



Benchmarking Ireland's Broadband Performance

November 2005



Executive Summary

Introduction

Broadband is not simply a faster way to connect to the Internet, it fundamentally changes the way people use the Internet. Connections are immediate and large volumes of data can be transmitted almost instantly. Broadband access can be provided by different means: Digital Subscriber Line (DSL), wireless, cable, dedicated leased lines, satellite and optical fibre¹. In the EU, DSL is the predominant technology and represents approximately 80% of all broadband lines, with cable accounting for most of the rest².

Broadband is of strategic importance because of its ability to accelerate the contribution of ICT to economic growth in all sectors, enhance social and cultural development, and facilitate innovation. Better use of ICT has been identified as one of the key factors required to improve Ireland's productivity performance³. Recent research found that the annual average growth rate of labour productivity in ICT-using industries was 1.7% in the EU-15 compared with 5.3% in the US between 1995 and 2002, indicating a positive relationship between ICT usage and productivity levels⁴.

Since 2002, Forfás has produced a series of periodic reports that benchmark the competitive provision, cost and quality of broadband services to enterprises in Ireland against other countries with which Ireland competes. The most recent report, published in November 2004, found that although there have been a number of significant developments in the Irish broadband market in recent years, Ireland continues to compare poorly for overall take-up of broadband and has slipped further behind the leading countries.

Earlier this year, Forfás revised the broadband benchmarking process, placing a greater emphasis on looking behind the numbers to understand why Ireland continues to be outperformed by other countries in terms of broadband take-up.

Key Findings

- Although broadband take-up in Ireland is increasing, take-up in other countries is also growing and as a result Ireland's relative performance has not improved. At the end of Q2 2005, Ireland ranked 25th out of the 32 countries for broadband take-up. When the comparator group is limited to the 21 countries benchmarked in the 2004 study, Ireland's position has actually deteriorated, from 18th out of 21 in 2004 to 19th out of 21 for 2005⁵.

¹ A glossary of technical terms is available in Appendix 1.

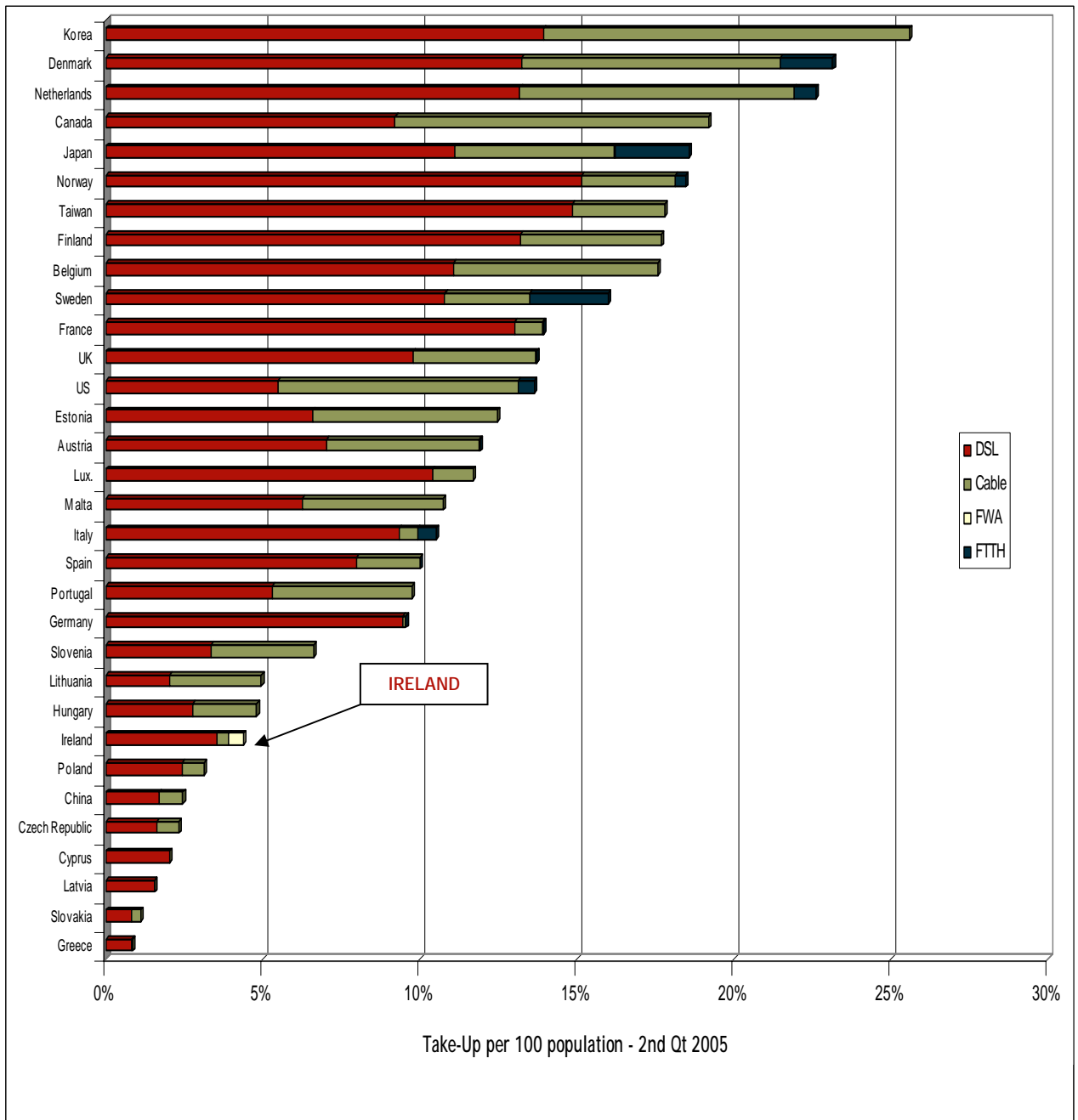
² European Commission, *Broadband Access in the EU: situation at 1 January 2005*, 2005.

³ Forfás Productivity Conference, October 2005.

⁴ Van Ark, Inklaar and McGuckian, *ICT and Productivity in Europe and the US. Where do the Differences come from?*, 2003.

⁵ The benchmark group has been extended from 21 countries to 32 and now includes the EU-25, Norway, Canada, the US, Japan, Korea, China and Taiwan.

Figure I: Broadband take-up by Population in the Benchmark Countries, Q2 2005



Source: Norcontel, PointTopic, OECD

- The cost of entry-level DSL in Ireland has decreased significantly since the launch of services in 2002, falling from a high of €141 per month for a 0.25-0.5 Mbit/s service in 2002 to €29 per month for a 1 Mbit/s service in 2005. This places Ireland amongst the most competitive in the benchmark group. Based on the amortised monthly costs for 1Mbit/s DSL, Ireland currently ranks 7th cheapest of 32 countries benchmarked. The costs of more advanced broadband services used by business such as 2 Mbit/s DSL services (small businesses) and 34 Mbit/s leased lines (large corporate customers) in Ireland are about average for the countries surveyed.

Why are other countries ahead?

One of the key objectives of this study is to understand why Ireland continues to be outperformed by other countries in terms of broadband take-up.

The key reasons which have emerged from our benchmarking analysis are:

- Widespread broadband availability
- Competition in the marketplace - both between and within platforms
- High PC penetration/ICT literate societies
- Integrated ICT/education policies
- Initiatives to create awareness and stimulate demand

See Section 5 for further details.

Moving Forward

Broadband is of major strategic importance in accelerating the contribution of ICT to economic growth in all sectors, enhancing social and cultural development and facilitating innovation. In light of this, Ireland's continued poor broadband performance will have serious implications for our future economic success and competitiveness.

Improving Ireland's competitiveness in terms of broadband availability, take-up, quality and choice is central to our ability to fully exploit ICT to increase productivity and deliver competitive advantage. Effecting the change needed to improve Ireland's broadband performance requires the engagement of all stakeholders from government to the telecommunications industry to the enterprise base.

To provide a platform for the renewed focus required to improve Ireland's broadband performance, Forfás is engaging in further consultation with stakeholders and invites written submissions to inform its deliberations on the key issues highlighted for attention by the benchmarking analysis. These include:

- Increasing broadband availability;
- Increasing competition in the market place;
- Creating awareness to increase demand.

Submissions should be sent (preferably by e-mail) by 5.00pm on Friday, 3rd February 2006 to:

Shane Quinlan
Forfás
Wilton Park House
Wilton Place
Dublin 2

e-mail: shane.quinlan@forfas.ie

Please note that submissions may be posted on the Forfás website, unless requested otherwise.

If you are making a submission, please indicate if there is any part of it that you would prefer not to be made public and why. However, Forfás cannot guarantee that any information provided will not be released pursuant to our obligations under law, including the Freedom of Information Acts 1997 and 2003.

1. Introduction

Broadband is not simply a faster way to connect to the Internet, it fundamentally changes the way people use the Internet. Connections are immediate and large volumes of data can be transmitted almost instantly. Broadband access can be provided by different means: Digital Subscriber Line (DSL), wireless, cable, dedicated leased lines, satellite and optical fibre⁶. In the EU, DSL is the predominant technology and represents approximately 80% of all broadband lines, with cable accounting for most of the rest. The European Commission defines broadband capacity as equal to or higher than 144Kbit/s but goes on to say that in reality the vast majority of broadband offerings are at least 512 Kbit/s and often exceed this, with speeds of 2 Mbit/s and above now common⁷.

Broadband is of strategic importance because of its ability to accelerate the contribution of ICT to economic growth in all sectors, enhance social and cultural development, and facilitate innovation. Widespread and affordable access can contribute to productivity and growth through applications that promote efficiency, network effects and positive externalities, with benefits for business, the public sector, and consumers. Broadband networks are an important platform for the development of knowledge-based global, national, regional, and local economies.⁸ Thus, broadband take-up is essential if IT is to continue to contribute to economic growth.

The potential benefits of widespread broadband deployment have been well documented. For example, a US Department of Commerce report in 2003 highlighted its role in enabling applications and services that will “transform our economy, education, health-care, R&D, entertainment, government and the quality of life for citizens around the world.” The deployment and usage of broadband is expected to significantly impact the global competitiveness of nations and businesses in the future.

The OECD has continuously highlighted the benefits of broadband for both consumers and businesses. For the private sector, broadband is an enabler of e-business and new market opportunities, allowing firms, including SMEs, to realise growth through productivity increases stemming from improved information exchange, value chain transformation, and process efficiency. Broadband can improve the efficiency, availability and reach of public sector services in areas such as health, education and other government services. For consumers, broadband can enhance the quality of life through economic, social and cultural development. For small, rural and remote communities it can be an enabler for economic and social inclusion.

Better use of ICT has been identified as one of the key factors required to improve Ireland’s productivity performance⁹. Recent research found that the annual average growth rate of labour productivity in ICT-using industries was 1.7% in the EU-15 compared with 5.3% in the US between 1995 and 2002, indicating a positive relationship between ICT usage and productivity levels¹⁰.

⁶ A glossary of technical terms is available at Appendix 1.

⁷ European Commission, *Broadband Access in the EU: situation at 1 January 2005*, 2005.

⁸ OECD, *Broadband driving growth: policy responses*, October 2003.

⁹ Forfás Productivity Conference, October 2005.

¹⁰ Van Ark, Inklaar and McGuckian, *ICT and Productivity in Europe and the US. Where do the Differences come from?*, 2003.

While Ireland has a very strong ICT producing sector, our performance is less impressive when it comes to the adoption of ICT by existing enterprises in the non-ICT related sectors of the economy¹¹. Ireland spends significantly less on ICT than virtually all other EU countries¹². An ICT literate country has a workforce with the appropriate technological skills to enable the widespread integration of ICT into business processes.

Since 2002, Forfás has produced a series of periodic reports that benchmark the competitive provision, cost and quality of broadband services to enterprises in Ireland against other countries with which Ireland competes. The most recent report, published in November 2004, found that although there have been a number of significant developments in the Irish broadband market in recent years, Ireland continues to compare poorly for overall take-up of broadband and has slipped further behind the leading countries.

Earlier this year, Forfás revised the broadband benchmarking process, placing a greater emphasis on looking behind the numbers to understand why Ireland continues to be outperformed by other countries in terms of broadband take-up.

2. Objectives of the Study

The overarching objective of the study is for continued policy focus at the national level on the broadband requirements of the enterprise sector and on Ireland's relative performance in meeting those needs.

The specific objectives of the study are:

- To determine and analyse the gaps between Ireland and leading competitor countries for broadband across a number of key indicators such as price, availability, take-up and quality of services;
- To review and analyse Government and industry initiatives - both supply and demand-side - in a number of comparable countries, in order to inform the identification of actions needed to improve Ireland's competitiveness.

3. Recent Developments in Ireland

Since the publication of the last benchmarking report in November 2004, there have been a number of significant developments including:

¹¹ Forfás, *e-Business Monitor*, November 2003.

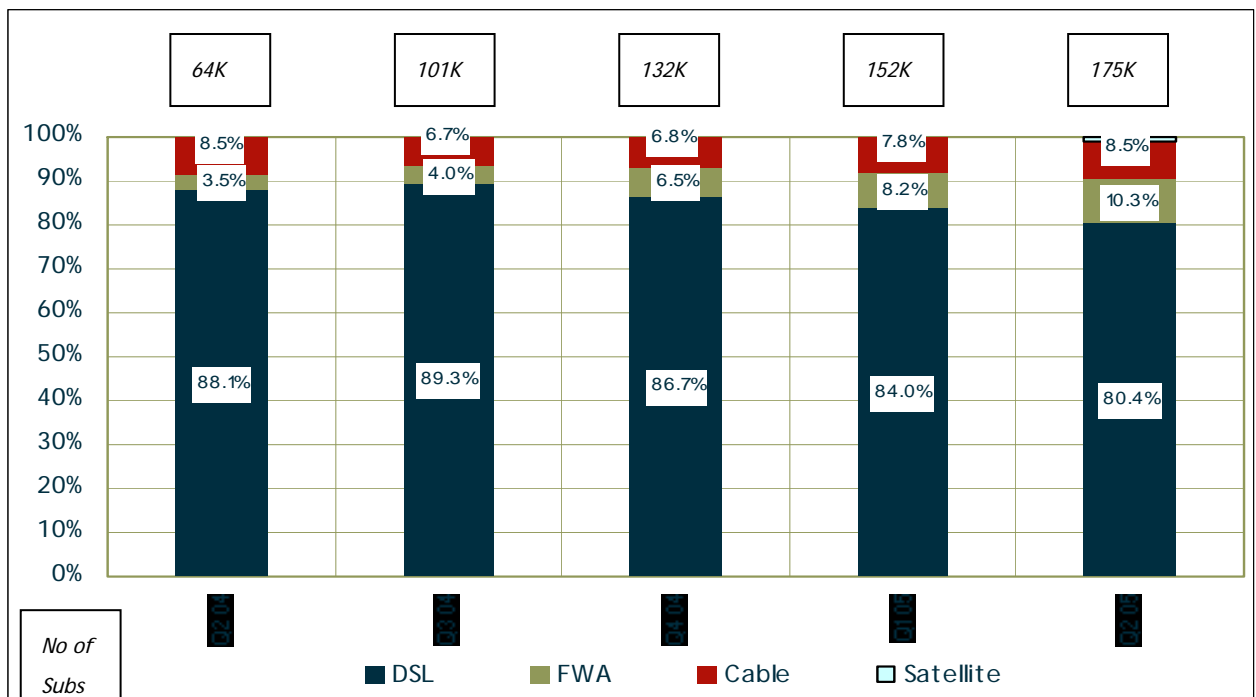
¹² European Commission, *The European Innovation Scoreboard*, 2005.

- Continued growth in broadband take-up;
- Declining price of entry level DSL;
- Progress on the rollout of MANS and County and Group Broadband Schemes

3.1 Continued Growth in Broadband Take-up

At the end of Q2 2005, there were 175,500 broadband subscribers in Ireland, up from 63,600 a year previously. Although this represents an annual increase of 170%, it should be noted that it also equates to less than 1 in 20 of the population subscribing to broadband services at the end of Q2 2005. Fixed wireless access (FWA) broadband services exhibited the fastest growth, albeit from a small base, growing from 2,200 to 18,000 subscribers (313% year on year increase). Cable subscriptions grew from 5,400 to 14,900 (177% increase), while DSL grew from 56,000 subscribers to 141,000 (154% increase). The proportion of broadband subscriptions delivered over access platforms other than DSL has increased in the last 12 months (Figure 1). In Q2 2005, DSL represented 80% of all broadband subscriptions compared to 88% for Q2 2004.

Figure 1: Broadband Take-up in Ireland by Platform, Q2 2004 - Q2 2005



Source: ComReg

3.2 Declining Prices

The cost of entry-level DSL services in Ireland has decreased significantly since the launch of services in 2002 (Figure 2), falling from a high of €141 per month for a 0.25-0.5Mbit/s service in 2002 to €29 per month for a 1Mbit/s service in 2005¹³. Among the factors likely to be contributing to

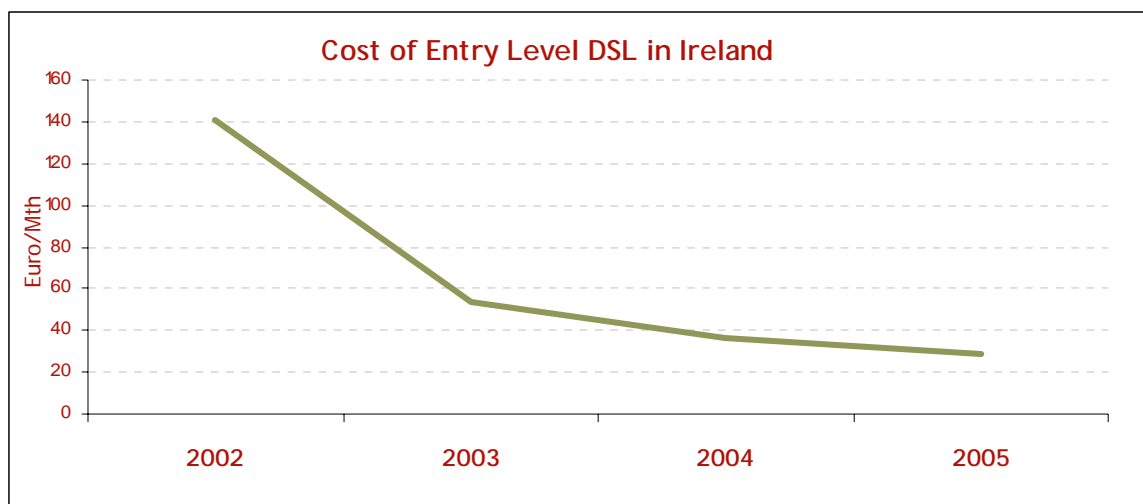
¹³ These figures are based on eircom prices and are the sum of amortised installation & equipment cost over 12 months plus the monthly line rental and subscriptions costs.

the lower prices for entry level broadband services is the availability, albeit limited, of services across other platforms such as cable and FWA.

3.3 Metropolitan Area Networks (MANs)¹⁴

The MANs were launched in 2004 and e-net now manages 20 of the 27 networks constructed in Phase 1 of the programme and are scheduled to take over the remaining 7 networks by the end of 2005¹⁵. Over 90 further MANs are in the advanced planning stages. Of the 20 MANs currently being managed by e-net, services are now being offered on 12 of the networks by at least one operator. In September, e-net signed agreements with ESB Telecoms and BT Ireland to provide an open access broadband network around the country¹⁶.

Figure 2: Cost of Entry Level DSL in Ireland: 2002-2005



Source: Norcontel, PointTopic

3.4 County and Group Broadband Schemes (CGBS)

This initiative was launched in 2004 to promote the rollout of broadband access to smaller rural communities of less than 1,500 people with the Government funding up to 55% of the infrastructure costs. Over €1.4 million was invested in the 1st phase, providing broadband access to 38 communities with a combined population of over 36,000 people. The 2nd phase of the scheme was launched in January 2005 with a further allocation of €6 million in grant aid. 119 projects have been approved to date and this is expected to cover a population of 355,000 people.

¹⁴ These are open-access transmission networks for service providers, built within a metropolitan area, using optical fibre or wireless infrastructure

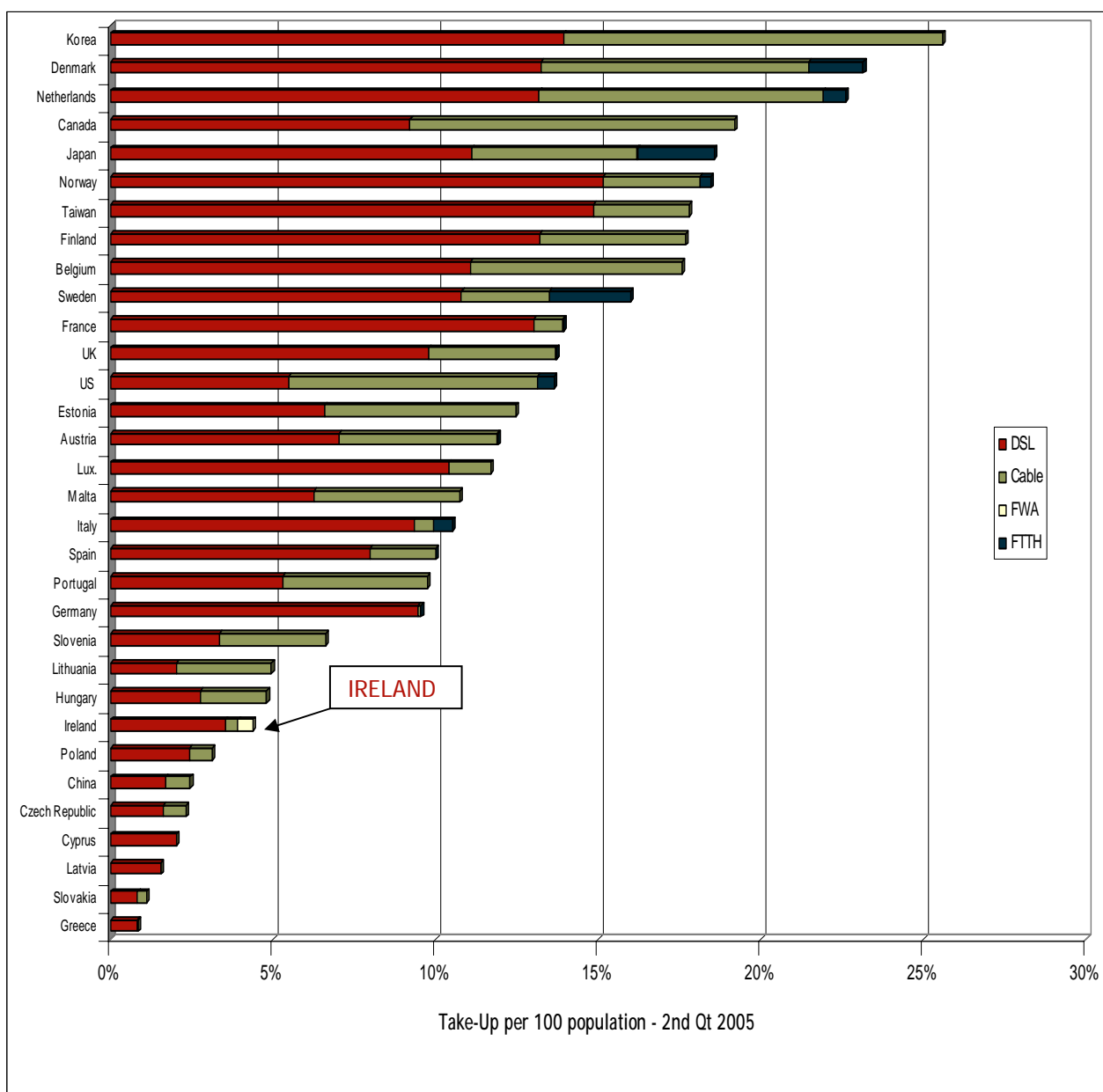
¹⁵ e-net was selected as the Managed Service Entity (MSE) for the State's regional broadband infrastructure in 2004 and holds a concession to manage, maintain and operate the Metropolitan Area Networks on behalf of the Irish Government for a period of 15 years.

¹⁶ These networks do not extend to all towns around the country.

4. Ireland's Comparative Performance

Although broadband take-up in Ireland is increasing, take-up in other countries is also growing and as a result Ireland's relative performance has not improved. At the end of Q2 2005, Ireland ranked 25th out of the 32 countries for broadband take-up¹⁷. When the comparator group is limited to the 21 countries benchmarked in 2004, Ireland's position has deteriorated, from 18th out of 21 in 2004 to 19th out of 21 in 2005¹⁸.

Figure 3: Broadband take-up by Population in the Benchmark Countries, Q2 2005



Source: Norcontel, PointTopic, OECD

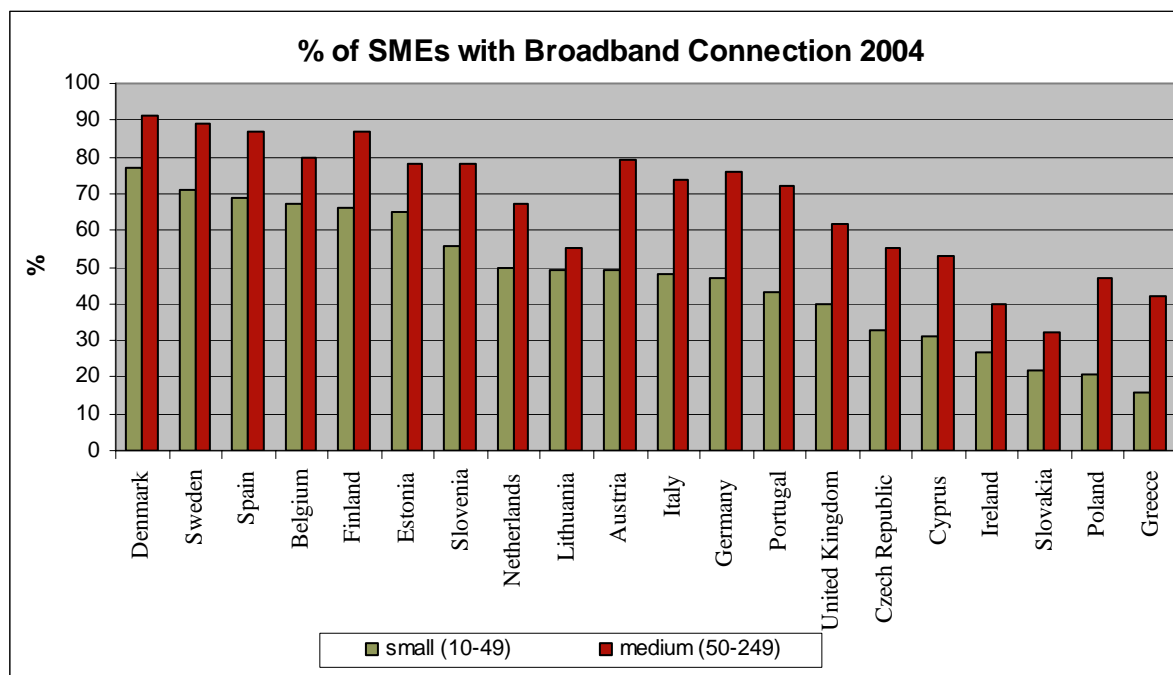
¹⁷ The benchmark group has been extended from 21 countries to 32 and now includes the EU-25, Norway, Canada, the US, Japan, Korea, China and Taiwan.

¹⁸ These comprise the EU-15, Hungary, Czech Rep, Japan, Korea, the US and Canada

In term of the overall broadband take-up table (Figure 3), Korea continues to lead the field with more than 1 in 4 of the population subscribing to broadband services while fewer than 1 in 20 are doing so in Ireland. In the last benchmarking report, only Korea had penetration levels greater than 20%. Denmark and the Netherlands have seen broadband take-up exceed the 20% mark in 2005.

In terms of broadband take-up by SMEs, according to the most recent Eurostat data for 2004, Ireland compares poorly, both for smaller (29%) and medium-sized companies (40%). Out of 20 EU countries included, Ireland ranks 17th out of 20 for take-up by companies with a workforce of between 10-49 employees and 19th out of 20 for take-up by companies employing 50-249 people. SME take-up data for 2005 will not be available until December 2005.

Figure 4: Broadband Take-up by SMEs - 2004



Source: Eurostat, Central Statistic Office (CSO)

ComReg and the Chambers of Commerce of Ireland (CCI) recently surveyed SME broadband take-up. The ComReg survey suggests a very significant increase in broadband usage among SMEs since 2004, with 49% of SMEs using a broadband connection in 2005 compared to 28% in the 2004 survey^{19 20}. However, the CCI survey puts broadband take-up among SMEs in 2005 at just 29%²¹.

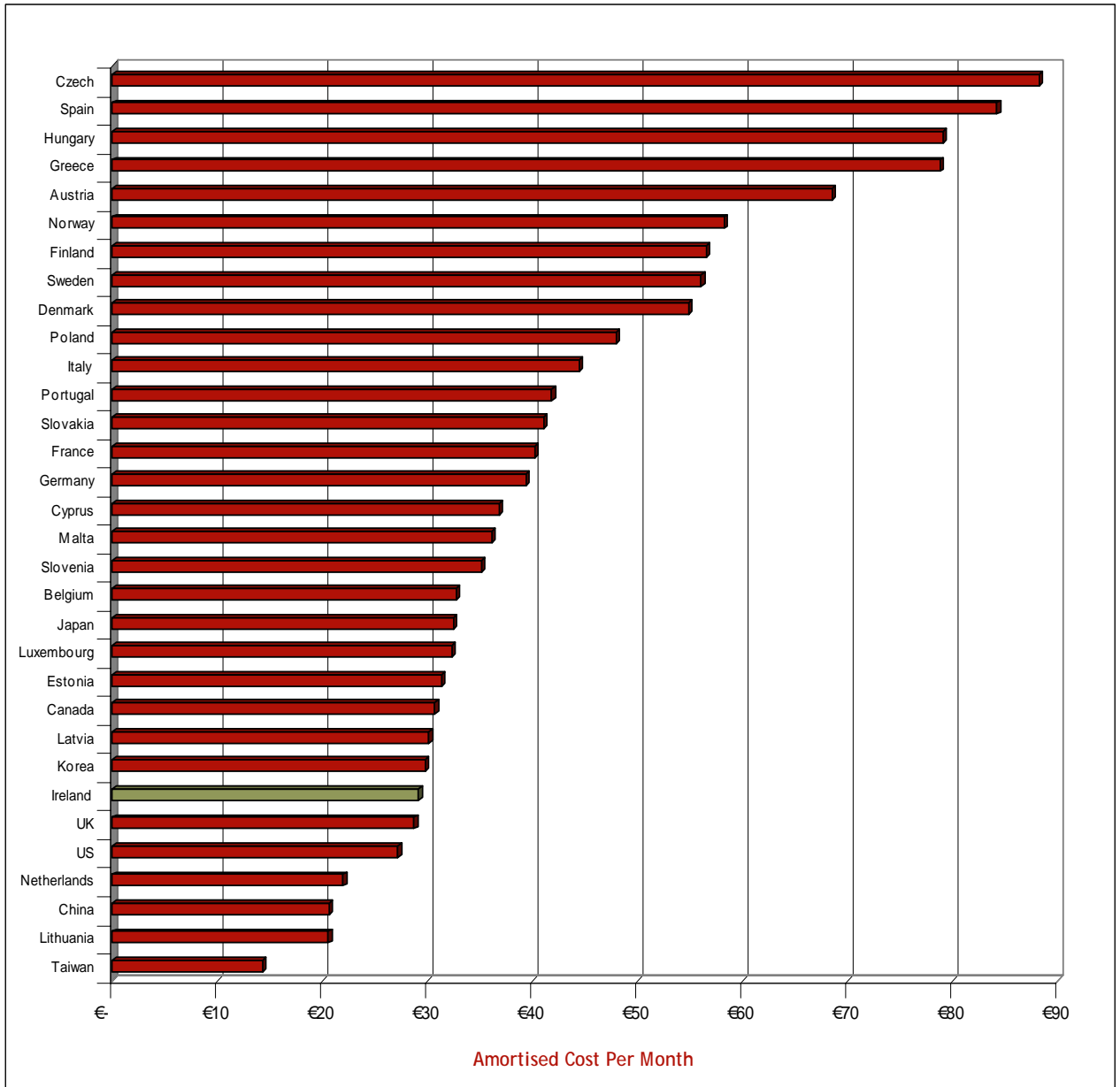
¹⁹ The sample structure has changed for this survey compared to previous business research undertaken by ComReg. There is now a greater representation of small companies (those with less than 10 employees) in the sample. The distribution of the SME sample across each of the company size segments has been determined by the share of employment each company size segment accounts for i.e. it is estimated that 57% of all employees are employed in companies employing less than 10 people, therefore 57% of the SME sample is made up of companies employing 1-9 people.

²⁰ ComReg, *SME & Corporate ICT Research - Wave 1 2005*, June 2005. <http://www.comreg.ie/fileupload/publications/Comreg0576b.pdf>

²¹ Chambers of Commerce, *SME e-Business Survey 2005*, November 2005. <http://www.chambers.ie/attachments/pdfs/SME%20eBusiness%20Survey%202005.pdf>

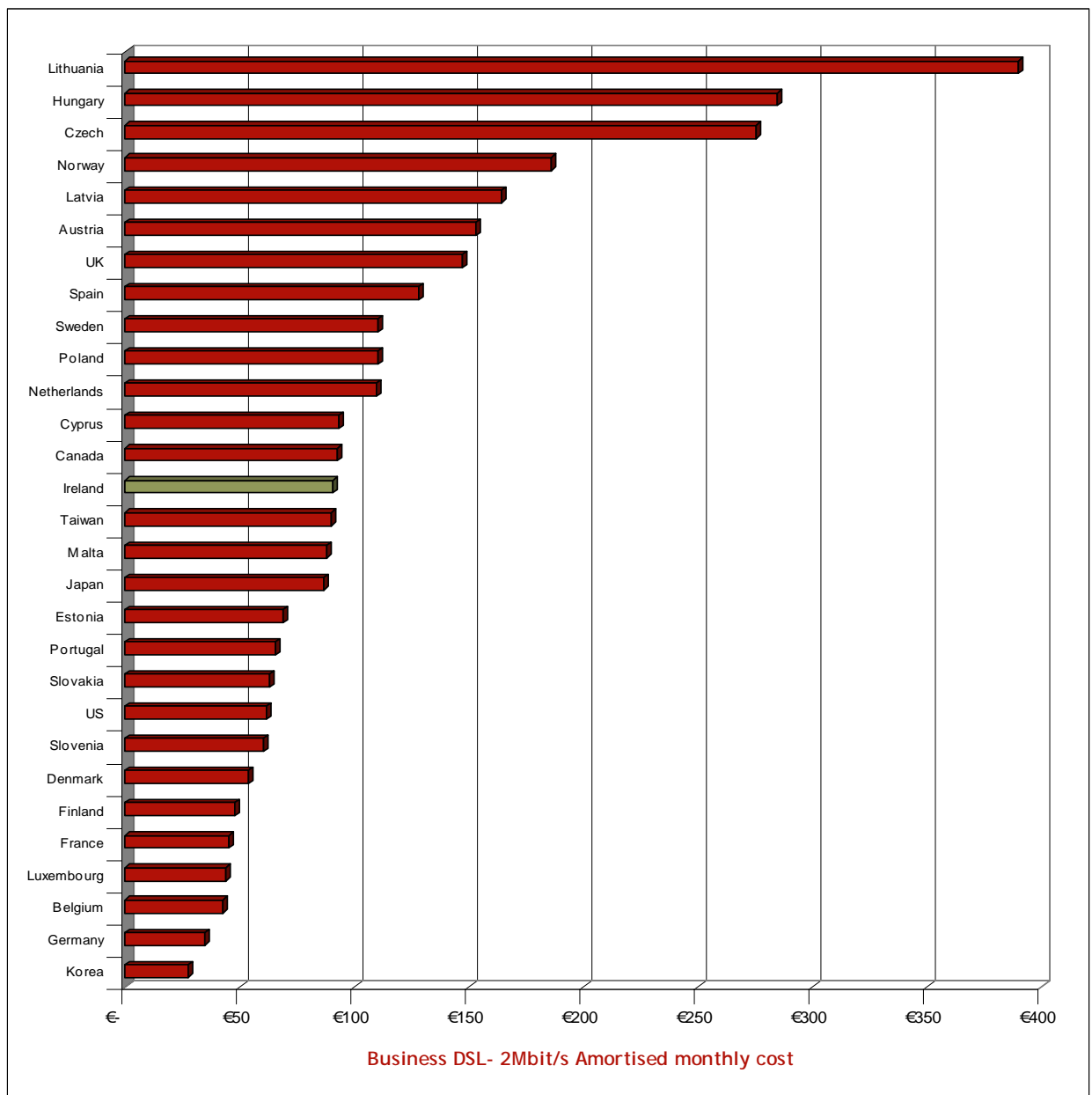
The costs of entry level DSL services (1 Mbit/s) in Ireland are amongst the most competitive in the benchmark group. As illustrated in Figure 5, based on the amortised monthly costs for 1Mbit/s DSL, Ireland currently ranks 7th cheapest of 31 countries benchmarked.

Figure 5: Entry level DSL - 1Mbit/s amortised monthly cost



Source: Norcontel, PointTopic

Figure 6: Amortised cost of Business 2Mbit/s DSL²²

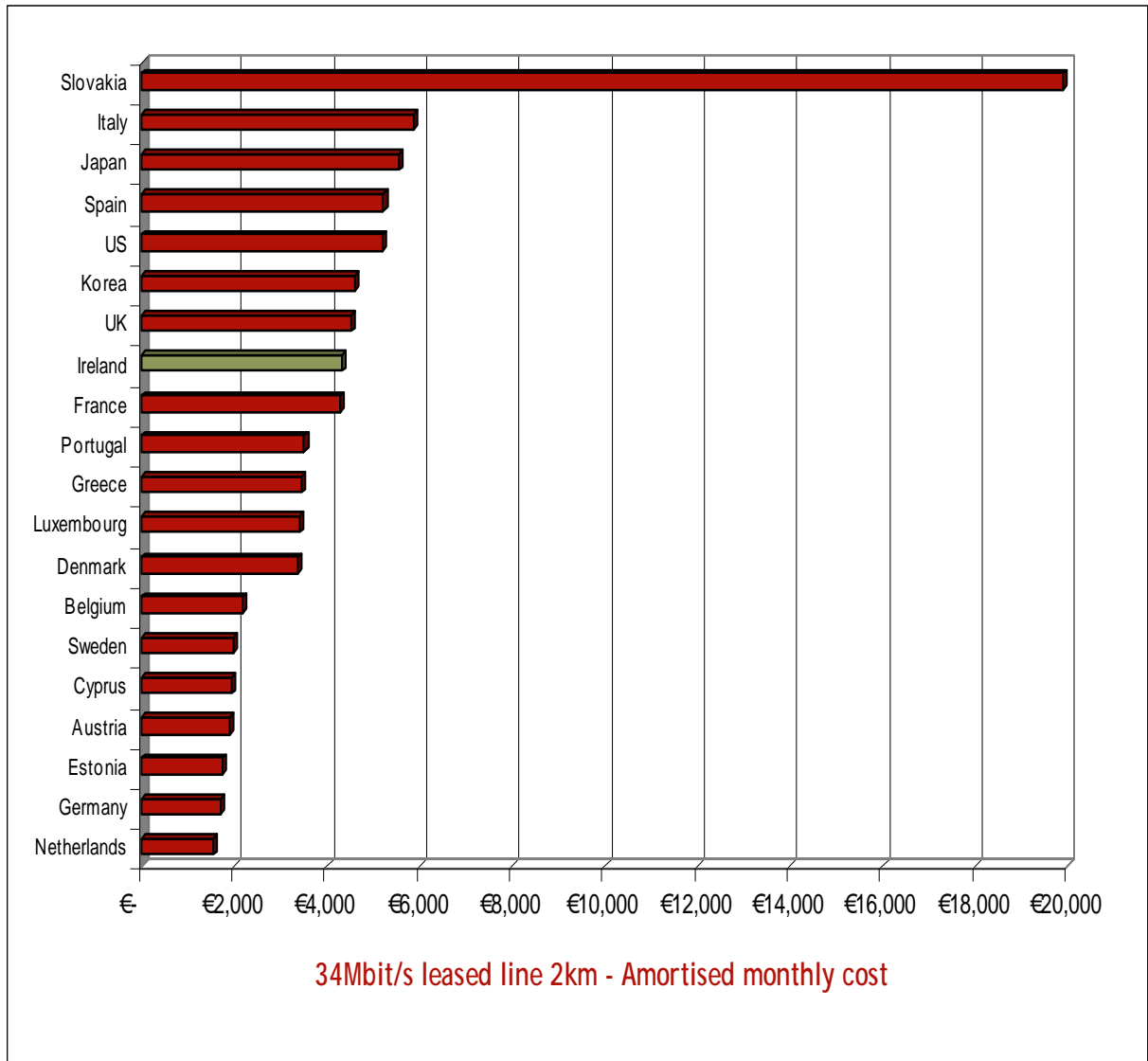


Source: Norcontel, PointTopic

²² The service is not available in: Italy, China and Greece. The lowest speed business DSL service in Japan was 25Mbit/s. In Luxembourg, Spain and Taiwan service prices were not quoted and 2Mbit/s residential service was used as a substitute in the price calculation.

The costs of more advanced broadband services used by business such as 2Mbit/s DSL services (small businesses) and 34Mbit/s leased lines (large corporate customers) in Ireland are about average for the countries surveyed (Figures 6 and 7).

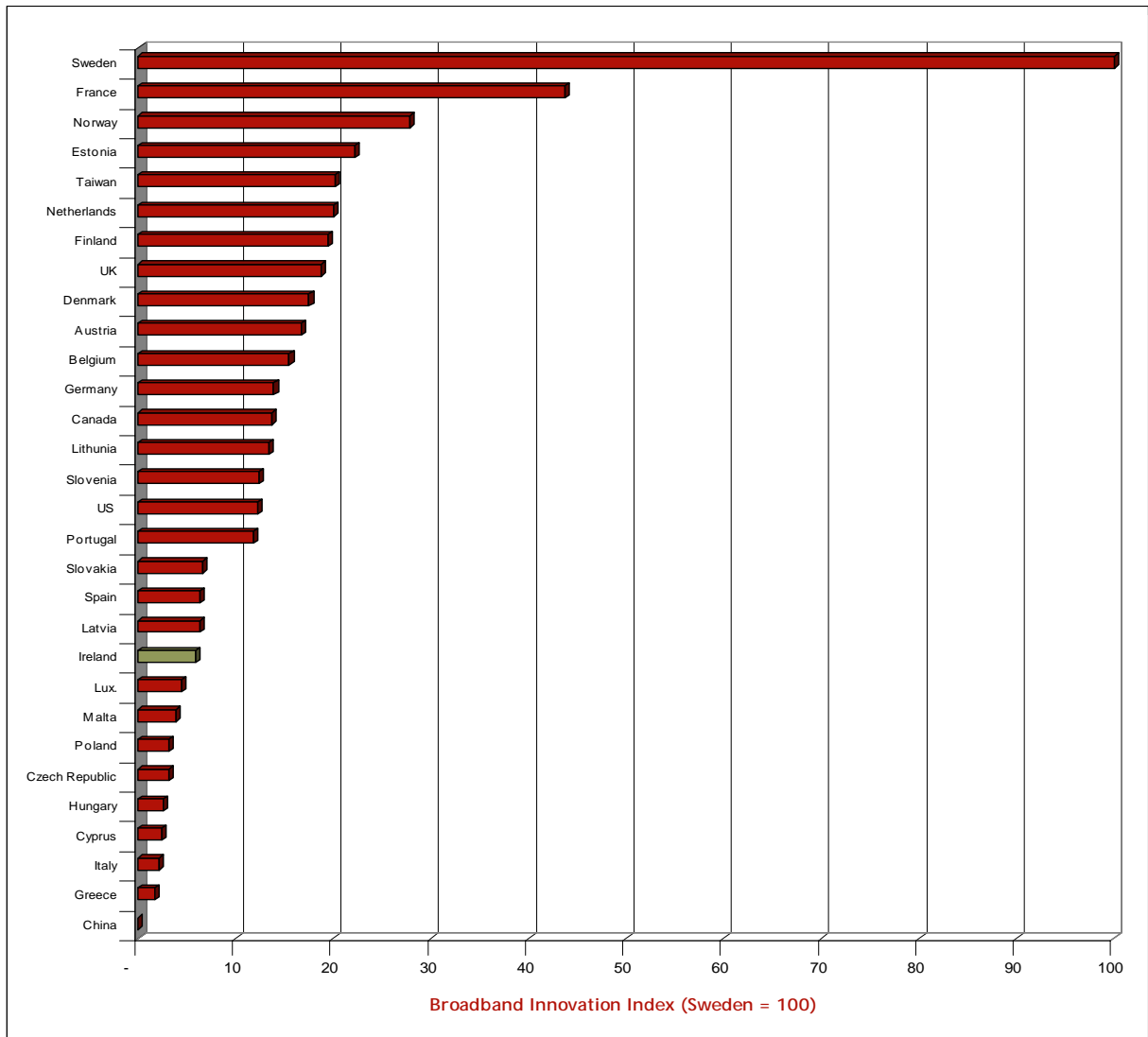
Figure 7: Broadband Leased Lines 34Mbit/s - 2km



Source: Norcontel, PointTopic

The broadband innovation index is used to measure quality of service (bandwidth capacity/choice of advanced products) performance across the benchmark countries. The index below is calculated relative to the best country, Sweden, which is given 100. Japan and Korea were excluded from the index because the widespread availability of 100Mbit/s service results in a ranking in excess of 400.

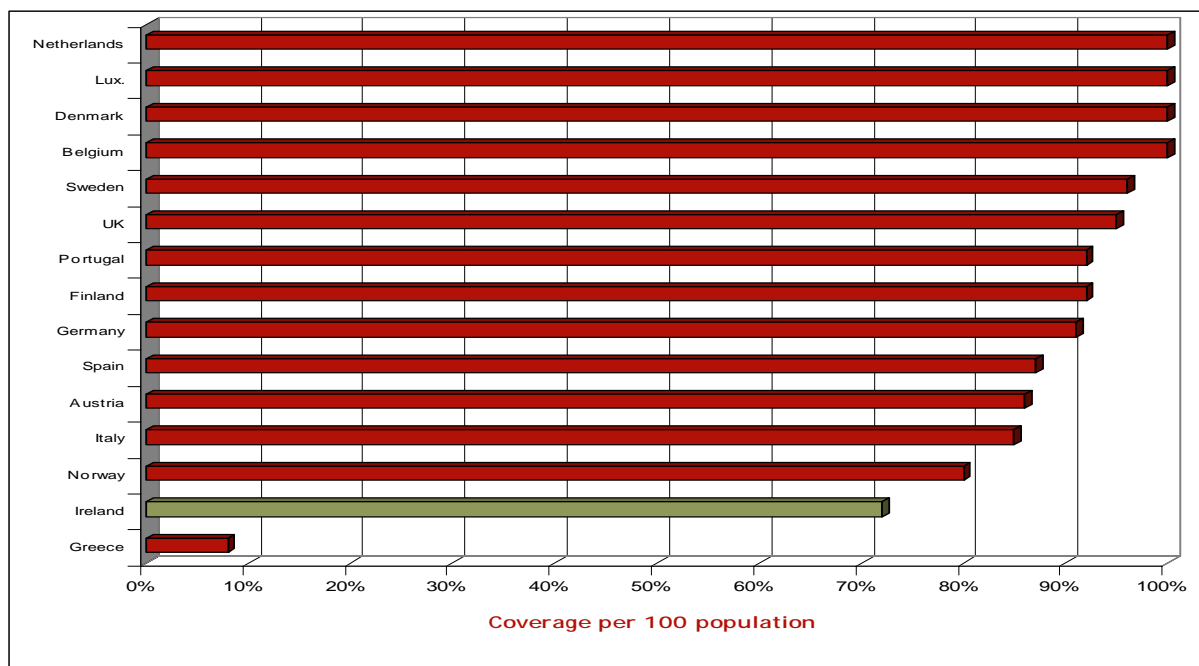
Figure 8: Small Business Broadband Innovation Index



Source: Norcontel, PointTopic, Operators

As illustrated in Figure 8, broadband innovation, and hence the quality of broadband services in Ireland, is below average. In Europe, the most innovative broadband countries are Sweden, with its high speed symmetric services of up to 25Mbit/s and France with high-speed services and a comprehensive range of advanced service offerings with varying download/upload/symmetric options available.

Figure 9: DSL Coverage per 100 population - 2004²³



Source: European Commission

Notwithstanding significant improvements in DSL availability in Ireland since its launch in 2002, data recently published by the European Commission estimates that DSL coverage in Ireland based on population stands at 72%, making it the second lowest of the EU-15 countries (Figure 9)²⁴.

5. Why are other countries ahead?

One of the key objectives of this study is to understand why broadband take-up in other countries continues to outperform Ireland.

The key reasons which have emerged from the benchmarking analysis are:

- Widespread broadband availability
- Competition in the marketplace - both between and within platforms
- High PC penetration/ICT literate societies
- Integrated ICT/education policies
- Initiatives to create awareness and stimulate demand

²³ Comparable data was only available for the EU-15, hence the smaller benchmark group.

²⁴ eircom has now upgraded 237 of their exchanges to DSL and over 430 exchanges are expected to be enabled by mid-2006, which will increase coverage to 90% of telephone lines. The number of DSL enabled telephone lines has increased to over 80% of total lines today compared to 41% in 2002 when services were first launched.

5.1 Broadband Availability

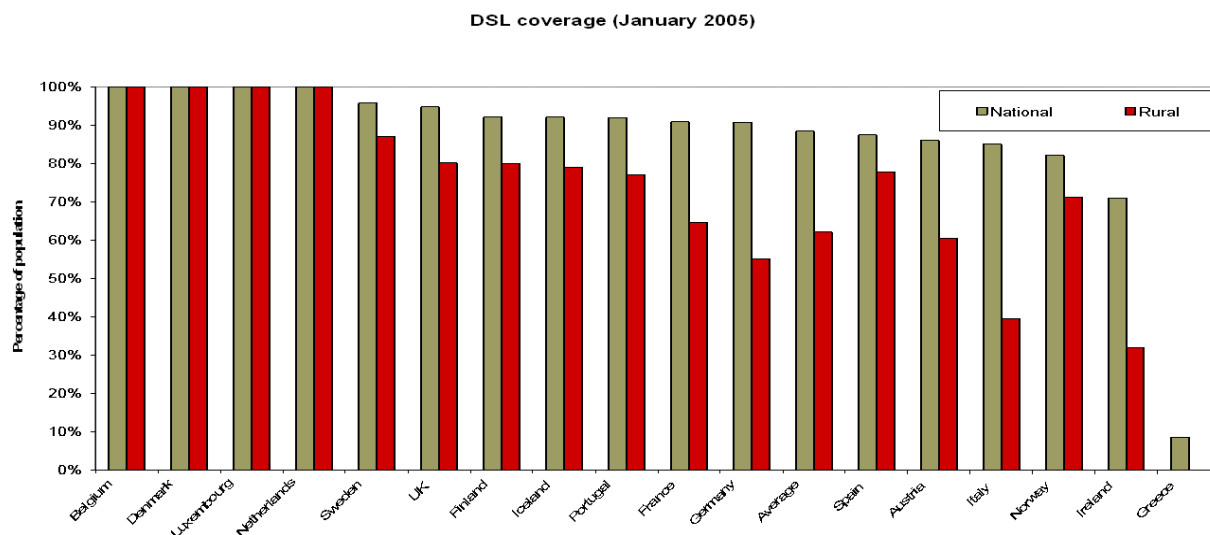
As mentioned in the previous section, national DSL coverage in Ireland based on the population covered is the second lowest of the EU-15.

The longer distances from the local exchanges to the home/business and from the local exchanges to the backbone in remoter areas mean that the commercial incentives to invest in the provision of broadband to these areas often turn out to be insufficient. However, according to a recent report from the European Commission, technological innovation (reducing the costs of deployment and extending the reach of wire-line or wireless technologies) is delivering positive results in terms of developments and facilitating market driven rollout.

Figure 10 highlights the difference between national and rural DSL coverage. Four countries are credited with 100% coverage, although it should be noted that this figure overestimates the availability of broadband as it includes lines unsuitable for DSL for technical reasons (being out of reach, poor line quality, or having incompatible line equipment).

High rural DSL coverage levels are not confined to EU-15 countries with high population densities and small rural populations (Figure 10). Sweden and Finland, which have the lowest population densities in the EU (20 and 15 persons per sq km, respectively), perform very well in terms of their rural DSL coverage. However, in Ireland, where the population density is relatively higher (57 persons per sq km), rural DSL availability stands at just 38% of the population making it the second lowest of the EU-15 countries. This is of particular concern considering Ireland has one of the highest rural populations in Europe; 40% of the total population lives in rural areas²⁵.

Figure 10: DSL availability by population: national vs. rural, January 2005



Source: European Commission

The awarding of Fixed Wireless Access Local Area licences by ComReg and the Government's County and Group Broadband Schemes are providing broadband solutions in some areas not served by DSL or

²⁵ EC, *Digital Divide Forum Report: Broadband Access and Public Support in Under-Served Areas*, July 2005.

cable, but gaps remain. In the absence of reliable data for broadband availability across all platforms, it is not possible to quantify the percentage of the population without access to any broadband services.

5.2 Competition in the Marketplace - Both Between and Within Platforms

Incumbent operators in many countries were originally reluctant to rollout DSL as it undercut the price of other business services (e.g. ISDN, leased lines). However, competition from cable TV companies provided the impetus for many incumbents to provide DSL services and as a result there is broad consensus that inter-platform competition has been one of the primary drivers of broadband take-up in many markets (e.g. US, Netherlands).

Some countries, such as France and Norway, have experienced substantial growth in broadband take-up in the absence of strong inter-platform competition. Norway has achieved an overall take-up rate of 18% primarily through DSL where the successful implementation of local loop unbundling (LLU) has resulted in more choice and innovative products on the DSL platform, such as VOIP (Voice over IP) services and IPTV (TV services over the Internet). Meanwhile in France, successful implementation of LLU in recent years has seen the percentage of the population covered by LLU increase from 11% in January 2003 to 50% in January 2005²⁶. Take-up has increased from 4% in Q1 2003 to 14% in Q2 2005.

The 2004 Forfás Broadband Benchmarking Study attributed Ireland's poor relative performance in relation to overall broadband take-up to the lack of real growth in competing platforms, especially cable, and the lack of competition and innovation within the DSL market. In spite of the growth in the number of players in the Irish broadband market and the significant increase in cable and wireless broadband subscribers in the last year, there has been limited progress in addressing these issues. And it is unlikely that there will be any significant developments in the DSL market in the near term considering the recent announcement from ComReg that eircom's proposals to allow its competitors' access to the local loop were "*disappointing*" and that eircom had failed "*to recognise the central importance of LLU as a product to enable operators to provide innovative, higher speed broadband products*". Reiterating its view that "*LLU can play a critical role in meeting the national objectives in relation to broadband*", ComReg has sought additional information from eircom as matter of urgency so that the process can be moved forward²⁷.

Although both Chorus and NTL have been rolling out cable broadband services, cable competition has been slow to develop while FWA is available mainly in the larger urban centres²⁸.

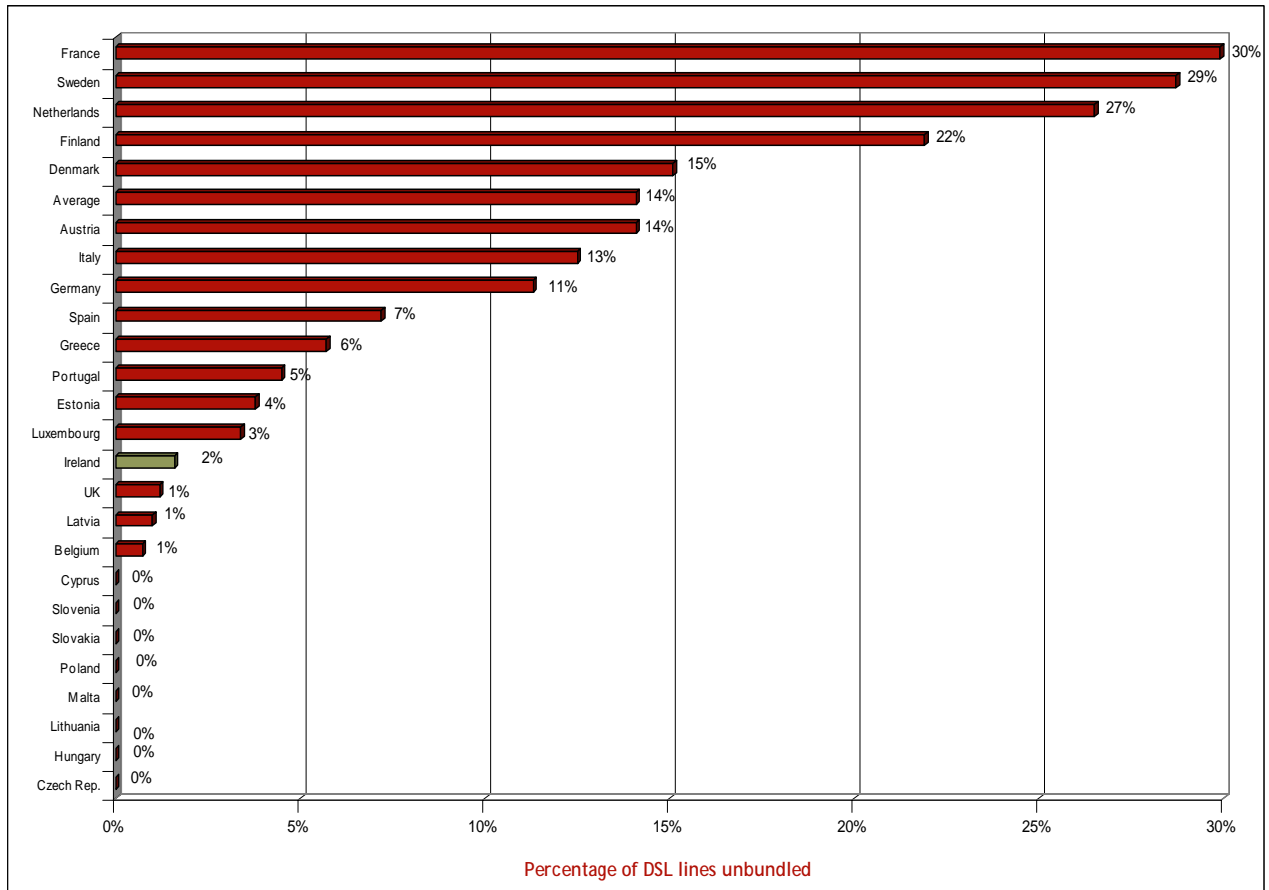
²⁶ Presentation by Commissioner of ART (French telecommunications regulator), April 2005
<http://www.sabanciuniv.edu/telecoms/presentations/G.Gauthey.ppt>

²⁷ <http://www.comreg.ie/fileupload/publications/ComReg0581.pdf>

²⁸ 33% of the ntl cable network had been upgraded for broadband with the Galway and Waterford networks fully enabled at the end of Q3 2005 while Chorus has upgraded its Cork network.

Meanwhile, with only 2% of telephone lines fully unbundled in Ireland (Figure 11), most of the alternative DSL service providers today are either resellers or offering bit-stream products which means that there is limited product differentiation in the market place.

Figure 11: Local Loop Unbundling in the EU-25, Q2 2005²⁹



Source: ECTA

The MANs programme, as well as the County and Group Broadband Schemes, have provided some infrastructure competition but limited co-ordination of these and other State-owned infrastructure is curtailing their effectiveness. The provision of competitive backhaul and national backbone capacity to connect the MANs to main national and international nodes and to each other is crucial to the take-up of the facilities by service providers. Without this backhaul capacity, the local access networks are isolated and have limited appeal to potential service providers. 18 of the 20 MANs currently managed by e-net have a backhaul connection from either ESB Telecom or BT Ireland³⁰. Service providers wishing to deliver services over a MAN are then in a position to avail of a complete end-to-end service, guaranteed with joint Service Level Agreements (SLAs) from e-net and the relevant backhaul carrier.

²⁹ Data not available for Cyprus

³⁰ 11 MANs are connected to the ESB Telecom backhaul network and 15 to BT Ireland's, with some locations connected to both.

The availability of competitive backhaul links to the MANs remains a concern for locations not served by either the ESB Telecom or BT Ireland backbone networks, such as two of the recently completed MANs, Kiltimagh and Gweedore. This problem is likely to increase as future phases of the MANs programme are rolled out. External connectivity is also crucial for the viability of the County and Group Broadband Schemes. The feasibility of using other state owned assets such as Aurora and RTE to provide a complete end to end service nationally needs to be explored to ensure that the state investment in the MANs and other infrastructure is fully exploited.

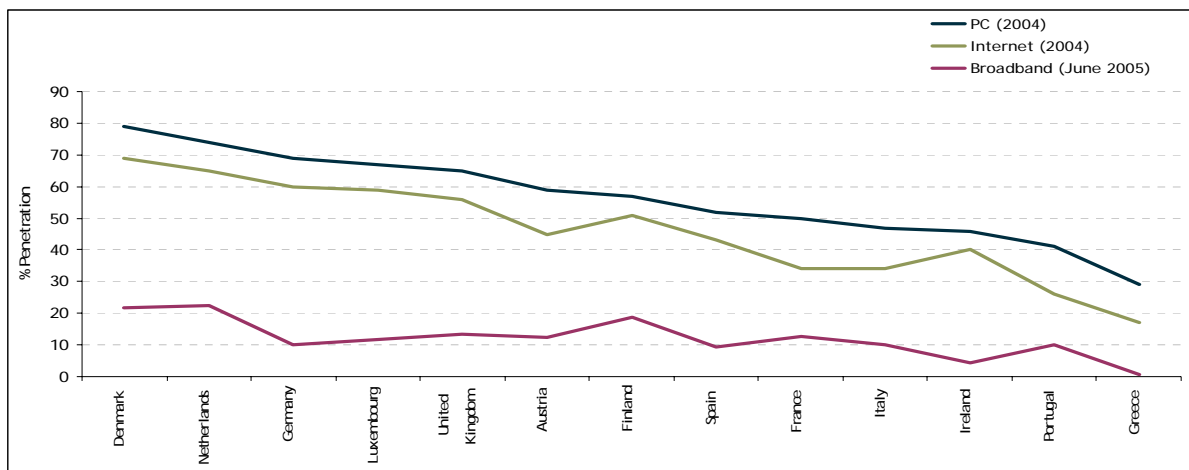
While the MANs have been successful in providing innovative and higher speed broadband services to business parks and large corporate customers, the scale of the networks is modest in the cities and towns served in terms of their coverage. In order to be a viable alternative for broadband access for SMEs and residential users, the reach of the networks must be significantly expanded. One option would be to use wireless solutions, such as Wi-Max.

5.3 High PC penetration/ICT Literate Societies

Many of the top broadband performers in Europe also tend to be the more ICT literate societies as illustrated by the positive relationship between broadband take-up and PC penetration in Figure 12.

However, the direction of the causality is not clear. As well as high PC penetration being a driver for broadband take-up, strong broadband penetration can also drive PC ownership. The PC penetration rate in Ireland is among the lowest in the EU-15 (Figure 12).

Figure 12: Relationship between PC penetration and Broadband Take-up



Source: ComReg, Eurostat

5.4 Integrating Technology into Education

Education is regarded as a key driver of broadband take-up. Korea has been pursuing policies to integrate the use of ICT in its education systems since 1997. The first stage of the policy involved developing the ICT literacy of teachers and students as well as the wider population. The second phase saw the emphasis shift from literacy to utilisation, not as a special subject or a technical education, but as something to be integrated with all subjects. During the implementation of the plan, several needs were identified - training, development of integrated ICT-based curriculum,

good quality educational content and utilisation plans. This led to the revised Classroom Advancement Plan being enacted at the end of 1999. The success of Korea's integrated education and technology strategy is seen as one of the primary contributory factors to Korea's position at the top of the league table.

Other countries, such as the US and the UK have also been looking at how emerging technologies can contribute to the quality of education and training and the move to a knowledge-based society. The US in its policy document on the subject, *Transforming Education & Training through Advanced Technologies*, maintains that fundamental rather than incremental reforms are required³¹.

In Ireland, the Broadband for Schools programme was launched in 2004 to provide broadband connectivity to all of the 4,100 primary and secondary schools in Ireland by the end of 2005^{32 33}. However, providing the broadband access is only part of the solution - ICT should not be viewed as something to supplement conventional classroom approaches. It needs to be an integral part of it. Key to achieving this is ongoing training for teachers. While the Teaching Skills Initiative does provide some training, ongoing professional development of all teachers is lacking³⁴.

5.5 Demand-Side Stimulation Policies

A number of countries have managed to drive take-up through demand-side initiatives. The Korean government has provided tax breaks to stimulate broadband demand in rural areas, rolled out e-Government, used the public sector as an early adopter, promoted internet adoption in schools and set up public broadband kiosks. The most significant initiative undertaken by the Korean Government was the "10 Million People Internet Education" project, the objective of which was to provide education services to 10 million people through online literacy programmes.

In the EU, several Member States have supported demand-side initiatives. The Danish government supported a programme which provided expertise to SMEs to help them realise the benefits of ICT. In 1997, the Swedish government put in place subsidies for purchasing PCs and subsequently achieved one of the highest PC penetration rates in the world. The UK broadband aggregation project allocated £1 billion to increase broadband connectivity in the public sector, making varying levels of bandwidth available to hospitals, schools and GP practices.

Interviews with industry and government stakeholders in the course of this study identified a lack of awareness among both residential users and SMEs of the benefits of broadband as the single biggest barrier to broadband take-up in Ireland. This is compounded by the lack of compelling content offerings, such as advanced e-banking services and IPTV (TV over the Internet) to incentivise Irish customers to subscribe to broadband services

³¹ <http://www.visions2020.gov/reports/TechPolicy/2020Visions.pdf>

³² The telecommunications industry committed €15 million of the final €18 million needed to fund the programme.

³³ The completion date is now likely to be spring 2006.

³⁴ Includes general introductory ICT courses, ICT in Teaching and Learning courses as well as some subject specific courses and technical courses.

Ireland also needs to take a longer term view to ensure that it does not continue to lag its competitors when the next wave of technological advances arrives. The Information Society Commission was central to provide initiatives in this regard. A new opportunity for strategic thinking is provided by the European Commission's i2010 strategy which aims to build a fully inclusive information society, based on the widespread use of information and communication technologies (ICT) in public services, SMEs and households. Member States are required to put National Information Society Priorities in place to give effect to the objectives of i2010.

The telecoms market is entering a period of significant change - new technologies are emerging at an increasingly rapid pace. The emergence of Next Generation Networks is changing how services are delivered to consumers and how operators interact with one another. New mobile and convergent wireless or 'portable' services are developing that can bring together several once separate sections of the industry. Other forms of convergence between different technologies, services, devices, companies, markets and regulations are also likely in the second half of this decade. Ireland needs to be ready to embrace and exploit such developments.

6. Moving Forward

Broadband is of major strategic importance in accelerating the contribution of ICT to economic growth in all sectors, enhancing social and cultural development and facilitating innovation. In light of this, Ireland's continued poor broadband performance will have serious implications for our future economic success and competitiveness.

Improving Ireland's competitiveness in terms of broadband availability, take-up, quality and choice is central to our ability to fully exploit ICT to increase productivity and deliver competitive advantage. Effecting the change needed to improve Ireland's broadband performance requires the engagement of all stakeholders from government to the telecommunications industry to the enterprise base.

To provide a platform for the renewed focus required to improve Ireland's broadband performance, Forfás is engaging in further consultation with stakeholders and invites written submissions to inform its deliberations on the key issues highlighted for attention by the benchmarking analysis. These include:

Increasing broadband availability:

National DSL coverage based on the population covered in Ireland, at 72%, is the second lowest of the EU-15 while only 38% of rural areas have DSL broadband coverage. The awarding of FWA licences and the County and Group Broadband Schemes are providing broadband solutions in some areas not served by DSL but gaps remain.

Given Ireland's spatial patterns, what is the most effective way(s) to accelerate the rollout of broadband services to all?

Increasing competition in the market place

Competition both between platforms (DSL and cable) and within the DSL market has been identified as one of the primary drivers of broadband take-up in other markets. In spite of the growth in the number of players in the Irish broadband market and the significant increase in cable and FWA broadband subscribers in the last year, competition in the Irish broadband market is limited.

How can Ireland accelerate the effective implementation of local loop unbundling to provide competition in the DSL market?

How can Ireland optimise infrastructure in state ownership to increase availability and choice of broadband services?

Creating awareness to increase demand

A lack of awareness among both residential users and SMEs of the benefits of broadband is regarded as the single biggest barrier to broadband take-up in Ireland.

How can Ireland best use experiences/initiatives in leading countries to create awareness and drive demand?

Are there local initiatives that have been successful in some regions in Ireland that can be used as a template for other parts of the country?

Submissions should be sent (preferably by e-mail) by Friday, 3rd February 2006 to:

Shane Quinlan
Forfás
Wilton Park House
Wilton Place
Dublin 2

e-mail: shane.quinlan@forfas.ie

Please note that submissions may be posted on the Forfás website, unless requested otherwise.

If you are making a submission, please indicate if there is any part of it that you would prefer not to be made public and why. However, Forfás cannot guarantee that any information provided will not be released pursuant to our obligations under law, including the Freedom of Information Acts 1997 and 2003.

Appendix 1

Glossary of Terms Used

- Always-on - Telecoms services (particularly Internet access) which is always available, negating the need to dial up
- Backbone - On the Internet or other wide area network, a backbone is a set of paths that local or regional networks connect to for long-distance interconnection
- Backhaul - routing telecoms traffic indirectly to the intended destination for the purpose of taking advantage of tariffs or prices that are lower than those afforded by direct routing
- Bandwidth - The width of a communications channel, typically measured in kbit/s (in digital systems). This measure gives an indication of how fast data flows on a given transmission path
- Bit-stream - a wholesale product whereby the incumbent installs a high speed access link to the customer premises and then makes this access link available to third parties to provide high speed services to customers.
- Broadband - A high speed connection which allows communications at speeds higher than can be achieved through basic rate ISDN (144kbit/s)
- Digital - The use of a binary code (ones and zeros) to represent information
- Download/Upload speeds - are related terms used to describe the speed of transfer of electronic data between two computers or similar devices.
- DSL (Digital Subscriber Line) - A family of similar technologies which allow ordinary telephone lines to be used for high speed broadband communications. The family includes ADSL, HDSL, VDSL etc.
- Fibre/fibre-optic - Strands of very pure glass that can carry far more information than copper wires over far greater distances
- FWA (Fixed Wireless Access) - is the use of a wireless communications link as the "last mile" connection for delivering telephony services to telecoms customers
- FWA Local Area licences - Licences permitting use of FWA on a local area network (LAN)
- Incumbent - The monopoly telecoms operator that existed in most countries prior to telecoms liberalisation. The incumbent is usually policed by a telecoms regulator to ensure that competing operators get fair access to its network
- Interconnection - The point at which one network hands over traffic to another network. The price and terms and conditions that apply to the handover are also referred to as interconnection
- Internet - The world's largest computer network, available to anybody with a PC, a modem, a telephone line and an access provider. It supports the reading of text, graphic and video files and email exchange
- IPTV (Internet Protocol Television) - a system where digital television service is delivered to consumers using the Internet Protocol over a broadband connection
- Leased lines - A leased line is a telephone line that has been leased for private use. Typically, large companies rent leased lines from the telephone message carriers (such as AT&T) to interconnect different geographic locations in their company

- Local exchange - The telephone company exchange where subscriber lines are terminated
- Local loop - The copper wires an incumbent has between its exchanges and its customers
- LLU - Local Loop Unbundling - Mechanism whereby service providers use the incumbent network to install their own broadband equipment for providing services
- Mbit/s (Megabits per second) - A measure of how many bits can travel between two points in a second in millions of bits
- Next Generation Networks (NGN) - a packet-based network which can provide a range of services independent of the network infrastructure, and can interconnect with multiple different types of networks (although typically with a common IP layer), offering greater flexibility and efficiency for operators and end-users alike.
- Regulation - The process by which a government agency ensures that a complicated market like telecoms behaves as if it were a competitive market while one player, the incumbent, has an extremely powerful position in that market
- Reseller - Service providers that re-sell the incumbent's wholesale product
- Symmetric - A connection with the same bandwidth in both directions
- VOIP (Voice Over Internet Protocol) - the routing of voice conversations over the Internet or any other IP-based network
- Wi-Fi - is a trademark for sets of product compatibility standards for wireless local area networks, intended to allow mobile devices, to connect to local area networks and is often used for internet access and wireless phones
- Wi-Max (Worldwide Interoperability for Microwave Access) - a certification mark for products capable of forming wireless connections between them to permit the carrying of internet data
- Wireless access - Access via a system that operates locally without wires