



Global Business Dialogue on Electronic Commerce

Broadband in Korea (Rep. of)

1. Overview

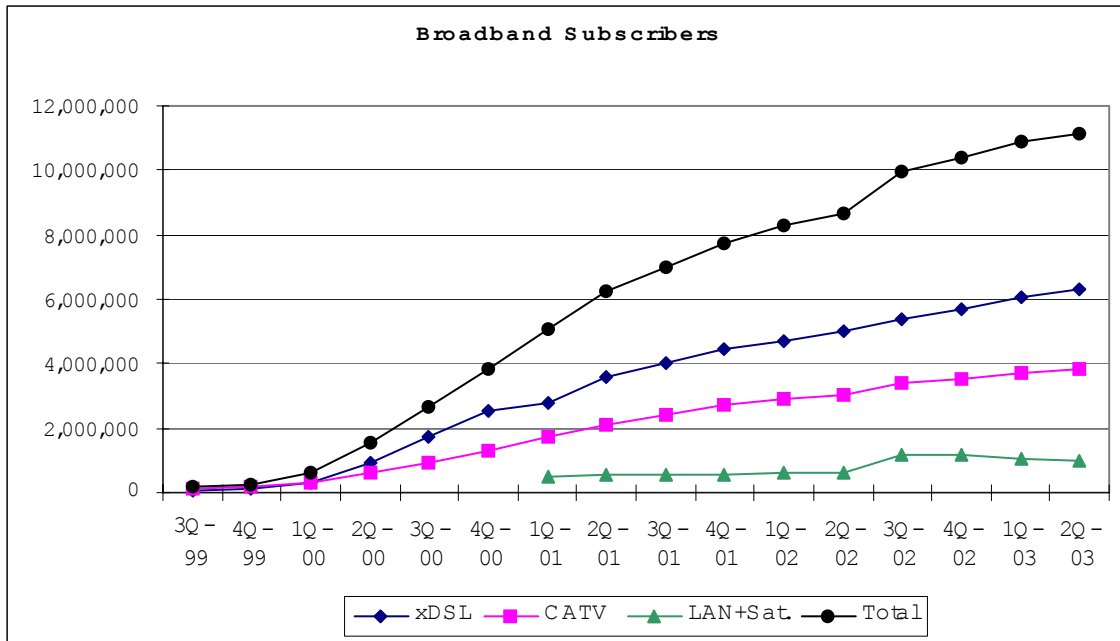
Broadband in Korea has become a new type of lifeline telecommunication service exceeding 72% of penetration rate in households, ranking the country number one in worldwide broadband access.

More than 98% of schools, from elementary to university, are connected to broadband Internet, utilizing IT to perform real online education.

Almost 50% of Internet traffic is generated by women, especially housewives, office workers, and students. Also, more than 70% of stock trading and 14% of bank trading are carried out

over the Internet, especially by aggressive participation of women. Regarding content, 74% of Internet users enjoy accessing audio/visual Internet broadcasting, and more than 30% use broadband for their Internet games and music downloading accordingly. Moreover, about 25,000 Internet cafes are widely spread all over the country.

There is a good trend of user demand for wireless Internet services such as wireless LAN and 2.3GHz portable Internet. Through these, Korea has already entered the stage for “anywhere, anytime and any device” communication.



2. Penetration Rate as of June 2003

The cable modem was developed at the earlier stage of broadband service, whereas ADSL has been available since 3Q 1999 and will continue to be increasingly widespread in the Korean broadband market. In 1999, the ratio between CATV and ADSL was 0.97% and 0.3%, respectively, but after takeoff of ADSL, the Korean broadband market evolved to high penetration of ADSL subscribers with more than 1 million within a year, and more than 2 million in 1Q of 2001.

As of June 2003, more than 11 million subscribers are using broadband Internet access services reaching 72% of Korean households.

Korea has just closed its 1st phase of broadband service development and now is moving towards the 2nd phase based on VDSL and Fixed-Mobile convergence services. VDSL has been commercialized since November 2002 and it is becoming more and more popular day by day.

As depicted in the graph on page 15, it is worthwhile to note that the role of LAN-based

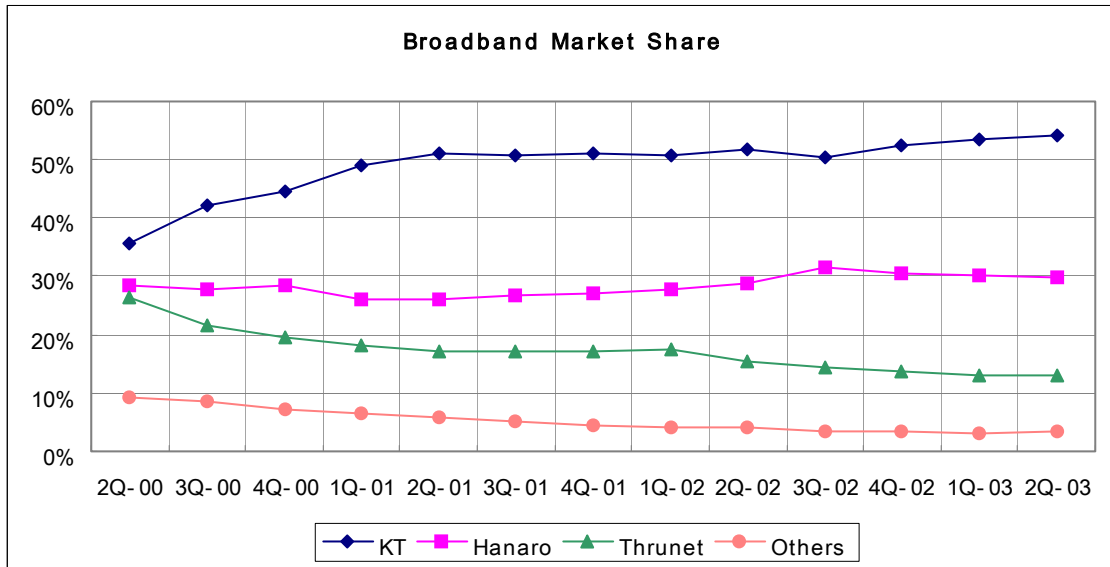
(Ethernet over optics) broadband services will continue to increase over time.

3. Pricing and Competition Aspects

There is a diversified price range of broadband services in Korea. The most popular broadband service prices are at 40,000 KRW (1,200 Korean Won = US \$1), and wireless LAN service prices at 10,000 KRW added to the broadband access service.

There were 110,000 SME multi-ADSL subscribers in Korea in 2002 which allow for connection of up to 16 computers to one ADSL line ranging from 40,000 KRW up to 256,000 KRW.

The major drivers of the rapid development of broadband access services in Korea have been competition among carriers, dense geographical user populations, market driven demand, and supportive government projects for the Information Society. Such drivers have resulted in aggressive marketing causing competition.



In Korea, KT, Hanaro Telecom and ThruNet are three major broadband service providers strongly competing with each other. Having only begun to provide ADSL from 3Q of 1999, KT has already secured more than 5 million subscribers, or 49% of total broadband users nationwide, emerging as one of the world's leading broadband Internet service providers. Due to an aggressive marketing and pricing strategy, Hanaro directly follows KT with a market share of 27%. (see graph on page 16)

Today's access network service market, however, is already in a mature stage where service provider revenues are facing a slow growth rate.

4. National Policy Environment Strategy

The Korean government successfully built KII (Korea Information Infrastructure) as a new vision of the 21st century. Broadband Internet infrastructure was fostered by the implementation of the Global Leader, e-Korea Initiative.

When it comes to pro-competitive policy, government promoted competition through significant deregulation on ISPs, and has put in place the open access network.

Moreover, the Korean government also made a great deal of effort to upgrade the user environment available to broadband services by encouraging the upgrading of communication lines to customer premises. One typical policy, seriously impacting households, was giving formal certification on communication quality inside customer premises.

For the success of the 2nd phase of broadband service, the Korean government is also preparing various political and regulatory measures in cooperation with industry. This will cover Fixed-Mobile integration and Telecom-Broadcasting convergence which mainly concerns the next generation broadband service targets.



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Broadband in Canada

1. Overview

Canada ranks 2nd in the OECD (behind only Korea) in terms of overall broadband penetration.

Some 60% of Canadians regularly make use of the Internet from the office or home and 60% homes are connected to the Internet, making Canadians among the most connected and biggest users in the world.

Of these Internet households, roughly half - some 3.5 million or 30% of total households - subscribed to cable modem or DSL broadband access services at the end of 2002. This is expected to rise to 35% of total households by the end of 2003 and to more than 50% by 2005⁵.

On a per capita basis, broadband access in Canada continues to exceed that in the USA by almost two to one, although the USA recently has begun to narrow this gap.

2. Competition Driving Broadband Penetration

The principal driver of the rapid development of broadband access services in Canada has been competition among cable and DSL broadband networks, resulting in aggressive marketing and pricing strategies.

⁵ IDC Canada Canadian Internet Access and Broadband Market Forecast and Analysis 2003-2007, April 2003.

a) Cable vs. DSL

Canada's cable television infrastructure developed independently of the telephone network and is well established, with more than 93% of homes passed. Early to recognize a new market opportunity, in 1996 Canadian cable companies were among the first in the world to offer broadband Internet access. By the end of 2000 they had signed up almost 1 million subscribers.

Canada's telephone companies also were the first among OECD countries to offer high speed commercial Internet access using DSL technology in 1996. As networks were upgraded to provide DSL services in more metropolitan areas, the telephone companies challenged the early lead of the cable companies in 2000 with aggressive marketing and pricing strategies, targeting not only cable's broadband customers, but also their own dial up subscribers. By the end of 2000 the number of DSL customers had increased to almost 500,000, a figure which more than doubled during 2001.

Fierce competition between the telephone companies and cable companies for residential customers continues to fuel the demand for broadband access services. During 2003, for the first time, the number of broadband households will surpass dial-up households. Further, within these broadband households, DSL use will exceed cable modem use.

b) Pricing

This competition for customers has kept prices low. Retail pricing for both DSL and cable modem service generally has remained constant at around \$C40 (\$US30) per month since these services were introduced. Recently some users have begun to see modest increases, as both the telecommunications providers and cable companies introduce new tiered pricing plans based on the speed of service. However, the availability of lower priced schemes and the bundling of Internet access with other services mean that prices are unlikely to increase substantially. Both the telephone companies and cable companies are required to provide third party access to their broadband access services. However, reflecting low retail prices, the wholesale market has been slow to develop and the incumbent cable and telephone companies remain the major suppliers in all regions of the country.

c) Alternative technologies

Alternative access technologies, including fixed wireless and satellite, are available commercially across the country but, since they are mainly used only in areas with very sparse population, they do not significantly affect total figures. Several “Wi-Fi” pilot projects are underway, including the provision of wireless broadband access on trains in the heavily travelled Montreal-Toronto corridor, and the government recently has announced its intention to make available additional radio frequency spectrum for applications such as Internet access.

d) Small Business Market

The small business market (less than 100 employees) for broadband services generally has followed a pattern similar to that of the residential market, with more than half of firms using the Internet making use of high speed technology in 2002, with DSL access more popular than cable. Price competition for small business customers also is fierce, with recent reductions bringing prices down to as low as \$C60-90 (\$US42-65) per month depending on

the speed and services offered. For larger businesses, broadband access generally is available through dedicated T1, frame relay, ATM or IP Virtual Private Network (VPN) technologies which integrate Internet access with a firm’s other data communications requirements and comparable statistics are not available.

3. Government Strategy

While competition remains the principal driver of broadband growth in Canada, other factors have been important. In particular, government understood early on the importance of Internet access and broadband connections for both economic and social development.

A series of initiatives were launched beginning in 1998 under the Minister of Industry’s “*Connecting Canadians*” agenda which, among other things, sought to ensure a friendly policy environment for e-commerce through a technology neutral tax regime, creating the legal framework for digital signatures in electronic records and to protect personal information and encourage the development of voluntary business guidelines to protect consumers conducting online transactions. It also established an ambitious e-government program with the result that, for the past several years, Canada has led international surveys measuring the availability of online government services.

4. Canadians are “Early Adopters”

Canadians also appear especially receptive to adopting the use of new communications technologies. For example, historically they generally have been faster than their U.S. counterparts to adopt new services such as the use of ATMs, telephone banking and debit cards, and in 2001 some 38% of individual tax returns were filed online. They also are among the world’s largest users of bandwidth intensive services on the Internet, including online gaming, music downloads, education and

training and using the Internet to work from home⁶.

5. The Impact of Geography on Broadband Penetration

Because of Canada's huge geography and relatively small population of 32 million, among the biggest challenges is the extension of broadband service to the 20% of Canadians that live outside metropolitan areas. Having met an initial target of ensuring Internet access for all public schools and libraries by 2000, the first country in the world to do so, the government is working in partnership with the private sector to ensure broadband access for all communities by 2005.

The "*Smart Communities*" initiative is a program of funding through a competitive process to bring publicly available broadband access to qualifying communities led by community "champions" for broadband development. In addition, there are a growing number of other federal, provincial and local initiatives to accelerate broadband penetration. These include, for example, contracting for government institutions, provision of seed funding to community projects, provision of capital funding for infrastructure projects, R&D tax credits to equipment manufacturers, and support for the development of online content to drive demand for broadband access.

⁶ Veenhof, Neogi and van Tol *High-speed on the Information Highway: Broadband in Canada* Statistics Canada Research Paper, September 2003 quoting International Telecommunication Union (ITU) *Promoting Broadband: The Case of Canada* ITU Workshop April 2003 (forthcoming).



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Broadband in the USA

1. Overview

In the U.S., broadband penetration predominately relies on landline-based technologies using cable television infrastructure (cable modem) and wireline telephony infrastructure (Digital Subscriber Line).

Broadband penetration in the U.S. has not been as rapid as many of the countries it competes with economically (e.g. Korea or Canada).

Some of these reasons include: unique demographic and geographic challenges (a lower percentage of population lives within central office-based DSL range); non-metered

local phone rates that do not make dial-up access as unattractive as systems with metered rates; regulatory advantages of cable modem compared with DSL; and the lack of an overall government plan or incentives for increased broadband penetration.

In December 2002 (see table below), compared with other member countries in the Organization for Economic Cooperation and Development (OECD) consisting of 30 of the world's industrialized countries, the U.S. ranks sixth in per capita broadband penetration. More recent statistics compiled by the OECD (see page 14) place the U.S. in 10th place.

December 2002	DSL subscribers	Cable subscribers	Other subscribers	Total subscribers	Subscribers per 100 inhabitants
South Korea	6,386,646	3,701,708	39,959	10,128,313	21.4
<i>Canada</i>	1,642,554	2,008,566	-	3,651,120	11.7
<i>Belgium</i>	517,000	326,181	25,813	868,994	8.5
<i>Denmark</i>	307,055	133,003	5,784	455,842	8.3
<i>Sweden</i>	424,000	153,700	142,500	720,200	8.1
U.S.	6,595,532	11,300,000	1,928,152	19,823,684	6.9
<i>Switzerland</i>	195,220	260,000	-	455,220	6.3
<i>Japan</i>	5,645,728	1,954,000	206,189	7,805,917	6.1
<i>Germany</i>	3,195,000	56,845	70,000	3,321,845	4.0
<i>U.K.</i>	590,000	779,319	2,000	1,371,319	2.3
<i>OECD</i>	30,058,261	23,075,208	2,625,176	55,758,645	4.9

2. Penetration Rate as of December 2002

According to the Federal Communications Commission (FCC), there were 19,823,684 broadband subscribers in the United States as of December 2002 (see table on page 21). This total number represents 6.9% of the population, and 6.5 million of these subscribers relied on DSL, 11.3 million on cable modem, and 1.9 on other technologies (FTTH, wireless, etc.). Broadband penetration has increased dramatically over the last two years with more telephony lines being upgraded to provide DSL services and pricing packages that make broadband subscriptions more attractive for consumers.

3. Pricing and Competition Aspects

The competition among varying broadband platforms in the U.S. is beginning to create price pressures and the bundling of services. In the late 1990s, cable television providers upgraded their networks to provide cable modem services and began to offer bundled packages of cable television, Internet, and (occasionally) local phone services. Incumbent local exchange carriers (ILEC) were slow to invest in the DSL market, citing high costs, low return, and the threat of network sharing obligations with competitive providers.

Recently, the main ILECs in the U.S. have achieved, or announced plans to achieve, approximately an 80% DSL availability rate for their customers, and several have announced plans to increase this penetration with investment in remote terminal facilities and fiber-to-the-premises projects. The ILECs have responded to the cable modem challenge with bundled packages of DSL, local phone, and (occasionally) wireless phone services. Several ILECs have recently made arrangements with satellite television providers with plans to bundle these video services with DSL, wireline, and wireless. Most stand-alone DSL or cable modem services are priced between \$30 and \$40 per month for the first tier of service with additional costs for higher or synchronous speeds.

4. National Policy Environment – Strategy

The U.S. lacks an overall national policy on broadband penetration. To date, most government activity has focused on unbundling obligations and achieving regulatory parity among the two primary broadband platforms.

The FCC is attempting to relieve ILECs from unbundling obligations for their fiber loops and broadband network elements while preserving the status quo for cable modem providers (no unbundling of networks and no mandated access for unaffiliated ISPs). However, no macroeconomic strategy exists to achieve ubiquitous broadband penetration in the same manner as previous government plans for telephony and electrification.



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Broadband in Europe (Belgium)

1. Overview

As of July 2003, there were 17,566,550 broadband lines in the EU, a 36.19% increase since January 2003. Of these lines, 12,579,164 were DSL lines (71.6% of the total) while 4,987,386 (28.4%) were provided using other transmission means, mostly cable modem.

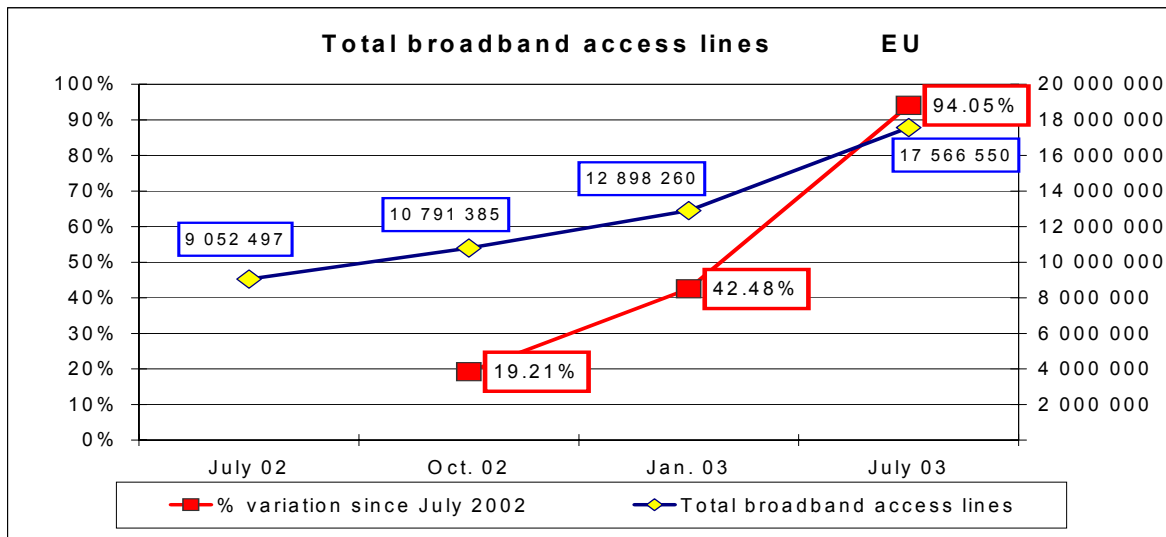
During the first six months of 2003, a total of 4,668,290 new broadband lines were added. This is a significant increase over the second half of 2002, when 3,845,763 lines were added.

Graph 1 shows the broadband penetration rate per number of inhabitants:

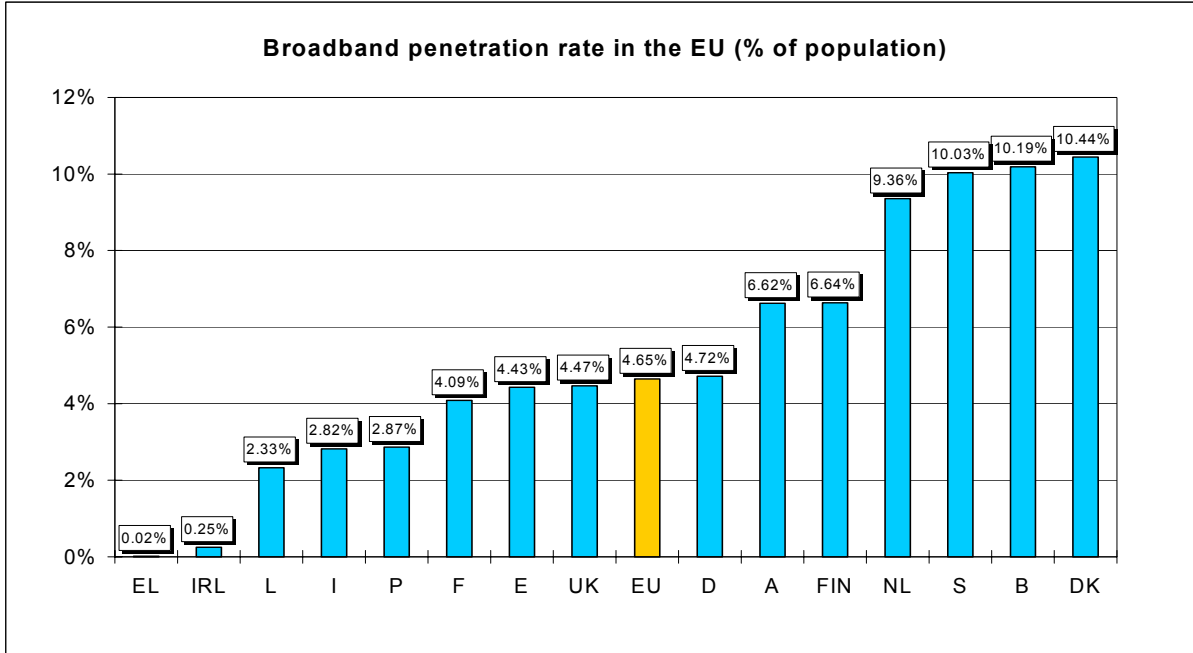
Graph 2 shows the broadband penetration rate per number of inhabitants. Finally, Graph 3 shows the percentage of PSTN lines that are being used to provide DSL access.

A number of factors involving EU-wide initiatives (e.g. eEurope) or national policies (e.g. Plan Info XXI in Spain) should be considered when analysing the success of broadband in Europe. However, the GBDe focuses on one of the most compelling examples of the advantages of infrastructure competition for the successful take-up of broadband, namely the Belgian case.

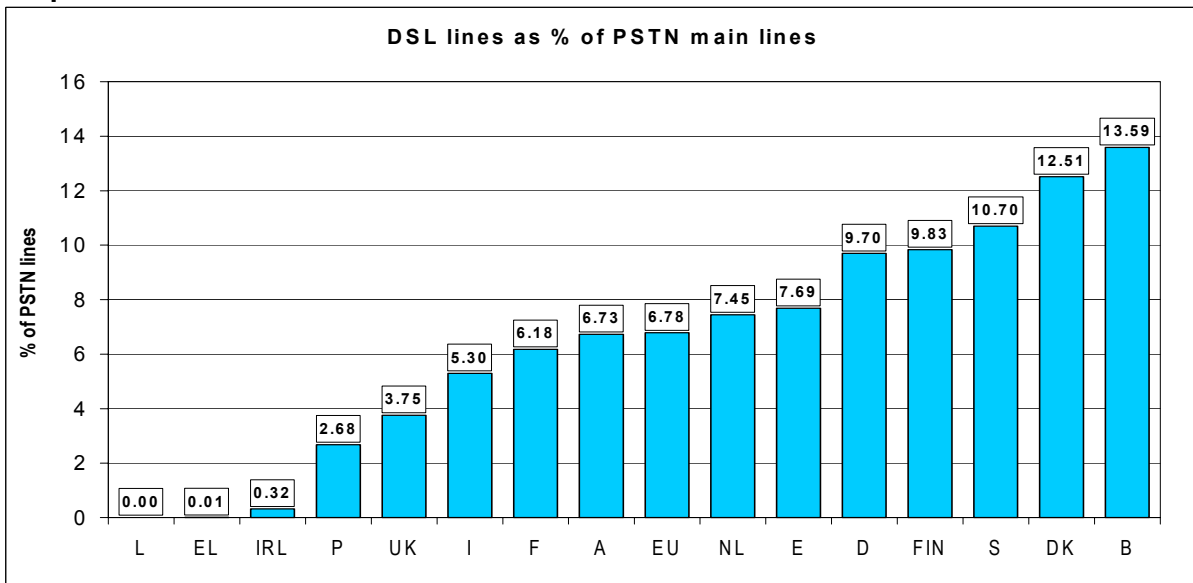
Graph 1



Graph 2



Graph 3



2. Key Success Factors of Belgian Broadband

Whereas Belgium boasts a successful experience in the broadband business, the following factors can explain the Belgian case.

Multiple access and competition in infrastructure.

Belgium has one of the highest cable penetration rates in Europe, which amounts to 98% of households. As far as DSL is concerned, the infrastructure coverage reaches about 98% of households: consequently, Belgian consumers have wide access to both broadband cable services and DSL via Belgacom or other DSL carriers who offer Belgacom’s wholesale

services⁷. This factor is key in broadband penetration in Belgium as the presence of two competing infrastructures and technologies explains the current success story of Belgium.

The total broadband market in Belgium amounts to more than one million connections, which represents a very high penetration rate in terms of actual users per households.

As shown by Graph 4 on the consumer and business market segments (CBS), cable and DSL are highly competitive in Belgium. In Flanders, the broadband split shows that cable is the leading technology, while Telenet, the major Belgian cable operator, currently holds 50% of this market segment.

3. Design of the Product

Another important factor explaining the successful case in Belgium is linked to the design of broadband products, characterized by a very high (download) capacity. While cable

⁷ Contrary to the cable sector, DSL technology is fully regulated in Belgium with Belgacom providing a regulated reference offer for bit stream access (BROBA) both at the local level (BROBA I) and at the ATM switch level (data connectivity-BROBA II). This allows other operators to define, market, distribute and sell their own DSL products to end-users, using Belgacom's installed and existing network infrastructure.

services offer a speed of up to 4 Mbps, Belgacom DSL products provide consumers with a 3 Mbps (download) capacity, which is already available with the basic ADSL retail product⁸.

Population coverage for such a 3 Mbps ADSL offer amounts to 84% (in its "best efforts" guarantee) and amounts to 60% on an "always" guarantee.

Belgacom is currently investing in new network infrastructures to gradually increase this ratio.

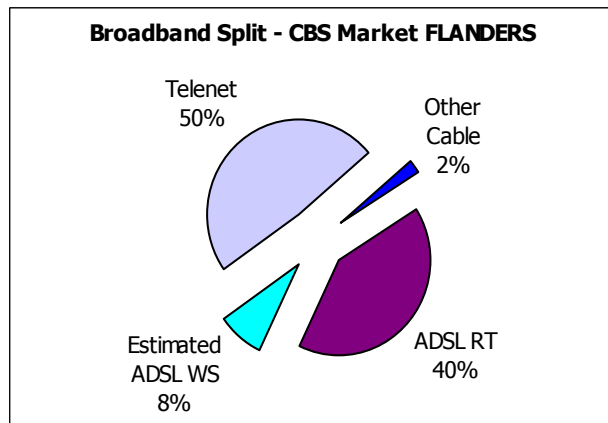
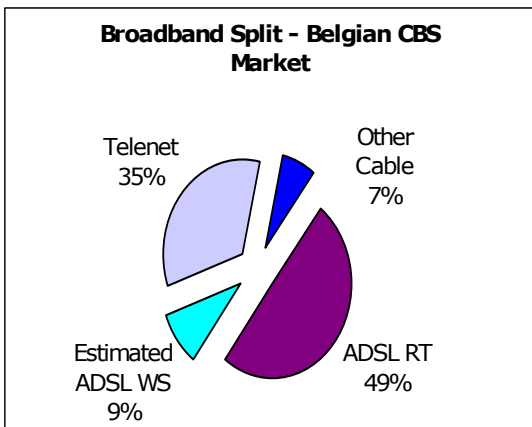
4. Pricing

The third key factor in the extensive and rapid development of broadband in Belgium can be found in the very low prices for broadband services. As exemplified by the following statistics, Belgium is characterized by very low prices. The basic ADSL Belgacom product, for example, costs 30€ (incl. VAT) at the retail level.

It is also worth mentioning that the Belgian ADSL offer features one of the best quality/price ratios in Europe.

⁸ ADSL GO: 3 Mbps download.

Graph 4



5. Government Policy

- Promoting Internet access in schools and libraries (I-Line project).
- Defining an e-inclusion program (new government agreement).
- PC *privé* context in order to increase PC penetration.
- E-government services:
 - Electronic individual and company tax declarations;
 - E-identity card for every Belgian should become a reality by 2007;
 - Secured Access to personal civil file via the Internet.
- Promotion of tele and home-working through:
 - The administration's investment in PCs and Internet lines;
 - Analyzing and defining an attractive and more suitable legal framework for teleworkers.

6. Key Factors to Further Developing Such a Success Story

• Regulatory environment

Belgium ranks number one in Europe in the penetration of both cable (98% households) and DSL due to the fierce competition that exists between both infrastructures.

However, the current regulatory environment in Belgium suggests that the cable sector should not be subject to *ex ante* regulation.

Such a situation is critical. The principle of technological neutrality in the regulation of electronic communication networks and services as well as the requirement to further support the current competition between cable and DSL services should lead to the conclusion that both technologies should be subject to the same regulatory treatment.

• Public policy

Belgium suffers from too low a PC penetration rate. The government should take all necessary

measures in order to increase the penetration of terminals, thus enabling access to the Information Society. PCs are certainly part of the solution but other types of terminals may also be envisaged.

In order to guarantee the success of this strategy, more cooperation with industry will be required. More coordination with public authorities and entities will also be necessary in order to achieve coherent and efficient communication.