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## Total telecom spending over the last ten years

The present article looks at telecom spending as a share of GDP and per inhabitant for a selection of countries over the last ten years. In a second step it also analyses the breakdown of telecom spending between the various sectors. Telecom services such as paging, telex or telegraph are not considered as they have been accounting for a small and declining proportion of telecom budgets over the last years. Total telecom spending thus comprises fixed telephony, mobile telephony, data communications (which includes cable modem and DSL as well as X.25, ATM, Frame Relay, leased lines and VPNs), CaTV and Internet access services. In addition, because it is often very difficult to have a precise and significant division between residential and business revenues, only total spending will be considered — both business and residential included. The 2005 exchange rate between US dollars and the local currencies has been used for all years.

### Telecom spending as share of GDP

Fig. 1 gives an indication of the telecommunication industry's growth. For the countries considered, total telecom spending averaged 2.3% of GDP in the last ten years, with the best performing years between 1995 and 2001, primarily pushed by the uptake of mobile and Internet services. During this period telecom spending grew by 67%, reaching an average of 2.5% of the countries' GDP in 2001 compared to 1.9% in 1995. After the height of 2001, the general trend stabilised at around 2.4% of GDP.

Of the countries covered, the growth was steepest overall in Japan where the telecommunications sector grew by 69% to account for nearly 2.8% of the country's GDP in 2001 compared to 1.7% in 1995. Afterwards the growth was much more subdued, but nonetheless carried on, to reach 2.9% in 2005. All in all, Japan thus experienced the highest increase in telecom spending as a share of GDP, from 1.7% to 2.9%. All other countries registered increases of 0.7 percentage points (Italy) or less. After 2001 the figure started even to decline in Sweden and the US. Sweden is actually the only country, of those examined here, which had

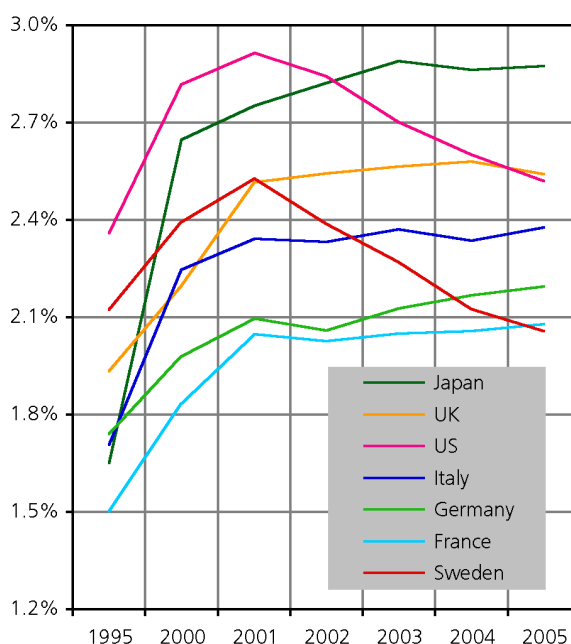


Fig. 1- Total telecom spending as % of GDP

a somewhat lower share in 2005 (2.06%) as compared to 1995 (2.12%). This can be explained by the fact that Sweden was already in 1995 an advanced country in terms of telecommunications usage, as regards fixed but also mobile and datacom services, with in addition relatively low prices as the market had already been liberalised.

### Telecom spending per inhabitant

Of the countries selected, monthly telecom spending in 1995 started at an average of \$41 per inhabitant and grew by 75% to an average of \$72 in 2005. Over the years, telecom spending per inhabitant grew at a compounded rate of 6%, whereby on average the growth was much faster between 1995 and 2000 than between 2000 and 2005. What is also striking on Fig. 2 is that, as Japan and the US have a much higher GDP per inhabitant than the rest of the countries and, as seen in Fig. 1, a high share of GDP accounted for by telecom spending, they consequently have a much higher telecom spending per inhabitant than the other, Western European, countries. Even the UK, the Western European country with the highest spending, has a spending 10% lower than Japan in 2005, i.e. \$77 compared to \$86.

Italy experienced over the ten-year period the fastest growth, 130%, in monthly telecom spending per inhabitant overall, whereby growth was much stronger between 1995 and 2000 than afterwards. Italy benefited in particular from early and very strong growth in the mobile sector, without losing too much on the fixed sector. The UK had the second highest overall growth, but unlike in Italy it was nearly as strong between 2000 and 2005 as before. Indeed between 2000 and 2005 the UK had by far the highest growth of the countries examined here. On the other hand, Germany and Sweden had the slowest growth over the ten-year peri-

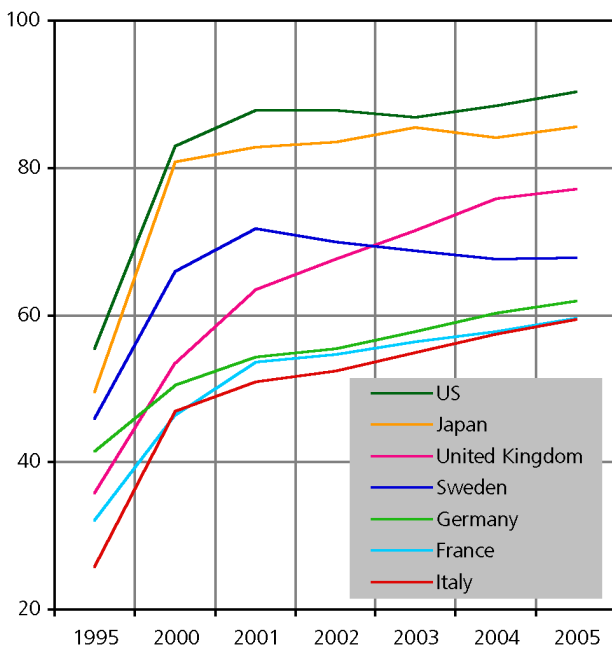


Fig. 2- Total monthly telecom spending per inhabitant in dollars

od, whereby for Sweden this was mainly due to recent years, whereas Germany experienced relatively low growth in both periods in part due to heavy price battles. Sweden is indeed the only country with a lower spending per inhabitant in 2005 than in 2001, and not much higher than in 2000.

### Telecom spending per sector

Breakdown by sector is presented below for Japan, the US, Germany and Sweden. As a general trend, the steady uptake of mobile communications and datacom and Internet services compensated for the decline of expenditure on fixed telephony services. Aside from the introduction of new mobile services and technologies, increase in competition in these markets resulted in decreasing prices, which led to the decline or stability in average monthly spending, in particular after 2000.

### USA

In the US (Fig. 3) mobile services spending per inhabitant grew the fastest between 1995 and 2005, closely followed by datacom services. CaTV services remained stable at around 10-11% while Internet services also grew strongly, although more moderately since 2001. In the meantime fixed telephony declined, so that at the end of 2005, fixed and mobile services accounted for nearly an equal share of an inhabitant's monthly telecom budget. In the US, although fixed line services experienced a declining share, it was not as drastic and not as early as in other countries where mobile telephony and in particular fixed-mobile substitution became popular earlier. In fact, mobile telephony did not grow as early and as fast as in other countries partly because of non-homogenous mobile networks and higher pricing. Consequently, of the

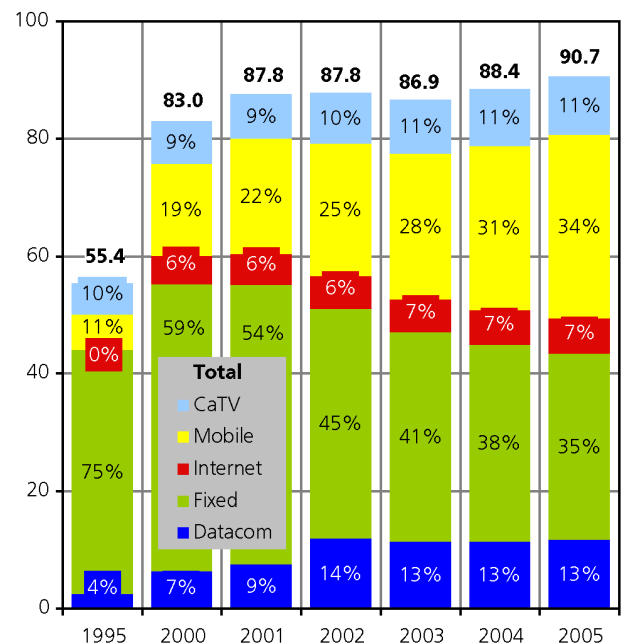


Fig. 3- Total monthly telecom spending per inhabitant in the US (dollars) – breakdown per sector

countries presented, the highest spending on fixed line services has been in the US. Mobile penetration has however been increasing in the last five years and spending on mobile services should exceed fixed telephony for 2006. Of the countries observed, the US has also by far the highest spending (in absolute terms and as a share of the total) for CaTV and Internet.

### Japan

In Japan as well mobile services recorded the strongest growth, fairly closely followed by datacom and CaTV (Fig. 4). In particular after 2000 did datacom and CaTV spending increase. Mainly because of mobile growth, fixed telephony declined, so that 47% of the spending was on mobile services compared to 28% for fixed line telephony in 2005. Japan has been one of the early leading nations as regards mobile telephony, so that fixed telephony decline was already particular strong between 1995 and 2000. In 2000, Japan average spending per inhabitant for mobile services was indeed the highest, with \$35, and more than twice as high as in the US. Since then the gap has declined but Japan has still by far the highest spending on mobile services (in absolute terms and as a share of the total) of the countries examined, also due to the fact that mobile data services (Internet, TV, videos, games etc.) are much more popular there than in the US or Western Europe. Japan has on the other hand the lowest spending on Internet services.

### Germany

In Germany, mobile services and datacom, and to a lower extent Internet services, fuelled the growth in telecom spending. Mobile services have grown by a compounded rate of 21% in 10 years, while datacom

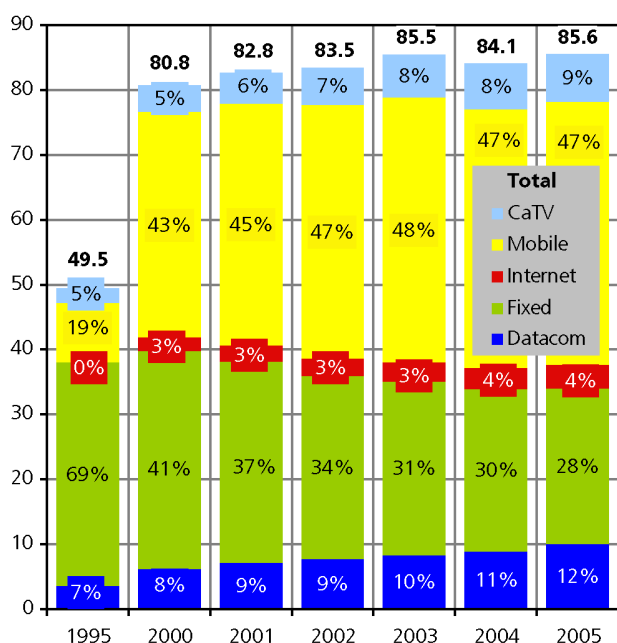


Fig. 4- Total monthly telecom spending per inhabitant in Japan (dollars) – Breakdown per sector

grew by 17%. Fixed line spending decreased by 4% on average per year, particularly in the years between 1995 and 2000. Fixed telephony spending decreased because of competition leading to lower prices as well as because of fixed-mobile substitution. It is however only in 2005 that mobile spending exceeded for the first time fixed telephony. Germany has also the highest share of datacom spending of the four countries.

### Sweden

In Sweden, mobile services grew strongly until 2000, slowing down afterwards. Indeed, in 2004, as the market was already completely saturated, the usage levels very high and the prices decreasing, mobile spending per inhabitant actually slightly decreased, before increasing again a little in 2005. CaTV spending increased the fastest after mobile services, but is still the lowest of all sectors, albeit not far below Internet spending. Interestingly for a country very much seen as a leader in terms of mobile telephony, fixed telephony still accounted for the largest share in 2005, 39% compared to 37% for mobile services. Fixed telephony did decline over the period, but not as strongly as in other countries, since usage levels for fixed telephony have always been high in Sweden and since liberalisation and related price decreases also happened fairly early on, so that spending of fixed telephony was already fairly low in 1995.

### Outlook

A conclusion to draw from these examples is that it is risky to make forecasts of one telecom sector in isolation of the others, in particular when the different sectors offer similar services and benefits to potential users. Indeed, from the analysis of the last ten years, it can be seen that any sudden and large increase in telecom

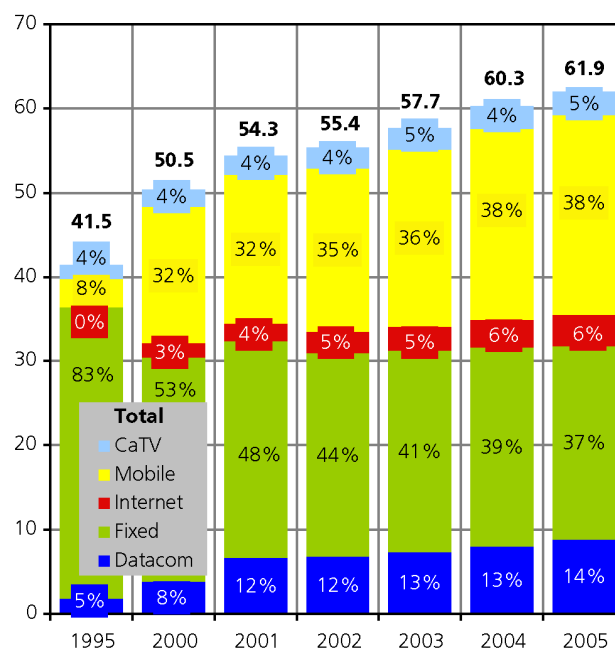
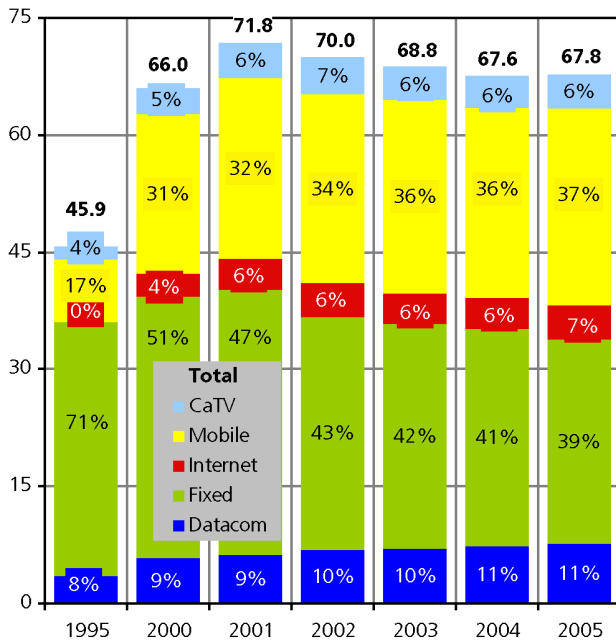


Fig. 5- Total monthly telecom spending per inhabitant hold in Germany (dollars) – Breakdown per sector



**Fig. 6- Total monthly telecom spending per inhabitant in Sweden (dollars) -- Breakdown per sector**

spending as a share of GDP or per inhabitant simply did not happen: an extra 1.2 percentage points in ten years for Italy is the maximum observed, or a maximum of 0.3 percentage point increase in a single year. For instance, in the US, the growth of mobile telephony was also slowed down by the other sectors' growth such as the initial success of paging. In addition, if new services do not imply new communications possibilities, the growth for one sector will be mainly fuelled by the loss of the others.

For instance, mobile telephony also grew to a great extent at the expense of fixed telephony, even if some real usage increase for telephony overall also did take place. This is important when for instance now considering the potential of "new" services such as mobile data or IPTV to name only two. If these services may indeed lead to higher telecom usage and spending overall, a significant share of their growth will nonetheless come from substitution i.e. lower usage for fixed data services (e.g. lower fixed Internet usage in favour of mobile Internet) or lower usage of traditional TV services (terrestrial or via cable or satellite) in favour of IPTV. In effect consumers have both a limited time and financial budget and it therefore cannot be expected that spending for all telecom services and applications grows at the same time, bearing in mind that other sectors (tourism, sports etc.) are also competing for the same time and budget. Finally, trends towards FMC and triple or quadruple play should lead to price reductions overall therefore putting pressure on telecom spending overall, which should therefore increase only moderately over the coming years. ■■

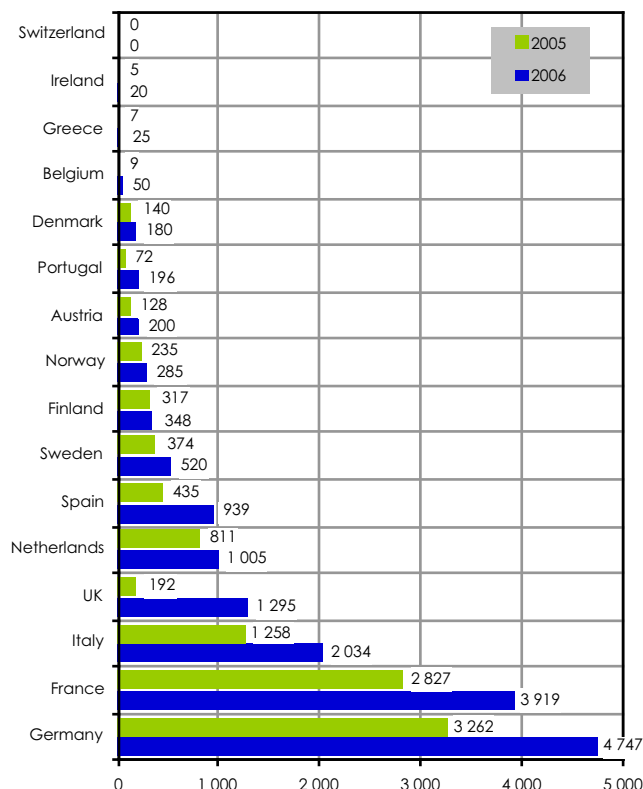
## Local Loop Unbundling

### Introduction

This article provides an analysis of local loop unbundling (LLU) in 16 Western European countries.

In nearly all examined countries, alternative operators use LLU to provide voice and/or data (Internet access) services to end-users.

LLU basically exists in two forms — full local loop unbundling where the alternative operators obtain the exclusive right to use the full frequency spectrum available on the copper line and thus the ability to provide telephone and/or high-speed services (xDSL) to end-users. On the other hand, with shared access, the alternative provider can provide high-speed services based on the high frequency band while the incumbent in most cases still provides basic telephony services. In this way, both the alternative provider and the incumbent have a direct relationship with the same customer.



**Fig. 1- Number of unbundled local loops in Western European countries — 2005/2006 (in thousands of lines)**

With the exception of Switzerland, where LLU is a long-discussed topic but still not implemented, all examined Western European countries have introduced LLU. The incumbents have to publish standard reference offers under regulated conditions.

### Installed based

Fig. 1 provides a comparison of the installed base of unbundled local loops in the years 2005 and 2006 in the examined countries. End-2006 a total of 15.8 million lines had been unbundled (full and shared) and the total number increased by 56.5% between 2005 and 2006. Since the end

of 2002, the total number has grown 12-fold. This is one proof of the growing competition in Western European telecommunications markets. The largest five European countries based on population (France, Germany, Italy, Spain and the UK) account for over 78.5% of the total unbundled local loops.

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With 4.75 million unbundled loops Germany still holds the largest share (about 30%) followed by France with 3.92 million (share 25%) and Italy with 2.03 million (13%). A group of countries follows, lead by the UK with 1.30 million (8%), the Netherlands with 1.0 million (6.4%), Spain with 0.94 million lines (6%) and then the three Scandinavian countries (Sweden, Finland and Norway).

In terms of growth, the UK showed the highest yearly growth rate with +575% followed by Belgium (+432%), Ireland (+292%) and Greece (+257%). Despite their high annual growth rates, countries such as Belgium, Greece and Ireland still have a comparably low installed base of LLU lines. Even countries with a comparably high installed base showed considerable annual growth rates, e.g. Italy (+62%), Germany (+46%) and France (+39%). Some Scandinavian countries showed comparably low growth rates in 2006, for instance Norway (+22%) or Finland (+10%).

Regarding the split between full unbundled and shared lines there exist differences in the examined countries. In countries, such as Austria, Germany and Ireland, the shares of full unbundled loops on total LLU vary between 95% and 100%. In contrast, in Sweden the share of shared lines on total LLU accounted for 76% end-2006, which was the highest of all countries. In the Netherlands (60%) and Spain (56%) as well alternative operators mainly use shared lines. In some countries (e.g. Greece, Italy, Finland), the importance of shared lines increased during 2006 whereas in several countries (Belgium, Denmark, the Netherlands, France, Spain, etc.), full unbundled lines are becoming more important and the share of shared lines on total LLU decreased in 2006. In particular in France, a migration from shared to full unbundled loops is visible and more and more operators switch to full unbundled lines.

## LLU unbundling within the context of competition

### LLU and total connections

Although the number of LLU has increased in Western European countries, the incumbents still hold the majority of connections in their respective markets.

The average share of unbundled lines as a percentage of total connections (POTS and ISDN) accounted for 7.6% at the end of 2006 (5.2% for 2005) in all examined countries.

As shown in Fig. 2, some countries — Finland (20.1%), the Netherlands (13.6%), Norway (13.3%), France (12.7%), or else Germany (12.4%) — show shares well above average, partly explained by the early introduction of unbundling and intensive competition. In

some larger countries, such as the UK and Spain, the share of LLU on total connections, with 4.1% and 5.4% respectively, are still below average. In countries such as Belgium, Greece and Ireland the share on total connections is below 1.5%, i.e. competition based on LLU is very limited.

The share of LLU on total lines increased in the range of three to four percentage points during in 2006, in particular in some countries such as Germany (4), Portugal and the UK (3.5) followed by France (3.4) and the Netherlands (3.2), which indicates a growing competition based on LLU.

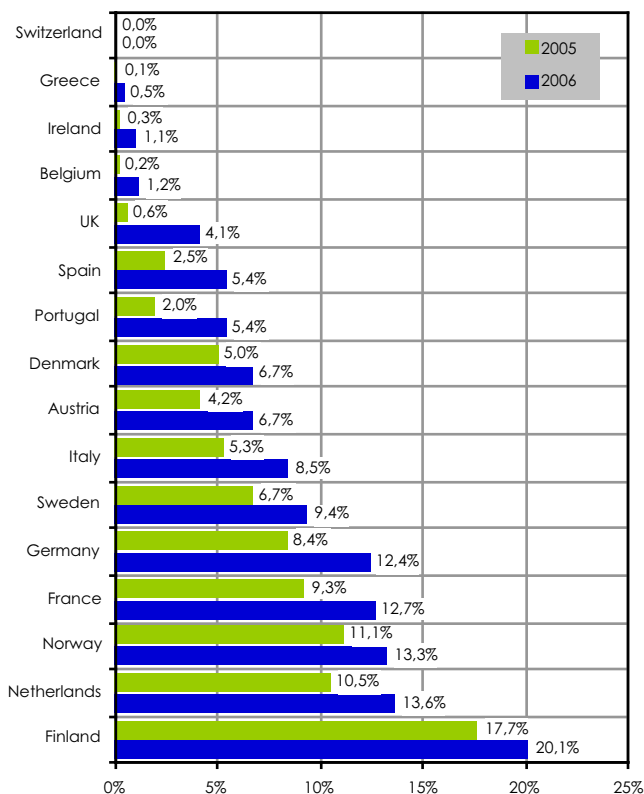
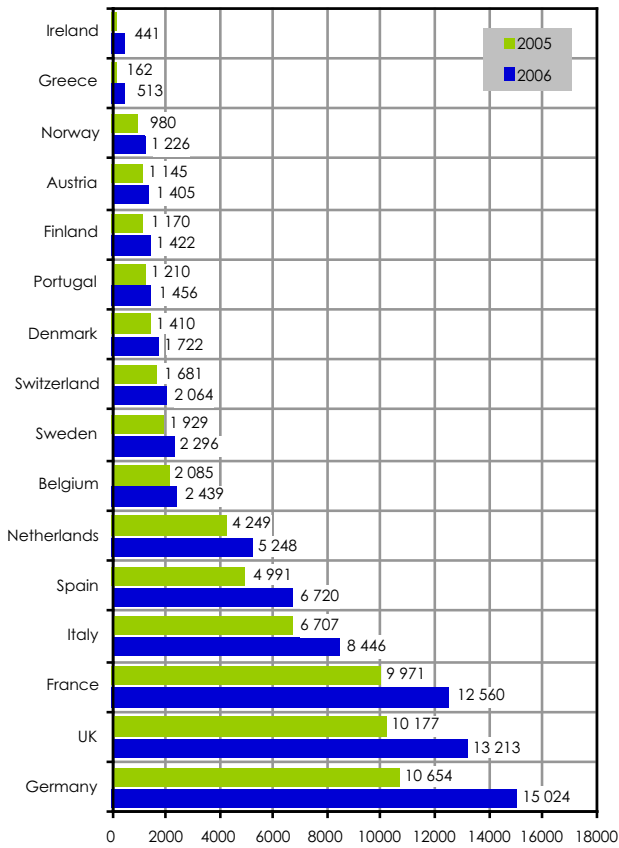


Fig. 2- Share of LLU on total connections (POTS and ISDN) 2005 and 2006 (in %)

### LLU and broadband Internet access

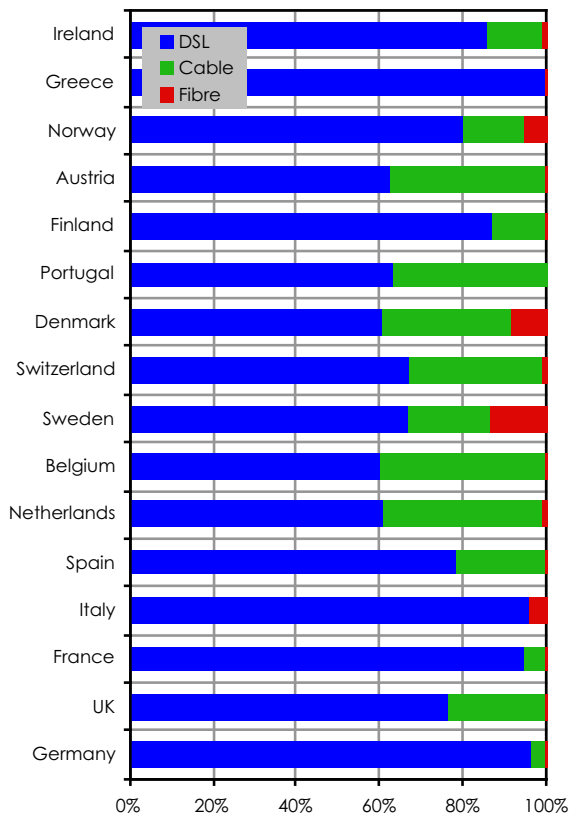
The following section provides an overview of LLU within the context of broadband access markets.

As already described local loop unbundling is one possibility for alternative operators to provide broadband services to end-users. In addition to the above-mentioned forms of unbundling, incumbents in many Western European countries are compelled by regulation to provide so-called "bitstream access" services to their national competitors. Bitstream access is fully based on the incumbents existing infrastructure for the provision of broadband services (xDSL), which includes DSLAM, DSL modems, bandwidths and so on. The incumbent installs a high-speed access link to the customer premises and makes this access link available to



**Fig. 3- Evolution of broadband lines between 2005 and 2006**

third parties, to enable them to provide high-speed services to customers. In many countries, incumbents have introduced regulated reference offers for "bit-



**Fig. 4- Share of different broadband technologies on total broadband (DSL, cable, fibre) end of 2006**

stream access" to promote competition for broadband services.

In addition to xDSL, other broadband technologies such as cable modem broadband access by CaTV operators or fibre optic based broadband access by incumbents and/or alternative operators are available in some countries.

The total number of broadband connections (xDSL, cable modem and fibre optic) amounted to 76.2 million at the end of 2006 with an increase of about 30% between 2005 and 2006. As shown in Fig. 3, Germany has the highest number of broadband connections with over 15 million (19.7% of total of all countries examined), followed by the UK with 13.2 million (17.3%), France with 12.6 million (16.5%), Italy with 8.4 million (11.1%) and Spain with 6.7 million (8.8%). The top-5 countries accounted for over 73% of the total broadband connections of all examined countries in 2006.

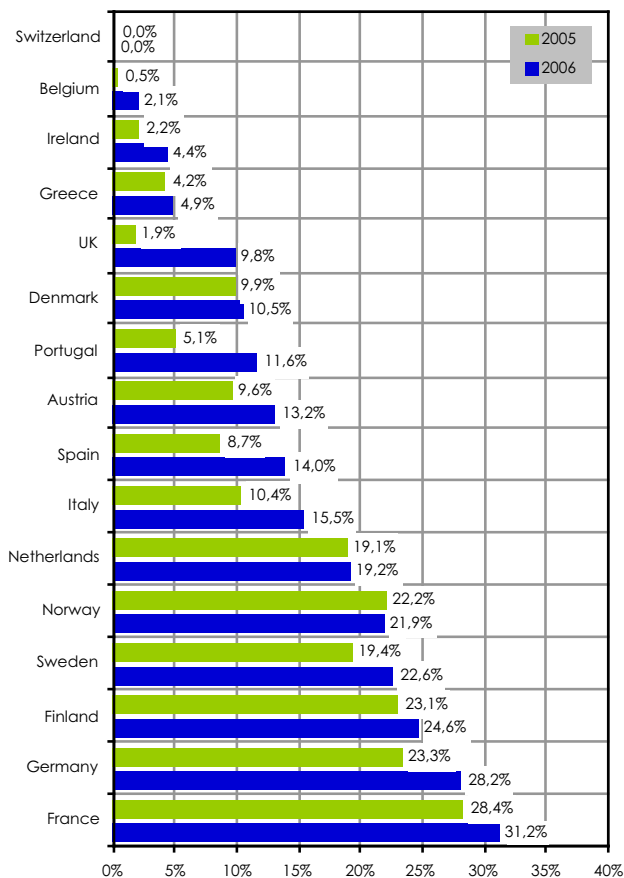
Among the larger countries, Germany showed the highest yearly growth rate with about 41% in 2006 followed by Spain (35%), and the UK (30%). The two smaller countries, Greece (+216%) and Ireland (+91%), showed the highest overall growth rates in 2006, although their share on total broadband connections is still below 1%.

Fig. 4 provides an overview of the split of the various broadband technologies used for broadband Internet access.

DSL is the main broadband technology and accounts for 83.1% of the total aggregated broadband connections in the examined countries, followed by cable modem with a share of 15.3% and fibre optic with 1.6%. Nevertheless a more detailed analysis shows some differences between the Western European countries. In a group of countries, such Belgium, Denmark, the Netherlands, Austria, Portugal, Switzerland and Sweden, DSL technologies account for 60%-70% of total broadband connections, whereas in Greece, Germany and Italy, broadband connections based on xDSL account for 95%-100% of all connections.

Apart from Greece and Italy, where cable modem services are not available, cable modem is the second broadband technology used in all countries. In particular in Austria, Belgium, the Netherlands and Portugal, cable modem accounts for 35%-40% of all connections, which indicates a comparably stronger technology-based competition between telecom operators and CaTV operators.

Fibre optic has gained a certain market share on total broadband connections only in some Scandinavian countries, e.g. Sweden (14%), Denmark (9%) and



**Fig. 5- Share of broadband connections based on unbundled local loops (in %)**

Norway (5%), as well as in Italy (4%). We expect a further increase in the next years in other countries, such as France or the Netherlands, as telecom operators invest in fibre-to-the-home/fibre-to-the-building infrastructure to provide services to their end-users.

Based on the previous analysis, the following part describes the role of LLU within the provision of broadband (Internet) access services.

Fig. 5 shows the share of broadband connections based on unbundled local loops in 2005 and 2006.

LLU plays an important role in the two larger countries, France and Germany, where 31% and 28% of the total broadband connections were based on LLU. In the three Scandinavian countries, Finland, Sweden and Norway, the figure is between 22% and 25%. While the average share of all examined countries was 15% end of 2006, compared to 12% in 2005.

With the exception of Switzerland and Norway, the share of broadband connections based on LLU increased in all other countries. The highest increases occurred in the UK with 8 percentage points, followed by Portugal (6.5), Spain (5.3), Italy (5.1) and Germany (4.9). The general increase indicates the growing demand for LLU in these countries and their growing importance for the provision of broadband services.

Yet the success of LLU is also a question of available alternative wholesale products, which had an impact on LLU evolution in the past. In Germany for instance, until 2004, LLU was the major wholesale product for alternative telecom operators to provide voice and/or Internet services. Resale offers (including the end-user relationship) for DSL were only introduced in late-2004 and regulated bitstream offers for DSL will only be introduced in 2007. In comparison, in the UK, resale offers (e.g. for telephony) as well as bitstream offers (for DSL) have a longer tradition. Although LLU was introduced back in 2000/2001, alternative operators provided DSL services mainly based on BT's other wholesale products (bitstream products such as IPStream and DataStream). For instance broadband connections based on BT's bitstream products still account for over 41% of the total broadband connections, although with a diminishing importance. Regarding the provision of DSL services in some other larger countries, such as France, Italy, or Spain, bitstream offers were initially used by alternative operators to provide DSL services. Today, more and more alternative providers shift from these bitstream products towards LLU unbundling. In some other of the examined countries, such as Belgium, Denmark, etc. the share of broadband lines based on bitstream wholesale products of the incumbents remained quite stable in 2006.

The combined share of LLU and bitstream based broadband connections show the highest values for the UK (51%), Germany (50%), followed by France (47%) as of end 2006. In particular in Germany, the combined share has grown by 11 percentage points, which was the highest increase in all countries. This is an indicator for the increasing competition in the German broadband access market.

## Outlook

The number of unbundled lines is increasing in all examined countries and expected to further increase during 2007. LLU will remain a very important method to introduce competition and in particular infrastructure based competition in the telecommunication markets throughout Western Europe.

It is important to find an appropriate and balanced regulatory approach regarding various wholesale products used from alternative operators to provide services to their end-users. For instance wholesale bitstream access products are sold on a retail-minus formula from the incumbent to its competitors, in comparison to LLU services which are based on cost-oriented prices. All methods should allow sufficient margins for alternative operators to compete effectively with incumbents and consequently to promote competition. Furthermore, regulation will need to introduce

effective methods and a regulatory framework to allow easy migration between various wholesale services. For instance, in countries such as France and the UK, migration is underway and operators shift from traditional bitstream or resale offers to LLU and invest in LLU infrastructure.

National Regulation Authorities play an important role in the evolution of LLU as they regulate prices for both wholesale and retail offers of the incumbents. In the majority of the examined countries, prices for fully unbundled lines and/or shared lines decreased during 2006. This may help alternative operators compete against the incumbents.

As show in Fig. 6, BT for instance had the lowest retail DSL market share (i.e. direct xDSL customers) with 32% at the end of 2006 compared to France (50%) and Germany (49%). Many DSL offers are based on BT's wholesale bitstream access products accounting for 54% of the total DSL lines in 2006 (compared to 64% end of 2006). From a wholesale perspective it must be stressed that BT generates comparably high revenues from its wholesale bitstream access products (sold on a retail-minus formula to its competitors), which are higher than revenues from LLU services (based on cost-oriented prices). Regarding infrastructure-based competition based on LLU or own infrastructure, which promotes competition, the UK market is still quite protected compared to Germany. Only in 2006 did the share of LLU on total DSL lines grow to nearly 13% compared to 3% end-2005. In comparison, the share of total xDSL lines based on LLU in Germany accounts for 29% and in France for 33%. In Germany, the incumbent Deutsche Telekom lost almost 12% market share based on direct end-user DSL connections between 2005 and 2006 whereas the market share of BT remained quite stable.

As already mentioned earlier in this article operators in some countries move along the value chain from a traditionally reseller oriented business model (using simple resale products) towards a more infrastructure based business model (e.g. in France or the UK, see Fig. 6). In particular operators who reached a critical mass (in terms of number of customers, etc.) will rather chose LLU or their own infrastructure based business models to gain more control over their services and provide more flexible and attractive products. Consequently, in some countries with more developed LLU markets, such as France and Germany, the products of alternative providers vary more from the incumbents' offers, as for instance compared to the UK. In France and Germany alternative providers offer for instance higher bandwidths for DSL or more bundled products (e.g. telephony and broadband) intensifying consequently competition. ■■

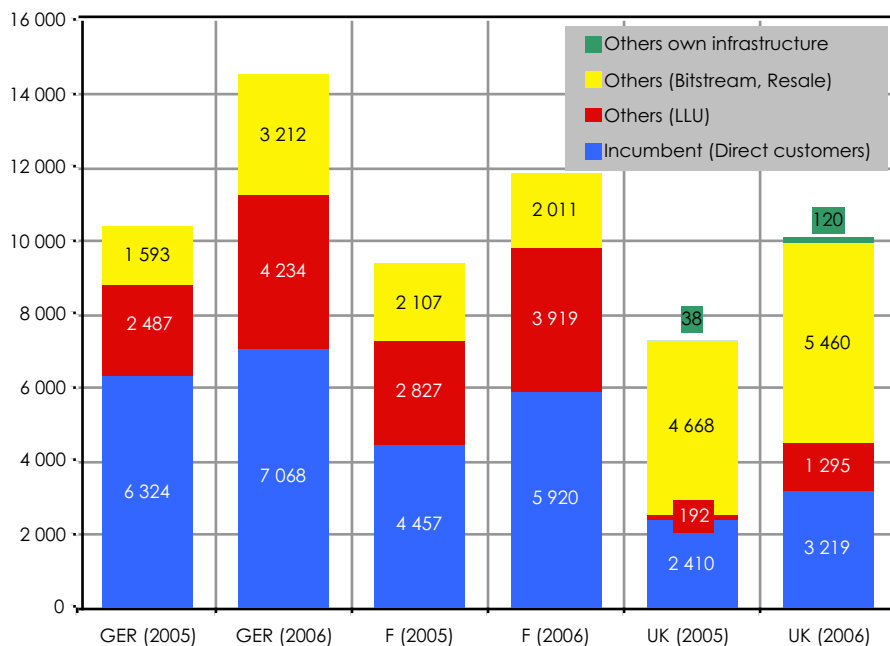


Fig. 6- Different forms of xDSL service provision — (xDSL lines in 1 000)

## Wholesale revenues from fixed line carriers in Eastern Europe

### Introduction

This article provides an overview of the fixed line wholesale market in six Eastern European countries, namely Croatia, Czech Republic, Hungary, Poland, Slovakia and Slovenia. Austria will be used as a reference for the analysis of the wholesale markets in these countries.

### Market context and regulatory situation

Austria has been part of the European Union (EU) for over ten years now. Czech Republic, Hungary, Poland, Slovakia and Slovenia accessed the EU in 2004. Croatia is not part of the EU yet, but has been candidate since 2004. The directives to the EU as regards the telecommunication markets have thus an important impact on the regulation of these markets.

Local Loop Unbundling (LLU), bitstream and Wholesale Line Rental (WLR) access products represent important drivers to the competition in the retail markets, and generally lead to increased choice and innovation, and lower prices for end-users.

- Local Loop Unbundling (LLU): alternative operators can enter the market without building their own networks in the local loop by leasing the incumbent's infrastructure; full unbundling enables them to offer the full range of telecommunications services, whilst shared access allows them to propose high speed services, basic voice telephony services being still provided by the incumbent over the same (copper) line;
- Bitstream: alternative operators use high speed access links installed at the customers premises, but do not have any access rights in the local loop;
- Wholesale Line Rental (WLR): alternative operators and service providers are able to offer access and call services to end-users by renting telephone access lines on wholesale terms.

Austria mandated LLU, bitstream and WLR products between 1999 and 2003. The countries with the most advanced regulatory framework are Hungary and Slovenia, which introduced LLU and bitstream a little later than Austria, as shown in Tab. 1. Besides, in Austria and Hungary, the incumbents launched recently a naked DSL offer at wholesale level. Naked DSL enables alternative operators to provide DSL without PSTN service, i.e. the end-users do not need a fixed telephone line to subscribe DSL service. Naked DSL can be based on shared access or bitstream, e.g. Austria.

On the other hand, Croatia, Poland and Slovakia really started to implement the European directives in 2005. However, the Polish regulator has regulated much farther the wholesale markets: it imposed a reference offer for bitstream access in May 2006 and changed the reference offer for LLU in October 2006, in particular by lowering the prices. In November 2006, the incumbent activated the first broadband lines based on bitstream but still did not have any agreements for LLU. WLR is also available, but on a bilateral basis.

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	LLU	Bitstream access	WLR	Comments
<b>Austria</b>	Since 1999 (full) and 2001 (shared)	Since 2000	Since end-2003	Naked DSL since 2006
<b>Croatia</b>	Since end-2005 (full)	Under review	No	Unclear regulation on the access to the distribution telecommunications network (DTK)
<b>Czech Republic</b>	Since 2003	End-2006 (only IP)	No	
<b>Hungary</b>	Since 2002	Since end-2000	No	5 regional incumbents (Magyar Telekom covers 80% of the territory) Naked DSL from Magyar Telekom since March 2007
<b>Poland</b>	Since 2005	Since 2006	Since 2006: agreement between TP and Tele2	No LLU lines in Nov. 2006 Worries of the EU commission on the independency of the national regulator
<b>Slovakia</b>	Since 2005	No	No	No LLU agreements at end-06 Worries of the EU commission on the independency of the national regulator
<b>Slovenia</b>	Since 2002	2003	No	Concerns of the EU regarding LLU take-up and power separation

**Tab. 1- Regulatory status of major wholesale products at end-2006**

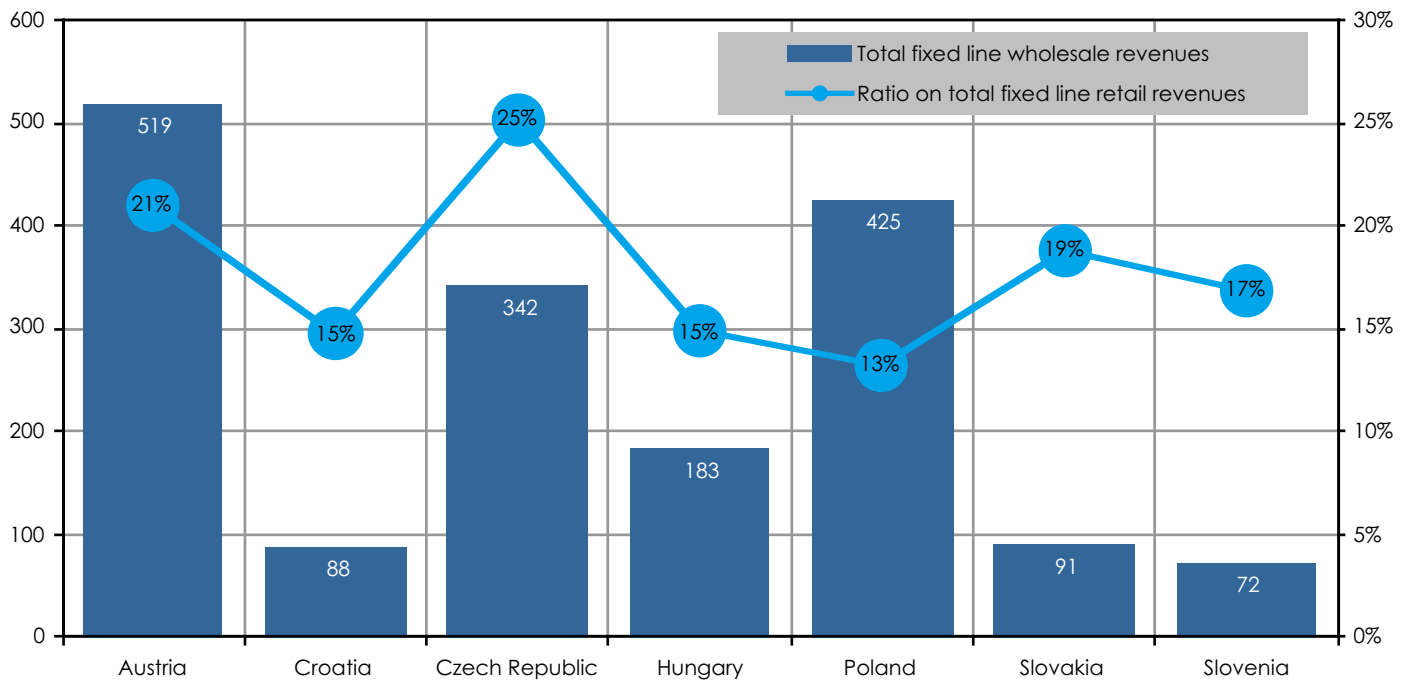
In general, the incumbents are trying to use their dominant position, which derives from their former monopolistic status, at their advantage, in particular as regards infrastructure access. In Austria, in 2006, alternative operators were complaining about too high monthly rental fees for LLU and reported delays in LLU lines opening. However, in Eastern European countries, alternative operators have to overcome larger obstacles, since the range of regulated access products is smaller and their take-up slower. For instance, in Croatia, the ownership of the distribution telecommunications network is unclear and as a result, the relations between the different players quite tense. Indeed, the incumbent T-HT has a contract concession for this network with the government of Croatia, but officially this should not give T-HT more rights than its competitors in the telecom market. Yet, at the end of 2006, T-HT cut the cables laid by the alternative operators Optima and Metronet in Velika Gorica, claiming that these companies had acted without following the procedure according to the law and thus violated T-HT's property.

### Main competitors

In the national wholesale markets, the incumbents are confronted with national and international competitors. Some international operators, especially Deutsche Telekom, France Telecom, Telefonica and Telekom Austria, are investing in Eastern Europe, since

these countries have lower fixed, broadband and mobile penetration rates and consequently higher growth prospects than in Western Europe. For instance, Deutsche Telekom is implementing an integrated approach among Croatia, Hungary and Slovakia, where the group has majority shares in the fixed incumbents. In April 2007, Telekom Austria got the green light from the Austrian regulator for the acquisition of eTel, which provides telecom services to business customers and has operations as well as network infrastructure in Austria, Czech Republic, Hungary, Poland and Slovakia. With this purchase, Telekom Austria confirms its strategic orientation in Eastern Europe. Other international operators are typically BT Global Services, GTS CE, which focuses especially in Central and Eastern Europe, and Verizon.

Yet, the incumbents also have to cope with infrastructure providers that are linked to another industry. In Croatia, HEP Telecom and ÖBBTel are subsidiaries of respectively HEP, the Croatian power utility, and ÖBB, the Austrian Federal Railways. In 2006, ÖBBTel enlarged its data network to Croatia. In Poland, Telekomunikacja Kolejowa is a spin off of PKP, the Polish National Railways. Although the company services first the railway industry, it also provides telephony, Internet and data services to other telecom operators in Poland.



**Fig. 2- Total fixed line wholesale revenues in million euros and ratio on total fixed line retail revenues by country in 2006**

### Fixed line wholesale revenues

In Austria, in the fixed line market, wholesale revenues amount to around 21% of the total fixed line retail revenues, as shown in Fig. 2. The main wholesale revenue stream comes from fixed line voice services, but they should represent a decreasing share of the total wholesale revenues: from 66% in 2004 to 60% in 2006 to 50% in 2009. This decrease is mainly due to the fixed mobile substitution and the rise of unbundled lines in the Austrian market. Indeed, alternative operators tend to increasingly use LLU (and mostly full LLU) to realise their DSL offers: LLU accounted for 16% of the total DSL lines in 2004 and for 23% in 2006 whilst bitstream accounted for 19% in 2004, but only for 14% in 2006. In 2009, over 30% of the DSL accesses should be based on LLU. Another trend is the rise of IP services. Indeed, carriers are by and by switching their backbone over IP. Besides, in the near future, VoIP services should gain in importance, leading to an increase in demand for VoIP interconnection.

In 2006, total wholesale revenues from fixed line revenues are the highest in Austria (compared to the other countries under scope), yet the share of these revenues on the total fixed line retail market is higher in Czech Republic. As regards the other countries, their fixed line wholesale revenues amounted to less than 20% of their fixed line retail revenues, i.e. over 15% in Slovakia and Slovenia, around 15% in Croatia and Hungary, and 13% in Poland. These countries differ also by the revenue repartition, as depicted in Fig. 3.

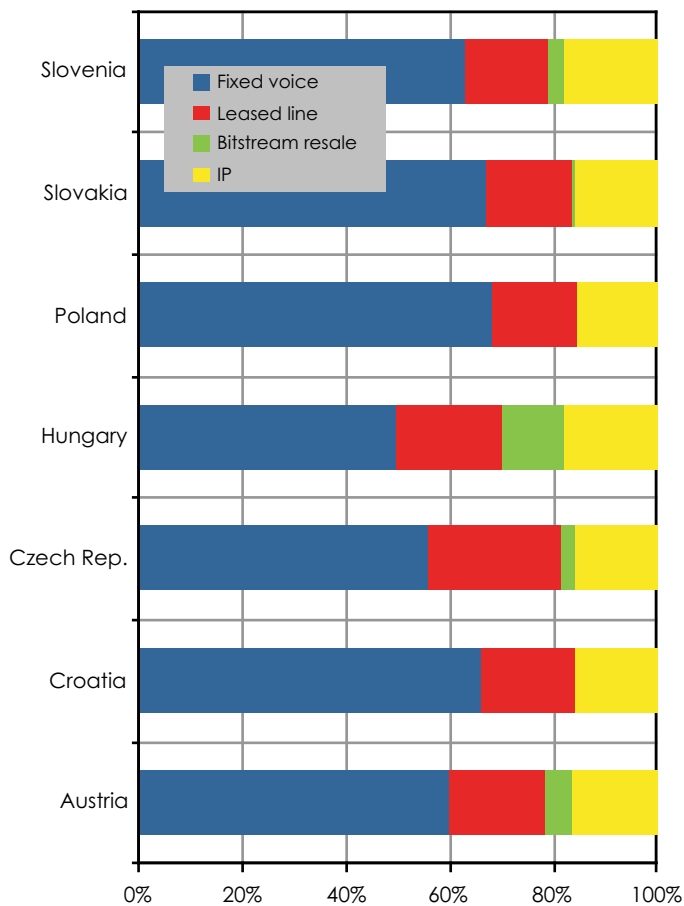
- Croatia, Poland and Slovakia are the countries with the highest share of voice revenues, i.e. over two thirds of the total fixed line wholesale revenues;
- Czech Republic, Hungary and Slovenia have a sizeable share of bitstream revenues;
- Hungary has a very high share of bitstream revenues in comparison to Austria and the other countries;

- Besides, Slovakia has also some revenues from bitstream, unlike Croatia and Poland, and the size of its fixed line wholesale market (based on relative revenues) is in between the Austrian market and the Slovenian market.

In Czech Republic, in 2006, wholesale revenues from fixed line carriers amounted to 25% of the total fixed line retail revenues. As regards the fixed line wholesale market, data services accounted for 45% of the total revenues, of which 3% came from bitstream services. In 2006, there was a wave of consolidation in the Czech telecom market, leading to an increased competition in the wholesale market and a downward pressure on prices, especially for leased lines and data services. Yet, there was also an increasing demand for new services, such as high capacity data services and LLU.

In Slovakia and Slovenia, fixed line wholesale revenues represented between 17% and 19% of the total fixed line revenues. Wholesale revenues from data services represented less than 40% of the total fixed line wholesale revenues; yet, they were relatively a little higher in Slovenia than in Slovakia, especially due to a more advanced regulatory framework in Slovenia. However, in both countries, there are some issues regarding the practical implementation of some regulated access products, in particular LLU, as well as the independency of the national regulators.

The Hungarian fixed line wholesale market amounted to 15% of the fixed line retail market. The fixed line wholesale revenues were characterised by rather high shares of revenues from data services (50% of the total wholesale revenues), in particular bitstream access (almost 12%) and IP services. Hungary is indeed a transit country for many international carriers, since it builds a bridge between Western and Eastern Europe.



**Fig. 3- Total fixed line wholesale revenue repartition by country in 2006**

In Croatia and Poland, the telecom markets are taking up a little slower, especially due to a quite recent regulation in the wholesale markets. In 2006, the total fixed line wholesale revenues amounted to 13% to 15% of the total fixed line retail revenues. Revenues from voice services amounted to over two thirds of the total wholesale revenues. Bitstream is not implemented in both countries. However, in Croatia, the wholesale revenues amounted to an increasing share of the total revenues of the incumbent thanks to the entry of new fixed and mobile operators in the market and the development of new services. For instance, in 2006, T-HT concluded LLU agreements with six operators. The total national wholesale revenues should increase by 40% between 2006 and 2010, compared to around 20%-30% for Czech Republic, Hungary, Poland, Slovakia and Slovenia, and 15% for Austria. By 2010, wholesale revenues should account for 20% of the retail revenues in Croatia, surpassing Hungary and Slovenia.

### Outlook

Wholesale revenues from fixed line carriers should continue to increase over the next years. In Croatia, the decision on the EU membership, which is due in 2009, should particularly foster the liberalisation of the market. Moreover, as Eastern European telecom markets open, new players should enter, increasing the demand for interconnection services or access products. National authorities will play an important role in

the take-up of these products and on the level of competition, since they can oblige the incumbents to open their infrastructure or to lower their prices on some regulated wholesale products. For instance, by 2010, the number of unbundled lines should grow significantly, provided that the fees are reasonable and the delays for opening a line are not "artificially" lengthend.

Besides, international telecom operators such as Telekom Austria should continue to invest in these countries. For the moment, they apparently keep on acquiring local companies to expand their footprint in the region. It will be interesting to see which operators will succeed on the long term in Central and Eastern Europe. ■■