

Broadband market competition report

Executive Summary

This report deals with competition in the wholesale broadband access market (market 12 in the Commission's Recommendation on relevant markets) and its relationship to broadband penetration. As the Common Position on Remedies¹ the analysis is made against the background of a regulated environment, i.e. in case of an SMP finding ex-ante regulation is required which means imposing at least one regulatory obligation to promote competition and efficient investment. The work was originally started in 2003 with an analysis and comparison of broadband market data with regard to penetration and the competitive situation both on the European as well as country level. Based on 15 country studies (provided by the responsible NRAs), the impact of regulatory intervention is analyzed and explained with the theoretical concept of the "*ladder of investment*". At the end of the report conclusions with regard to regulatory strategies are drawn.

The report is structured in 4 chapters:

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|------|---|-------------|
| I. | Market data analysis (empirical evidence) | p. 3 – 12; |
| II. | Country case studies | p. 13 – 29; |
| III. | Analytical concepts (theoretical framework) | p. 30 – 38; |
| IV. | Conclusions | p. 39 – 44. |

The results will inter alia be used as input to the development of best practice and draws on the review of the Common Position on Remedies, but it will also be published as a stand-alone report. As data from more reporting dates (adding data as of 1 July 2005 and 1 Jan. 2006) is available, some trends will be analysed.

The main findings of the report are:

Competition is pushing broadband penetration as countries with more competitive markets (measured by market share of new entrants) tend to have a higher broadband penetration as well as a faster growth. Competition is promoted by NRAs through access regulation in the DSL market, which pulls inter-modal competition. Thus inter-modal competition (mainly between DSL and cable networks) is a result of intra-modal competition on the DSL platform pushed by access regulation according to the concept of the "*ladder of investment*". This concept links a pro-competitive regulation with investment which in turn is pushing broadband penetration, in other words a virtuous circle is created.

The concept of the "*ladder of investment*" is followed explicitly or implicitly by all 15 NRAs (where the legal framework is set up) of the country case studies. The recent developments in European broadband markets confirm that the ladder of investment started to work as the result of regulatory action hoped for thus confirming the conclusions drawn in the first Broadband market competition report (published in May 2005) that the ladder concept can serve as a general regulatory model. It corresponds to the ECNS framework as it encourages efficient investment while

¹ ERG Common Position on the approach to Appropriate remedies in the new regulatory framework (doc. ERG (06) 33), available at <http://www.erg.eu.int/documents/#ergdocuments>.

promoting competition at the same time. The more complete the chain of available access products is, the higher the competitive dynamic (e.g. France, Italy, Norway, UK, Spain). In the 11th Implementation Report published on 20 February 2006² the Commission considered the ladder concept explicitly as a part of the ECNS framework as the following quote shows “the framework’s concept of the ladder of investment³ to continue “While there are many factors that contribute to broadband rollout and take-up, competition is one of the most important”⁴ as it stimulates investment of both incumbents and new entrants⁵.

In order to make the ladder of investment operational, NRAs have to ensure that access products are consistently priced and that proper migration processes are in place allowing new entrants to move on to the next rung whenever they are ready.

Questions:

- 1) Do you think the market data analysis adequately reflects the market development in your country?
- 2) Do you think the country case study analyse the situation adequately in your country?
- 3) Do you think that the overall conclusions regarding the ladder of investment follow from the data analysis and the country case studies?
- 4) Do you think another regulatory model can better explain the development of European broadband markets? If yes, which one and why?
- 5) How do you see the issue of intermodal competition (competition between cable and DSL)?
- 6) Please feel free to make other general comments and to provide reasons to your opinion.

Note:

Recently the ERG consulted on regulatory best practice developed for the wholesale broadband access market (market 12 of the Recommendation on relevant markets susceptible to ex-ante regulation) and wholesale local loop access (market 11).⁶

^{2 2} Available at:

http://europa.eu.int/information_society/policy/ecomm/implementation_enforcement/index_en.htm.

³ 11th Implementation Report, Annex I, COM(2006)68, SEC(2006)193, p. 9.

⁴ 11th Implementation Report, Annex I, COM(2006)68, SEC(2006)193, p. 36.

⁵ According to recent data of Informetecs, alternative carriers invest at a faster pace than incumbents. Cf. Informetecs, December 2005 Biannual Service Provider Capex Analysis: Europe (H1 2005).

⁶ Cf. http://www.erg.eu.int/documents/cons/index_en.htm.

I. Market data analysis (empirical evidence)

Purpose: This part provides the empirical basis. It is a stocktaking exercise acc. to past exercise and gives a static overview of the broadband market situation (market 12 of the Recommendation on relevant markets and related retail broadband markets). Also, a comparative-static analysis will be made in order to assess the market development since the 2005 Report and to analyze the impact of regulation on competition and broadband penetration.

Data collected:

1. Broadband market:
 - Number of retail broadband connections;
 - broadband penetration (by technology);
 - wholesale products used (acc. to definitions of COCOM data collection, cable BSA, naked DSL/bitstream);
 - state of competition (e.g. market share of competitors);
 - other indicators.

The result of the data collection (reporting date: 1 July 2005 / 1 Jan. 2006) is provided in the excel table. As not all NRAs provided data, and in order to get a complete picture the assessment of the market situation in quantitative terms has also been based on the data of the recent document COCOM06-12 ("Broadband access in the EU: situation at 1 January 2006", dated 04 May 2006).

The main results can be summarized as follows:

- broadband penetration is increasing in Europe at considerable speed;
- DSL is the technology mostly used and accounts now for more than 4/5 of all broadband lines, the rest provided mostly via cable;
- it is remarkable that DSL lines grew in 2004 6x faster than cable, overtaking cable in a number of countries and reducing the overall share of cable; the growth of DSL lines is higher than those of other technologies.
- in countries with high shares of cable (NL, Belgium, Austria, Estonia, Malta, Switzerland, the UK), penetration is high, but with the exception of the NL and the UK growth is stagnating, suggesting that broadband growth is DSL based (see also previous point), in Malta growth is split more or less equally between the 2 platforms;
- in terms of absolute numbers of broadband lines added the UK, Germany, France, and Italy are the fastest growing broadband markets, followed closely by Spain and the NL ;
- regarding growth rates, Finland, Luxembourg, the NL, UK, DK, SE, FR are the leaders, followed by Germany (above average) and Austria;
- countries with an already high penetration tend to have high growth rates too (in particular DK, the NL, and FI);
- at the same time, the market shares of incumbents continue to fall, more markedly in the DSL market (see below);
- in general countries with high growth rates/penetration tend to have more competitive markets (measured by the market shares of new entrants) than countries with average or low growth rates as shown in Table/Diagram 1.a and Table Diagram 1.b;

- this suggests that competition pushes penetration;
- the competitive dynamic is more marked for the DSL markets than for the cable markets: the loss of incumbents' market shares in the DSL market is 21.4 %points while for the total broadband market the loss is less than half of it (10.4 %points) as Diagram 2.a shows;
- while at the beginning most new entrants relied on resale, followed by bitstream access, LLU (full and shared access) has taken over as the preferred form of access (cf. Diagram 2.b) and is now the wholesale access product mostly used (with a share of nearly 40%);
- this suggests that migration from bitstream to LLU is taking place, notably in France;
- this suggests that the ladder of investment exists, new entrants are starting to climb up the ladder (cf. 11th Implementation Report) and a move from service-based to access-based competition can be observed (see below);
- competition is (mainly) driven by access regulation and is access-based (intra-modal / platforms) rather than inter-modal (facility-based / alternative infrastructures), although competition from cable operators can be observed particularly in the NL, Austria, Belgium, Estonia, Malta, Switzerland, Spain, and the UK; however, the existence of several infrastructures (DSL / cable) does not automatically mean they are "competing" (the effects varying on a per-country base, see country studies in the Annex);
- the more complete the chain of access products is (and the more complementary the options are a new entrant can choose from), the higher the competitive dynamic (see country studies), albeit the existence of alternative infrastructures has to be taken into account as particularly the example of the NL shows where market 12 (low quality bitstream) was found to be effectively competitive by OPTA;
- thus differences in the effectiveness of access regulation explain differences in competition and accordingly in penetration growth.

Table 1.a

July 2005		
Country	Market share new entrant	BB penetration
Austria	61%	30%
Belgium	51%	40%
Czech Republic	55%	7%
Denmark	44%	44%
Estonia	43%	23%
Finland	34%	37%
France	55%	34%
Germany	28%	21%
Greece	25%	3%
Hungary	47%	11%
Iceland	59%	67%
Ireland	30%	11%
Italy	28%	23%
Lithuania	43%	0%
Malta	75%	26%
Netherlands	56%	54%
Norway	44%	40%
Portugal	20%	29%
Romania	100%	2%
Slovakia	33%	5%
Slovenia	33%	21%
Spain	47%	28%
Sweden	63%	37%
Switzerland	60%	40%
Turkey	0%	5%
United Kingdom	76%	32%
All / Average	48%	25%

January 2006		
Country	Market share new entrants	BB penetration
Austria	60%	35%
Belgium	52%	45%
Czech Republic	48%	11%
Denmark	38%	49%
Estonia	40%	31%
Finland	34%	45%
France	54%	41%
Germany	40%	27%
Greece	30%	5%
Hungary	45%	15%
Iceland	56%	78%
Ireland	33%	16%
Italy	28%	28%
Lithuania	39%	0%
Malta	69%	32%
Netherlands	56%	60%
Norway	46%	48%
Portugal	23%	33%
Romania	98%	4%
Slovakia	30%	7%
Slovenia	39%	28%
Spain	46%	32%
Sweden	63%	44%
Switzerland	59%	45%
Turkey	1%	9%
United Kingdom	77%	40%
All / Average	49%	31%

Table 1.b

July 2005		
Country	DSL market share new entrants	DSL penetration
Austria	31%	17%
Belgium	22%	25%
Czech Republic	23%	4%
Denmark	28%	30%
Estonia	2%	13%
Finland	32%	32%
France	52%	32%
Germany	26%	21%
Greece	25%	3%
Hungary	26%	7%
Iceland	59%	66%
Ireland	24%	10%
Italy	26%	22%
Lithuania	4%	0%
Malta	57%	15%
Netherlands	27%	32%
Norway	40%	33%
Portugal	12%	16%
Romania	88%	0%
Slovakia	21%	4%
Slovenia	2%	14%
Spain	31%	21%
Sweden	43%	24%
Switzerland	36%	25%
Turkey	0%	5%
United Kingdom	66%	23%
All / Average	37%	20%

January 2006		
Country	DSL market share new entrants	DSL penetration
Austria	32%	20%
Belgium	23%	28%
Czech Republic	20%	7%
Denmark	29%	33%
Estonia	1%	17%
Finland	33%	39%
France	52%	39%
Germany	38%	26%
Greece	30%	5%
Hungary	26%	10%
Iceland	56%	77%
Ireland	25%	14%
Italy	26%	27%
Lithuania	3%	0%
Malta	48%	19%
Netherlands	28%	36%
Norway	41%	39%
Portugal	17%	19%
Romania	14%	0%
Slovakia	18%	6%
Slovenia	9%	19%
Spain	30%	25%
Sweden	43%	29%
Switzerland	36%	29%
Turkey	1%	9%
United Kingdom	68%	29%
All / Average	40%	25%

Diagram 1.a: BB access penetration over households / market share new entrants

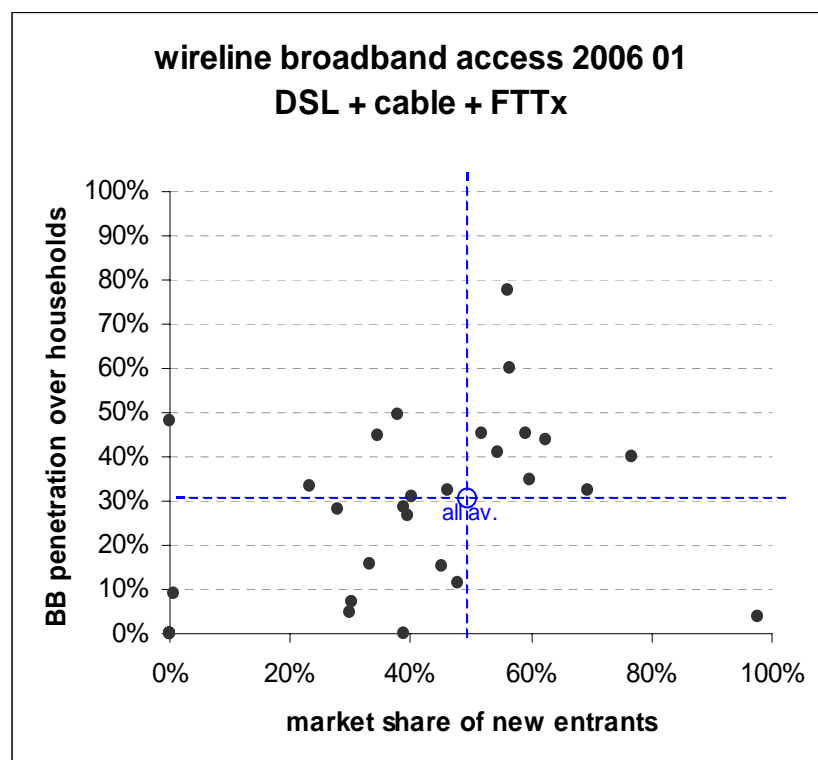
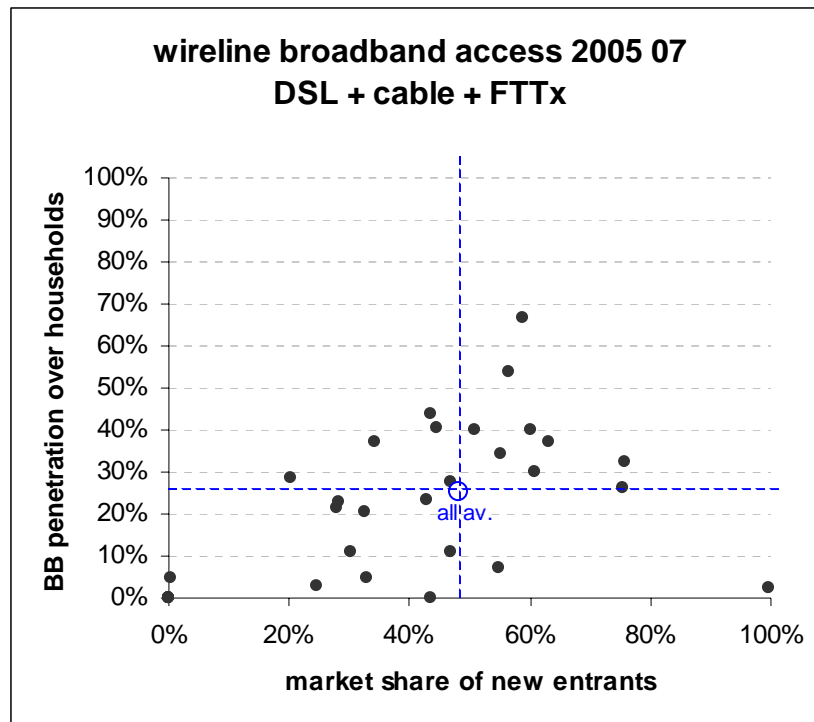


Diagram 1.b: DSL access penetration over households / market share new entrants

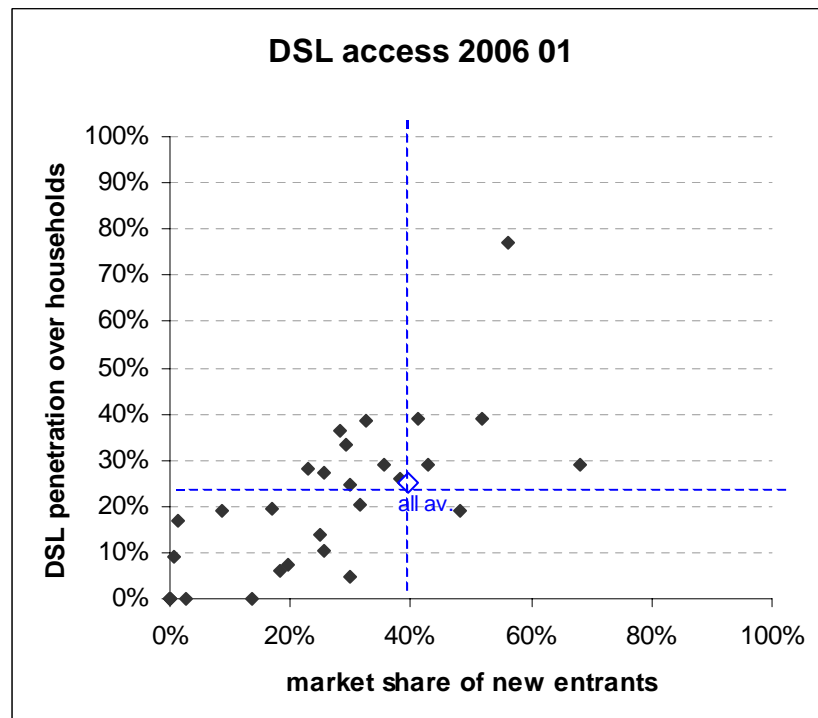
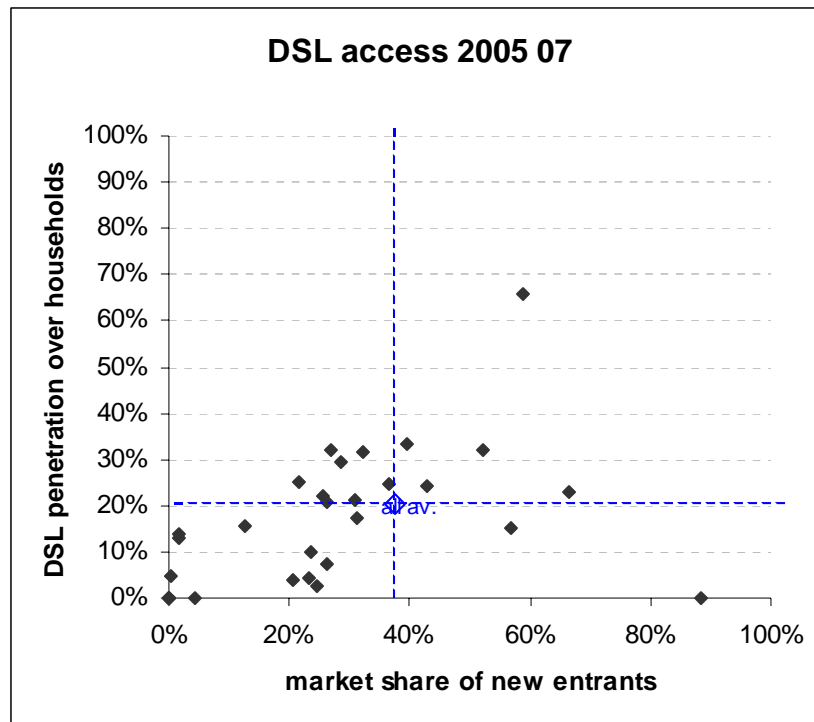
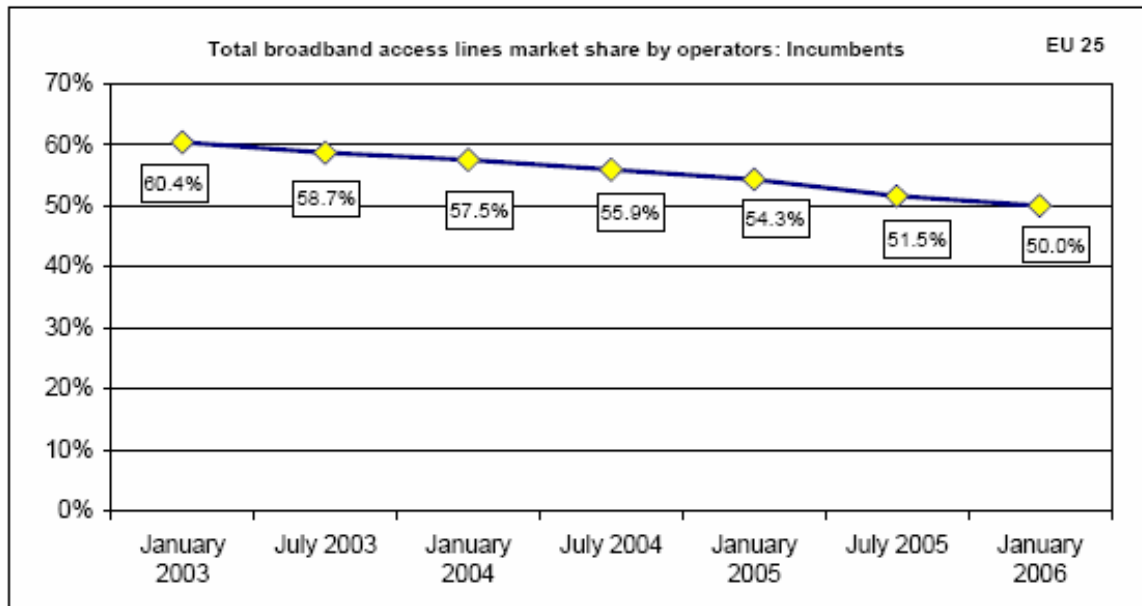
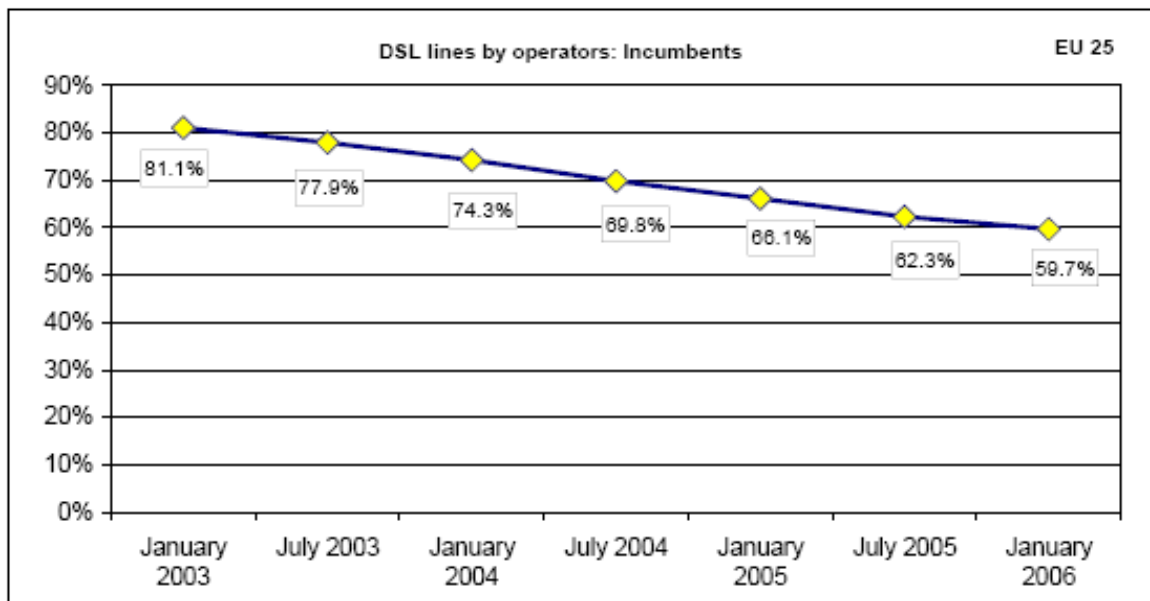


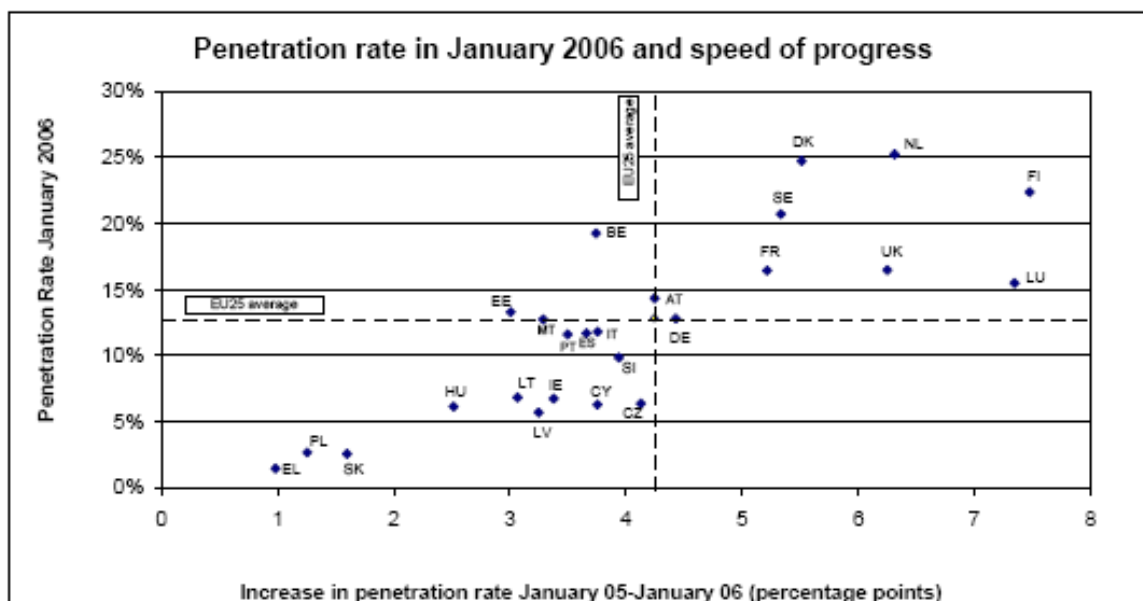
Diagram 2.a



Source: COCOM06-12



Source: COCOM06-12

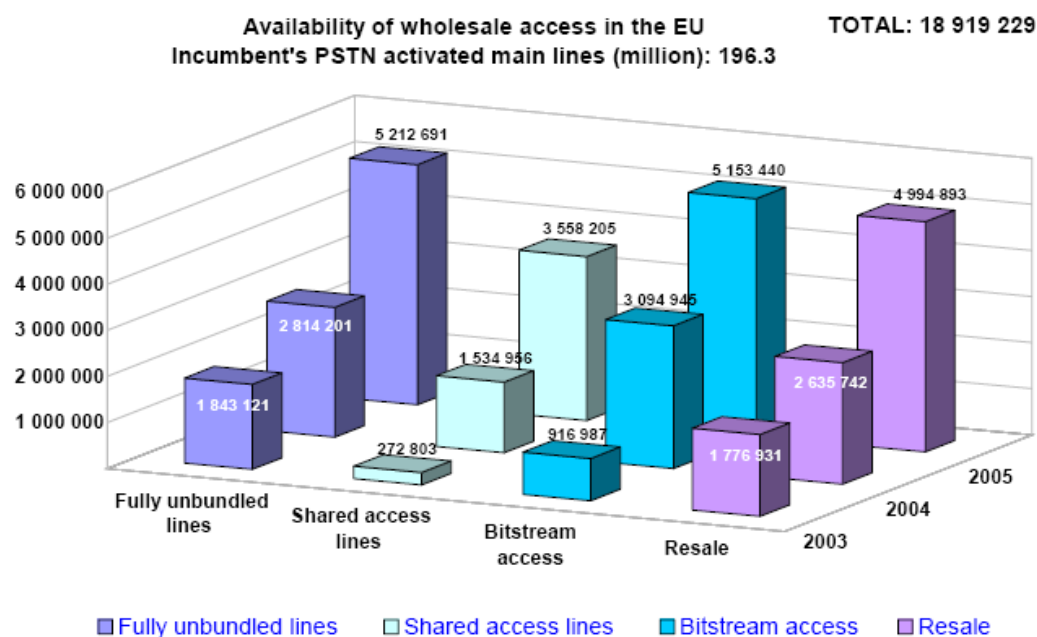


Source: COCOM06-12

This diagram shows that countries with already high penetration, in particular Finland, Denmark, the Netherlands, and Sweden also grow at a higher rate, thus there is a dynamic reinforcing acceleration once a certain basis is reached.

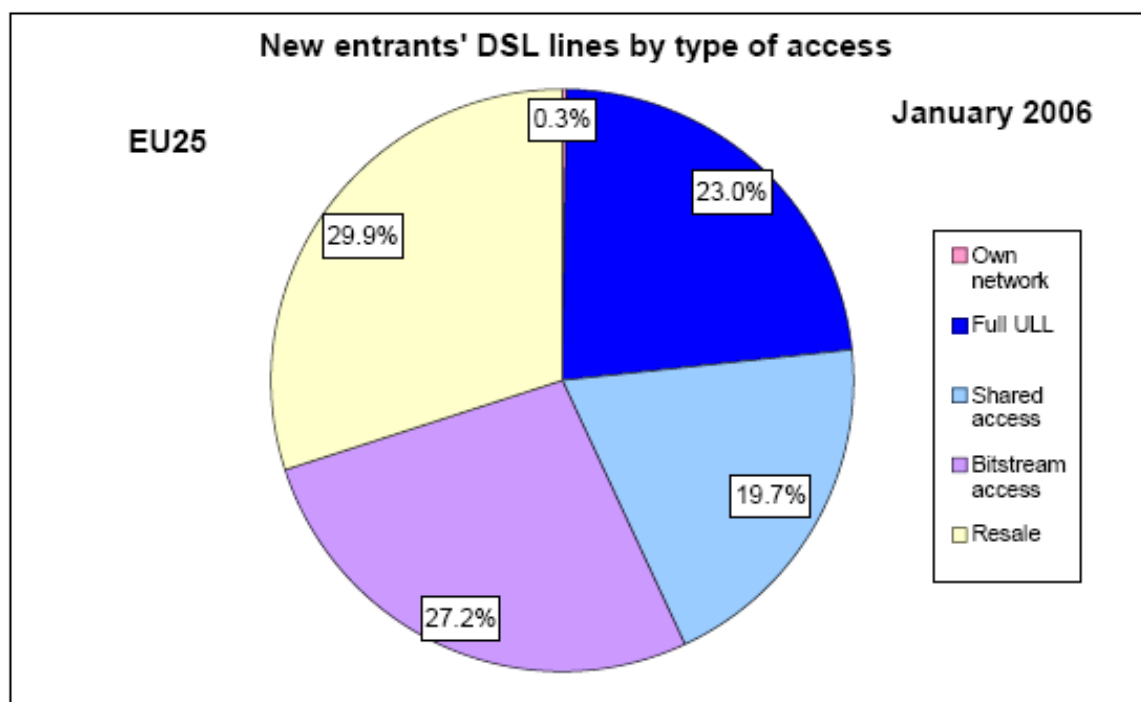
Diagram 2.b: Use of access products

Figure 55

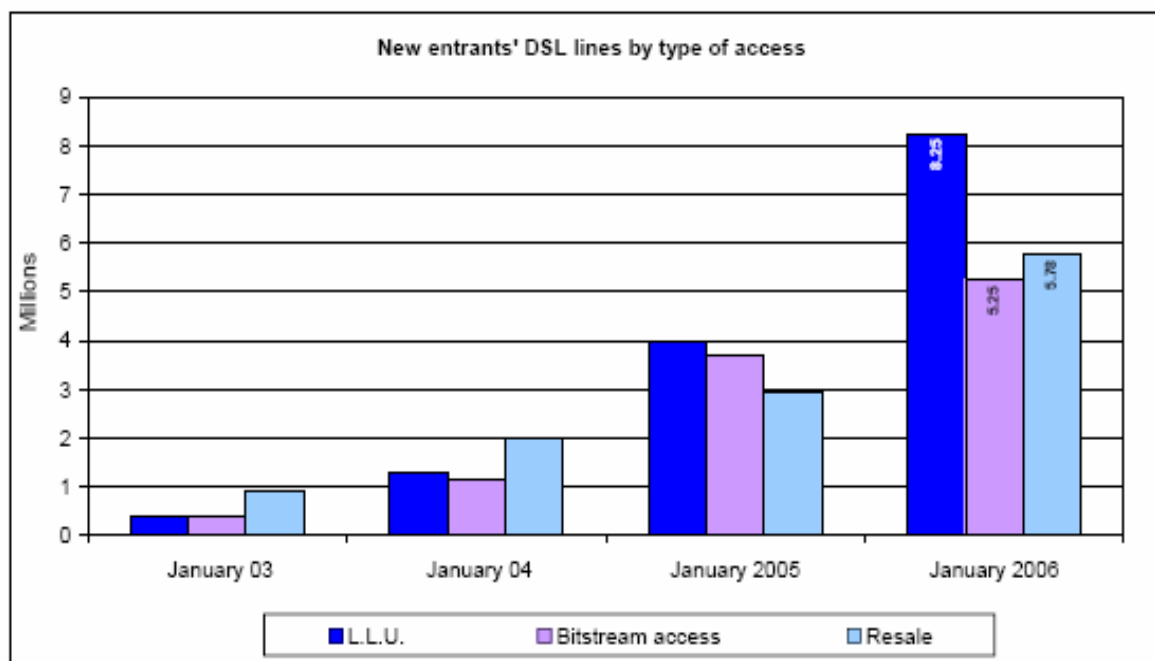


Source: 11th Implementation Report (reporting date 1 Oct. 05)

Diagram 2.c: Use of access products (January 2006)



Source: COCOM06-12



Source: COCOM06-12

The working of the concept of the ladder was confirmed by data presented in the 11th Implementation Report⁷: “Equally, the data show that market entrants are investing more in infrastructure, thus boding well for the sustainability of competition” and even more explicitly stating that “the framework’s concept of the investment ladder is still useful.”⁸ “For example the countries with the highest penetration (above 15%) all have high cable penetration but often also well-developed access regimes such as for LLU or bitstream. There have also been some notable successes such as in France, the United Kingdom, Austria and Estonia, where a combination of competing infrastructure and effective regulation have stimulated competition and resulted in relatively high broadband penetration.”⁹ More recent data (cf. COCOM06-12) support these findings as well as the calculations in the annex including data of 1 July 2005 and 1 Jan. 2006. The fact that resale is surpassing bitstream again is due to 2 effects: in a number of countries new entrants move up the ladder from BSA towards LLU (notably France, Italy, the movement is expected to happen in Ireland and Norway). On the same time Germany has seen an enormous uptake in resale lines accounting for a large part of the growth in resale lines in Europe. The latest data published by the Commission (COCOM06-29, reporting date 1 July 2006) confirms the general tendency further.

The progressive nature of infrastructure investment is in general confirmed by NRAs’ experiences, as several cases have been observed already where alternative operators were gradually rolling out their networks making use of different access products (e.g. going from bitstream access to local loop unbundling). The shift from the lower rungs (resale and bitstream) towards higher forms of access (shared and fully unbundled access to the local loop) became more markedly in the period covered by the 11th Implementation Report (October 2004 – October 2005) clearly indicating the process of moving up the ladder is working in practice as the following quotation underlines: “New entrants are gradually shifting from resale and bitstream access towards local loop unbundling in the provision of broadband services.”¹⁰ France is in general the example quoted most often as demonstrating the progression up the ladder. Most recently, this trend (progression up the ladder) has been confirmed with the data collected by the Communications Committee for its latest broadband report¹¹ As can be seen in the diagrams 2.c LLU continues to increase significantly.

While the shifts towards access products (rungs) higher up the ladder show that regulatory action has started to work in the direction hoped for, the relationship between market shares of new entrants (as a proxy for effective pro-competitive regulation) and broadband penetration (as a proxy for investment) lag behind, but point also in the right direction.

⁷ Available at:

http://europa.eu.int/information_society/policy/ecomm/implementation_enforcement/index_en.htm.

⁸ 11th Implementation Report, Annex I, COM(2006)68, SEC(2006)193, p. 8/9.

⁹ 11th Implementation Report, COM(2006)68, p. 6.

¹⁰ 11th Implementation Report, COM(2006)68, p. 7 and 11th Implementation Report, Annex II, COM(2006)68, SEC(2006)193, p. 57 (Figure 55 –see above Diagram 2.b).

¹¹ Broadband Data – COCOM 06-12 of 4 May 2006.

II. Country case studies

Purpose: The intention of this part is to provide an overview of the situation in different countries and the changes since the last Report. It tries to identify typical developments and thus contains a dynamic aspect. Besides exogenous factors (e.g. population density and dispersion), the broadband market will be influenced by regulatory intervention. The overall aim is to link the market development to regulatory intervention/strategy of the NRA. The motivation/reasoning behind the regulatory intervention should be clear. Therefore, NRAs have described the market situation in their countries and the regulatory objectives as well as the strategy followed to achieve the objectives.

The aim is to identify from the descriptions of typical market situations, that they may require different types of regulatory strategies (types and timing of regulatory measures). The situation can be characterized e.g. by the dominating technology, the dominating wholesale product, the existence of new retail product bundles such as triple play (to catch the impact of new products and marketing strategies). As it is intended to develop a sort of “best practice” guidance, NRAs shall try to distinguish factors that can be generalized from factors specific to national circumstances.

NRAs have covered the following:

- Describe/Update the description shortly the typical elements of the broadband market situation in your country (dominant technology, number of players etc., typical retail offers (speed/type offered, tariff structure [flat rates, packages, others] etc.), commercial strategies of market players (bundling etc.) (*link to BB quality, bundling, pricing from a consumer perspective paper of EU WG, which will be published in Q1/2007*);
- Describe/Update the description of the development of the market (with special emphasis to any changes due to the arrival of Triple play offers); intensity of competition (e.g. parameters of competition – price and/or quality);
- Describe/Update the description of the reasons for regulatory intervention (e.g. result of the market analysis and/or requests for intervention, because commercial negotiations failed or considered too slow, complaints of market players, others, etc.);
- Describe/Update the description of the objectives of the regulatory strategy (promotion of [specific type of] competition, promotion of broadband penetration, others, etc.); Does your NRA follow a particular regulatory model? If yes, which one?
- Existence and impact of Triple play offers on the broadband market and on the regulatory intervention;
- Describe/Update the description of the regulatory measures and the reasoning behind them on a product level (which access products/access points were mandated and why; timing [did you mandate all products at the same time or follow a sequential

approach?]; are **migration processes** available?, did you encounter difficulties in implementing/enforcing migration processes? [if yes, which ones and how did you manage to overcome them?]; price control principles [dynamic access pricing?, cost-orientation, retail-minus, others; margin squeeze testing?]; operational issues / SLAs; change of strategy since last Report (reasons? E.g. the strategy did not have the expected effect, failed);

- Are new access products such as “naked DSL/bitstream” related to VoIP offers available in your country? Please describe the products and their regulatory treatment (since when do they exist, did you mandate them or where they voluntarily offered / commercially negotiated, etc.);
- Others such as geographical dimension and e.g. role of local authorities.

These elements allow conclusions to be drawn on the impact of regulatory interventions (see Chapter IV) on the broadband market and more specifically to assess the impact on the market/competition development as well as broadband penetration since the last Report.

Country cases: see Annex II

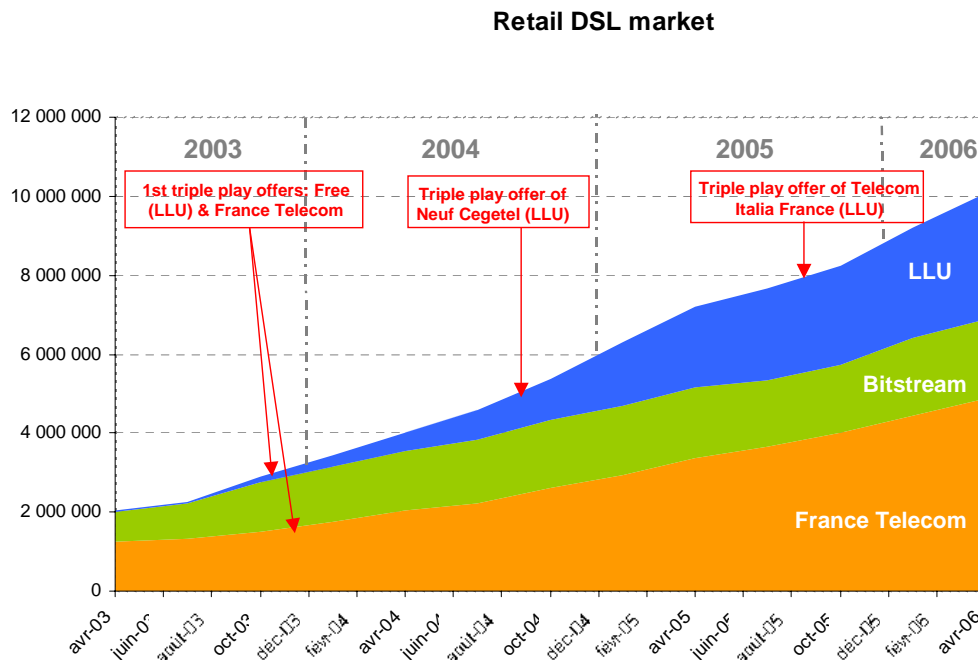
1. France	p. 14;
2. Italy	p. 16;
3. Spain	p. 17;
4. Portugal	p. 18;
5. Austria	p. 19;
6. Germany	p. 20;
7. The Netherlands	p. 21;
8. Norway	p. 22;
9. Sweden	p. 23;
10. Ireland	p. 25;
11. Malta	p. 26;
12. Belgium	p. 27;
13. Romania	p. 27;
14. Slovenia	p. 28;
15. Turkey	p. 29.

1. France

In France like in Spain and the UK the complete set of wholesale access products is available to new entrants, shared access being the preferred option making France the country with the highest number of shared lines. ADSL Connect ATM (ACA, ATM bitstream offer) – and LLU were both available since 2000, but were not attractive enough to incite the OLOs, who only used “IP/ADSL”, (France Télécom’s IP wholesale offer) delivered at a national level until ART intervened (on its own or upon request of SP) to modify the BSA offer and the RUO. Regarding LLU, two main decisions (2001 and 2002) made the offer especially for shared access more attractive resulting in the take-off observed in 2003. Regarding bitstream, ART had to

settle several disputes in 2001 and 2003, but the offers really become attractive at the beginning of 2004, when France Télécom made the “IP/ADSL” offer available at a regional level, and the ACA tariff-structure evolved, enabling OLOs to benefit from the better origination tariffs with fewer switches connected. Today several bitstream offers are available both at the IP or ATM level, either for the professional or the residential market.

SP offer triple play (VoB, TV, Internet access) in unbundled areas, double play when using bitstream access. ARCEP notes that Voice over Broadband (VoB) was firstly available only with shared access, as an add-on service. Thus, following the successful introduction of VoB in France, which coincides with the take-off of shared access in summer 2003, OLOs began to propose VoB based on bitstream access products, and France Télécom proposed its own VoB service in summer 2004. The diagram below shows the development of the French retail DSL market.



With shared access or bitstream, end users still have to keep their voice telephony subscription with France Télécom. ARCEP expects a shift towards full unbundling when VoB is replacing traditional voice telephony services and notes that this migration started already (150 000 fully unbundled lines). Since July 2006 FT offers a wholesale naked DSL product (stemming from the obligation that the retail product can only be offered if 3 month prior to the launch a wholesale product is made available).

ARCEP like OFCOM considers LLU as the keystone to promote broadband competition and pursues the extension of infrastructure-based competition via LLU. ARCEP considers it essential that bitstream offers are available which can be used to complement unbundling in order to address the retail market at a national scale (“geographical complement” to LLU for the non-unbundled areas). ARCEP regulates bitstream prices in such a way as to guarantee a sufficient margin to LLU providers and to ensure that the movement from BSA towards LLU continues. As a wholesale

market has developed, ARCEP has lifted the national BSA obligation. Besides determining access prices, ARCEP also looks closely at the improvement of the quality of service trying to speed up delivery and facilitating migration (remedies for market no. 12). ARCEP considers that VoIP technology will have a significant impact as it reduces costs considerably and has a potential for increasing competition. The French retail broadband market is characterized by a high level of competition (more than 50% new entrants' market share in DSL). To ensure backhaul between MDFs, ARCEP imposed on FT the obligation to offer dark fibre, however, the offer is slow to materialize.

As an element becoming more important local authorities start promoting competition by launching broadband roll-out projects in non-unbundled areas.

2. Italy

The high growth rates achieved by the Italian market for broadband access in 2004 and 2005 have continued to be experienced during the first 6 months of 2006: at end June 2006 there were 7,661,000 broadband retail lines active, a 39% increase over the June 2005 figure and a 120% increase over the June 2004 figure. This can be attributed to a large extent to the regulatory actions taken by AGCOM (see below).

When TI announced at the end of 1999 its ADSL retail offer, AGCOM deemed it necessary to intervene to avoid pre-emption of the retail market before full implementation of LLU. TI was mandated to provide wholesale broadband access services on a non-discrimination basis, already at this stage, AGCOM also imposed on TI the obligation to provide detailed SLAs for the wholesale offer. As pricing principle AGCOM uses retail minus: OLOs must be able to replicate the retail offer of TI. AGCOM established a strong link: TI is only allowed to launch a retail service when the corresponding wholesale access product is available. In January 2001, in order to speed up competition at retail level, as well as to ensure non discrimination between operators, AGCOM extended the availability to all authorized operators. Although AGCOM originally considered LLU the main form of access, it soon realized that the market dynamics advanced the implementation of LLU too much and thus also mandated a bitstream offer, which is also deemed the necessary complement for LLU providers in areas with less population density. In 2003 AGCOM issued general regulatory guidelines that aimed at introducing more flexibility of wholesale offers in order to allow greater differentiation of end user services. TI must give a 90 days notice before launching a new wholesale offer or modifying an existing wholesale offer. When the changes pertain only to the price of the offer the notice period reduces to 30 days.

With the increase in complexity of the "retail-minus-principle" due to product bundles and the fact that retail prices were relatively high, AGCOM adopted after notification of market n. 12 a revision of the bitstream pricing model moving from retail minus to cost orientation in order to ensure price consistency along the ladder of investment. The market share of new entrants in the broadband retail market is 28%. The use of shared access increased considerably, AGCOM expects a move from BSA to LLU due both to the change in price control measures but even more to more effective migration processes enforced with a new regulation of unified migration processes

according to the principle of the “wish of the customer”. In order to avoid cannibalization of LLU, DSLAM-BSA is available only at non-unbundled MDFs.

3. Spain

The first broadband offers in Spain were made by cable operators in 1998 (but only in some regions), while Telefonica (its ISP) launched its first ADSL offer in 1999. Cable operators offer triple play services, however the presence varies considerably. Cable has a share of 25% of the Spanish broadband lines. From the beginning onwards, Telefonica was obliged to offer ATM bitstream, the price being set by CMT since 2001 on a retail-minus margin of appr. 40% of the retail price for the per user connection charge and on cost-oriented level for the charge per ATM port. The margin covers the additional costs of providing the retail services like network costs (charge per ATM port, backhaul to PoP, IP network, external internet connectivity) and the retail activities (customer care etc, discounts/promotions), the latter considered to make up roughly half of the margin. The bitstream offer was incorporated in the RUO in 2001. New entrants rely mainly on bitstream access, followed by resale. Due to difficulties with the size and dimensioning of collocation rooms, LLU had a slow uptake (starting in October 2001). Only with the 2nd revision of the RUO in July 2004 and subsequent decisions where CMT set conditions for block migration of bitstream connections to full or shared unbundled loops, the use of LLU increased and gained speed.

Up to now CMT tried to find a balance between service and infrastructure competition by setting incentives to move on to LLU use through cost-oriented prices by at the same time use a less aggressive retail minus pricing for bitstream access (margin squeeze issues are a concern with the introduction of metered offers by Telefonica). CMT as AGCOM has changed for the same reasons from retail minus to cost-orientation for BSA pricing and performs margin squeeze tests to ensure consistent pricing of BSA and LLU. CMT is in the process of finalizing the revision of the RUO which became necessary as several disputes emerged due to the success of LLU which caused problems of scarcity of collocation space in several MDFs. In 2006 LLU figures have clearly increased: new entrants are now present at 655 sites and have ordered many more; unbundled loops (full plus shared) are almost 680.000 (end of June 2006). Similar to ARCEP CMT has obliged Telefónica to offer BSA on the regional as well as the national level.

With regard to delivery and migration processes, CMT is monitoring their effectiveness with two newly added obligation: (i) publication of Key Performance Indicators of LLU services and related retail services; and (ii) total transparency of internal forecasts and activities of self-supply by Telefónica (space allocation, site preparation, cabling, etc.).

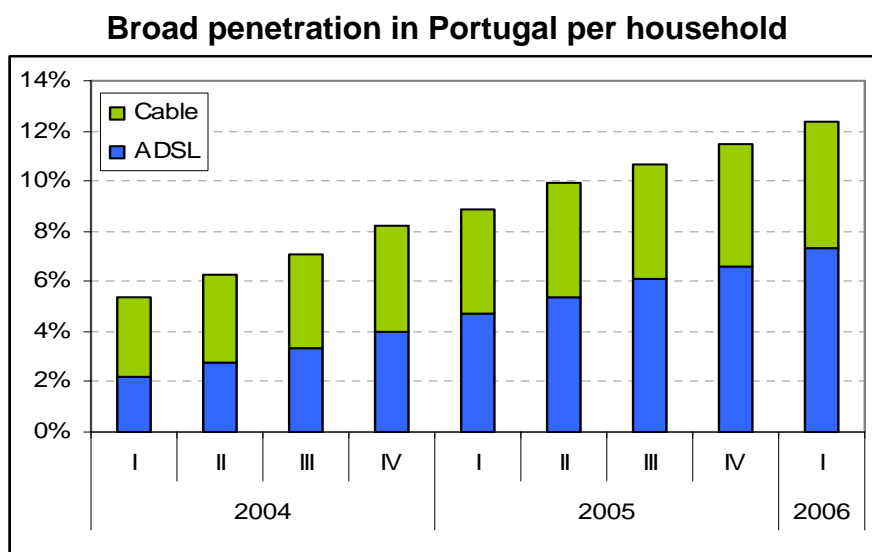
Four market players with massive presence and innovative offers (ADSL2+, Television) are already in the market. Telefónica has also been very active marketing a triple play offer.

Voice over IP has not played any major role in broadband developments so far, ADSL is bundled with voice flat rates offered with CPS, which is possible thanks to capacity-charged interconnection.

With the new obligations, the CMT intends to improve LLU compliance thanks to the greater transparency of Telefónica's self-supply; it will be possible to compare Telefónica's self-provision with LLU services delivery, so that discrimination will be easier to detect. On the other hand, by implementing the new obligations the CMT will ensure bitstream becomes more effective offering more diverse and attractive options to new entrants.

4. Portugal

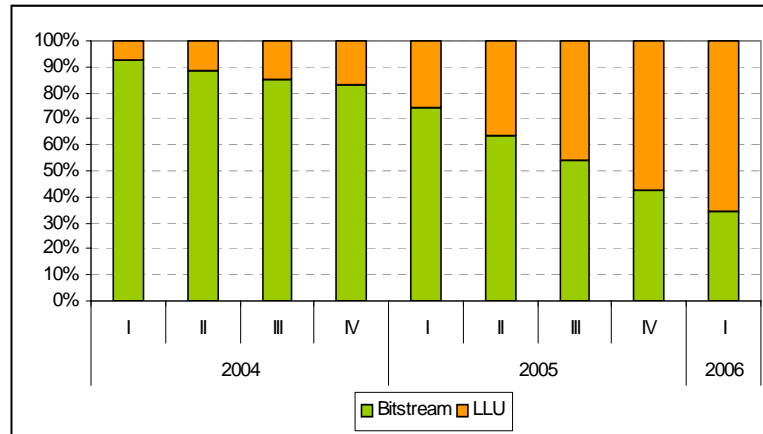
The first broadband offer was via cable modem in 1999, ADSL followed 2 years later in 2001. Currently Portugal has a broadband market structure where DSL has now overtaken cable:



Its characteristic feature being that the PSTN incumbent - PT - also owns the biggest cable network. This limits inter-modal competition. Hence ANACOM in its market no. 12 analysis found PT dominant on both the PSTN network as well as the cable network. After interventions from ANACOM, PT is obliged to offer bitstream access (at IP backbone as well as ATM parent and distant switches). IP aggregation access is still the preferred option. However recently there is an important uptake on full unbundling, following ANACOM recent interventions on RUO: a) on prices; b) processes; c) SLAs specially delivery times and; d) ordering the inclusion of ADSL2 and ADSL2+. It is also important to note that so far ANACOM has been the only country to use Art. 12f) and imposed an obligation of duct sharing on PT which is now on the edge of "going-live".

New operators started promoting higher downstream bit rates through LLU and have announced triple play offers, PT recently followed quadruplicating the DSL downstream rate offer maintaining the wholesale price: ANACOM expects the recent uptake of LLU to continue. While adjusting incentives for infrastructure investments, ANACOM tries to ensure price consistency between access prices: LLU and ATM bitstream, which are set at cost-oriented levels and IP access which has been regulated according to retail minus to ensure replicability of PT's retail offer in order to promote competition as the market share of PT in the DSL market is 83%, overall nearly 80%.

It is quite important to mention the fact that LLU is used increasingly and the first signs of a movement from BSA towards LLU (i.e. climbing to a higher rung of the ladder) can be seen (cf. the diagram below). As regulatory strategy ANACOM is pursuing the ladder of investment concept.



5. Austria

As in a number of other countries, cable operators launched the first broadband offer in 1996 followed 3 years later (Nov. 1999) by the first ADSL offer of TA. Also as in all countries where cable was launched first except Portugal, DSL has meanwhile taken over showing the greater dynamic of the DSL market. Also, cable operators are often present only in regional areas (exclusively serving their individual areas, CATV operators are often owned by or linked to local communities) and cannot compete with TA on a national scale. After launching its ADSL offer, the association of ISP in Austria (ISPA) succeeded together with informal pressure of RTR to force TA to make a bitstream offer. BSA is still the option mostly used by new entrants, but the number of fully unbundled lines has increased considerably and is growing faster than bitstream access which seems to suggest that migration is starting, although both products are used complementarily as in France, Spain and Italy to complete the retail offer. ISPs also offer BSA to other ISPs based on LLU. There are also cable wholesale products offered by cable operators to ISPs. Also, since April 2006 a naked DSL product is offered by TA.

RTR pushed platform competition further, e.g. new WLL (dedicated licensed) frequencies were auctioned in October 2004 with an obligation on the providers to meet a certain minimum coverage until end of 2007 and 2008. The spread of W-LAN hotspots developed rapidly in the last years, offering nomadic/mobile broadband access on airports, train stations, cafes, restaurants, hotels and other (public) places. These offerings typically use frequencies in the license-exempt ("freely available") ISM band. FTTH is provided by the public power supplier to residential households in Vienna, TA starts FTTH roll-out (trials) providing triply-play offers to customers in small villages.

Another interesting fact was the buying of the biggest LLU operator by UPC as the biggest cable operator thus expanding its footprint also in DSL areas.

As the number of households that can be served by more than one LLU beneficiary shows, competition between LLU based ISPs is going on. RTR is following the ladder of investment and considers the right pricing on all stages of the value chain to be critical and continues to regulate LLU on cost-oriented prices, but will also test for margin squeezes between LLU and bitstream access in order not to cannibalise LLU. RTR expects a stimulus from triple play offers over DSL, which would give a push to inter-modal competition. VoIP has not had a visible impact yet. The DSL market share of new entrants reached 31% and nearly double including cable (61%). The bitstreaming offer of TELEKOM AUSTRIA can be seen as a complement to ULL as the main purchasers of bitstreaming are the two largest ULL-beneficiaries. Bitstreaming enables ULL based ISPs to complement their ULL-products to offer services to end customers on a nationwide basis. Over time ULL catches up against bitstreaming. RTR is using the retail-minus principle to regulate the BSA price.

Most of the broadband access products to end customers in Austria are provided by vertically integrated DSL and CATV ISPs. There is a lot of (to a certain degree competing) infrastructure in place.

6. Germany

In Germany DSL is the predominant technology with an overwhelming share of 97%. Germany was one of the first countries to introduce full unbundling, which was available since the beginning of 1998. The number of fully unbundled lines continues to grow at a steady rate and has meanwhile passed the 3.5mio threshold (moving rapidly towards 4mio). Shared access is not much used in Germany as the 53 operators (so-called city carriers) that use LLU also offer voice telephony services via full unbundling (probably the only country where this plays a role). Bitstream access is not available yet, but the decision to impose IP-BSA has been taken and BNetzA expects the RO to be in place (and used) soon. Since the 2nd half of 2004, DT made voluntarily a resale offer of T-DSL (not regulated), which saw a tremendous uptake to 2.5mio lines after DT reduced the price and offered a 2nd resale product (NetRental) on even more favourable terms, giving to ISPs for the first time the possibility to offer customers the access plus the internet connectivity instead of the usual 2 contracts that the customer has to sign, which impeded on competition as it gave DT and its ISP subsidiary T-Online an advantage in marketing. As BSA was missing, so far in Germany, some internet backbone operators (like Telefonica) using T-ZISP (74 handover points, regulated), other ISPs using T-Gate (1 handover point, not regulated), both broadband originating services without direct customer access. The DSL (and accordingly the broadband) retail market is dominated by DT, who holds a market share of 60%.

As a result of the market analysis of market n. 12 DT was designated as SMP operator in both the ATM and the IP part of the market opening the way to impose a BSA obligation. As a result of the notification (at the end of which the Commission withdrew its serious doubts letter), VDSL is included in the market insofar as services delivered via VDSL are substitutable to services delivered via traditional infrastructure. With the missing steps of the ladder, Germany has a less competitive market, but caught up in penetration due to resale and increase in LLU lines. The success of DT's resale offer explains also the increase in the market share of new

entrants which was ar. 40% at the end of 2005 further increasing to ar. 50% during 2006. Also, in a way Germany made life hard for itself as it started at the highest point (LLU) of the ladder requiring a substantial initial investment to reach the MDFs/DSLAM locations (which meant that most of the 53 city carriers with the exception of Arcor and a few others are only present in their local area). On the other hand the high upfront investment for LLU to get to the MDFs and in collocation infrastructure etc. has also an advantage as it allows city carriers a multiple use enabling them to make bundled offers of voice and broadband services, which pays off in the medium term. BNetzA aims at promoting sustainable competition and a diversity of business models as can be seen in the variety of carriers.

An alternative operator (Hansenet/TI) started a triple play offer in the area of Hamburg with an IPTV product included (all based on LLU). DTAG started to roll-out the VDSL network in 10 major cities, but has seen only a small number of customers for the triple play offer (including the premier league).

VoIP offers started in the beginning of 2004, by the end of 2005, 500,000 active users of VoIP are estimated. VoIP services were included in the relevant retail markets and dealt with in the same way as traditional voice telephony services, i.e. the same obligations are imposed.

7. NL

The Netherlands are – besides Belgium and Austria - the country with the highest share of cable modem connections. 40% of the broadband connections is cable (and 60% DSL). Like in Austria, Spain, Switzerland and Malta, cable operators were the first to offer broadband connections in 1998 (followed by an ADSL offer of KPN in 2001), but in all those countries DSL has meanwhile taken over (in 2004) confirming the trend that competition that pushes penetration is coming from intra-modal competition based on regulated access rather than inter-modal competition between alternative infrastructures. In the NL most new entrants' lines are based on shared access, fully unbundling increasing and having a 24% (q3 2006) of all unbundled lines.

High quality wholesale broadband access is regulated in the Netherlands, but not on price. Low quality (consumer) bitstream access is not regulated in the Netherlands. OPTA concluded in December 2005 in its market analysis decision of market 12 that there is no SMP-party on this market. The incumbent does have a voluntary bitstream offer in the market. In the past bitstream access did not turn out to be a crucial step in the latter of investment in the Netherlands which is demonstrated by the quick and high take up of LLU (27% of the unbundled DSL-lines lines are in the hands of entrants). To give new entrants enough incentives to invest in own infrastructure the LLU price for fully unbundled lines was partially based on dynamic access pricing. OPTA has now implemented the EDC price cap on LLU tariffs for the years 2006-2008. LLU prices go further down.

Cable operators and DSL operators (the incumbent and other DSL-operators via LLU) have started to offer Voice over Broadband (VoB) services. OPTA's market analysis shows that VoB services are part of the same relevant access and conveyance markets at the retail level as traditional fixed telephony (PSTN) services. OPTA applies a price squeeze test for both PSTN and VoB services. However, the

price floor on VoB services is more relaxed than on PSTN services, in the sense that KPN is allowed to use lower VoB tariffs than PSTN tariffs without ex-ante approval by OPTA.

The incumbent and one entrant also offer IPTV via DSL. The DSL retail market share of new entrants is 27%. The broadband market share of cable entrants is 40% and of DSL-entrants 16%. In Q4/2006 KPN has announced its plans to take over one of the DSL entrants (Tiscali). The Dutch NCA is currently investigating this takeover plan.

In 2005 KPN announced that it shall migrate its network to a 'Next Generation Network' during the next few years. With this migration, KPN aims to acquire a cost-effective broadband IP-network through which it can provide future electronic communication services. KPN will remove the circuit-switched telephony exchanges and the MDF-locations and part of the local loop between the MDF locations and the cable distribution boxes will be switched from copper to fiber. A significant part of regulated service provision in the market for unbundled access, namely MDF access, will be phased out. OPTA published a consultation document about these plans and published a position paper in October 2006. In this position paper OPTA has concluded that there is sufficient motivation for conducting new market analyses in the short term in order to determine what (potential) competition problems (could) arise in the various relevant markets (markets 11 and 12 and the market for SDF backhaul) and what other access options there must be in such a case to mitigate the effects of phasing out MDF access.

8. Norway

In Norway most broadband connections are provided via DSL technology, however there are also cable modem connections accounting by the end of June 2006 for 14%. At the same time 50% of the households had access to broadband. Telenor had a retail market share of nearly 51% at the end of June 2006, so the Norwegian retail market is quite competitive. In Norway a so-called naked DSL service (without a voice telephony subscription) is available to customers. However, if the end-user chooses not to have a PSTN/ISDN service any longer, the broadband provider has to compensate Telenor for the difference between full and shared access. This difference is currently at approximately 7 € (excl. VAT).

There has been a strong increase in both the number of broadband subscribers and the number of VoB (Voice over Broadband) subscribers in Norway during the last year. By the end of June 2006 there was 1126 921 broadband subscribers in Norway. 282 871 of these users are subscribers to VoB services. NPT has not documented any direct impact of VoB services on the sales of broadband yet. There are however reasons to believe that the number of VoB users will still increase and that this will have a positive effect also on the uptake of broadband.

NPT intervened several times to improve the RUO (requiring cost-orientation of the voluntarily LLU offer Telenor made in spring 2000), in particular decisions were made by NPT in July 2001 with regard to i.e. fault handling and SLAs, also for collocation NPT intervened imposing report obligations on Telenor for all cases where requests were turned down. NPT inspected collocation space (in 3 exchanges). The price of shared access foresees a 50/50 split of costs between telephony and broadband

services. A bitstream access offer is available since 2001 on a non-discrimination basis (reasonable requests, no price regulation). A complete set of wholesale products is available to new entrants. In 2004 a migration process was set up as one provider migrated most of its customers from bitstream to LLU with “bulk pricing”. The objective of the interventions on LLU was to ensure the availability of functioning wholesale products.

As ARCEP and OFCOM, NPT considers market no. 11 as the cornerstone for sustainable infrastructure competition and is committed to a strategy of supporting possible investments according to the ladder of investment. The market analysis notified in January 2006 to the EFTA surveillance authority found Telenor SMP operator both in market 11 and 12. The decisions were made in February 2006. For market 11 NPT imposed all obligations, for price control a price-cap is implemented foreseeing 2 reductions of the LLU monthly rental fee (30%). This is however expected to have no significant negative effect of the roll-out of fibre and other access technologies by alternative operators. These investments are primarily driven by other factors. Tele2 – one of the main competitors in the broadband market – recently announced its strategy to shift from BSA to LLU in order to counter increasing competitive pressure with differentiated products, thus NPT expects a movement up the ladder.

9. Sweden

Technologies for broadband access

The Swedish market is characterized by a mix of technologies, DSL being the predominant technology with a share of 65 %, but cable and fibre technology are also fairly widely spread. Most new entrants still rely on shared access, followed by resale, fully unbundled lines making up approximately 15 % of all unbundled lines. A bitstream access product is not yet available in Sweden.

Regulated products

LLU is available since March 2000 and regulated at cost-orientated prices since the beginning of 2001. The uptake on the LLU market was initially very slow, but during 2004 and 2005 there has been a substantial growth of LLU-based access lines. There are still competition problems related to the provision of LLU-based products, however, for example with respect to equal access to information systems. Another important issue has been the financing of building out existing stations where there is no capacity left. The incumbent has signed a contract, regarding co-financing, with the main buyers of LLU-based products and the issue is under the supervision of PTS. Another issue has been the provision of naked DSL, where the incumbent is obliged to provide retail as well as wholesale products without requiring a PSTN subscription. Naked DSL has not yet left any major signs in the Swedish market, however. VoIP has had little impact so far, but is expected to affect the market more profoundly in the coming years as the number of VoIP subscriptions is growing at a fast rate.

Regulatory models

PTS has adopted a regulatory policy for access regulation in a recently published document. PTS believes that the ladder of investment is a fruitful model for regulation

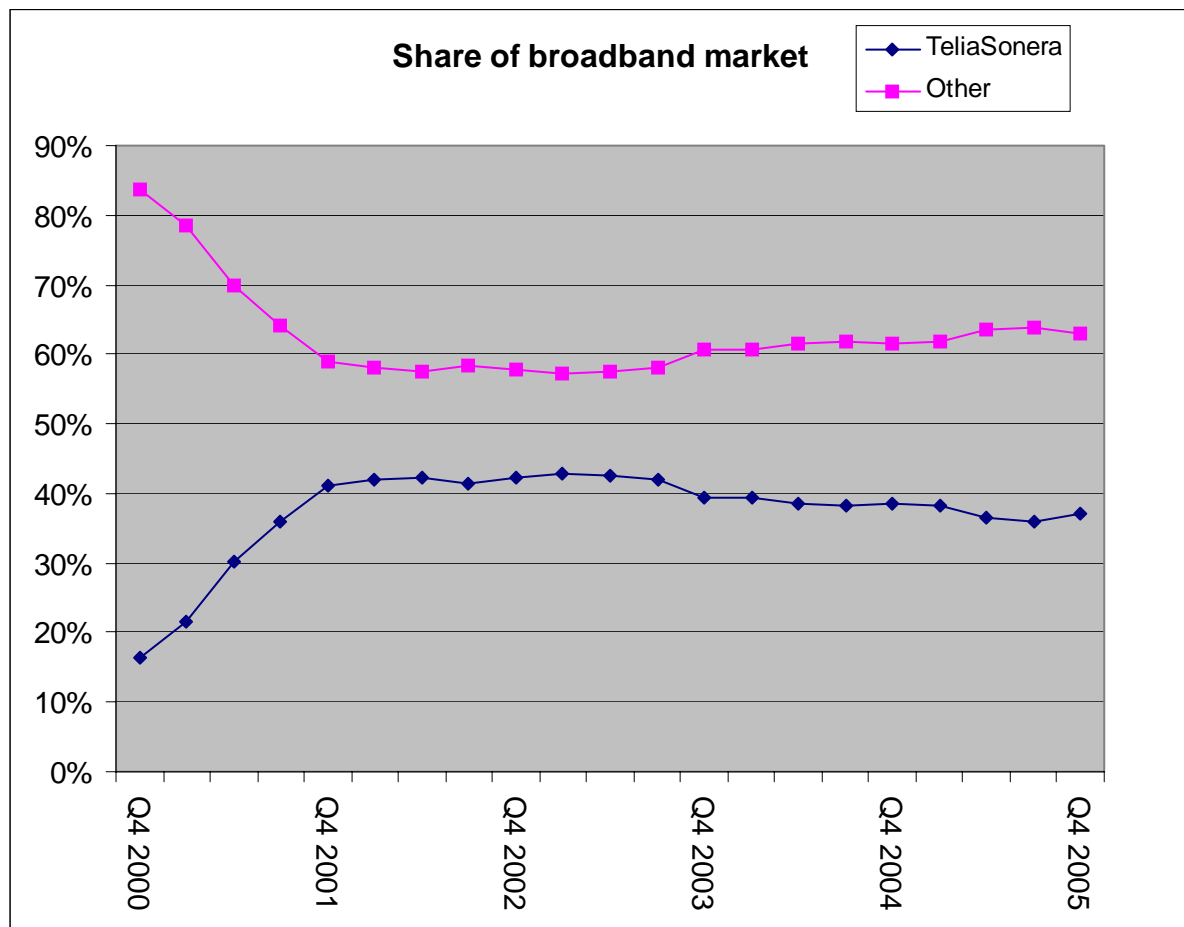
of fixed telephony and broadband markets. As a consequence, PTS is currently working intensely with the implementation of the bitstream access reform in Sweden (the Swedish court, Länsrätten, decided in the spring of 2006 in favour of PTS decision to oblige the incumbent to provide bitstream access).

PTS is currently also working with a national strategy for broadband, with a focus on competition in the broadband markets as well as availability of broadband.

Interesting aspects of the Swedish broadband market

One interesting aspect of the Swedish market is that several operators compete with the incumbent with a resale product based on the LLU wholesale products of the incumbent, which is a phenomenon that PTS considers to be very positive since it is a sign of a higher degree of infrastructure-based competition.

Another important aspect of the Swedish broadband market is due to the fact that Sweden is a country that is large in size, but small with respect to population. Many areas of the country are sparsely populated and it has been shown that there appears to be little incentive for investing in LLU in many of these areas. It has furthermore been shown that there are asymmetric conditions between the incumbent and new entrants, which prevent market entry of new entrants in relatively large areas of the country. Bitstream access has been considered crucial in this context.



10. Ireland

The Irish broadband market is characterized by an 84% share of DSL as the predominant technology, cable following with 7%, but being restricted by historic low levels of investment in the network. Local authorities construct fibre-optic metropolitan area networks with the financial assistance of the Irish government. In 2004 Ireland experienced rapid DSL growth of approximately 500% which was accompanied by a substantial reduction in retail prices. This growth continued in 2005 and 1Q/2006 (see annex), thus an uptake from a low base can be noted.¹² ComReg has mandated bitstream access as well as LLU (both full and shared access). In February 2005 eircom was designated SMP operator and a BSA obligation imposed, for price control measures the retail-minus principle is used. Bitstream access is the option mostly used by new entrants, full unbundling and shared access having developed at a much slower pace. At the end of 2004 two new operators entered the LLU market and commenced the unbundling process.

ComReg also enforced important improvements in processing: bitstream port transfer allows customers with an existing DSL service to migrate to an alternative operator without significant break in service (already in place); integrated LLU and GNP ordering, which means that an access seeker is capable of ordering the 2 services together on a single order is being explored as is the ability to migrate retail customers (single or in bulk) whose services are based on a particular wholesale products (e.g. bitstream, wholesale line rental etc) to a retail product(s) based on LLU offerings. ComReg stresses the importance of 'this simplifying of migration processes for stimulating competition in the provision of broadband services and enabling operators to move to the next rung. As NPT ComReg expects to see a movement from BSA towards LLU.

So far, the impact of VoIP is negligible, but ComReg expects infrastructure-based service providers to use IP technologies that will allow them to offer innovative premium services generating incremental revenue. Therefore ComReg expects VoIP triple plays, which are closely tied to the long-term development of the broadband market. The status of VoIP in the context of the market analysis is currently under review. The first Triple Play offers have arrived, ComReg expects to see more of those with the increase of LLU. New entrants have a DSL market share of 25% and a broadband market share of 33%.

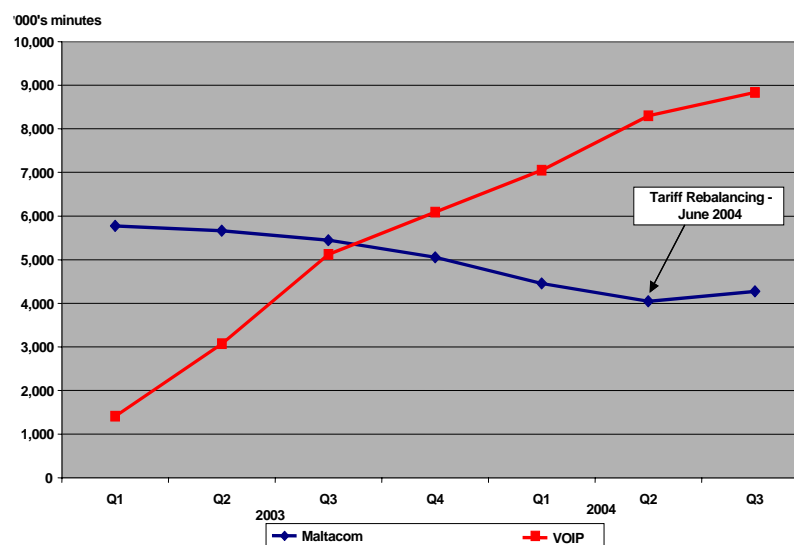
¹² A significant proportion of the new entrants' market share in Ireland is accounted for by Fixed Wireless Access (FWA) customers. FWA is the fastest growing broadband platform in the Irish market. As at March 06 there was estimated to be approximately 55,000 active FWA broadband users which represented year on year growth of 340%. In addition to increases in geographic footprints, a number of leading FWA providers now offer self install broadband which has simplified the connection process for consumers. As these figures have not been taken into account for the calculation, the results underestimate the dynamic of the Irish market.

11. Malta

Malta has seen the first broadband offer from cable operators, meanwhile DSL has taken over with a stable 60:40 relation, penetration equates to about 33% in terms of households or 13% in terms of population. ISPs can retail DSL services based on a resale offer only (no other access forms available so far, a RUO offer has been published meanwhile, but to date no take-up of the service was registered by MCA). On the other hand, cable is retailed by the cable operators' ISP subsidiary only. Under the old regulatory regime, the MCA had mandated third party access (= cable BSA), but this has not been implemented. Pending the outcomes of the ongoing market definition and analysis exercises, which is currently in national consultation stage, regulatory intervention has effectively paused. Once the market analysis is complete, the applicable remedies would be proposed and, if accepted, applied.

Broadband take-up (both DSL and Cable) was boosted in the last quarter of 2004 when providers doubled the connection speed without price increase. this offer was repeated again in October 2005 when both broadband providers doubled the connection speeds with no price increase and reductions in one-off (installation) fees. Comparable to the UK, the DSL market share of new entrants based on resale is 48% and the overall broadband market share of new entrants is 69% (UK: 77%).

With regard to VoIP, it has developed since its start in January 2003 as a cheap alternative for international calls, where it is used as a substitute to fixed telephony international calls, Maltacom is offering VoIP services. The take-up of VoIP services in terms of international calls was phenomenal (see diagram), but the impact on the broadband market is not significant so far (2 SP offering VoBB), probably the critical mass in terms of broadband subscriptions has not yet been reached. In July 2005, Maltacom introduced a Carrier Select service, which effectively competes with the international card operators. Meanwhile, in the same period of time, the local cable operator also launched a VoIP product, however uptake for this service is relatively low so far. Overall, VoIP is therefore not considered to be a driver of broadband take-up, but the evidence is not decisive.



2005 also marked the move towards triple play offers from both the DSL as well as the cable operators.

In October 2005, the MCA issued 3 grants of rights of use of spectrum in the 3.5GHz band for nationwide broadband wireless access (BWA) hoping for a roll-out of a new infrastructure thus reinforcing an environment favourable to inter-modal competition.

12. Belgium

The Belgian broadband market is characterized by a high share of cable connections (40%) and inter-modal competition going on between DSL operators and cable operators as both infrastructures have near to total coverage (98.5%).¹³ The complete set of access products (LLU, (ATM-)BSA, resale and naked DSL) is available since 2001. BIPT has seen a movement from resale to bitstream, however differentiation of retail offers is not a factor to choose unbundling, which depends more on cost advantages (when reaching a critical mass of customers per MDF). This explains the low start of LLU which only increased in speed in 2006. Belgium is the only country to regulate the LLU charge according to the retail-minus principle, but is developing a cost model now. BIPT emphasises the need for transparency and therefore plans to improve the SLA offer including key performance indicators (incl. QoS for retail services).

VoB services are offered. As traditionally most Belgian households got their services from 2 operators, triple play offers managed by only one operator are not common in Belgium. However with the introduction of VDSL2 by Belgacom (and a TV over DSL service) the situation might change. In order to manage spectrum efficiently within the access network which gets more complicated with new transmission technologies (such as VDSL2), BIPT has set up and chairs an industry working group for the Spectrum Management of copper pair cables.

13. Romania

At the end of June 2006, the Romanian market shows an interesting feature as mobile access (offered by a CDMA2000 operator) accounts for 42% of all broadband lines in Romania, followed by cable with about 28% of the market and UTP/FTP cable with 22%. DSL is still small (3.8%), but very dynamic (growth of 516% in the first 6 months of 2006). RomTelecom launched the DSL offer in 2005. The 2 main cable operators offer triple play services.

Considering LLU as important to promote infrastructure competition ANRC designated RomTelecom as SMP operator on market 11 and imposed an obligation to provide full and shared unbundling as well as to publish a RUO, tariffs are regulated according to cost-orientation. As several provisions of the RUO did not comply with ANRC's decision, ANRC modified its decision in 2006 and further detailed RomTelecom's non-discrimination and transparency obligations. In particular RomTelecom must publish an internal reference offer (including KPI for delivery times, fault repair times etc.). An additional obligation on the incumbent relates to the

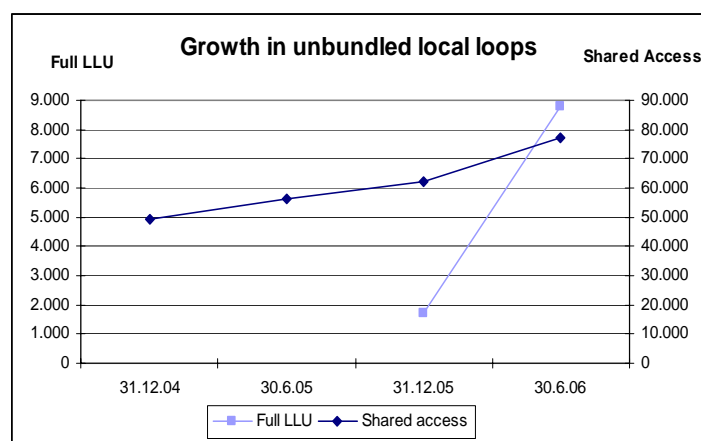
¹³ However, BIPT has also observed difficulties of altnets to compete against the incumbent and the cable operators.

publication, with one year in advance, of plans of modification in the access network (related to deployment of street cabinets and Fibre To The Cabinet).

As a particular remark, the process of incumbent's optical MSAG-ready (Multi Service Access Gateways) equipments installation into its access network inside main cities will have a major impact on the alternative operators' LLU business plans since it significantly increases the number of subscriber lines access nodes and simultaneously decreases the number of subscriber lines per access node. The process notably increases the amount of initial investments needed by the OLOs and diminishes the average number of subscriber lines per installed DSLAM, increasing the risk of business plan failure. Therefore, the take-off of LLU process might not happen in the expected parameters. In 2006, ANRC set up a LLU working group with the main task of identifying viable economical and technical solutions to the problems raised by the installation of optical network units in the access network of the incumbent.

14. Slovenia

While DSL is the main form of broadband access in Slovenia, with 31% cable connections have a considerable share. In 2005 the Slovenian broadband market has seen a dramatic growth of almost 50%, broadband penetration now reaching 27% by households. The incumbent operator SIOL (subsidiary of Telekom Slovenije) has a market share of 82% in the DSL market and 56% in the total broadband market. Telekom Slovenije was designated SMP operator on both market 11 and 12 and in both cases all obligations were imposed. APEK initiated a process of reviewing the RUO, in particular for the provisions regarding collocation. As the following diagram shows, shared access as well as full unbundling (albeit to a lesser extent) have seen an uptake in the last year.



Based on unbundled local loops and subloops, last year a number of operators in Slovenia began to provide commercial VoIP telephony services to end users via broadband access. Thus the impact of VoIP on broadband in Slovenia is noticeable considering that the service was launched only in the second half of 2005. Two new entrants offer also IP TV as part of triple play offers, cable operators have not yet upgraded their networks.

15. Turkey

As in many countries, first broadband offers in Turkey were provided over cable infrastructure. However, as in Portugal Turk Telekom (the voice telephony incumbent) built the CATV infrastructure initially in 9 big cities and the provision of CATV services started in 1991. ADSL speeded up over the last year. 816,237 subscribers in 01.07.2005 has increased to a level which is two and a half times higher than before and reached 2,094,800 subscribers by the date of 01.07.2006. Although the retail ADSL tariffs and wholesale tariffs (simple resale with 18% mark-up) had been approved simultaneously by TA (Telecommunications Authority), alternative operators were not interested in simple resale.

The introduction of the DSL bitstream offer was delayed due to Turk Telekom challenging TA's price decisions. The following dispute resolution procedure (after alternative operators complaint) has been resolved by TA, and draft contracts regarding DSL bitstream access are about to be signed between the parties.

Since 1 July 2005 the communication regarding LLU is in place and TA assessed the RUO submitted by Turk Telekom in October 2005 and asked Turk Telekom to revise several provisions after conducting a public consultation. The renewed RUO was submitted in May 2006 and approved by TA in November. The contracts have not been signed between the operators yet, so LLU is not operational currently.

Simple resale, BSA and LLU are the options of the alternative operators in order to provide broadband access. Currently the market share of the incumbent (Turk Telekom) in broadband services is about 99%.

III. Analytical concepts (theoretical framework)

Purpose: The purpose of this part is to underpin the results found with regard to the concept of the ladder of investment (Cave's ladder of infrastructure investment) with the developments / regulatory strategies followed by the NRAs since the last Report. In other words the concept of the ladder is tested against empirical evidence and practical experiences from NRAs when implementing regulatory measures. The concept of the ladder of investment was also reinforced by the findings of the Commission's 11th Implementation Report.¹⁴

Furthermore, the concept of the ladder is refined (e.g. complementarity of LLU and BSA etc.) and dynamic aspects will be looked at in particular (are competitors sitting on different rungs or are there different ladders existing?, see updated Remedies CP¹⁵, pts. 4.2.3 and 5.2.2.3) taking into account the developments and changes since the last Report.

Key questions:

- Linking regulatory interventions to market development:
 - effects of regulatory interventions on the market and competition development and the reasons;
- Generalization of causes (regulation implemented) and effects (market evolution, competitive situation, evolution of broadband penetration);
- Role of structural parameters such as population density and dispersion as well as other country-specific factors ("geographical dimension", measured e.g. share of population covered in relation to total numbers of MDFs);
- Role of timing of regulatory intervention;
- Ladder of infrastructure investment (Cave), consistency of pricing: does it work in practice? What are the conditions to make the ladder concept operational?;
- Relationship between broadband market development and Triple play offers: regulatory model / recommendations for regulatory intervention;
- Best practice guidance based on distinguishing general from country specific factors.

The market data analysis and the country studies both lead to the conclusion that the following hypothesis can explain the market development both in terms of competition and penetration / growth of penetration:

H1: regulation ⇒ competition ⇒ investment ⇒ penetration.

Regulation (mandating access products including consistent price control measures) leads to competition, which then incites investment¹⁶, which in turn pushes

¹⁴ Available at:

http://europa.eu.int/information_society/policy/ecom/implementation_enforcement/index_en.htm.

¹⁵ Cf. <http://www.erg.eu.int>.

¹⁶ Supposing that the new player entered the market and some initial investment has been made, which is necessary even for resellers (marketing investments etc.).

penetration. The underlying process can be explained with the concept of the “***ladder of investment***” or “*ladder of infrastructure construction*” describing a coherent and comprehensive approach to access regulation.

This regulatory model which was developed among others by Prof. Martin Cave¹⁷ assumes that investments are made in a step by step way by new entrants. In order to allow new entrants to gradually (incrementally) invest in own infrastructure they need a chain of (complementary) access products to acquire a customer base by offering their own services to end users based on (mandated) wholesale access. Once they have gained a critical mass generating revenues to finance the investment, they will deploy their own infrastructure¹⁸ taking them “progressively closer to the customer and increasingly able to differentiate their service from that of the incumbent”¹⁹, also making them less dependent of the incumbent’s infrastructure. This involves migration from one access product (or access point) to another (moving to the next rung). Thus “the entrant passes progressively through several stages of infrastructure competition, as it ascends a “ladder of infrastructure”²⁰, the initial phase being service competition, which can therefore be seen as a *vehicle* to infrastructure competition^{21,22}, which is the ultimate aim as it ensures sustainable competition in the long run. Once the process gets started and provided the right regulatory measures are taken (see next paragraph), the process will get its own dynamic and with the different elements reinforcing each other will become self-propelling²³.

In order to kick-off the process as well as to ensure that it does not stop and new entrants keep on moving to the next rung, proper migration processes must be in place and prices must give the right incentives. Therefore pricing of access products must be consistent, i.e. the relative prices must reflect the difference in cost between the products. In other words: the price difference or margin must satisfy the margin squeeze test of covering the incremental costs of providing the “wider” product.²⁴ When rungs are too far away, the move to the next rung becomes too risky, when rungs are too close, it would not pay to move to the next rung. In both cases due to wrong pricing, the new entrant remains sitting on “his” rung without moving on.

When looking at the broadband market, mostly the following wholesale access products are included in the chain, forming the rungs of the ladder starting with the lowest rung:

- resale;
- bitstream;
- shared / fully unbundled access.

¹⁷ E.g. Cave, The Economics of Wholesale Broadband Access, Proceedings of the RegTP Workshop on Bitstream Access – Bonn – 30 June 2003, MMR-Beilage 10/2003. Recently Cave expressed himself more critically in 2 papers prepared for KPN and DT.

¹⁸ Cf. ERG Common Position on Remedies, p. 68.

¹⁹ Cave, Remedies for Broadband Services, Study for the Commission, Sept. 2003, available at http://europa.eu.int/information_society/topics/ecom/useful_information/library/studies_ext_consult/index_en.htm#2003, p. 20.

²⁰ Ibid. p.10.

²¹ Cf. ERG Common Position on Remedies, p. 68.

²² This does not imply a complete duplication of the access network, thus only *efficient* investment shall be encouraged to promote infrastructure competition.

²³ Allowing ultimately to remove regulation.

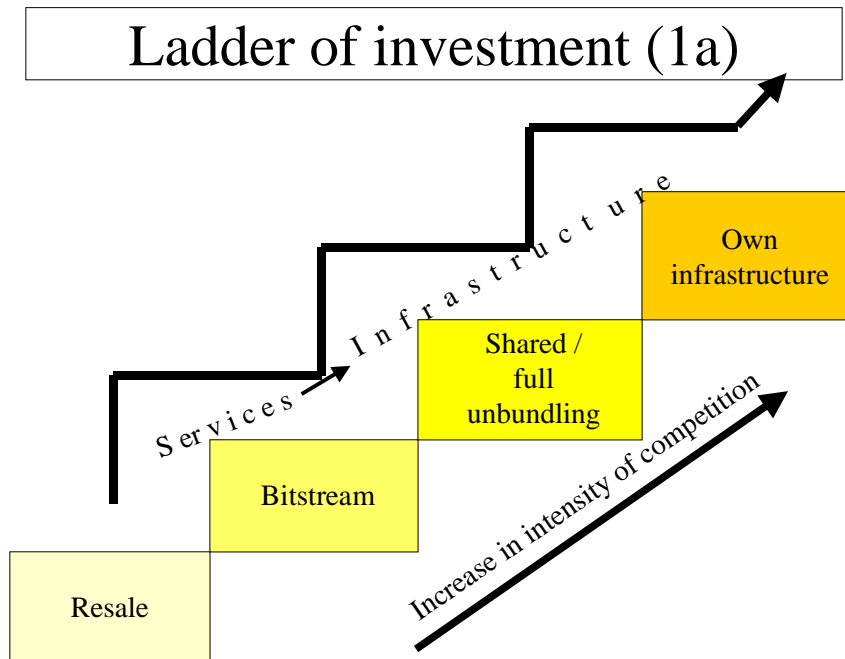
²⁴ Cf. Cave, op. cit., p. 22; ERG Common Position on Remedies, p. 88/89.

Also certain backhaul services (ATM backhaul, ATM broadband conveyance, other backbone transport) may be provided.

Following the logic of the process lower rung access products should be made available first as this allows easy market entry. Thus a sequential approach should start with making the resale option available. In general, all access products must be fit-for-purpose. Also, the process will work the more smoothly the more products are available as moving on becomes easier when no rung is missing. The more complete the ladder is, the more competitive are the DSL markets (see particularly France, Iceland, Norway, Sweden, Austria, Spain Denmark, Finland, Italy). Countries like Germany where a rung in between the two extreme ends of a commercially successful unregulated resale product on the low end and the regulated well established regulated full unbundled access on the upper end is missing (BSA) and which started in reverse order (with the unbundled local loop available first) have less competitive DSL markets and a lower penetration as market entry originally required more initial investment by new entrants. Germany is catching up now to a certain extent as resale is increasing penetration, but with regard to competition the market is in danger of leaning more towards service based rather than infrastructure competition. Another interesting case is the UK, which is one of the most dynamic markets, besides a considerable share of cable connections, resale is still pre-dominant, LLU has taken off now.

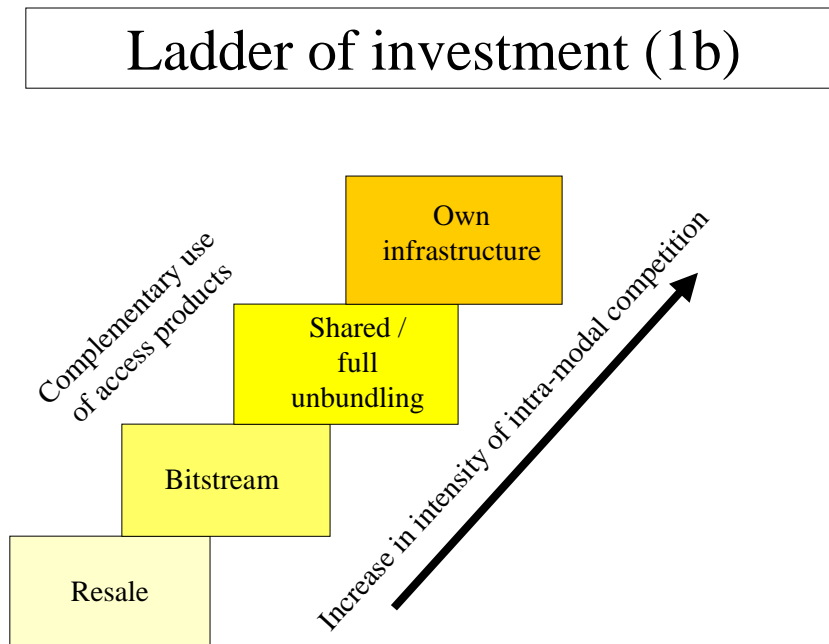
However, in order to be able to migrate to the next rung, it is fundamental that migration is possible without complications, especially without interruption of service for customers. Thus to make the ladder operational in practice, NRAs must ensure frictionless switchover from one access product to the next. In reality incumbents are often reluctant to provide proper handling of migration thus being the cause when new entrants (have to) remain on the same rung. This is surprising as incumbents constantly point out the advantages of infrastructure competition, which means they should have an incentive to comply. As this seems not to be the case in practice, NRAs have to enforce compliance in this fundamental area and monitor closely the design of the processes as well as the handling. A number of NRAs emphasise the importance that migration processes are effective and are therefore closely monitoring migration processes.

The ladder of investment can be presented as follows:

Diagram 3.a

As stated above, the migration from resale to bitstream is taking place, the increase in shared access especially in France, Sweden and Ireland indicates that new entrants are moving on, but it is also important to note that e.g. in France, Italy, and Spain where BSA was available very early, bitstream access is used complementary to unbundling in areas with less density to get national coverage and complete the offer which is an important marketing aspect. Thus the passage is based on the use of 2 access products, but the rationale behind the business model might still be the same: acquiring a sufficiently large customer base first before making the next step in investment (gradually rolling-out further). NRAs should therefore encourage this strategy bearing in mind that both steps may have to exist over a long period. The parallel use of 2 (or more) access products can be presented as a partial overlap of the rungs of the ladder as shown in Diagram 3.b:

Diagram 3.b



Especially in countries with large differences in population density between the various areas of the national territory, it may be that new entrants would need to serve either the whole country or none of it; they may be limited in their ability to just serve the high density areas. In such cases, it is not a serious option for them to use LLU (say) in urban areas unless bitstream is available in less densely populated (rural/remote) areas. Nevertheless, this does not imply that geographical limitation of the bitstream remedy would be appropriate as different players may be relying on national availability. Regulators in those countries should also bear in mind that in order to get competition across the national territory new entrants will also have to be able to serve low density areas economically, which may necessitate the availability of multiple access products²⁵.

In the case of services to corporate customers, the removal of one rung may mean that a new entrant may no longer be able to make a multi-site offer based on different access products and would lose the customer seeking a single source supplier. This may have a significant detrimental effect on competition for the supply of services to such customers. For example, while city suburbs are generally thought to be fertile territory for market players which seek to offer broadband services to residential consumers via unbundled local loops, the same may not be the case for providers which address only the corporate market. There may be insufficient density of corporate customers to justify the overheads of using unbundled loops in such areas. In these cases, the competitor would need to rely on bitstream services. Also, for business customers, who are generally extremely sensitive to quality of service, the functioning of migration processes is crucial for the choice of an operator.²⁶

²⁵ Cf. ARCEP decisions 05-0278 and 05-0280 of 19 May 2005 and 05-0281 of 28 July 2005.

²⁶ Cf. ERG Remedies CP (ERG(06)33) – June 2006

When the process works successfully and investments are made by both the incumbent and new entrants, because competition forces them to invest, penetration increases faster as the investment is born “by several shoulders”. This effect can be seen in Diagram 1.a and 1.b. Further, the recent development in France, Germany, Italy, and the UK seems to suggest that the process of climbing up the ladder gains additional momentum once a certain threshold is passed.

While countries with high shares of alternative infrastructures – mainly cable – tend to have more competitive broadband markets (market shares of new entrants are twice or nearly twice as high as those of new entrants’ in countries with predominantly DSL markets) overall, we can distinguish countries such as Austria, the NL, Belgium and Spain with additional access-based competition from the DSL part from others with less access regulation in the DSL market. In the first group of countries the broadband market as a whole is driven by the DSL part based on access regulation, which causes an increase in DSL which then pulls the cable part of the broadband market. Thus inter-modal competition is a result of the dynamic of the intra-modal competition in the DSL part based on regulated access rather than the cause of a competitive broadband market. Good examples of this positive interaction are Belgium and the NL.

H1 can therefore be specified in the following way:

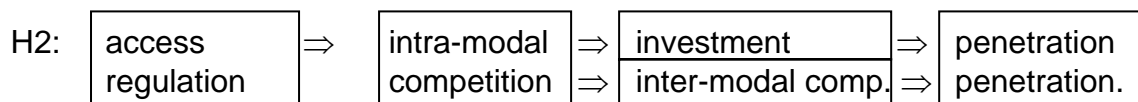
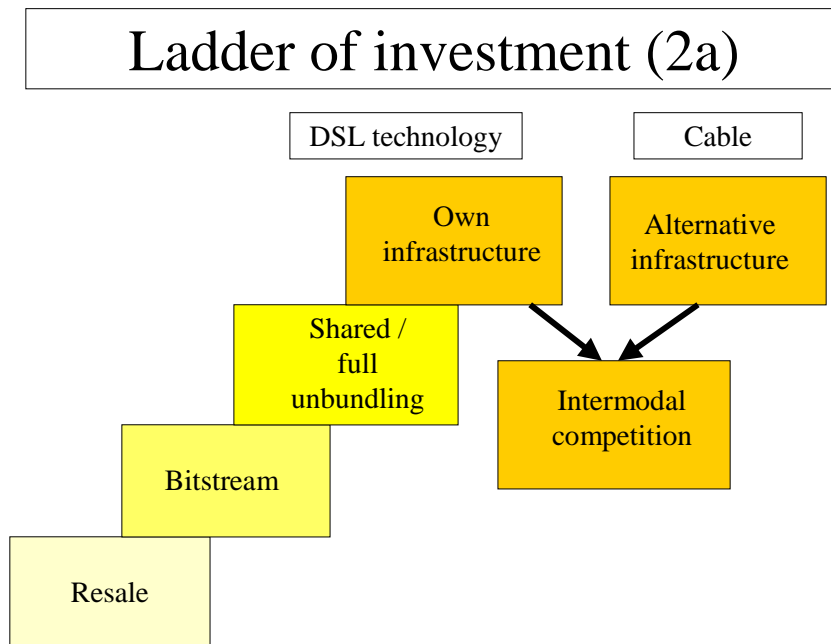


Diagram 4.a shows the ladder of investment including its effect on inter-modal competition²⁷:

²⁷ Note: an operators whose offer is based on bitstream still compete with cable operators on the retail market. Thus inter-modal competition happens at all layers.

Diagram 4.a



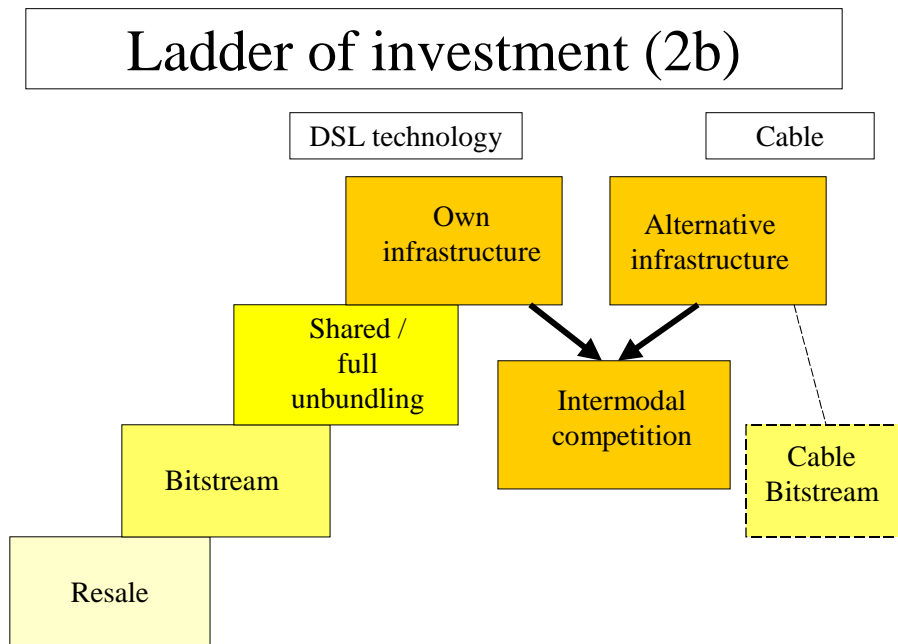
The finding regarding the interaction between DSL and cable in the broadband market seems to suggest that:

- the alternative regulatory model that assumes the mere existence of alternative infrastructures will lead – more or less – automatically to competition and thus considers regulation not decisive or,
- where regulation does not take account of all technologies, which risks distorting the technology mix,

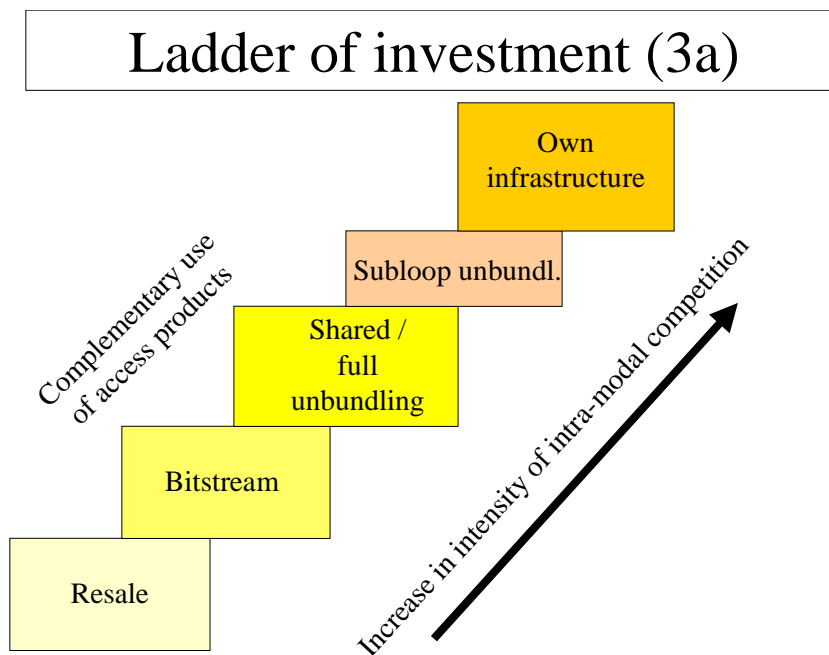
is not a real option. The latter approach can be observed in the USA today and might therefore be called the “American model” while the “ladder of investment” explains the recent European development in broadband markets. It corresponds to the ECNS regulatory framework, which requires NRAs to encourage efficient investment in infrastructure, and to promote innovation (Art. 8.2 FD).

Given the recent fall-back of the share of cable modem connections, the requirement for technological neutrality and the fact that the limited regional extent of cable networks might also limit their ability to compete, NRAs may apply appropriate measures to cable operators²⁸ in order to promote (inter-modal) competition further. The widening of the scope of the regulatory framework and the possibility of technological neutral regulation now provided for by the ECNS framework can stir broadband market dynamics when used adequately by NRAs. This scenario is shown in Diagram 4.b:

²⁸ If found dominant on the relevant market.

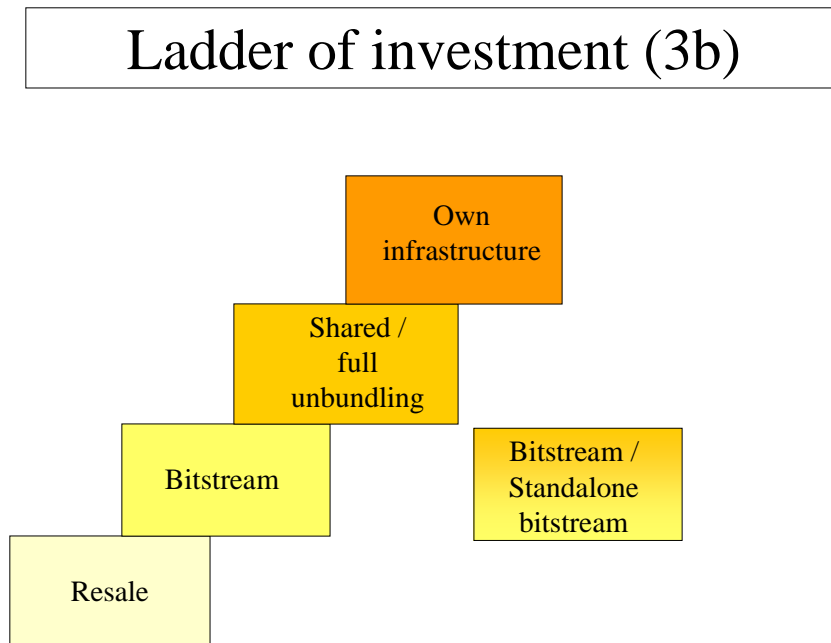
Diagram 4.b

With the arrival of fibre being rolled-out further to the customer, there is an increased interest in subloop unbundling. Theoretically, this “rung” would sit between shared/full unbundling and own infrastructure (see following diagram 5.a). The effects of FFTx on the ladder of investment need further investigating.

Diagram 5.a

Further, we see the arrival of so-called “standalone bitstream” or “naked DSL”, i.e. a broadband connection where the customer is not obliged to take a voice subscription, which is available now either on a commercial or a regulated basis in Austria, Belgium, Denmark, France, Norway, and Italy. This form gains importance as operators can provide voice over broadband. It could be included in the diagram as follows.

Diagram 5.b



IV. Conclusions

Purpose: The purpose of this part is to draw conclusions from the empirical description, the description and analysis of the market development in the country studies and the regulatory interventions since the last Report. Is it possible to identify key factors for success/failure? Do certain strategies only work in certain environments? Are they country specific or universal? If a successful strategy is country specific, why do certain strategies work in some cases and not in others? Are there certain conditions to be fulfilled for a successful regulatory intervention (influence of timing etc.)? Is it possible to identify typical market situations and to link them to certain regulatory strategies? What role do VoIP service offers play for the broadband market? What is the impact of certain VOIP regulatory strategies on the development of these innovative services?

Key factors/areas of conclusion:

1. Broadband market competition

The analysis of the empirical data has shown that broadband competition in Europe is emerging (continued decline of incumbents' market share both in the DSL as well as in the broadband market) as the ladder of investment starts to work. Competition is positively correlated with penetration as countries with more competitive markets tend to have a higher broadband penetration as well as a faster growth. This proves the positive interaction between effective regulation promoting competition in turn driving investment and penetration thus creating a virtuous circle. The finding that competition is the main driver of broadband penetration is supported by an article published by Distaso/Lupi/Manenti²⁹ as well as by the 11th Implementation Report. The 11th Report states that effective regulation is crucial for broadband roll-out.³⁰ Notably shared access has been a "catalyst" for broadband growth in the UK, France and Denmark³¹, showing that unbundling obligations can promote investment.³²

Regarding the process of climbing the ladder, the data of the 11th Implementation Report as well as the COCOM data of reporting date 1 Jan 2006 (COCOM06-12) and the IRG data collection clearly indicate that the mechanism is working as predicted theoretically by the model as the use of LLU (fully unbundled lines and shared access) increased tremendously, LLU now being the main wholesale access for new entrants³³ that are more and more using access products that require investment in deeper levels of infrastructure (substituting lower rungs for higher forms of access). The reason for this move is the intensified competition requiring operators to differentiate their products to be competitive. A prerequisite for the movement towards higher rungs is that effective (fit-for-purpose) migration processes are in place.

²⁹ Walter Distaso, Paolo Lupi, Fabio M. Manenti (2005), "Platform Competition and Broadband Uptake: Theory and Empirical Evidence from the European Union". University of Padua Working Paper. Downloadable at <http://ideas.repec.org/p/wpa/wuwpio/0504019.html>.

³⁰ 11th Implementation Report, Annex I, COM(2006)68, SEC(2006)193, p. 32.

³¹ 11th Implementation Report, Annex I, COM(2006)68, SEC(2006)193, p. 37.

³² 11th Implementation Report, Annex I, COM(2006)68, SEC(2006)193, p. 9.

³³ 11th Implementation Report, Annex I, COM(2006)68, SEC(2006)193, pp. 37, 56/57 (Figure 55) – Diagram 2b-2c).

This also clearly shows that for the movement up the ladder it is not necessary to remove the rungs, but that new entrants progressively move up the rungs out of “self-interest” (“vital interest”) once they have acquired the necessary customer base/volume to make it economically sensible to move up, i.e. when the additional capacity can be filled. The latter behaviour reflects a general economic rationality when deciding on investment: this will be done stepwise in line with the customer base as it makes sense to add additionally capacity only when it is likely that the increment can be filled. There is no difference here between incumbent and new entrant operators: both will gradually roll-out networks rather than in one big jump.³⁴

Where new entrants gradually roll-out their own networks, regulators can start removing rungs corresponding to markets shown to have SMP no longer. As new entrants start using their own infrastructure and climb the ladder, the process might also be reinforced by the offering of wholesale products by new entrants. With competition becoming more intense, NRAs may have to regulate only the “higher rungs”. For example, in France, the Netherlands and Spain, new entrants offer resale or bitstream access products to third parties on the basis of bitstream access or shared/full unbundled access from the SMP operator.³⁵

Any removal of rungs (“tough love”) must be carefully prepared as the example of Canada made clear where the originally devised expiry of the LLU obligation in certain areas had to be postponed, because the thresholds set for alternative access offers proved unrealistic and were largely missed. However, the example of ARCEP removing the national BSA product, because a wholesale market has established firmly shows that the removal of rungs can also be successfully implemented once market forces have started to work as expected.

2. Role of regulatory intervention in promoting infrastructure competition:
Path-dependence (due to national circumstances) vs. one (harmonised) regulatory model (best practice guidance if possible)

The concept of the ladder of investment explains – at least a posteriori – the recent development of broadband market competition in Europe very well and does serve as a regulatory model for NRAs, as markets with the complete set of access products made available to new entrants tend to be more competitive than those where elements are missing or migration does not work, i.e. the distance to the next rung becomes too big (missing access products) or too tedious (poor or no migration processes). Based on the results of the country studies it can therefore be concluded that the more access products are available (“the more rungs the ladder has”), the smoother the process of climbing the ladder runs. The exact implementation of the ladder in terms of timing, pricing and product design needs to be adjusted (“customized”) to national circumstances as e.g. the level of resistance of the incumbents differ (e.g. in some countries incumbents made voluntary BSA offers [Austria], in others incumbents appeal decisions which may be blocked by court decisions [BSA in Sweden] delaying the process) and other structural/exogenous factors need to be taken into account as well. For example, in the NL competition

³⁴ Cf. ERG Remedies CP – Explanatory memorandum (Annex) – June 2006

³⁵ Cf. ERG Remedies CP (ERG(06)33 – June 2006.

between cable and DSL operators is so strong, that market 12 was found to be effectively competitive in the market analysis of OPTA.

In a number of countries migration from bitstream to shared and full access can be observed where migration processes are running smoothly (France) and costs are reduced through bulk migrations (Norway, Iceland). In other countries (France, Italy, Spain) bitstream access and shared access are used complementarily to get national coverage, but e.g. in Spain the CMT set the conditions for block migration from BSA to shared/full unbundled access, which is used in the near future.³⁶ However, the complementary use of several access products may mean that both forms of access should be made available over a longer period. Also, pushed by VoB becoming a substitute for traditional voice telephony services migration from shared to full unbundled access has started already (e.g. France). Again, it has to be stressed that in order to make the ladder operational, NRAs must put the highest emphasis on the design and monitoring of migration processes. The importance of migration processes is mentioned by all NRAs, some already starting concrete action (e.g. AGCOM, ARCEP, OFCOM and ComReg). Also it should not be forgotten that migration needs time to work out.

While last time, most countries looked at in the country studies applied the retail-minus principle for setting the BSA price, due to the advent of bundled retail offers, the application got more and more complicated leading to a change to cost-orientation by AGCOM and CMT. Also, it might create inconsistencies with LLU prices set at cost-oriented levels. BIPT that up to now regulated LLU on a retail-minus basis is now working on a bottom-up cost model to determine the price cost-oriented in the future. In general to make the ladder work, access prices must be consistent. NRAs therefore start applying margin squeeze tests between wholesale products as well as between wholesale and the retail level in order to ensure consistency.

In case suitable (fit-for-purpose) access products are made available at consistent prices and smooth migration processes are in place, a sudden increase ("jump") in demand e.g. resulting of VoIP services uptake, will lead to a move up the ladder and to a faster growth rate, otherwise the process will be slowed down and demand pushed back as new entrants are not able to get suitable access in a timely manner. Access products can be introduced sequentially, but they should be introduced in logical order (starting with the lower rungs) and NRAs should announce their strategy and a timetable to provide a stable planning horizon for all market players to make sound business plans. Once the ladder is established and continued monitoring preserves the availability of consistently priced access products, the process will propel to a higher dynamic as it gathers momentum (e.g. France, UK). This may be linked to passing a certain threshold level.

According to the theoretical model of the ladder of investment, the regulator should not only encourage access, but may actively support the upward move by signalling

³⁶ Lately also more direct forms of migration could be observed: e.g. in Ireland a provider whose principal focus has been on voice (carrier pre-selection) recently entered the LLU market and by-passed the earlier infrastructure phases of resale and bitstream; in Portugal a move from resale to full unbundling was seen, in other countries providers moved from BSA to full unbundling leaving out shared access (to save on migration costs). NRAs should not prevent these direct migrations "leaping over" one or several rungs in case these business models are considered viable by providers.

either through dynamic pricing or sunset clauses that regulation will be removed (thus new entrants should not establish themselves forever on a particular rung, i.e. business models should not be built on the unlimited availability of specific mandated access products). However, at this moment in time while most NRAs are still in the process of erecting the ladder, it is too early to anticipate when and how these elements can be introduced by NRAs in practice³⁷ without risking disruption.³⁸ Even though we also see examples where NRAs start removing rungs (national BSA in France).

Countries with a high share of cable modem connections also promote access-based competition according to the ladder concept and do not rely on inter-modal competition, notably this can be seen in Belgium, the NL and the UK. The only exception is Switzerland, where the legal basis for the introduction of other forms of access (BSA, LLU) is missing. Given the limited regional extension of cable networks, cable operators are not able to compete on a national scale, which limits the possibilities of inter-modal competition.

All NRAs of the country studies follow explicitly or implicitly the ladder concept as a regulatory model, and the success of regulatory intervention can now be seen. The differences to be seen both in broadband penetration as well as in the competitive structure of markets, are due to the starting time of the process, i.e. countries where NRAs started early and in a systematic way to implement the ladder effectively have gained an advantage as the process once started is reinforcing itself (higher penetration is correlated positively with growth rates). The table below shows since when access products were available in the different countries.

³⁷ Until now only OPTA introduced dynamic access pricing (cf. above p. 12/13).

³⁸ Speeding up the process too much may create the opposite effect of new entrants “falling down the ladder” (i.e. exiting the market).

Table 2: Availability of wholesale access products

Country	Resale	BSA	Shared access	Full unbundl.	Cable ³⁹	New entrant DSL market share	New entrant BB market share	BB penetr.
France	1999 ⁴⁰	ATM 03 IP 4Q/03	2002	2001	-	52%	54%	41%
Italy	-	1Q/00	1Q/01 ⁴¹	1Q/00	-	26%	28%	28%
Spain	2Q/99	2Q/99	1Q/01	1Q/01	X	30%	46%	32%
Portugal	-	4Q/00	4Q/01	1Q/01	X	17%	23%	33%
Switzerl.	2001	-	-	-	X	36%	59%	45%
Austria	-	1Q/00	3Q/01	2Q/99	X	32%	60%	35%
UK	2Q/00	2Q/02	4Q/00	2Q/00	X	68%	77%	40%
Germa.	2Q/04	-	2Q/01	1998	-	38%	40%	27%
NL	-	-	4Q/01	3Q/00	X	28%	56%	60%
Norway	-	1Q/01	2Q/00	2Q/00	-	41%	46%	47%
Sweden	2Q/00	n/a ⁴²	Q2/01	Q2/00	X	43%	63%	45%
Ireland	-	2Q/02	1H/02	1H/02	-	25%	33%	16%
Malta	2000	-	1Q/05	1Q/05	X	48%	69%	32%
Belgium	2Q/99	2Q/01	2Q/01	2Q/01	X	23%	52%	45%
Romania	-	-	3Q/04 ⁴³	3Q/04 ⁴⁴	X	14%	98%	4%
Slovenia		3Q/02	1Q/03	3Q/05	X	9%	39%	28%
Turkey	2004	3Q/05 ⁴⁵	4Q/06 ⁴⁶	4Q/06 ⁴⁷	-	1%	1%	9%

3. How to balance the promotion of infrastructure and service competition?

Following the concept of the ladder of investment and especially setting the right access price signals to set incentives for efficient investments is the best way to balance service and infrastructure competition. Emphasis must be put on consistent pricing. The difficulties that arise when using different pricing principles (e.g. cost-

³⁹ This column signals whether cable networks play a significant role (X) or are not/less important (-). The data of the 3 last columns (new entrant DSL market share, new entrant BB market share, and broadband penetration) is taken from Tables 1.a / 1.b (reporting date: Jan. 2006).

⁴⁰ IP offer at national level.

⁴¹ On December 2001, AGCOM issued further detailed technical regulation in order to speed up shared access uptake.

⁴² A commercial BSA product is available for business but not for residential customers.

⁴³ Incumbent's RUO has been available since Sept. 2004. First LLU contract concluded in March 2005.

⁴⁴ Incumbent's RUO has been available since Sept. 2004. First LLU contract concluded in March 2005.

⁴⁵ BSA tariffs have been approved by TK in July 2005, but Turk Telekom and the operators have not signed any agreement up to now and the operation has not been started. TA concluded a dispute resolution process between Turk Telekom and an operator regarding BSA, the agreement is expected to be signed soon.

⁴⁶ The first RUO of the incumbent has been approved by TA at the end of November, but the operators have not signed any agreement up to now and the operation has not been started.

⁴⁷ The first RUO of the incumbent has been approved by TA at the end of November, but the operators have not signed any agreement up to now and the operation has not been started.

orientation for LLU prices, retail-minus for BSA) are mentioned by several NRAs, who try to combine the 2 principles, but this is likely to require a more detailed analysis.

The emphasis on the encouragement of efficient investment in the ECNS framework can be seen as a new paradigm compared to the focus at the beginning of liberalisation to open up the incumbent's network focusing more on – short term/static – service competition under the 1998-ONP framework. Now as the market is further developed, naturally NRAs must look on long term/dynamic issues to ensure that the process of emerging competitive market structures continues to evolve in the right direction with a stable level of competition, while preventing a “swing-back” (re-monopolisation) through leveraging of market power.

In spite of the advent of “new” technologies re-monopolisation is a danger as the example of ADSL2+ and VDSL2 and the difficulties encountered with non-discriminatory implementation show (e.g. Belgium). On the other hand, these new technologies open the chance to (more) inter-modal competition (e.g. video-on-demand and triple play offers of both DSL providers and cable operators providing the whole package to the customer) if NRAs ensure their pro-competitive introduction through appropriate regulatory measures such as availability of suitable wholesale access products. Wholesale offers should enable new technologies in order to promote innovation and competition.

The concept of the ladder of investment corresponds to the ECNS framework and for the moment NRAs should continue to follow it as an approach with a sound theoretical basis working in practice as the examples of France, Italy, the UK, Spain and others show.

4. Outlook

As mentioned above, with the deployment of FTTx, unbundling on the level of the street cabinet (subloop unbundling plus backhaul) becomes more important. Considerable investment of new entrants might be needed to be able to connect to street cabinets.

The economics (or more precisely the “geography”) of LLU have to be taken into account when forecasting future development. This means that there might be a limit in the size of the MDFs up to which it is worthwhile connecting to an MDF (varying according to the distribution/dispersion of the population); after that minimum size the accessible market becomes too small to be addressed and investment will not be recouped. Thus BSA as a “geographical complement” will be needed to ensure competition with differentiated products (quality, not only price) across the national territory⁴⁸. In the future competition between different platforms might not only come from cable operators, but wireless technologies such as WiMax may also play a role.

⁴⁸ It has to be noted that in case the incumbent follows a national pricing strategy, households in rural areas will benefit from the competition in non rural areas.

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Annex I

BB DEFINITIONS

Definitions used in the tables for the collection of data:

- Broadband capacity: Downstream capacity equal to or higher than 144 Kbit/s.
- Retail access: access provided to end users.
- Incumbent: Voice telephony incumbent; Incumbents are defined as the organisations enjoying special and exclusive rights or *de facto* monopoly for provision of voice telephony services before liberalisation, regardless of the role played in the provision of access by means of technologies alternative to the PSTN. Cable operators are not seen as incumbent
- Number of lines: [Incumbent's] PSTN activated main lines: Telephone (analogue and ISDN) lines connecting the subscriber's terminal equipment to the PSTN and which have a dedicated port in the local switch (excl. spare capacity, dedicated capacity). **Total activated subscriber lines** connected to the [incumbent's] PSTN, not necessarily incumbent's subscribers (= plus fully unbundled lines as they are also subscribers' lines), may also include lines of newly rolled out copper network.
Explanation:
 This is a kind of variable to measure the overall market size, not to calculate market shares of incumbent vs. competitors, because of course fully unbundled lines are not incumbent's subscriber lines.
- Incumbent's xDSL retail lines: Provided to end users by the incumbent incl. of incumbent's subsidiaries/ISP, but excl. of resale to new entrants.
- "New entrants" refers to alternative telecommunications operators, as well as internet service providers (ISPs).
- Fully unbundled lines: Fully unbundled lines supplied by the incumbent to other operators, excluding experimental lines. In the case of full unbundling, a copper pair is rented to a third party for its exclusive use. Fully unbundled lines could in principle be used for services other than broadband;
- Of which xDSL = used by the new entrant (beneficiary) to provide a retail DSL line
- Shared access lines supplied by the incumbent to new entrants: Shared access lines supplied to other operators, excluding experimental lines. In the case of shared access, the incumbent continues to provide telephony service, while the new entrant delivers high-speed data services over that same local loop.
- Bitstream access: Supplied to new entrants. Bitstream access refers to the situation where the incumbent installs a high-speed access link to the customer premises and then makes this access link available to third parties, to enable them to provide high-speed services to customers. Bitstream depends in part on the PSTN and may include other networks such as the ATM network, and bitstream access is a wholesale product that consists of the provision of transmission capacity in such a way as to allow new entrants to offer their own, value-added services to their clients. The incumbent may also provide transmission services to its competitor, to carry traffic to a 'higher' level in the network hierarchy where new entrants may already have a broadband point of presence.
- Stand-alone/Naked DSL/bitstream: as bitstream access, but without the voice telephony service of the incumbent.
- Cable BSA: a bitstream access product over cable network infrastructure.
- Simple resale: In contrast to bitstream access, simple resale occurs where the new entrant receives and sells on to end users - with no possibility of value added features to the DSL part of the service - a product that is commercially similar to the DSL product provided by the incumbent to its own retail customers, irrespective of the ISP service that may be packaged with it. Resale offers are not a substitute for bitstream access because they do not allow new entrants to differentiate their services from those of the incumbent (i.e. where the new entrant simply resells the end-to-end service provided to him by the incumbent on a wholesale basis). Only resale to new entrants (excl. of resale to incumbent's subsidiaries/ISP).

- WLL: Internet broadband connections by means of wireless local loop (sometimes referred to as fixed wireless access - FWA)
- Cable modem: Internet broadband connections by means of cable TV access
- L.L.: Internet broadband connections by means of dedicated capacity (Leased Lines) provided over metallic copper pairs, including tail ends or partial circuits. "Incumbent's leased lines" includes only retail lines and excludes lines provided to other operators. "New entrants' leased lines" includes all retail lines provided to end users, even if based on wholesale lines supplied by the incumbent.
Note: as except for a few MS, NRAs were unable to provide the broadband usage via leased lines (as it is often not known for which services a leased line is used, data in this column is only for information).
- Other: Internet broadband connections by means of satellite, fibre optic (FTTx technologies), powerline communications, wireless (WiMAX etc., no hotspots) etc.
- 3G: data cards to be included, handsets not (still used for voice mainly, normally not 'broadband').
- Wholesale products of new entrants: offered over own infrastructure (not resale of a wholesale offer bought from the SMP operator).
- Wholesale products of new entrants: offered on the basis of LLU such as bitstream to 3rd parties.

All data should be provided on a national basis.

- Population (as recent data as possible)
- Number of households (as recent data as possible)