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**COMMUNICATION FROM THE COMMISSION
TO THE COUNCIL, THE EUROPEAN PARLIAMENT,
THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE
AND THE COMMITTEE OF THE REGIONS**

Connecting Europe at High Speed: National Broadband Strategies

{SEC(2004) 599}

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1. **INTRODUCTION**

Broadband plays a major role in modernising economies and societies.[1] As an enabling technology, it is at the core of the diffusion of the information society and of the development of information and communication technologies (ICTs). These technologies in turn are key drivers of productivity and growth.[2]

Broadband enables the delivery of new advanced content. It promotes the development of new services and improved delivery of those that already exist. It allows the re-organisation of working and production processes. All of these developments bring significant benefits to businesses, administrations and consumers.

The benefits of broadband are widely recognised. All Member States of the Union are already exploiting these benefits as they experience significant increases in deployment and take-up. This development, which is largely market driven, is highly encouraging. There are nevertheless obstacles to more rapid progress.

Some of these obstacles were highlighted in the *e*Europe 2005 Action Plan[3]. *e*Europe 2005 aims at the development and use of advanced services running on a secure broadband infrastructure. It sets widespread availability and use of broadband as one main objective to be attained by the end of 2005.

The achievement of that objective is stimulated by public policies that encourage investment in broadband infrastructure, applications and services. Indeed all EU-15 Member States have now drawn up National Broadband Strategies which propose a series of initiatives to deal with these obstacles and to accelerate the deployment and take-up of broadband.[4] Many of the new Member States are also working on national strategies. Some have already completed them.

These strategies contain a wide array of initiatives both on the supply-side (infrastructure deployment) and on the demand-side (increased usage) of the market. Two key areas of focus include increasing deployment in under-served areas, with public support foreseen in areas where market forces do not deliver the necessary investment, and aggregating demand from public administrations. This is in line with the invitation to Member States from the Telecom Council of March 2004 *"to prepare and implement national broadband strategies, with a view to, inter alia, connecting all public administrations to broadband by 2005 and proposing, where appropriate, digital-divide quick-start projects, using, where appropriate, existing financial instruments such as structural funds, so as to increase broadband coverage of under-served areas"*. It also conforms to the priorities highlighted by the Growth Initiative[5] endorsed by Heads of State and Government in December 2003.

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[1]   'Broadband' refers to high-speed 'always-on' connections to the Internet that support the delivery of innovative content and services. Compared to traditional narrowband connections, broadband access is immediate and large volumes of data can be almost instantly transmitted, reducing waiting time and improving efficiency for users.

[2]   Communication *"Connecting Europe at High Speed: Recent Developments in the Sector of Electronic Communications"*, COM(2004) 61.

[3]   COM(2002) 263.

[4]   Presidency Conclusions of the 2003 Spring European Council, par. 38.

[5]   COM(2003) 690.

The aim of this Communication is to provide an overview of broadband developments and of national broadband strategies drawn up by the EU-15 Member States following the commitment they made at the 2003 Spring European Council[6]. The present Communication therefore focuses on the situation in the EU15 and proposes to extend that commitment to the new Member States.

The overview is developed in three parts. The first part (Section 2) looks at technological developments, the nature of broadband benefits and the role of content, services and applications. The second (Section 3) provides an overview of the national broadband strategies, identifying the main supply and demand-side initiatives. A summary of the strategies can be found in the Staff Working Paper[7] accompanying this Communication. The third part (Section 4) analyses the growth of broadband in the European Union and links it to the role of competition within an appropriate regulatory environment. Section 5 provides overall EU-level policy.

2. BROADBAND PERSPECTIVES

Compared to traditional narrowband connections, broadband changes the overall presentation of the Internet, moving from slow and often user-unfriendly text format, to a fast, colourful system combining video, animations and sound. Connections are immediate and large volumes of data, notably video/graphical content, can be almost instantly transmitted.

2.1 What is broadband?

The term 'broadband' is commonly used to describe Internet connections that are 'always on' and that provide a speed which is significantly faster than dial-up connections, supporting the delivery of innovative content, applications and services. Most current definitions[8] link broadband to its transmission capacity. However, as speed evolves with the development of bandwidth demanding applications, the definition may quickly become obsolete.

For the purpose of this report, broadband will refer to a wide range of technologies that have been developed to support the delivery of innovative interactive services, equipped with an always-on functionality, providing broad bandwidth capacity that evolves over time, and allowing the simultaneous use of both voice and data services.

Broadband is already available in national and international backbone networks through fibre optic links with very large capacity. However, infrastructure needs to be enhanced to bring high-speed services to residential users and small/medium businesses by upgrading or building infrastructure to each premise. The 'broadband bottleneck' commonly refers to the last-mile connection to the final user.

There are a variety of technology options with different characteristics that may be used for this purpose, exemplifying the convergent nature of broadband communications. A short

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[6]   Full broadband data for new Member States will only become available at a later date.
[7]   Commission Staff Working Paper – Annex to "Connecting Europe at High Speed: National Broadband Strategies", SEC(2004) 599.
[8]   Definitions of broadband vary widely. According to ITU Recommendation I.113, broadband means transmission capacity that is faster than primary rate ISDN. The FCC considers broadband to mean speeds in excess of 200 kb/s, and the OECD a service with downstream capacity of at least 256 kb/s.

description of available technologies can be found in Annex 1 of the Staff Working Paper complementing this report.

Currently, broadband access is mostly offered via legacy infrastructure, such as the telephone copper network using DSL[9] technology and cable TV networks using cable modems. Developments in DSL and cable modem deployment are rapid, as they result from the upgrading of existing networks. Broadband access can also be offered over new infrastructure, both fixed and wireless. The advantage of new platforms is that they offer almost unlimited bandwidth (fibre optic), flexibility (WLAN[10]), coverage (satellite), and access on the move (3G[11] and beyond). Wireless technologies, which require radio spectrum to operate, are increasingly emerging as attractive alternatives for the coverage of rural and remote areas, where the upgrading of existing infrastructure can be particularly costly.

DSL and cable modems are expected to remain the dominant platforms in the short to medium term, as new infrastructure requires a longer period for deployment. Access networks are likely to converge to similar architectures, with fibre coming increasingly close to the premises, and high-speed cable, DSL, wireless links, or fibre itself connecting the final user.

In the future, various technologies are expected to coexist. They will both compete with one another (facility-based competition) and complete each other, resulting in hybrid technological solutions expected to facilitate widespread coverage.

2.2 Benefits of broadband

Member States have designed national broadband strategies to accelerate coverage and stimulate take-up because of the substantial benefits broadband can offer. Broadband opens the way to the creation of new markets through the development of increasingly interactive applications and new high-quality services. Beyond the emergence of new multimedia applications, a wide range of services is expected to grow in parallel with the take-up of broadband, delivering new economic and social benefits.

Broadband is an enabling technology. Its benefits are realised through the delivery of advanced applications and services expected to bring about productivity gains both for businesses and public administrations. *e-commerce* and *e-business*, for example, become more convenient. They allow business deals to be concluded fast and reshape the supply chain. *Distance education* and *learning* are stimulated through real-time services, resulting in the upgrade of skills, improved human capital and life-long learning. In *healthcare*, high-speed Internet access allows diagnosis and patient treatment to be carried out independently of geographical location. In the context of *e-government,* broadband facilitates the on-line supply of existing and new public services. It improves the efficiency of public administrations and facilitates contacts between citizens and government. Finally, *teleworking* and *videoconferencing* have become real and practical options. Benefits of broadband play a crucial role in promoting progress towards an inclusive knowledge-based economy and ensure growth through improved competitiveness.

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[9]   Digital Subscriber Line.
[10]   Wireless Local Area Networks.
[11]   Third Generation Mobile Communications.

2.3 The role of content, services and applications

The value-added of broadband depends on the applications it enables, the content it makes accessible, and the way it is effectively used. Like all networks, however, broadband is characterised by the 'chicken-and-egg' problem. On the one hand, demand for broadband will lag as long as innovative applications, services and content are not developed. On the other hand, there will be no real push for new applications, services and content as long as the supporting infrastructure is not sufficiently deployed. The complementary role of infrastructure and content development was highlighted in *e*Europe 2005 and is reflected by the policy mix proposed by national broadband strategies. In this context, several important issues remain to be addressed.

The first relates to the fact that, while the increased availability of online music, films, and other multimedia content improves the attractiveness of broadband, it also worries content producers as peer-to-peer technologies can facilitate the violation of copyright laws. There is a broad consensus that technologies to manage digital rights (DRM) help to establish the right incentives for all stakeholders, including a secure environment for ensuring remuneration of right-holders, payment for online content, prevention of illegal copying, and preservation of consumers rights and privacy. DRM technologies are key to the development of new business models that minimise risks and costs faced by content providers when bringing content online.

Two other issues are security and interoperability. The 'always-on' feature of broadband increases the vulnerability of networks and of the information transmitted on them. Fully interactive applications, including in the field of public services, require an adequate level of confidence in areas such as identity management or e-payment.

The convergent nature of broadband technologies reinforces issues of interoperability. Users may want to access the same digital services and content in a variety of situations and locations, using different devises (e.g. PCs, 3G or digital television) and network connections. Interoperability therefore concerns various layers (networks, devices and services). Interoperable solutions at all levels would facilitate the development of innovative content and services that can be delivered on all platforms. They would also enhance further deployment of broadband services and stimulate increased usage. These issues are addressed in the framework of *e*Europe 2005 and its current update following the mid-term review of the Action Plan[12].

3. MAIN ELEMENTS OF NATIONAL BROADBAND STRATEGIES

Following the commitment made at the 2003 Spring European Council, all EU-15 Member States have designed coherent plans indicating objectives and relating roadmaps. All strategies recognise the primary role of the market for broadband deployment. They also recognise the role of public policy in complementing the effective functioning of the market, addressing both the supply and the demand side to stimulate a virtuous circle whereby development of better content and services depends on infrastructure deployment and vice-versa. Within this framework, the main initiatives considered by the strategies concern the need to increase broadband deployment in under-served areas and to stimulate demand

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[12] *eEurope 2005 Action Plan: An Update, COM(2004) 380.*

through financial incentives, aggregation of public demand, and increased usage by administrations, schools, health centres and SMEs. Devising and implementing effective policy instruments to correct market failures or complement the action of market forces is a complex task. This report does not aim to carry out an assessment of the appropriateness of these initiatives. Rather, it aims to provide an overview of key characteristics of these initiatives, describing the debate underlying the various issues and highlighting some examples. National strategies are summarised in Annex 2 of the accompanying Staff Working Paper.

3.1   Supply-side initiatives

Supply-side initiatives directly impact infrastructure deployment. In this context, all Member States highlight the importance of a competitive environment enhanced by convergence of alternative platforms and by the implementation of the new regulatory framework for electronic communications.

Competition and faster deployment or upgrading of infrastructure are mainly taking place in densely populated areas. Less populated areas are characterised by the presence of one single service provider, and some of the more remote and rural areas are currently excluded from broadband deployment. Consequently, most strategies pay particular attention to the need for increased coverage in areas where market forces do not deliver the necessary investment.

3.1.1   Increasing coverage in under-served areas

The benefits of broadband highlighted in section 2.2 are particularly significant for remote and rural areas, as improved communication systems can address a variety of challenges posed by distance. Broadband allows people to communicate and share information regardless of their physical location. Improved interactivity enables citizens located in those areas to participate more actively in the social and democratic life. Broadband improves their living standards by bridging distance, facilitating healthcare, education and access to public services.

However, growth in broadband connections is mainly taking place in urban areas (Figure 1). In a market-oriented environment, operators may not find it profitable to invest and upgrade or roll-out infrastructure in areas where expected demand is insufficient to ensure a positive return on investment. This may occur in scarcely populated areas or where the distance from the exchanges to the final user is too great. Public funding in under-served areas is frequently considered necessary to provide incentives and stimulate investment.

Figure 1 - DSL and cable modem coverage in the EU 15
December 2003
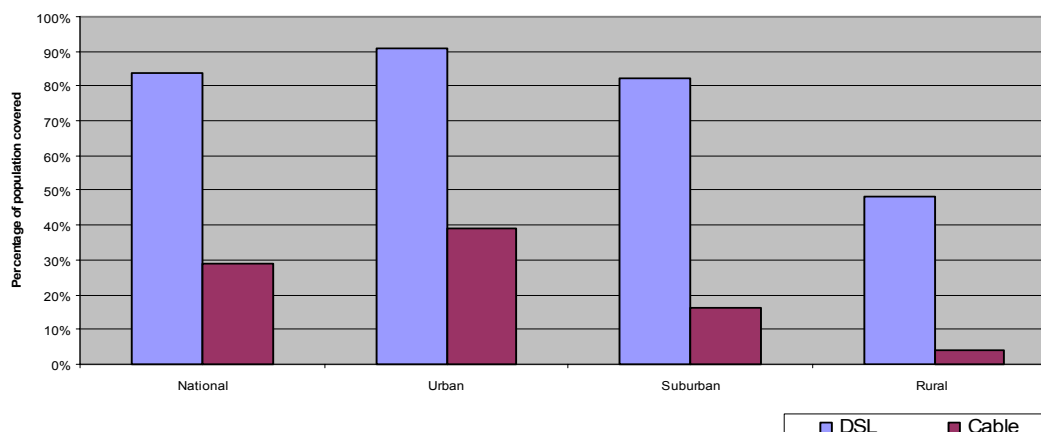
Source: IDATE

NOTE: Calculations are based on the following definitions
Urban areas: areas with population density > 500 inhabitants/Km²
Suburban areas: areas with population density between 100 and 500 inhabitants/Km²
Rural: areas with population density < 100 inhabitants/Km²

Coverage: percentage of population in each area depending on switches equipped for DSL (include those living too far away from the switch to be reached) and/or living in houses passed by an upgraded cable.

The scope for public intervention in under-served areas was emphasised in *e*Europe 2005 and reiterated by the European Initiative for Growth in December 2003. The initiative announces 'Digital-Divide Quick-Start projects' to accelerate broadband deployment in under-served areas through a technology-neutral approach. Structural Funds and funding from the European Investment Bank can be used for this purpose on the basis of the "Guidelines on criteria and modalities of use of Structural Funds for electronic communications"[13], published by the Commission in July 2003. The guidelines are based on competition rules and on the new regulatory framework to ensure that public support does not distort competition. In this respect, in the absence of market incentives to invest, public funding of open access infrastructure, defined according to technological neutrality and managed by an independent entity, appears to be the solution most conducive to effective competition. The Commission has also set up a Digital Divide Forum to analyse broadband issues and will report on its work in September 2004, as announced in the White Paper on Space[14].

In developing public support in under-served areas, many Member States have undertaken a detailed mapping of infrastructure availability. The mapping may serve three purposes: (i) it identifies areas characterised by market failure; (ii) it allows a clear assessment of current needs; and (iii) it provides a baseline against which to assess progress in broadband deployment. Member States already disposing of detailed mappings are Denmark, Finland, France, Greece, Italy, and Sweden. The Spanish broadband strategy announces the launch of a

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[13] Available at http://europa.eu.int/comm/regional_policy/sources/docoffic/working/sf2000_en.htm.
[14] *White Paper: Space: A new European frontier for an expanding Union. An Action Plan for implementing the European Space policy,* COM(2003) 673. More details can be found in the Communication *eEurope 2005 Action Plan: An Update, COM(2004) 380.*

study to assess availability of infrastructure throughout the country as the first step of a detailed roadmap to increase coverage.

The definition of market failure and of under-served areas justifying public support varies across Member States. Some countries consider public intervention acceptable in areas where broadband infrastructure is not available. Others extend the concept to areas where only one provider is operating. In this view, public intervention aims at facilitating new entry and enhancing competition.

In many countries, municipalities have entered the wholesale broadband market by rolling out fibre optic networks. Municipal efforts have raised the concerns of commercial operators, but have often stimulated private investment in response to the competitive pressure[15]. By ensuring structural separation between wholesale and resale provision of services, municipal wholesale networks potentially stimulate competition in services. On the contrary, some countries believe that municipal wholesale networks may distort commercial incentives to invest and waste public resources, reaffirming the primary responsibility of the market to ensure broadband availability.

To facilitate broadband deployment in under-served areas, local initiatives are often accompanied by demand-aggregation policies, as described in the next section.

Italy is considering the opportunity of introducing supply-side financial incentives to facilitate deployment in remote and rural areas, on the basis of a classification of communities according to per-capita average income, population density and diffusion of ICT skills.

Finally, some strategies underline the importance of emerging technologies such as WLAN, satellite, powerline communications and 3G. Italy underlines the role 3G may play also by interconnecting to the terrestrial digital network and providing the return channel for interactive services.

The UK is experiencing the launch of services by relatively small wireless service providers that tend to focus on a limited number of rural communities. At the same time, incumbents such as France Telecom and Telekom Austria are conducting trials using WLAN to provide broadband in areas where DSL upgrades would not be profitable.

The Irish Metropolitan Area network: This initiative involves the construction of high-speed fibre-optic rings linking the key business districts in 19 towns and cities across the country in a partnership with local and regional government organisations. These Metropolitan Networks will provide broadband to businesses, schools, hospitals and private users on an open-access basis. More than € 64 million have been committed to the first phase of this programme in 2003-2004, with infrastructure expected to be operational in the second half of 2004. A neutral Management Service Entity will manage the networks. This initiative is further complemented by € 140 million of Exchequer Funding to be invested until 2007 to provide open access broadband infrastructure in all cities and towns with a population greater than 1,500 inhabitants, with a Group Broadband Scheme to facilitate smaller communities to pool their broadband demands and ensure connectivity from a range of providers.

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[15] In many countries, legislation allows the existence of municipality wholesale networks. The new regulatory framework would require that access to such networks is available at non-discriminatory conditions. In France, in 2003 the French Parliament went further and proposed a bill introducing the opportunity for local municipalities to operate networks when private alternatives are lacking.

Other examples include Sweden, where public support may concern different levels of the network hierarchy (national backbone, regional and local networks); France, which is planning the installation of optical networks on a regional or urban scale to enhance competition; Greece, proposing Public-Private Partnerships to build LANs in under-served areas; Finland, drawing up national guidelines for regional and local governments on the use of public funding.

In conclusion, most Member States support the deployment of broadband in remote and rural areas. However, the use of public funds may distort competition and affect future market developments, in particular when some level of private investment is already undertaken. The Guidelines on the use of Structural Funds in electronic communications provide general criteria to minimise these risks. They can therefore be applied to all funding initiatives.

3.2   Demand-side initiatives

Governments can play an important role in encouraging broadband deployment through policies that stimulate demand. These policies may consist of financial incentives, of improving government usage through e-government, e-health and e-learning activities and the development of innovative public services, educating children to the use of the new technologies, ensuring a secure environment, etc.

3.2.1   Financial Incentives

Financial incentives are used in Austria, Italy and Sweden and take the form of fiscal subsidies for broadband connections.

> **Italy:** The 2003 budget law foresaw a subsidy of € 75 for residential and business broadband access, with total funding of € 27 million. These funds have enabled more than 350,000 new connections. Because of the result, the 2004 budget law has earmarked another € 30 million.

The effectiveness of financial incentives in directly stimulating broadband take-up could be improved, taking into account that financial incentives may have a high deadweight effect unless they are targeted at those social groups that cannot afford the use of new technologies.

Italy considers that low PC penetration may be acting as a constraint on Internet use and has set up incentives to address this restraint too. Section 4.3 looks at PC penetration and Internet use more in detail.

3.2.2   Initiatives aiming at increasing usage in the public sector (e-government, e-health and e-learning)

All Member States support the development of on-line public services to improve the efficiency of the public sector. In turn, development of innovative services stimulates user demand facilitating infrastructure deployment. *e*Europe 2005 has highlighted the role of broadband-enabled services to stimulate use, although development of innovative services is primarily up to the market.

Most national strategies attribute particular importance to the area of e-government. Increasingly interactive services potentially improve the interaction between citizens and the public administration, facilitating the development of demand-led systems through more innovative and personalised public services. Broadband-enabled e-government may also

improve the efficiency of administrations by changing management patterns and improving organisational performance. All Member States are undertaking advanced e-government initiatives within the *e*Europe framework.

Broadband has also led to revolutionary developments in the medical field. It enables collaboration among different organisations and health professionals, and it provides the necessary infrastructure for bandwidth-intensive applications such as telemedicine (for example tele-consultations, telemonitoring, and telecare, either at home or in hospital). Telemedicine enables improved access to healthcare and better quality medical care to those who cannot visit a doctor, as well as early diagnoses and medical treatment. The French national strategy encourages the constitution of expert networks to stimulate sharing of medical dossiers. The German strategy sets targets for the development of patients' electronic medical records. In Belgium, the electronic identity card will soon be available for the medical practitioners and will give access to electronic health records.

In the area of education, distance learning is one of the better-known broadband applications. Students from any geographical location can take advantage of opportunities in all educational institutions, following courses that are flexible to their individual needs, interacting with professors in real-time and participating in group projects with participants located in different areas. In Denmark, the electronic network Sektornet provides broadband access to the Internet and a number of services such as training, technical support, videoconferencing, etc. for primary and secondary schools.

> **Portugal, the e-U initiative:** Every University in Portugal will be able to offer their students online services and information with fast Internet access everywhere on campus. The e-U Initiative is a national programme, developed under a public-private partnership model, covering 57 university institutions and includes: the installation of Wi-Fi systems in all campuses thanks to the deployment of Wi-Fi access, with roaming; wireless laptops at special prices (with the help of five major Portuguese banks, fourteen laptop suppliers, nine broadband ISPs and other hardware and software companies); online university services; development and supply of scientific and educational contents online; training of university academic and administrative staff; financial support to low-income students; laptop awards to the best students. A national advertising campaign, including TV, was launched to promote the initiative and the brand e-U. This project benefits from financial support from the European Union and is linked to the *Online Scientific Library Project,* which places more than 3,500 international scientific journals online.

3.2.3 Initiatives aiming at connecting public administrations, schools, hospitals and health centres (demand aggregation)

To realise the benefits of broadband-enabled services, public administrations, schools and health centres need to be connected. The aggregation of public-sector demand increases certainty of expected revenues facilitating investment. It is particularly important in under-served areas accompanying supply-side initiatives to foster deployment. If collective demand within a community is not sufficient, municipalities often create networks and consolidate aggregation across several communities.

Many national strategies include demand aggregation initiatives, although strategies do not always describe the steps needed for implementation. Connectivity of schools, hospitals and public administrations varies across countries, with the Nordic countries featuring broadband connections for more than 90% of institutions. e-procurement is often mentioned as a key demand-aggregation tool, fostering connectivity for all public administrations. One well

specified initiative is the Greek Syzefxis project, which earmarks € 71.5 million to provide broadband to all public buildings on the basis of demand aggregation.

Demand aggregation may occur at various government levels. Initiatives at the central level allow a better exploitation of economies of scale. However, if not carefully designed, they may create or reinforce dominant positions, for example by limiting the number of providers at the national level. The Netherlands in particular experimented with various demand bundling schemes and found that demand aggregation at national level within a sector has led to high prices. The Netherlands points to cross-sectoral demand bundling at the regional level as the most promising solution.
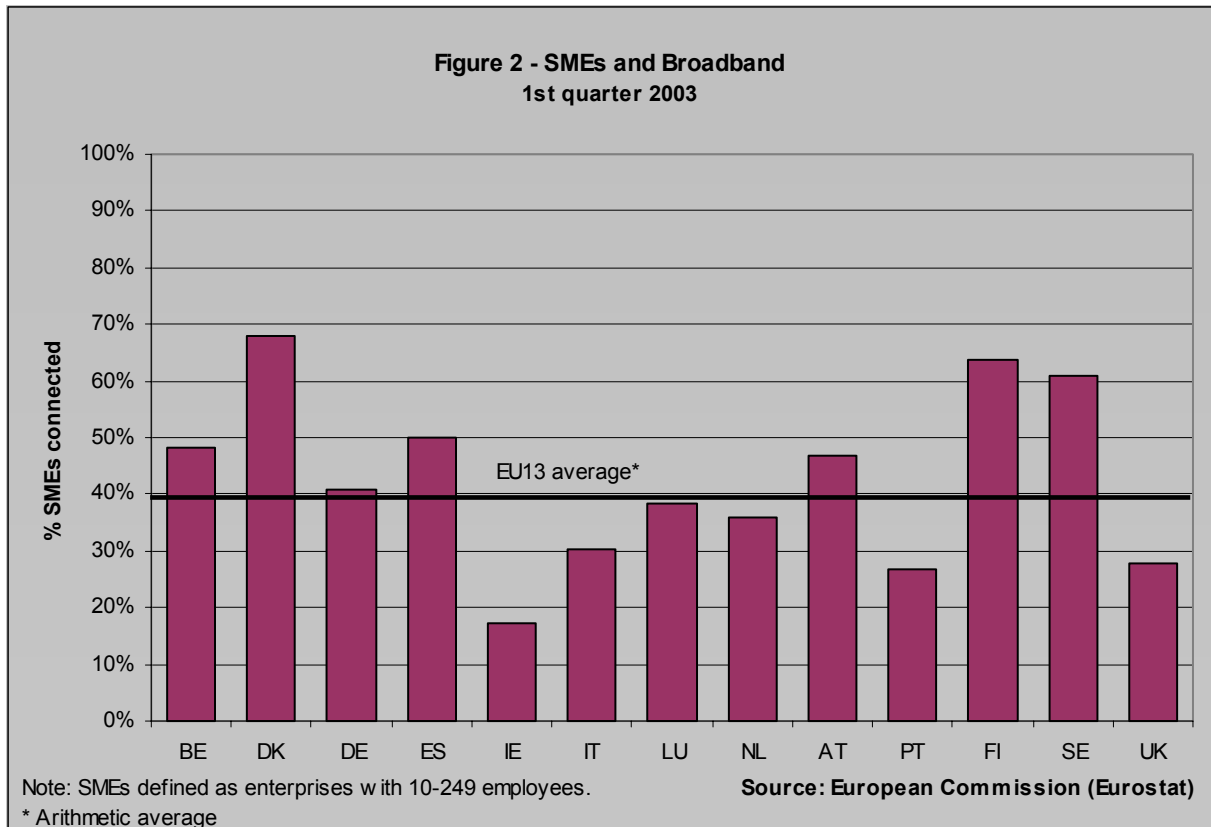
> **The UK Broadband Aggregation Project**: The UK national broadband strategy is articulated around demand aggregation. £ 1 billion has been allocated to increase broadband connectivity in the public sector until 2006, including plans to deliver 2Mbps and 8Mbps respectively to all primary and secondary schools; 256 kb/s to all GP practices and at least 2Mb/s to all hospitals and other Health Authorities; the Criminal Justice System will provide ICT infrastructure across the major criminal justice organisations. The Project will set up 9 Regional Aggregation bodies and a National Aggregation body to aggregate public sector demand and take it to the market. Demand aggregation occurs at the regional level, and Regional Development Agencies are key partners to the project.

3.2.4 *Initiatives aiming at connecting SMEs*

ICTs are strategic tools for businesses. The Communication "Connecting Europe at High Speed: Recent Developments in the Sector of Electronic Communications" highlighted the macroeconomic impact of ICTs on productivity and growth. It emphasised the need for businesses to complement investment in ICTs with changes in working processes and upgrading of skills.

Broadband has the potential to transform businesses and the way they work, enabling companies to become more productive and innovative. While most large companies are connected to broadband, SME connectivity is lagging behind (Figure 2)[16]. The slow take-up of broadband by European SMEs is often attributed to the shortage of appropriate applications and to the lack of awareness by SMEs of the potentials of ICTs for their performance. Broadband strategies illustrate initiatives that are undertaken within the framework of e-business. They aim at raising awareness and at stimulating demand. To encourage SMEs to take advantage of the broadband benefits, France highlights the importance of stimulating the creation of applications specifically targeted at SMEs. In this context, DRM systems and secure payments play an important role.

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[16]   More data on connectivity of SMEs can be found in the latest e-Business W@tch report to be found at http://www.ebusiness-watch.org/marketwatch/resources/E-Business-2003.pdf.

Figure 2 - SMEs and Broadband
1st quarter 2003

[Bar chart showing % SMEs connected by country. Y-axis: % SMEs connected, from 0% to 100% in 10% increments. X-axis countries: BE, DK, DE, ES, IE, IT, LU, NL, AT, PT, FI, SE, UK. A horizontal line labelled "EU13 average*" at approximately 40%.]

Approximate values:
BE: 48%, DK: 68%, DE: 41%, ES: 50%, IE: 17%, IT: 30%, LU: 38%, NL: 36%, AT: 47%, PT: 27%, FI: 64%, SE: 61%, UK: 28%

Note: SMEs defined as enterprises with 10-249 employees. **Source: European Commission (Eurostat)**
* Arithmetic average

Denmark: The Ministry of Science and Technology has launched an initiative to stimulate take-up of broadband by SMEs. The programme will provide SMEs with training and assistance through private consultants, helping them to overcome practical problems and increase competency related to starting out in eBusiness. Consultants, trade associations and regional business organisations will help 60 SMEs realise their first gains from eBusiness, e.g. establishing an electronic catalogue for eBusiness portals. The experience and good practice stemming from the 60 pilot projects will then be shared with other Danish SMEs.

3.3   Common elements of national broadband strategies

The analysis of broadband strategies reveals that proposed initiatives are based on similar principles, suggesting that broadband deployment in the EU is led by a common approach. These principles are:

- Recognition of the primary role of the market in the expansion of broadband.

- The role of public policy in complementing the effective functioning of the market, addressing both the supply and the demand side to stimulate the virtuous circle where development of better content and services depends on infrastructure deployment and vice-versa.

On the supply side:

- The importance of competition and convergence across alternative platforms, to be stimulated through the consistent implementation of the new regulatory framework for electronic communications.

- The role of public policy in extending coverage of under-served areas, with particular care not to distort competition, nor to inhibit private investment, and on the basis of a technology-neutral approach.

- The need for an assessment of broadband availability and take-up through a continued monitoring of the market.

- The importance of R&D for the development of next-generation broadband, cost reductions and innovative applications and services.

On the demand side:

- The relevance of demand-aggregation policies that improve certainty for investors and increase use by public administrations, educational and healthcare establishments.

- The importance of the development of broadband-enabled open and interoperable applications and services for businesses and administrations.

- The need of overcoming barriers to the development of new innovative content, progressing in areas such as IPR protection, DRM systems and m-payments.

- The role of security and trust to stimulate broadband use.

4. GROWTH OF BROADBAND

As reflected in the national strategies, Member States are strongly supportive of the objective of widespread broadband availability. This support has built up over the years and is the result of emerging policy efforts, including *e*Europe and the development of a pro-competitive regulatory environment. As a result, broadband markets have grown over the last two years and markets are becoming more competitive.

Moreover, the structure of the industry is being affected by convergence, as evidenced by the emergence of TV over ADSL and Voice over the Internet Protocol. The boundaries between telecom operators, equipment manufacturers, broadcasters and content producers have blurred, resulting in new forms of competition with the potential to deliver better services, lower prices and more choice.

4.1 Recent developments

Deployment and take-up of broadband are increasing at a fast pace in the European Union. At the end of 2003 there were 22.8 million connections, an increase of almost 100% over one year (Figure 3). All Member States are experiencing a rapid expansion of the broadband market, but disparities are still significant. The average EU penetration rate (defined as number of subscribers as a percentage of total population) increased from less than 3.4% at the end of 2002 to 6% at the end of 2003[17].

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[17] Effective usage is greater than this number, as one subscriber may correspond to multiple users.

Figure 3 - Broadband take-up in the EU 15
**January 2003 - January 2004**
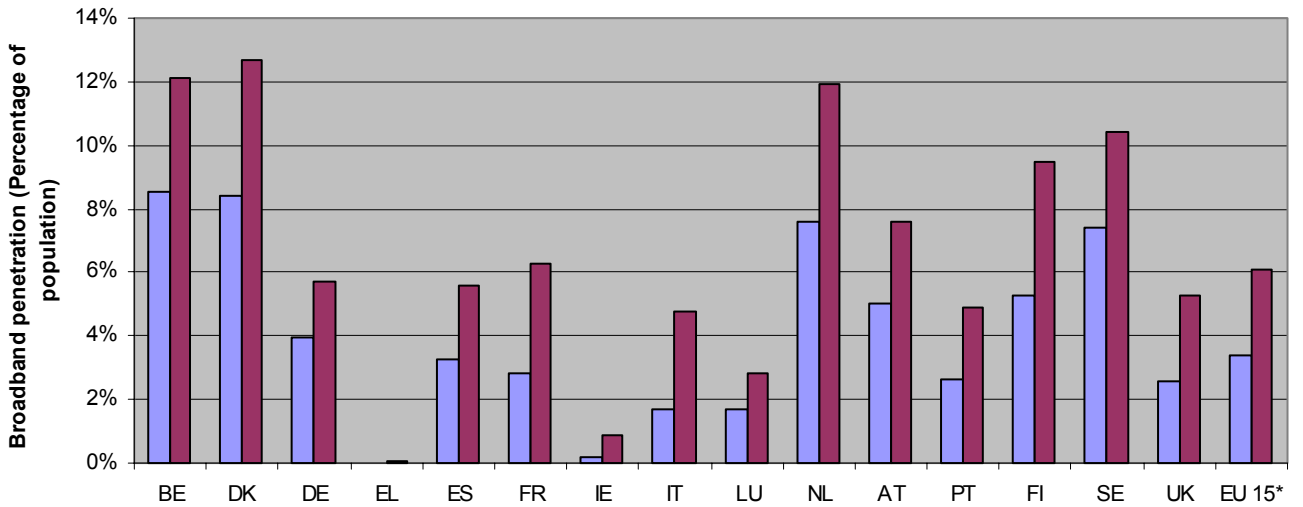
Note: Penetration rate: number of subscribers as a percentage of population

█ Jan. 03 █ Jan. 04

*Average of 15 Member States

Recent broadband developments are mainly driven by DSL technologies (Figure 4). This is particularly due to the wide reach of Public Switched Telephone Networks (PSTN). However historically, where available, cable networks were upgraded to broadband capabilities first. In January 2004, DSL represented 74% of total connections and cable reached 22%. Other technology platforms are still in the early stages with few subscribers but increasing their presence.

Figure 4 - Broadband take-up by technology in the EU 15
**July 2002 - January 2004**
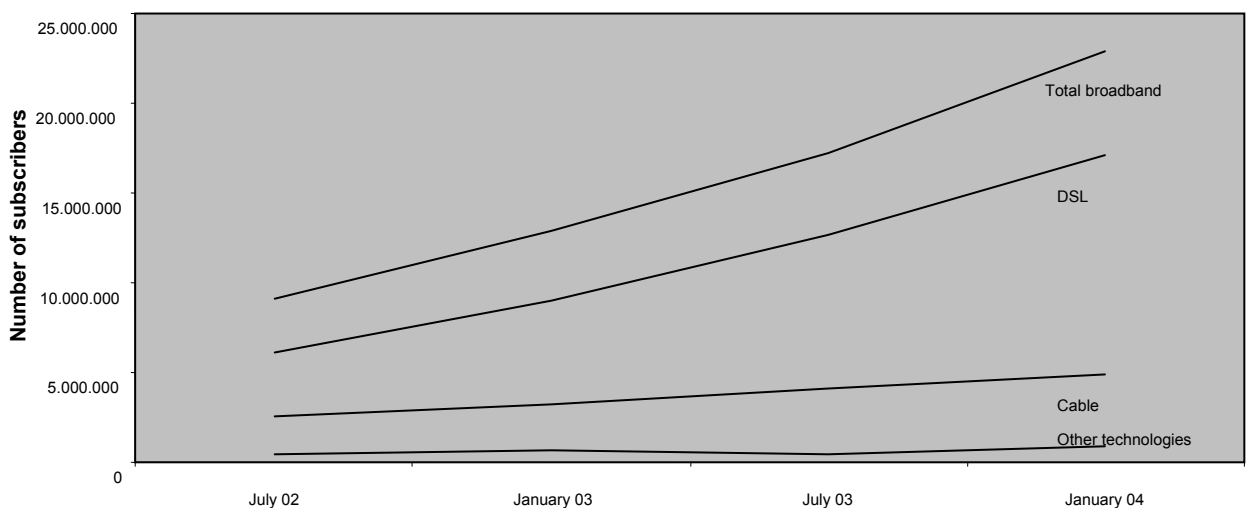
Source: Commission Services

## 4.2   An international comparison

The European Union as a whole was not a front runner in the development of broadband. More recent trends indicate, however, that the gap between the EU and its competitors is reducing.

Some Member States had an early start in broadband deployment and reach levels of penetration above 10% of the population. Five countries have higher penetration rates than the United States, but they still lag behind South Korea and Canada (Figure 5).

Figure 5 - A comparison with third countries
January 2004

Source: Commission Services and Point topic
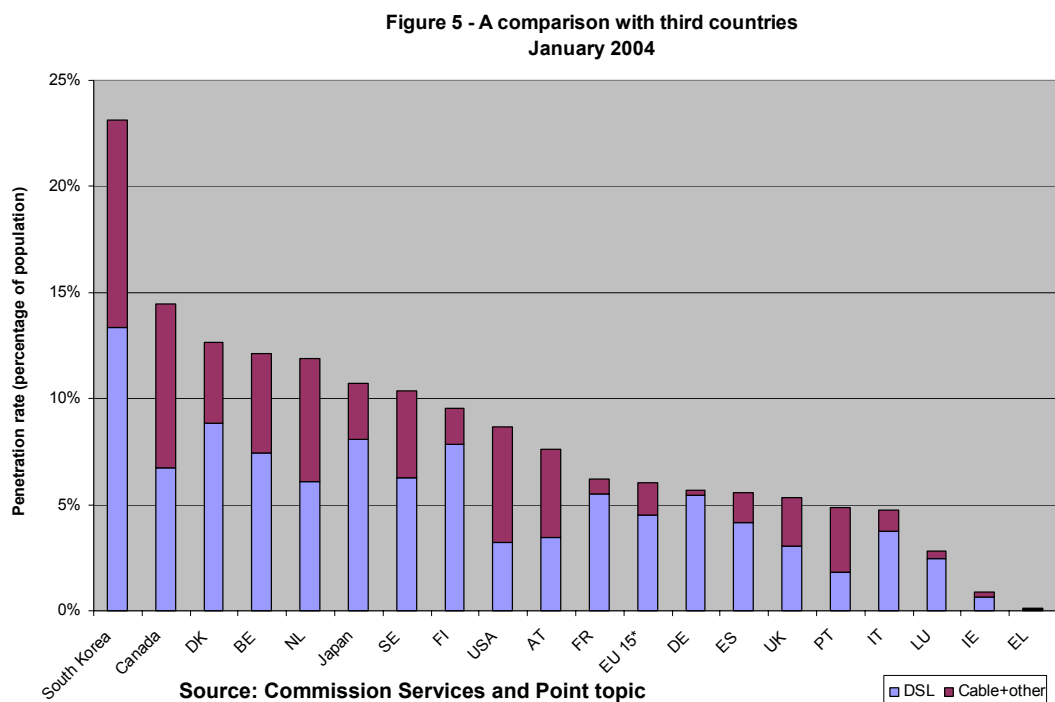
South Korea, with a penetration rate of 23%, has approached saturation (Figure 6). Some European Member States were amongst the fastest growing markets in the second half of 2003. This is the case of Denmark, the Netherlands and Finland, although they already started with relatively high penetration rates. France is witnessing strong growth in DSL connections, achieving a penetration rate above EU average. Data from Greece and Ireland also show significant growth, proof of a true take-off of the market.

Figure 6 - *Growth in broadband penetration rates
**July 2003 - January 2004**
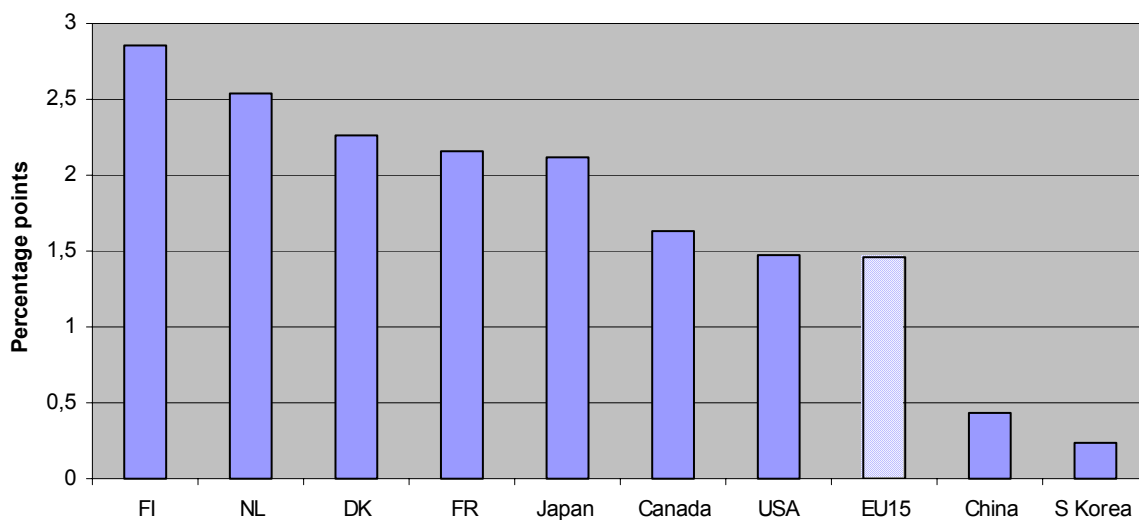
Source: Commission Services   * Difference in percentage points

4.3   PC penetration

Some countries consider the stimulation of PC penetration as an important element of broadband national strategies, to foster Internet use and broadband. However, the relation between the take-up of broadband and the penetration of PC and of the Internet at the aggregate level does not give strong evidence of a direct relationship between these variables. Provisional data coming from the latest *e*Europe 2005 benchmarking exercise (Figure 7) show that some of the countries with the highest penetration of PC and of the Internet like the UK have a relatively low broadband take-up. On the contrary others, like Portugal, feature low household take-up of PC and the Internet with a relatively high proportion of broadband connections.

Figure 7 - Connected Households
1st quarter 2003
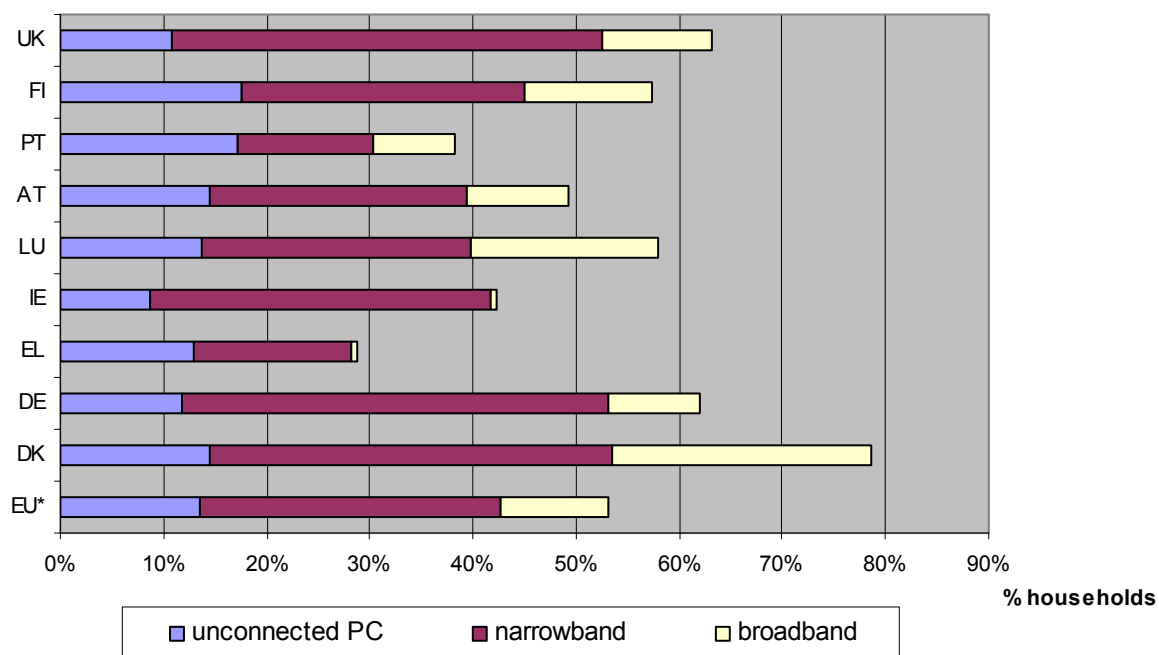
Source: Commission

* Arithmetic average of 9 Member States

4.4. The role of competition

Competitive broadband markets are prone to faster growth. Facility-based competition and open access provisions on incumbents' networks deliver benefits in terms of the price/performance ratio and increased diversity of choice for consumers. These principles have been embedded in the new regulatory framework for electronic communications. Recent developments corroborate these views. Competition on the broadband market is still weak in a number of Member States, but increasing.

4.4.1 Facility-based competition

The best performing countries in the Union and abroad are characterised by a significant degree of facility-based competition (Figure 8). Competition between alternative platforms improves customer choice and allows providers to control all aspects of their network, including costs and maintenance. In general, there is a positive relationship between facility-based competition and growth in penetration rates:

Figure 8 - Facility-based competition
January 2004
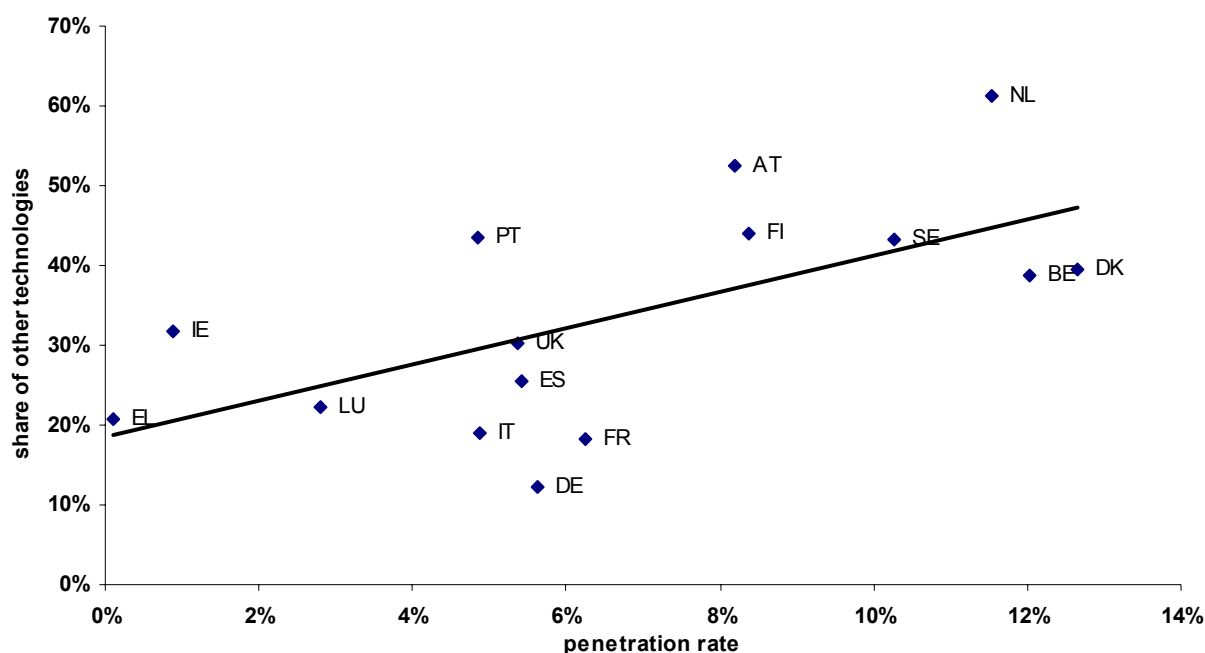
Source: Commission services

*Note: The chart considers the aggregate market share of cable modem, satellite, fibre optics and unbundled DSL lines as an indicator of facility-based competition. The other share, made by the incumbent's DSL, resale and bitstream access, does not provide the same service differentiation from the users' point of view.

Facility-based competition is not widespread in the Union. Cable coverage is relatively limited, especially in the large countries (with the exception of the UK). New platforms bringing fibre-to-the-home have been built in Sweden and Italy, although mainly in urban areas. Wireless technologies are expected to change the market in the medium term, but currently provide a viable alternative through local trials only.

4.4.2 *Access competition*

In the absence of strong facility-based competition, regulation designed to open local access bottlenecks to competitive forces has an important role to play for the delivery of innovative services. Local loop unbundling and shared access were mandated by Regulation 2887/2000[18]. The slow pace of local loop unbundling led regulators to focus on other types of wholesale products such as bitstream access[19]. In its Recommendation on Relevant Product and Service Markets[20], the Commission identified a relevant market for 'wholesale broadband access' covering bitstream access.

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[18]   Regulation (EC) No 2887/2000 of 18 December 2000, OJ L 336 p. 4 of 30.12.2000.
[19]   Bitstream access is a wholesale product that consists of the provision of transmission capacity in such a way as to allow new entrants to control the technical characteristics of the service to the final user and to offer their own value-added services.
[20]   Commission Recommendation 2003/311/CE of 11 February 2003, OJ L 114, 8.5.2003, p. 45.

The opening of the DSL market to competition is reflected in the recent trends. The average market share of the incumbents has reduced over time, reaching 73.7% of the DSL market in January 2004, down from more than 80% one year before. The shares of resale, bitstream access and local loop unbundling have increased (Figure 9).

Figure 9 - DSL market in the EU: evolution of market shares of incumbents and new entrants January 2003 - January 2004

Source: Commission Services

☐ DSL incumbent ☐ Bitstream ☐ ULL ☐ Resale
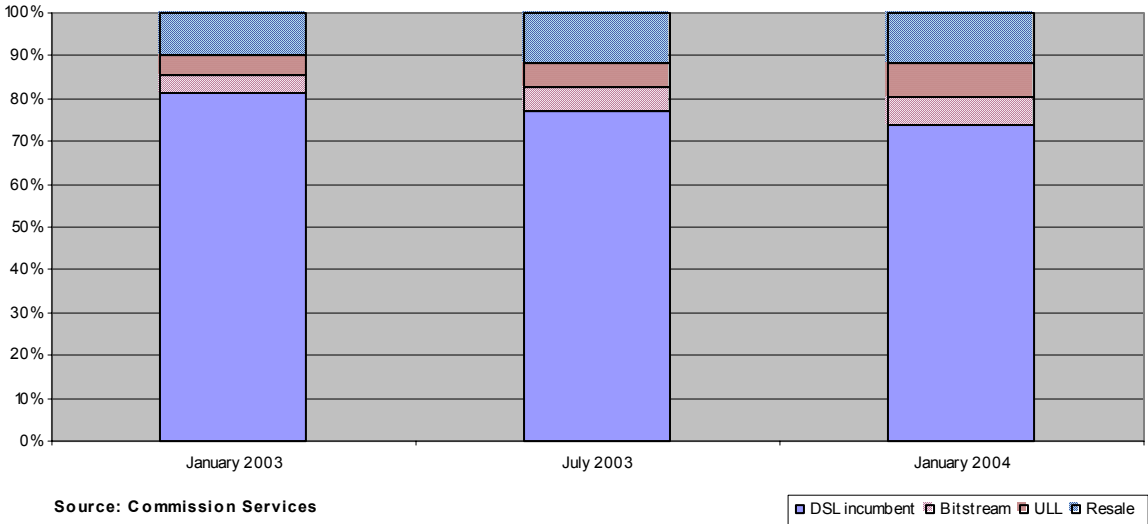
In the total broadband market, the incumbent's share in January 2004 is 57%, down from 60.6% one year earlier. In some countries (Germany and Luxembourg in particular) the incumbent still has a relatively high share. In Portugal, Denmark and Finland the incumbent also owns part of the cable network.

## 4.5   Price considerations

Stronger competition is ultimately reflected in the behaviour of retail prices. It is therefore useful to investigate the relationship between broadband take-up and prevailing retail prices. Prices vary across countries, and the comparison is made complicated by the different speeds offered and by variations in pricing structures[21]. Figure 10 shows prices charged by incumbents in the Member States for different speeds as of February 2004. Prices relate to monthly residential un-metered offers, and do not take into account the initial fixed cost of the modem. Prices are similar across countries at low speeds, while variations are more pronounced at higher performances. Tests on the correlation between broadband penetration (Figure 3) and prices (Figure 10) confirm that prices are significant determinants of broadband take-up at all performance levels, except for speeds above 2Mb/s. In this category, the availability of high-speed offers seems to be attractive in itself, independent of price.

In Belgium, residential customers have been offered relatively high speed services (3 or 4 Mb/s). In November 2003 the federal government called upon cable and telecom operators to market lower bandwidth services. Some operators have quickly reacted and nowadays it is

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[21]   In some countries offers may include a metered element relating to the usage of the service.

possible to purchase connections at lower speeds (250-512 kb/s) and reduced prices (20 euro per month) or with alternative metered pricing.

Figure 10 - Incumbents' prices for unmetered residential DSL February 2004

Monthly fee (euro per month)

☐ 144 >512 Kb/s   ■ >=512<1024 kb/s   ☐ >= 1024 kb/s   ☐ >=2MB/s
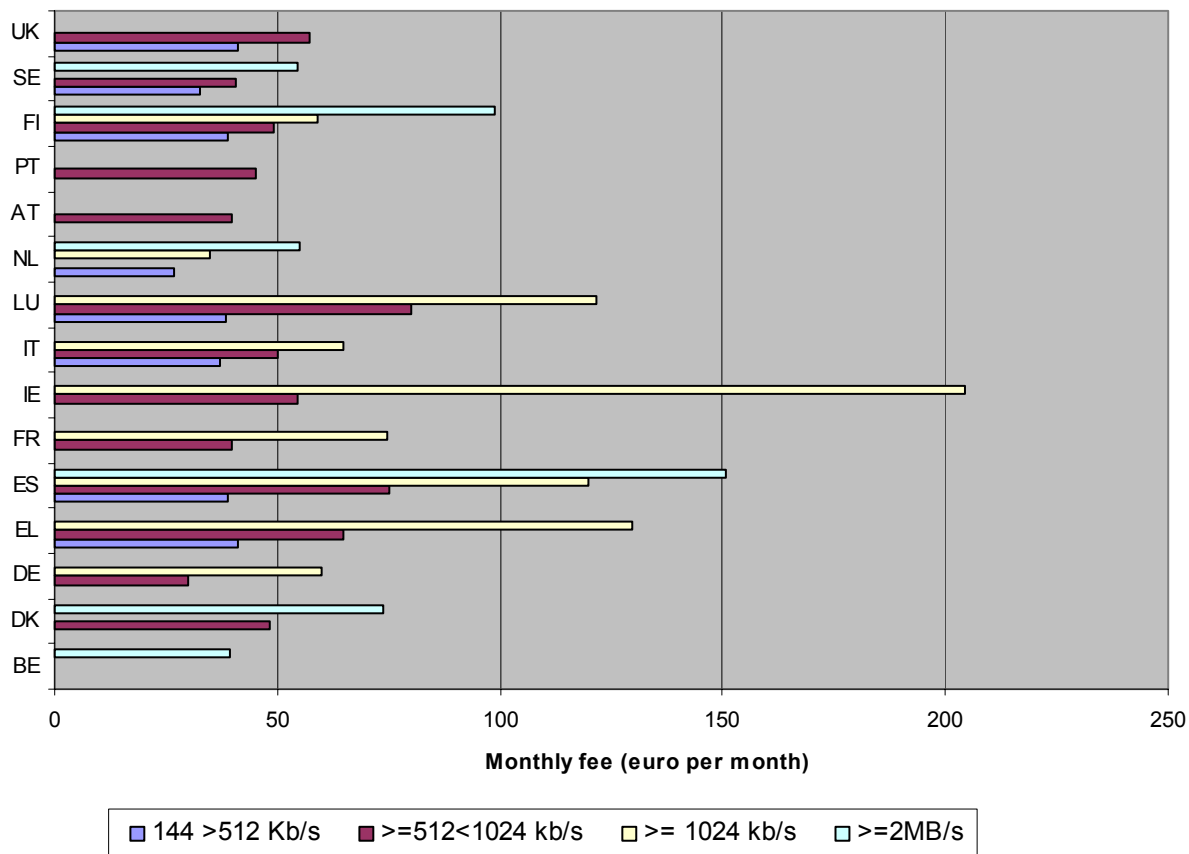
Source: Offers published on incumbents' Websites

Overall, competition is limited but there are good signs of improvement. The rapid growth in broadband take-up witnessed over the past two years is clearly linked both to facility-based competition and the increase in competition within the DSL market. High penetration rates are related to more attractive offers in terms of prices and speeds. This strengthens the importance of the quick transposition and consistent implementation of the new regulatory framework for electronic communications and of the work on remedies the Commission is carrying out with National Regulatory Authorities.

5. CONCLUSIONS

Broadband services potentially create new markets, increase workers' productivity, and add value to business performance, public efficiency and quality of life. Harnessing the broadband benefits is crucial to consolidate progress towards a knowledge-based economy and ensure growth through improved competitiveness. The successful deployment, take-up and use of

broadband are therefore of central importance to the future prosperity of the European economy and to its social cohesion.

Recognising the benefits of broadband, at the 2003 Spring European Summit Member States agreed to draw up national broadband strategies by the end of the year. The EU-15 Member States have now made available coherent plans indicating the objectives and roadmaps that have been reviewed in this Communication.

Availability of infrastructure varies across countries, as it is driven by geographical features, population density, technological developments, coverage of cable TV networks, level of competition, and other factors. As a result, strategies describe initiatives with varying emphasis according to the state of coverage, but all adopt a common approach.

Several Member States have signalled the need for national strategies to be adjusted and updated, taking into account new technological and market developments. Particular attention should be paid to the following issues:

(a) On the supply side:

(i) Mapping of broadband availability is a useful starting point for the identification of under-served areas and needs to be continuously monitored and updated given the rapid development of broadband throughout the Union.

(ii) Public funding should take account of the Guidelines on the use of Structural Funds in electronic communications not to distort competition nor private commercial incentives.

(b) On the demand side:

(i) Promoting the development of open and interoperable public services.

(ii) Proposing all necessary operational measures to enhance connectivity of public administrations, schools, hospitals and public health centres.

(iii) Implementing demandaggregation policies taking into account competition concerns.

(iv) Improving the efficiency of financial incentives for broadband take-up.

In the short-term, given the strong focus on coverage of remote and rural areas, national strategies are most likely to have an immediate impact on the deployment of infrastructure. For this reason they are considered an important contribution to the Growth Initiative. A first assessment of their achievements will contribute to the progress report on the Growth Initiative to be submitted to the European Council in Spring 2005.

Further actions on the supply and the demand-side of the broadband market have been proposed by the Commission Communications "Connecting Europe at High Speed: Recent Developments in the Sector of Electronic Communications" and "eEurope 2005 Action Plan: An Update, COM(2004)380". These actions aim at accelerating coverage of under-served areas, overcoming barriers to the development of innovative content and services to stimulate demand, obtaining greater insights on the reasons for the current lag in demand, and facilitating deployment of the new Internet Protocol (IPv6) to widen the range of innovative services and applications.

These actions are complemented by the following:

- *Technological developments, growth of the broadband market, exchange of experiences and lessons from implementation require an update of national broadband strategies. Member States should complete a comprehensive update by the end of 2005.*

- *New Member States should adopt national broadband strategies by the end of 2004.*

- *Monitoring progress in the implementation of national broadband strategies will contribute to the assessment of the eEurope 2005 objectives of widespread availability and use of broadband in the EU. The Commission will review progress and developments in the first half of 2006 as part of the evaluation of eEurope 2005.*