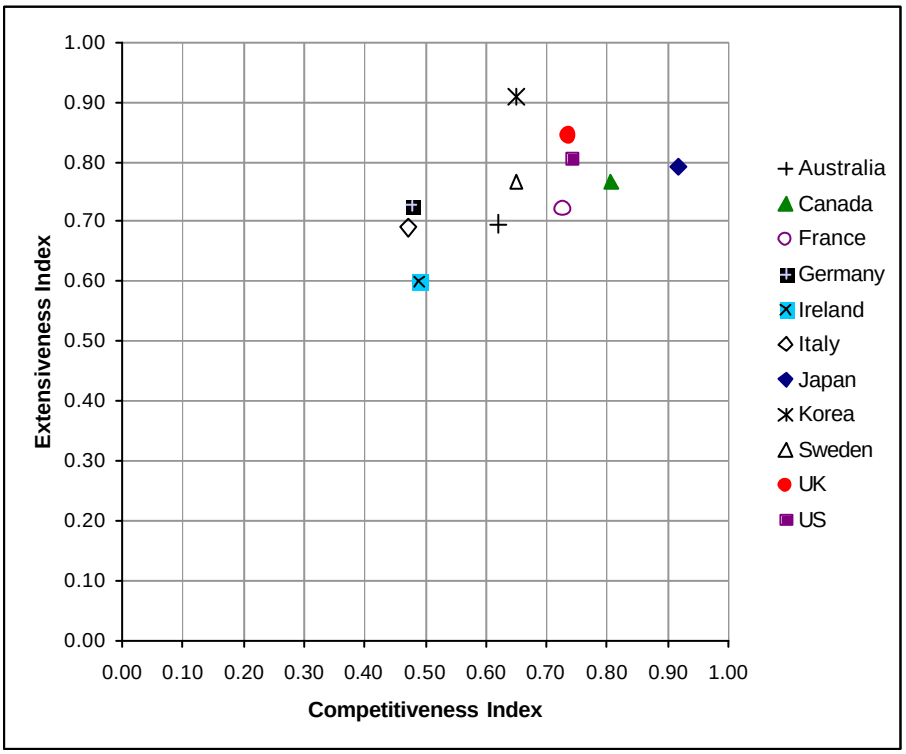
Figure 2.11: Extensiveness Index at Q1 2005

	Q1 2005	G7 rank Q1 2005	Q3 2004	G7 rank Q3 2004	G7 rank Q1 2004
South Korea	0.91		0.90		
UK	**0.84**	**1**	**0.79**	**1**	**3**
US	0.80	2	0.74	4	4
Japan	0.79	3	0.75	3	1
Canada	0.77	4	0.76	2	2
Sweden	0.77		0.71		
Germany	0.73	5	0.71	5	5
France	0.72	6	0.66	6	7
Australia	0.70		0.67		
Italy	0.69	7	0.64	7	6
Ireland	0.60		0.50		

Source: Ovum

Plotting competitiveness against extensiveness, we see the following effects.

Figure 2.12: Extensiveness versus competitiveness



Source: Ovum

Whilst the UK cannot yet match South Korea for extensiveness, nor Japan (where price and strong player competition remain key factors) for competitiveness, it is in a good position. Indeed, it has increased its score in the extensiveness index due to its higher availability, as well as growth in 3G and digital TV, which improves its market content index. Price reductions have improved the competitiveness index slightly, although further improvements in choice are anticipated from unbundling.

3. Summary of key data

Broadband market competitiveness

Broadband market competitiveness is defined in terms of choice, price and regulation.

Choice

A comparison of choice between the UK and other markets is assessed based on the level of infrastructure supplier competition, retail competition and choice of supplier for the end user. It is notable and not unsurprising that the least competitive markets are those with the strongest incumbents. Deutsche Telekom, Telecom Italia, Telstra and Eircom all continue to dominate the broadband space, and all are considered to wield more power than their respective country regulators in determining the market dynamics in which they operate. Strides in LLU in France, and hefty price cuts have helped improve competitiveness there.

Competitiveness is, nevertheless, starting to improve more generally, and in Europe, the new EU Regulatory Framework that is being implemented at present is set to level the playing field, as we are seeing in markets such as Japan. NTT is a classic example: the drastically reduced local loop unbundling charges introduced by the Japanese telecoms regulator have stimulated growth of broadband and VoIP (led by Yahoo! BB). This resulted in a decline in NTT's call revenues of 15% in 2003 – and this trend continued in 2004 although at a reduced rate of 5.7%. However, NTT was granted an increase in its interconnect rates.

With regard to retail competition, we are seeing much more pronounced competition occurring with LLU offering opportunities to new entrants. Incumbent market shares in the retail market are moving below 50%, with exceptions continuing to be Germany, Ireland and Italy. Low LLU prices do not guarantee high competition, but it certainly helps. Japan and France have the lowest shared access costs and the highest DSL competition.

Initially slow to develop its LLU offering, aggressive proponents of LLU have emerged in the UK - Bulldog (now owned by Cable and Wireless**)** and latterly Tiscali and Wanadoo. The UK also offers competitive choice through its cable players, with ntl and Telewest continuing to consolidate their positions. Telewest added 88,000 broadband subscriptions in the first quarter 2005 (to over 786,000).

Although Italy scores low in this benchmark, competitor Fastweb is proving highly successful in major urban areas, offering competitive differentiation to Telecom Italia in terms of price and services.

In Ireland, new entrants such as e-net (wholesale provider), Magic Networks (FTTH in new buildings) and Smart Telecom are entering the market and have the potential to shape a more competitive national market. However, so far they have had very little impact on denting the broadband market share of Eircom.

In the US, much of the success of the DSL providers in recent months can be put down to an improved competitive positioning by these providers vis à vis the cable operators. While the cable operators have sought to avoid a price war by waging a 'speed war', the DSL operators have combined the two, offering lower entry-level pricing and increasing the range of bandwidths available. There is now a fairly clear dichotomy between the DSL providers and the cable providers:

- DSL providers are offering services at speeds between 256kbit/s and 3Mbit/s, priced at between $30 and $50 per month, where the service is not part of a bundle
- cable providers are offering services at speeds between 3Mbit/s and 6Mbit/s, at prices between $45 and $85 per month, on an unbundled basis.

Additional competition comes from alternative DSL providers which provide service over the RBOCs' local access networks, and from a handful of players which have built their own infrastructure. However, this last category remains marginal in the US market today. Satellite providers such as DirecTV are also increasingly playing a role in the broadband market, using their TV distribution networks and taking advantage of Ka-Band technology to offer two-way transmission at broadband speeds.

South Korea has an extensive choice of broadband service providers available to individuals – the Government was a major catalyst in the rapid rise of the domestic broadband market. It created a highly competitive market framework in terms of the player landscape, with limited regulatory controls and provided targeted incentives for start-up companies. Its vision and strategy was a key factor in providing confidence to private companies and investors entering the market. The government's direct and indirect incentives included:

- **encouragement of facilities-based competition**. Cable modem service providers either constructed their own hybrid fibre-coaxial (HFC) networks or more often leased cable TV (CATV) network from Powercomm, a leased line network operator. In addition, the local loop bottleneck prevalent in other markets didn't exist in South Korea to the same extent as it does in other mature telecoms markets. In South Korea, the landlord (not the incumbent) owns the block wiring in apartment complexes, which eased the burden of interconnection at an access level. This meant that KT, as the incumbent, faced fewer regulatory restrictions and presented opportunities for new entrants such as Hanaro
- **high-capacity backbone infrastructure constructed**. New high-capacity backbone infrastructure was constructed using more than $1.5 billion of direct Government funding. This allowed broadband to become accessible to non-profit organisations such as government bodies, schools and research institutes
- **soft loans issued**. The South Korean Government provided more than $1 billion in soft loans to operators from 1999 to 2005. In 2000 and 2001 this was targeted at operators building out in less densely populated towns and rural areas
- **a certification programme**. The government introduced a certification programme for broadband buildings and apartments, which allowed property developers to incrementally charge more for higher-grade broadband services in their apartment blocks. This resulted in a plethora of partnerships between

construction firms, ISPs and operators building broadband-ready complexes and offering low-price promotional deals

- **launching e-government, education and training initiatives**. The 'Ten Million People Internet Education Programme' was introduced in June 2001, providing Internet education courses to those who could not otherwise afford the Internet. It was targeted to those less technically adept.

In South Korea, industry players have argued that the government's open regulatory policy led to 'over-competition' and the current market instability. However, this is hard to quantify. Yes, the outcome may have been different if the South Korean Government had created entry barriers. Yet the government didn't dictate the number of competitors; it simply created and encouraged the competitive framework. While the government did invest in infrastructure and offer soft loans, at $1 billion these were a drop in the ocean compared to the estimated total broadband investment of $10 billion by 2002 and $30 billion by 2005. The South Korean Government encouraged a highly competitive market - but it was always up to individual operators to determine the business case and viability of their entry strategy.

Canada made an early start with broadband and has managed its development relatively well. Of the seven biggest industrialised countries it is still the one with the highest overall broadband penetration, and is holding its place more effectively against competition from Asia-Pacific and Europe than the US has been able to. Cable modems are the most popular way to receive broadband, representing 53% of broadband connections. A lot of this success is down to strong government backing for broadband development. Federal and provincial governments in Canada have encouraged the deployment of broadband infrastructure and services. The government initiatives have included seed funding to community projects, capital funding for infrastructure projects, research and development tax credits to equipment manufacturers, funding trials for broadband applications and developing and supporting online content.

Canada is also home to some of the leading broadband fixed wireless access (FWA) vendors, and spectrum has been licensed for fixed wireless services. FWA services are available in some areas, but as in other countries, their progress has been limited. Many communities also receive broadband services via satellite.

Japan came late to the broadband world, but subscriptions are now rocketing, due to pro-competitive polices. The success of Yahoo! BB has made Japan the largest LLU DSL market in the world. It has introduced technologies such as Ethernet DSL and services such as VoIP to the Japanese residential market. Although cable only covers just under one half of households in Japan, it has a high cable-TV take-up and a reasonable cable modem market. Satellite TV is also popular and there is much work underway for HDTV. Broadband subscribers who receive their connection via fibre to the home (FTTH) have risen dramatically. The FTTH services of 100Mbit/s are offered to homes at extremely low prices. Value-added services (VAS) are popular in Japan and are a major driver for broadband. Users have access to every type of VAS available - video on-demand, music on-demand, games on-demand, TV and others.

Price

Japan again leads on price: it has the widest range of bandwidth services, from 1.5Mbps to over 40Mbps, and is the cheapest DSL market in this benchmark, and probably the world.

In terms of low entry pricing, many of the countries in the benchmark (notably France) are reaching similar levels (although Germany continues to fall further behind). In the last report, Italy also appeared to be lagging. However, prices have since fallen and Italy has now improved its price index considerably (moving ahead of Germany in the ranking). Italy has emerged as one of the leading markets in terms of innovative broadband tariffs. Aggressive triple-play bundling from Fastweb initially led to strong bundled offers from Telecom Italia. All three operators (including Wind) have now deployed VoIP to offer cheap phone packages as part of their integrated consumer offerings.

Many providers are now offering pricing incentives for users to take-up broadband services. Along with special offers for an initial free subscription to broadband access, many providers are offering free installation as an incentive. This is often the case in the US and it is now favoured by operators in the UK. We are also starting to see the trend in Canada and France.

Pricing has continued to improve in the UK, as competitive forces drive down subscription fees – building on the significant reductions reported in the previous report. As a result, we have seen a substantial increase in the uptake of broadband services as they become more affordable to wider sections of society. A trend, particularly in the UK, is broadband providers increasing the speed of services but keeping the monthly fee the same.

The most striking trend to emerge over the past year has been a decisive move by a number of operators away from unlimited broadband usage and contract-only charging, for example in South Korea and Italy. Operators are resisting broadband access commoditisation, catering more for different consumer preferences and gaining better control and visibility over network costs and operation. In essence, operators are using price as a shaping mechanism for Internet traffic.

Most operators have now introduced download limits, charging for extra Mbit/s or Gbit/s of volume usage. More strikingly, in some markets the balance has been tipped to more time-based charging. For example, Italy has seen a dramatic return to metered products with reduced contract fees and non-contract options, and no 'unlimited' usage. Telecom Italia only offers one product with a flat-fee monthly contract. Out of five Alice branded offers, there are two with no contract fees charged by the hour or minute and two with metered usage. Fastweb has also changed its product offerings in favour of metered options with evening- and weekend-only options and a metered offer charged at euro1.50 per hour.

One result of such a shift is a potentially negative impact on broadband usage around the home for applications such as streaming radio, network-based home monitoring applications and webcams i.e applications which are run for an indefinite period.

Regulation

There have been a number of developments in regulation within the countries in this study – particularly around LLU pricing.

In December 2004, Ofcom in the UK announced the reduction of BT's LLU prices for fully unbundled lines and shared access. This was not the first reduction in 2004 – BT first cut its prices in May 2004.

At the end of a long consultation in November 2004, ComReg in Ireland issued its final decision over the price of Eircom's fully unbundled local loop, bringing it from 16.81 euros per month to 14.65 euros per month. The new prices became effective from 1 December 2004 and will be subject to a price cap regime of CPI-0 (consumer price index plus zero) every year for the following three years, starting from 1 December 2005. This means any increase in service pricing will, on average, be restricted to stay in line with inflation, but may not exceed this level.

In November 2004, ComReg published a consultation paper proposing a drastic reduction in shared local loop charges, from 9 euros to 0.39 euros, representing the cost of carrier billing and administration - the only incremental costs in providing shared access.

In Australia, the Australian Competition and Consumer Commission (ACCC) recommended that Telstra divest its HFC network and shares in pay TV company Foxtel. But the government has not pursued structural solutions to improve competition, and instead it is seeking to privatise its remaining 50.1% shareholding in Telstra.

In the US, although not altering its score over the last 6 months, there has been much activity. In August 2004, the FCC issued a notice of proposed rule-making concerning unbundled access to network elements (UNEs). These rules were finalised in December 2004. Some important issues have been addressed. Firstly, fibre loop will continue to be excluded from unbundling. Also, mass-market switching will be progressively phased out and will not be available on an unbundled basis from December 2005. Unbundling of high-capacity loops (DS1 and DS3) as well as dedicated transport (including dark fibre) will continue to be available, but only for low-density loops. For high-density loops, Competitive Local Exchange Carriers (CLECs) will now have to invest directly or buy a tariffed offer from Incumbent Local Exchange Carriers (ILECs). ILECs will be allowed to increase prices for all UNE services over the next year by up to 15% compared to current prices. Shared access is now available again, after being excluded from the Triennial Review. Bitstream is now available as part of the LLU package.

The FCC was long awaited to issue new rules on unbundling for the US market. The Triennial Review, along with the subsequent interim rules, contributed to creating a climate of uncertainty over the destiny of unbundling in the US, which these new rules should bring to an end. In practice, the FCC has tried to find a compromise between the interests of ILECs and those of CLECs. The market will ultimately decide whether this fine line is the right one to foster the US broadband market.

In October 2004, the FCC issued a ruling allowing incumbent local exchange carriers (ILECs) to deploy fibre-to-the-curb (FTTC) local infrastructure without having to grant unbundling rights to competitors over it.

In March 2005, Agcom, the Italian telecom regulator, published its market analysis for the wholesale broadband market. Telecom Italia was found to have significant market power in the national wholesale broadband access market. Among the remedies proposed was the introduction of DSLAM interconnection obligation and the requirement to offer the latter, along with the ATM interconnection service, at cost-oriented prices. In Agcom's proposals, cost-orientation will also apply to the metropolitan transport service associated with bitstream access that Telecom Italia has to offer. The regulator's proposals will now be subject to a consultation and to the review of the EC. A final decision on changes to the current regulation will be made before mid 2005.

Broadband market extensiveness

Broadband market extensiveness is defined in terms of broadband availability as a percentage of population coverage, and market context, which assesses potential broadband take-up, and takes account of similar technology services such as ISDN, 3G, flat-rate narrowband and digital TV.

Availability

The availability of broadband has been an issue all over the world, whether in the UK, France, the US, Australia or beyond. Although the pressure is generally unidirectional - from the pressure groups to the operators - there may also be good reasons for the operators themselves to be more aggressive about the deployment of broadband. However, operators are under commercial pressures from shareholders and will tend to roll out infrastructure and services where it is commercially viable to do so or where they envisage a strategic competitive advantage

The pressures on DSL operators are economic and political. On the one hand their shareholders (and creditors) demand swift returns on investment, with many operators now working on a three-year or shorter period as the basis for investments. DSL rollout is an expensive business and the irony is that the smallest and least economically viable exchanges are also the most expensive to upgrade, because they are often more remote. Financial managers will be reluctant to invest in universal DSL coverage if they do not see a clear plan for a return on investment.

This is the issue that most DSL incumbents under review here now have to address. Most, apart from Ireland, have now reached or exceeded 80% population coverage. The remaining exchange areas are likely to be in rural communities and will be expensive to enable.

The emergence of technologies such as fixed wireless access (FWA), FTTH and satellite offer new alternatives to the disenfranchised, although development is slow. In the UK, PCCW, the Hong Kong telecoms group, has recently ruled out a

nationwide roll-out of its UK wireless broadband service in the near term. So far the company has invested $14m in acquiring all 15 UK wireless broadband licences, and up to $40 million in rolling a service out to target 400,000 households in the Thames Valley area around London – an area already well served by DSL and cable.

Two options available to extend the footprint of DSL are cable and broadband wireless.

Extending the footprint: DSL

Some of the larger and more aggressive cable operators in Europe are now looking to extend their network reach by deploying local loop unbundling. NTL intends to enter 300 of BT's main exchanges, thereby extending reach to an extra 2 million homes, and other players in Europe such as Telenet or UPC have not dismissed such a move.

There are, however, numerous technical and operational issues for cable companies to consider:

- Cable and DSL have fundamentally different architectures - The overall architecture of a cable network is very different to that of a DSL network. Cable has a far more distributed architecture, often with many remote head-ends; there is considerably more monitoring of equipment at a localised level. More modern systems have moved towards a generalised IP core, but outside of the core the two network types are very distinct. This would mean that operators will have to invest in significant new equipment - there is relatively little that can be shared. From an operational cost point of view, moving into DSL will also mean that cable operators will have to invest in additional skill-sets among technical staff - both in the field and in operations centres. The two customer provisioning systems are also different, requiring additional investment.
- Choice and availability of backhaul capacity - Cable operators may have some general core network capacity reaching into new areas to be served but in many cases they will need to provision backhaul circuits to local exchanges to deliver unbundled loops or otherwise lease capacity from the incumbent carrier or other alternative carriers. Such networking capacity is likely to be relatively expensive and there will be technology choices to be made, for example Ethernet or ATM. We can expect cable operators to concentrate their efforts on selected areas, probably major cities and other dense urban areas to maximise the return on newly deployed network capacity. Widespread service coverage in the early period of DSL rollout is not likely.
- Video streams for cable and DSL are fundamentally different – The coding techniques used in DSL and cable are quite different so if both forms of broadband access are to be used then at some point in the content provisioning architecture, the service provider will need to re-encode the signal, potentially requiring additional equipment. Re-encoding could either be done at the outset for both types of network, or transcoding could take place within the distribution network perhaps at the edge of any common infrastructure the networks might share.

Broadband wireless

The fixed and mobile worlds are converging, and as they do broadband wireless technologies will play an increasingly larger role. Users not only wish to use a greater range of devices whilst on the move, but we also want them to easily communicate with each other. Often the best technology to provide both functions is a wireless one.

There is no single wireless technology suitable for all occasions. Device-to-device communication, for example, has a completely different set of requirements than device to network. Different devices and applications also have differing characteristics, which may lend themselves better to a certain wireless technology and not others.

So for different situations and applications, different technologies are being developed. However, the variety of broadband technologies does not stop there. There are a number of technologies and standards being developed by vendors, or groups of vendors, which effectively do the same, or at least similar, job. There is therefore a 'soup' of technologies being created.

We compare each of the technologies against each other in five key areas: capacity, coverage, mobility, technology availability and industry acceptance. *Figure 3.1* shows a summary of our comparisons of each technology in each area.

Figure 3.1 **Broadband wireless technology comparison**

	Capacity	Coverage	Mobility	Technology availability	Industry acceptance
Bluetooth	★	★	★	★★★★★	★★★★★
UWB	★★★★★	★	★	★★	★★★★★
WiFi	★★★★	★★	★	★★★★★	★★★★★
WiMAX (802.16-2004)	★★★	★★★★	★	★★	★★★★
WiMAX (802.16e)	★★	★★★	★★★	★	★★★
HSDPA	★★	★★★	★★★★★	★★★	★★★★★
TD-CDMA / UTRA TDD	★★	★★★	★★★	★★★★	★★
CDMA2000	★★	★★★	★★★★★	★★★★★	★★★★
802.20 (incl. Flash-OFDM)	★★	★★★	★★★★★	★★★	★★
Other (iBurst)	★★	★★★	★★★★★	★★	★

Source: Ovum

Within the home, WiFi has succeeded as an application well suited to its capabiilties. It is strongly demanded by customers to create home networks, and pushed heavily by device and CPE vendors. The success of this technology in this area is guaranteed.

Within the personal area network, Bluetooth has already achieved supply-push and can be found in tens of millions of devices today. As the need for close-range machine-to-machine communication escalates, demand is also building - albeit slowly. It is so far hard to see what the real demand for ultra wideband (UWB) will be, but it is starting to be pushed by some home equipment vendors, so perhaps this too will eventually end up in our homes whether we demand it or not.

There will be both a great push (by operators and vendors) for 3G as well as a certain amount of demand-pull, mainly from business users in the early stages. WCDMA has gained great support from the industry but lacks bandwidth capability. HSDPA resolves this issue and therefore will certainly be deployed in WCDMA areas. Similarly, CDMA2000 will gain support in the CDMA regions.

WiMAX is likely to succeed and will be used for fixed wireless access in rural areas and for wireless 'hotzones'. This means it will replace WiFi in some public areas to extend the reach of hotspots, but not all, as WiFi will remain the cheaper technology. WiMAX 802.16e is likely to be too late to take much of the HSDPA market.

Other solutions such as Flash-OFDM and iBurst are unlikely to succeed in a big way in the short to medium term unless they join one of the larger, more accepted standards. In the longer term, 802.20 mobile broadband technologies in particular may start to gain more supporters as HSDPA starts to run out of steam.

Market Context

In predicting the next wave of broadband adopters, it is useful to examine those consumers of similar digital technologies such as digital TV, 3G, ISDN and flat-rate narrowband services. The UK scores particularly well as an early adopter of digital TV services, with 62% of households taking up digital TV services, increasing our propensity to take-up not just fixed Internet services, but so-called ‘triple play’ offerings (TV, telephone and broadband Internet).

The common thread of these similar technologies is the use of interactive, content-based services. These will be the ultimate driver of future broadband growth and are therefore important considerations in predicting development and commercial revenues – increasingly important as take-up improves and competitors seek to differentiate their respective services.

Broadband take-up

As availability and population coverage of broadband approaches 100% in many markets, the key indicator of demand and performance becomes take-up. It is well documented that the UK got off to a late start, but is now making substantial headway

in terms of growth. Whilst there is still some way to go before equalling South Korea, Canada and Japan, the UK has seen 16.5% growth in take up between Quarter 4, 2004 and Quarter 1, 2005.

Broadband providers are becoming much more ‘savvy’ in targeting customers and driving up demand. We have seen the choice of different broadband access products increase considerably, a trend which will continue throughout 2005. This has happened in three ways:

- greater capacity means a wider range of access speeds i.e. from 512kbit/s to 8Mbit/s
- the introduction of either capacity-based or time-based charging linked to the targeting of different user groups with differently priced products i.e. higher cost for heavy downloaders, cheaper cost for weekend-only users
- the demise of 12-month-only contracts and the rise of pay-as-you-go products.

Broadband service providers are finally placing more emphasis on the 'service' aspect of broadband. This translates into more awareness of customer needs and preferences and greater focus on customer care and support.

The most obvious evidence of this is in actual product names. Although some providers are still using technical terms such as ADSL in their marketing, other softer and more meaningful consumer terms are being used, and some standard product groups are emerging:

- *Classic*: standard broadband access product with mid-range bandwidth and pricing aimed at average users
- *Beginners*: cheaper, simpler offerings with a greater degree of instruction and 'hand holding'. Also includes dial-up offerings aimed at first-time users
- *Economy/light*: the cheapest offerings, sometimes with minimum bandwidth, often incorporating download limits, sometimes marketed in the pay-as-you-go category
- *Family*: 'value for money' offerings, usually standard broadband speeds i.e. between 512kbit/s and 1.5Mbit/s depending on market. More marketing of parental control
- *Pro:* high-end services with high speeds and generous/unlimited download allowances. These sometimes incorporate extra storage/email addresses
- *Pay-as-you-go:* aimed at both economy and temporary users unwilling to sign up for a 12-month contract; for example students or people in short-term rented accommodation.

The number of broadband lines at end Quarter 1, 2005 and resulting penetration is detailed in Figure 3.2.

Figure 3.2 Broadband lines and penetration Quarter 1, 2005

Country	Broadband lines	Households (000)	Penetration (%)
Australia	1,832,300	7,305	25
Canada	5,888,711	11,825	50
France	7,667,000	24,691	31
Germany	7,526,930	38,931	19
Ireland	151,400	1,317	11
Italy	5,249,555	22,840	23
Japan	19,770,200	48,081	41
South Korea	12,086,836	16,756	72
Sweden	1,426,100	4,175	34
US	36,491,110	109,283	33
UK	7,160,000	25,096	29

Source: Point Topic

Country characteristics, comparisons with the UK and learning points

Australia

Culturally, Australia is very similar to the UK, but the country's differentiator is that it has two major cities (Sydney and Melbourne) and state capitals (Canberra, Darwin, Perth) which are sophisticated and innovative, while much of the rest of the country is rural. The urban centres are testbeds for new technology development, such as fixed wireless broadband and fibre (however, trials of fibre to the home in Perth by Bright Telecommunications are reported to have stalled). TransAct in Canberra has a mixed fibre-to-the-kerb solution but otherwise it is greenfield ventures driven by Telstra, whereas elsewhere it is proving a struggle for potential users to get access to broadband services.

After years of very slow growth, broadband is finally taking off in Australia, achieving 25% household penetration by March 2005 due to strong price competition. Unbundled local loop and line sharing has been available for some years, but only now are alternative operators deploying their own infrastructure in the Telstra exchanges. However this is confined to urban and metropolitan areas. Telstra is possibly the most vertically integrated incumbent in the world, dominating every sector in which it operates despite increasing competitive pressures.

Whereas the UK is fairly content to continue along the DSL route, the geographic challenges mean that Australia could well become a key player in the development of wireless broadband technologies, driven by the need to increase coverage.

Canada

One might consider Canada to be similar in some ways to Australia due to the rural challenges, but the market has vastly different drivers. Not least is an underlying desire to be recognised as an equal to the US in the technology space. The technology vendor market is thriving, particularly in the wireless space, and the large cable market provides significant competition to the telcos.

We anticipate Europe as a whole catching up with Canada and the US over the next 5 years. In the meantime, Canada's bullish drive to increase broadband uptake is admirable. It is focused on enabling the more rural areas, fighting for universal access, and *choice* across the country. This is not just about providing 'poor man's access', i.e. a basic service level, in more remote areas. The view is that all citizens should be able to access the same level of sophisticated, value-added services nationwide.

France

Although France does not score particularly well in comparison to other markets detailed in this report, due to continued, however declining (just 47% when compared to 90% some years ago), dominance of France Telecom and focus on DSL rather than other technologies such as cable. It is nevertheless performing well in Europe following substantial LLU activity. The rise of competitors such as Free, Neuf and Noos is improving the country's competitive stance.

Since the end of last year, there has been consolidation in the market due to the high-level of competition (as a result of a combination of low prices and continuous focus on higher performance and innovation). Telecom Italia bought Tiscali France (April 2005) and Cegetel and Neuf Telecom announced they will merge (end of 2004).

The success of LLU in France is something to note and learn from. With (some might say unprecedented) proactive and speedy action by the regulator ART (now Arcep) in removing the barriers for ADSL2+, stimulating competition, and allowing greater speeds to be offered at little increase in price to the end user. Moreover, ART has just given its approval for the deployment of Reach-ADSL technology (Re-ADSL).

Other activity worthy of note in France is the greater role played by local authorities in the development of broadband infrastructure. Government has encouraged these bodies to build out their own local access loops by offering reduced-rate loans. As a result, many of them are specifying networks, financing roll-out and contracting directly with operators and service providers to build and run them. End users of the network are then customers of those service providers.

Germany

Germany is a fairly large, well-populated country with one dominant national player, Deutsche Telekom. Although an early mover with Deutsche Telekom driving DSL roll-out according to its estimation of financial viability, competition has started to increase over the past year and almost doubled (22% in 2004 compared to 11% in 2003) in terms of subscribers base.

Germany's differentiator is that the legacy systems have been based on the federal states or Länder, with business communities and opportunities based in and around these areas. Broadband players have therefore sprung up within these major conurbation areas (e.g. HanseNet in Hamburg, and NetCologne), and whilst their individual subscriber bases (and hence market shares) are generally comparatively small, they are nevertheless providing competition to the incumbent on a region by region basis. One key challenge for Deutsche Telekom in this respect is that it is difficult for the incumbent to define competitive national rates, as it is competing with a different player in different regions.

Interesting though this phenomenon is, it is unlikely to be witnessed in the UK where players are likely to seek economies of scale through national roll-out rather than restricting to a single urban area.

Moreover, the regulator RegTP recently demanded a 10% decrease in LLU price rental in an effort to shape a more competitive broadband market where end-users would benefit from low prices and variety of broadband services.

Ireland

Despite significant investment from EU funds, and initiatives from government, broadband has been slow to develop significantly in Ireland. Lack of demand, poor infrastructure, expensive services and limited competition continues to hold back growth. ComReg is starting to demand changes on the part of Eircom.

Momentum is now starting to gain in Ireland and it appears that Eircom is now taking the development of broadband seriously as it increases its broadband coverage to 74%. Significant investment and initiatives from government are hoped to make Ireland a country with 100% broadband coverage by 2007. We have also started to see new entrants in the Irish market including e-net, Magic Networks and Smart Telecom.

ComReg recently announced a drastic decrease in LLU rental in an effort to attract more new entrant operators and make the market more competitive to the benefit of end-users.

Italy

Not scoring particularly well against the other country markets in this report, Italy nevertheless is proving an innovative, forward-looking market. Fastweb may not be big on a national scale compared to Telecom Italia, but it is providing a significant

competitive threat to the incumbent at a regional level. It is viewed as perhaps the most successful triple play operator outside of Asia with its fibre and unbundled DSL services offering advanced video and interactive services.

Telecom Italia too is building its reputation as an innovator, offering some interesting tariffing models, and propositions for fixed-mobile convergence and migration. Characterised by its high quality, value-added services, Italy is demonstrating that it can build a promising market without having a significantly competitive one.

Unlike the UK, there is no cable in Italy, but the unbundled lines used by Fastweb demonstrates a much greater deployment of LLU than in the UK. Italy also demonstrates the most successful use of fixed-wireless access for triple play outside of Asia.

Japan

Japan is a vastly different market to the UK, and as such is difficult to compare on a like for like basis. It leads technology deployment, such as VDSL, VoIP, and FTTH (where initially it was a late starter). It has a strong competitive market, aided by progressive regulation, with some cable, and is very much demand driven. For example, national fixed line voice services was seen to be expensive in Japan, and this led alternative operator Yahoo! BB to provide much cheaper VoIP services. Around 75% of its customers take VoIP as part of their broadband service.

Technology savvy users are driven by one-upmanship – particularly against South Korea as well as against their co-citizens. If one subscriber buys a 45Mbps service, then chances are his neighbour will also want that and more.

The Japanese experience is seen as difficult to copy outside of that particular culture, but it is nevertheless useful to study. Unlike Italy and the US, Japan is actually not significantly ahead in the provision of value-added services (although there seems to be a lot on offer, from video games to electronic books, music downloads to Voice over IP), but they have the capability and capacity to provide whatever is demanded.

South Korea

South Korea's main broadband driver was a significant government push to become a leading global force in the broadband space. The South Korean Government invested significant amounts of money into the infrastructure to stimulate competition. But what government and service providers failed to identify fully was the business case for broadband. In 2003, South Korean telcos suffered substantial losses, and the intense, competitive marketing activity between them resulted in increased churn and costs. Thrunet went into receivership in March 2003. By the end of 2004, it reported revenues of KRW350 billion (£172 million), whereas the debt stood at KRW448.5 billion (£220 million).

After long loss-period for KT's broadband operations, the company announced better than expected revenue growth (almost 5%) for 2004. Moreover, these operations require further investment in capital expenditure and operating expenditure.

Nevertheless, it is useful for other markets to understand the reasons behind South Korea's market difficulties and learn from them.

With 72% of South Korean households having broadband, the technology is pervasive and getting faster. It is changing the accepted business models for creative sectors in a country where digital music downloads already vie in value with CD sales, and the online video games market is larger than that of VHS and DVDs combined.

Whereas the typical home broadband service in the UK offers a data speed of around 1Mbps, in South Korea, a common rate is 10Mbps. Korea Telecom also offers a 20Mbps premium service, and there are trials of a 100Mbps service. These speeds are important because the faster the average access gets, the more technically viable it becomes for services such as on-demand television and video chat. Turning broadband homes into an alternative content distribution network would have fall-out for many sectors, particularly broadcasting. The second point to make is that online gaming is the emerging star of South Korea's broadband sector. It is a cultural phenomenon, which spreads beyond the home to high-street cafes and beyond the traditional male skew of western games markets.

South Korea provides the UK with other learning points, particularly as regards its approach to access agnosticism: many service providers will use the best and most effective technology available to them, whether it be cable, DSL, FWA or fibre to the apartment. In the UK, cable operator ntl is also considering spreading its own footprint using DSL, and it will be useful to examine the South Korean experience in undertaking this. Moreover, other useful lessons relate to new pricing models and capped rates followed by major South Korean operators.

Sweden

A major driver for broadband uptake in Sweden is the public sector – enabling schools, universities and other public services is a key concern for the government. By the end of 2004, only 10 municipalities, out of 283 in total, did not have infrastructure in place to support broadband services and some have developed open access fibre networks. For example in Vasteris an open access fibre network has been developed and any operator can use it (Telia already does so).

In addition, the high number of apartments has made it relatively easy for B2 to install fibre, pushing forward the roll-out of higher speed services.

Sweden's geography is also considered to play a part in driving broadband. Remote areas and short daylight hours in the winter has encouraged the Swedes to find new ways of communicating and as a result, wiring up rural areas has been encouraged.

Sweden is a fairly competitive market, where cable and fibre vie with the incumbent, TeliaSonera – the cable operators UPC and Comhem in particular being quite aggressive about broadband roll-out.

In terms of best practice, the UK can learn from Sweden's public sector push where significant investment is being made into public services with direct involvement of private, commercial companies.

US

The US broadband market is dominated by ten players, six cable operators and four local phone companies, which between them have almost 90% of the market. However, each of the phone companies and each of the cable companies has a discrete geographic coverage area, so that in any given part of the country the market is largely fought over by one local phone company and one cable company, creating a series of local duopolies. Competition based on regulated access to networks is minimal, although a handful of players, mostly serving business customers, have made this their business.

The cable operators entered the broadband market first, followed by the DSL operators, and cable has maintained a majority share ever since, though the gap is slowly closing due to rapid DSL growth. Cable services tend to be offered at higher speeds for a higher price, while DSL is typically offered for slightly slower speeds and lower prices. Cable TV covers the vast majority of households in the US, and broadband availability is at 88% of cable deployment, while DSL has reached 75% availability across the country. The US is therefore an interesting example of inter-modal, or facilities-based competition, a situation which has come about despite early attempts by regulators to foster service-based competition.

The quest for a triple, or quadruple, play defines the competing operators' current and future plans. On the one hand, the cable operators, whose heritage is cable TV, have launched first broadband Internet access and more recently voice over IP services. On the other, the local phone companies are rolling out advanced broadband networks to support TV over broadband services.

Several of the cable operators began rolling out VoIP services in 2004, in some cases in addition to TDM-based services they already offered. They have seen rapid take-up in the first few months, garnering several hundred thousand subscribers between them, but overall penetration rates are still low.

In some ways, the US may be seen as too competitive. The FCC is currently experiencing some quandaries in regulating open access to networks. It has decided for the moment not to require fibre providers to open their networks. This might be negative in terms of competition, but the alternative is that if players are mandated to open up, they will refuse to cooperate or to invest at all.