Broadband market competition report – Annex

Broadband / VoIP project - French Case Study

In the following answers, we will distinguish two different kinds of **VoIP** services:
VoB, *Voice over Broadband*, includes telephony services using **VoIP** technology on a broadband access;
VoI, *Voice over the Internet*, represents all voice communication services using **VoIP** technology without any control of the quality of service by the operator which supplies the service (Skype for example).

Describe shortly the typical elements of the broadband market situation in your country (dominant technology, typical speed offered, typical tariff structure etc.)

Residential market

The residential retail market is mainly composed of DSL access and cable access. With about 6.3 M subscribers at the beginning of 2005, the DSL part represents more than 92 % of the broadband lines in France. High speed Internet over cable is not very developed : though cable access potentially covers around 25% of the households, it represents less than 8% of the broadband lines, and this share has slightly decreased during the past few years. This situation may evolve though in the years to come, for a large part of the cable providers have merged into two main groups in 2004.

The DSL part of the retail market is particularly dynamic in France. The number of subscribers has increased by 90% during 2004. Thus today, the penetration rate of DSL is about 20 % of the total of copper pairs in service.
The market is shared between:

- France Télécom, the incumbent, mostly through its retail brand *Wanadoo*. Its market share is now below 50 %;
- LLU OLOs (Free, Neuf Télécom, Cegetel, Tiscali, Telecom Italia France), which also use bitstream as a complement of LLU in some geographical areas;
- simple ISPs, which don't own their network, and buy wholesale IP offer at a national level.

For the past two years, the average bitrate commonly subscribed by end users has evolved from the typical "512 kbit/s access" to the "2 Mbit/s access". A "*maximum bitrate"* offer is about to become a standard : the end user is given the maximum bitrate (up to 10 Mbit/s in ADSL) permitted by its line. Since the adoption of ADSL2+ in autumn 2004, subscribers have now even access to 20 Mbit/s bitrate offers (provided by 2 ISPs).
First double/triple play DSL offers were launched in 2003 (see question 2). Today, SPs (Service providers) generally provide triple play offers – **VoB**, TV over DSL and Internet – in unbundled areas and double play offers, based on bitstream, elsewhere – **VoB** and Internet access.
VoB DSL offers, which generally enable unlimited fixed national calls, and cheap international calls, are never stand alone offers, but are bundled to an Internet access service.
There are two kinds of TV over DSL offers:

- either the SP only provides a TV access: the end user has to subscribe to a content provider;
- or the SP provides its own bundle of TV channels, with a selection of free TV channels.

Broadband retail DSL offers are usually sold on a flat rate basis. You can either pay for a stand alone Internet access or have additional services on top of it :

- the tariff of a single Internet access has constantly decreased for the past two years, and, today, it varies from 15 € to 30 € depending of the area (unbundled or not) and the bitrate (in unbundled areas, SP generally offered the best bitrate available);
- **VoB** services tariff varies from 9 € to 15 € to add on top of the Internet tariff;
- when his line is fully unbundled, the end user pays a subscription to the OLO (from 0 € to 13 €) but does not have to pay a line rental to France Télécom.

To sum up, the cheapest products you can find are :

- 15 €/month for a stand alone Internet access at 2 Mbit/s (if you commit to CPS on top of it, otherwise the access is 5€ more);
- 30 €/month for "maximum rate" Internet access + TV over DSL + **VoB** on full LLU (no line rental paid to France Télécom).

France Télécom's DSL network covered about 90 % of the French population at the beginning of 2005, while the unbundling areas coverage reached about 50 %.

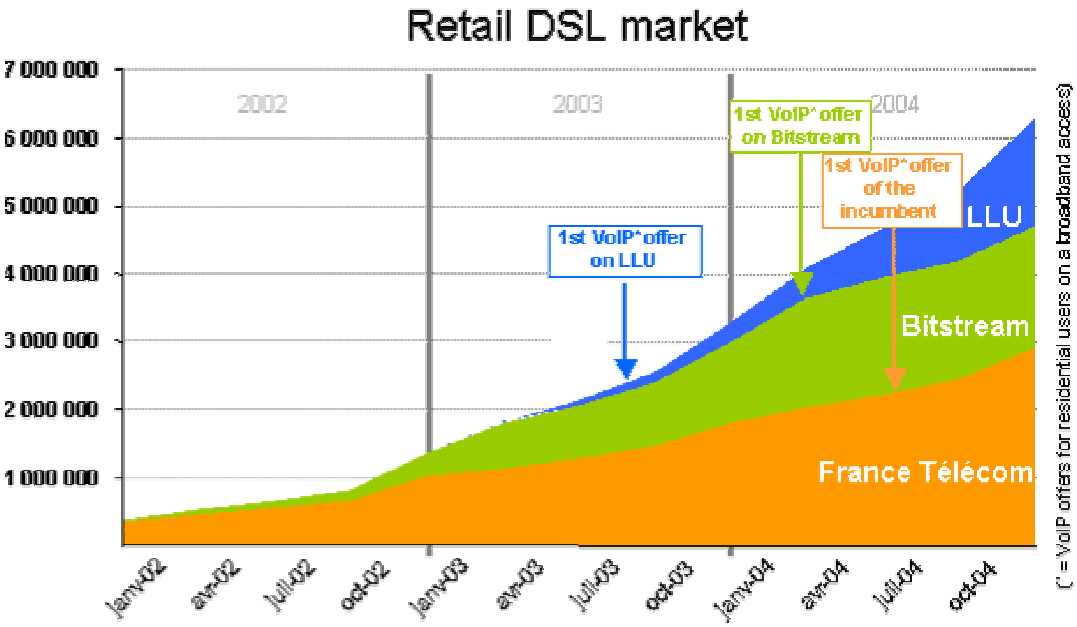
Professional market

Offers designed to professional end users are based either on full LLU or on Turbo DSL, an ATM bitstream offer provided by France Télécom with options such as guaranteed bandwidth or recovery time.

Different services are provided to end users on the retail market : Internet access, **VoB** (see question 8 for further details), VPN, etc.

Describe the development of the market (with special emphasis to any changes due to the arrival of VoIP service offers):

The following scheme illustrates the development of the broadband over DSL retail market for the past three years:



First residential DSL access based on LLU (shared access) were made commercially available at the beginning of 2003. Since then, LLU market share has progressively risen.

In summer 2003, Free Telecom was the first ISP to provide **VoB** to its end users (with unlimited national calls to fixed numbers) thanks to its set top box, called "Freebox". This service was restricted at first to unbundled areas, and then extended to the whole territory during spring 2004, based on France Télécom's IP Bitstream offer.

LLU, based mainly on shared access till summer 2003, really took off during the second half of 2003: today, unbundled access (both shared and full) stand for more than the quarter of

DSL access. A second quarter corresponds to bitstream offers (of which 65 % at a regional level).
For a large part, people decide to subscribe to a LLU offer in order to get large bandwidth at a low price. However, the takeoff of LLU coincides with the introduction of the first **VoB** services, which was the first time unlimited calls were made possible in France. So, the proportion of end users who decide to subscribe to such an offer mainly in order to get an unlimited telephony service may not be negligible.
ART notes that, today, all LLU OLOs provide **VoB** services, and people now make a link between LLU offers and **VoB**.
For the last six months, a second trend has been observed, the slow takeoff of full unbundling, which permits to stop paying the rental line subscription to France Télécom. The telephony service is provided in that case only on **VoB** by the LLU OLO. The success and efficiency of first **VoB** services built on shared access have thus convinced the OLOs to start providing access based on full LLU for the residential market. Today, more than 150 000 end users have made this choice, and this figure may grow faster in the months to come.
Meanwhile, France Télécom's subsidiary Wanadoo launched its **VoB** retail offer, as add-on to POTS service, in summer 2004. And France Télécom has recently announced that it is willing to provide in the next few months a "naked DSL" retail service (for which the end user won't have to keep its POTS service anymore).

Describe the reasons for regulatory intervention (e.g. commercial negotiations failed, or considered too slow, complaints of market players, requests for intervention, others, etc.) :

From a regulatory perspective, **VoB** can potentially fall into 2 different categories :

- Broadband access regulation ;
- Voice services regulation (interconnection, CPS,…).

For the time being, in the old framework, there has been no formal regulatory intervention on the **VoIP** in France. For example, France Télécom has spontaneously proposed a bi-channel bitstream offer to allow OLOs to provide **VoB** on bitstream offers so as to let them replicate France Télécom's own retail **VoB** offer.
ART will soon notify to the European Commission its market analysis on broadband and fixed telephony, in which the rules of regulatory intervention on **VoB** will be set.

Describe 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?

The general objectives of intervention of ART are:

- the extension of the broadband coverage of the French population in a competitive environment
- the extension of infrastructure-based competition via LLU

Concerning broadband markets, ART promotes competition based on alternative networks and on innovative services. The "capillarity" of their networks allows LLU OLOs to offer innovative services for the end users (like **VoB**, TV over DSL, etc).
The strategy of ART is thus based on the following principles.
French retail broadband market is characterized by a high level of competition. So e*x ante* regulation on this market is not appropriate given its dynamism. Competition on the retail market is then guaranteed by regulation on the wholesale markets.
ART has determined three relevant wholesale broadband markets (LLU, bitstream at a regional level, bitstream at a national level) on which remedies are applied.
ART considers LLU as the keystone of broadband competition, being the most incentive way for the deployment of alternative networks. LLU regulatory intervention is based on the determination of access prices and on the improvement of the quality of service.

OLOs need to buy France Télécom's bitstream offers in order to complete LLU in non unbundled areas, where LLU is not economically profitable today.
ART regulates those bitstream offers so as to guarantee an acceptable margin between France Télécom's bitstream tariffs and the costs of OLOs based on LLU. ART considers it is in the interest of the sector to preserve the extension of LLU and to create an alternative wholesale bitstream market.

Impact of VoIP service offers on the broadband market and on the regulatory intervention:

LLU is the keystone of the development of VoB

On the one hand, with LLU shared access, **VoB** is provided as an add-on service (the end user has to keep paying its line rental to the incumbent) quite attractive, considering national calls on fixed are unlimited on **VoB**. On the other hand, with full LLU, the end user is no more linked with the incumbent. All his calls are then established through its **VoB** service.
The growing of LLU, especially full LLU, is therefore tightly bound to the development of **VoB** as a substitute to traditional telephony.
Thus, ART has to look carefully after the quality of service of **VoB**, for end users will not accept degraded telephony services. Moreover, the portability process must be enhanced in order to permit end users to keep their number while migrating to full LLU.
The quality of service of **VoB** delivery processes depends on a large part of the quality of LLU, especially full LLU's. ART takes particularly care of the migration process and of the after-sales service: France Télécom has to ensure the shortest delays of cut, during a migration, and of restoration, when there's a problem on the line.

Wholesale bitstream offers have to allow the carrying of voice

An OLO which wants to offer the same **VoB** services at a national scale and to harmonize its commercial communication has to buy France Télécom's bitstream offers where LLU is not available. In order to ensure a good quality of service, those bitstream offers have to be designed to guarantee **VoB** traffic.
In order to allow the replicability of Wanadoo's visiophony offer that has been launched in autumn 2004, France Telecom has modified its bitstream offers. Those wholesale offers can now be composed of two channels, a best-effort one for the Internet traffic and a guaranteed one for the **VoB**.
Moreover, in its analysis of the 12th market, ART intends to impose on France Télécom the obligation to provide double channels bitstream offers to allow double play on the retail market.

Describe the regulatory measures and the reasoning behind them on a product level

Former bitstream framework, before the market analysis

Till the beginning of year 2000, the only way, apart from LLU, for an OLO to offer DSL products on the residential retail market, was France Télécom's IP wholesale offer delivered at a national level called "IP/ADSL".
Bitstream wholesale products which are available today are the result of demands France Télécom acceded for two main reasons: France Télécom estimated them reasonable or it was compelled by the competition authorities or the regulator.

- "ADSL Connect ATM":

Following a decision of the French competition authority ("Conseil de la concurrence") in February 2000, France Télécom proposed a bitstream ATM offer, consisting in the delivery of DSL access at the parent or the distant ATM switch. This offer was the object of a first settlement of dispute, in spring 2001, after which the ART slightly decreased its tariffs. Then,

at several times, particularly when the incumbent asked to decrease the tariffs of its national IP offer, ART prompted France Télécom to start negotiations with OLOs, in order to make ADSL Connect ATM offer more efficient. It failed, and resulted in a second settlement of dispute, which lasted till January 2003. This offer was still not widely bought by OLOs, until France Télécom decided to change the structure of tariffs, in spring 2004, which enabled an operator to benefit the better origination tariffs with fewer switches connected.

- "Turbo DSL":

Turbo DSL is an ATM offer provided by France Télécom since 1999 on the business retail market, but which ART considers as a wholesale offer for it is mainly bought by the OLOs which propose services for companies (guaranteed access, VPN, etc). Its tariffs evolution were submitted to ministry approval based on ART's recommendation. Its tariff-structure is not yet equivalent to ADSL Connect ATM one, but France Télécom makes it evolve progressively.

- "Collecte IP/ADSL régionale":

At several times, OLOs asked France Télécom to adjust its IP/ADSL offer to regional deliveries. France Telecom finally provided, at the end of 2003, a wholesale IP offer delivered at a regional level. This offer evolutions are submitted to ministry approval based on ART's advice.

Market analysis

ART will notify this month its market analysis to the European Commission for broadband markets (11th market, 12th market and "bitstream at a national level").
The bitstream market will include both IP and ATM offers and professional and residential offers. Thus, Turbo DSL, ADSL Connect ATM and IP ADSL regional will be included in this market and regulated as such.
In particular, these are the remedies ART has mandated on the bitstream market:

- access:
  - at least delivered in both ATM and IP;
  - delivered at two different scales, according to the capillarity of the OLO [local : 100 delivery points / regional : 20 delivery points];
  - with two levels of services : adapted for residential offers or professional offers;
  - mono- and bi-channels : to allow the proposal of guaranteed **VoB** offers outside LLU areas;
  - with efficient migration process – within bitstream offers, and with LLU.
- non-discrimination
- publication of information:
  - publication of SLA indicators
  - publication of a reference offer which ART can modify, when justified
- QoS engagement
- transparency
- tariff control
  - tariffing reflecting the costs
  - prohibition of tariffs causing eviction of LLU OLOs
- accounting separation.

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.);

When France Télécom launched its **VoB** retail service (as a second line, not as a customer main line: the end user still pays for and has access to POTS), France Télécom spontaneously proposed a bi-channel bitstream offer to allow OLOs to do **VoB** as well,

based on bitstream offers. This new bi-channel offer is available both delivered at the IP and ATM levels – but it is not “naked DSL”, end users still having to pay for the line rental and still having access to POTS.
On top of that, France Télécom has announced that it is willing to provide in the next few months a “naked DSL” service, both at the retail and at the wholesale level, based on the high frequencies of the copper pair, where voice would be transmitted as **VoB**. A subscriber whose access would be based on such a “naked DSL” offer would not have to pay the line rental to France Télécom anymore.
The French Council of Competition expressed that this offer would be retailed with **VoB** and so the “naked DSL and **VoB**” association could be an alternative on the retail market to “phone on PSTN + line rental”.
“Naked DSL” granted at the wholesale level can be seen as an opportunity to introduce more competition in the access network.
In its analysis, ART notes that retail “naked DSL” cannot be released without a proper wholesale “naked DSL” product (based on the obligation of non discrimination imposed on France Télécom on the bitstream market): wholesale ”naked DSL” is the complement offer an OLO needs in non-unbundled areas to provide the same services as with full LLU.
But ART also notes that wholesale “naked DSL” should be a complement to full LLU and not precede it. There is a concern that “naked DSL”, both at the wholesale and retail level, would be a threat to full LLU, even in unbundled areas, if it benefits from low tariffs and better operational processes and QoS than full LLU. So far, full LLU has not taken off as much as shared access, mostly because of these QoS problems.
For these reasons, the “naked DSL” issue is quite complex. No such offer has been proposed by France Télécom so far.

Impact of VoIP service offers on the fixed telephony.

Three kinds of **VoB** offers have been identified so far:

VoB for residential telephony

For the moment, **VoB** service offers are too recent, and their impact on the residential fixed telephony market cannot be quantified. But we can describe some events we expect to happen.
The **VoIP** technology uses less than half the capacity of classic voice (which enables more canals by line), then the cost of a minute of communication in **VoIP** is really lower than with classic voice technology. Therefore, this new technology should induce better competition, and a decrease of telephony prices. The introduction of **VoB** offers seems to have already increased competition on the residential telephony market: the number of main actors has doubled thanks to those new technologies.
As these services are obviously partial substitutes for classic telephony, we can rightfully expect their appearance to lead to a diminution of the demand of classic telephony. In particular, part of the residential consumers using CPS offers from alternative operators might change for **VoB** offers.
The fall of costs due to the use of this new technology should lead to the appearance of more attractive offers for long calls (international calls for example).
It has already enabled some SPs (like Free, in August 2003) to propose an offer with unlimited local and national calls. This may have already had consequences on the incumbent French operator policy: France Télécom, recently provided (in June 2004) an unlimited classic telephony offer.
VoB for firm services when the phones of the company are connected to a PABX
In that case, the operator, in order to make the connection, may use **VoIP** technology in its access network. If the PABX allows it, it can directly connect its **VoIP** network to the PABX; if not, it can use an interface to transform **VoIP** into ISDN.
On this professional market, the arrival of **VoIP** technology seems to have widened the possibilities of OLOs, and then promoted the development of competition.

Before the arrival of **VoIP** technologies, these operators were not able to supply access to small sites (of companies) because of the expansive tariffs of leased lines. As a consequence, these companies often used call-by-call offers.
Access costs have decreased for two main reasons:

- OLOs can use less expansive access offers, like LLU;
- **VoIP** technology uses less than half the capacity of classic voice.

Competition has really expanded on this sector, and more and more companies choose to go for alternative operators' solutions.

VoB for firm services when the phones of the company are not linked by a PABX, but by a Centrex IP of the operator, located outside the firm

In that case, all the communications, including the internal communications, are carried threw the operator network in IP.
On this second professional telephony market, **VoIP** technologies lead to new usages. The **VoB** services allow many new possibilities such as telephony network management outsourcing, voice on data convergence, etc.

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WHOLESALE BROADBAND REGULATION IN ITALY

In Italy, wholesale broadband access services have been submitted to specific regulation since end 1999, when ADSL roll out was at its very early stage.
Regulatory measures have been then progressively reconsidered and refined, following the evolution of technical and commercial options available. The most recent proposal for regulation has been recently issued within market analysis n.12 and it's now under national public consultation, pursuant article 6 of the Framework Directive.

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The first AGCOM decision on wholesale broadband access dates back at December 1999 (dec. n. 407/99). At that time, while AGCOM was working on national regulation for local loop unbundling (LLU was indeed envisaged as the primary mean to develop competition in narrowband and broadband access services), Telecom Italia announced a plan for nationwide roll out of retail ADSL access services and, following, a commercial launch of retail broadband access services.

AGCOM considered that, taking such initiative before full implementation of LLU, T.I. could have easily pre-empted the new market of high speed internet access, and put into action its supervision powers.

Given the lack of specific regulation, AGCOM issued decision 407/99 in the light of ONP "special access regime" (D.97/33); AGCOM considered wholesale broadband access as a peculiar form of "special access" and used its powers to intervene to ensure such access to competitors at fair, reasonable, transparent and non discriminatory conditions.

AGCOM released a provisional authorization to T.I. to provide wholesale broadband access service based on ADSL technology, in compliance to a set of regulatory
obligations, aiming at ensuring competition at retail level.
T.I. was mandated to provide a wholesale broadband access services to OLOs under transparency and non discrimination principles (both widely referred to pricing, technical and provisioning conditions), to set up a separate accounting system for ADSL access service provided to its own retail arm and to its subsidiaries and to provide a detailed SLA for wholesale offer to OLOs (covering provisioning and maintenance, QoS and technical issues[1]). Finally, T.I. had to submit to AGCOM any proposal of prices and technical options for retail customers in combination with a correspondent wholesale offer at least with 30 days notice to commercial launch. The proposal should include a detailed description of retail pertinent costs (namely: commercial, marketing and customer management costs).

[1] In line with the guidelines of D.97/33 for interconnection services, the obligation of separate accounting for ADSL services was intended in order to enforce cost oriented prices.

AGCOM would then evaluate the fairness and the non discrimination of wholesale conditions. The first revision of T.I. wholesale offer (dec. 217/00/CONS) took AGCOM to modify several pricing and provisioning proposals.

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In March 2000, AGCOM finally issued general regulation for LLU (dec. 2/00/CIR). Article 5 of LLU regulation provided general guidelines for wholesale DSL offers.
In line with former AGCOM decisions, T.I. had a general obligation to provide OLOs a virtual access service (CVP), connecting the customer premise to OLOs point of presence, whenever T.I. had offered an x-DSL access service to its final customers (even, through its subsidiaries).
Pricing of wholesale service should have been defined according to retail minus principle, subtracting commercial, marketing costs, as well as customer management costs (charging and customer care) to retail prices; with following decisions, AGCOM assessed the retail minus ratio at around 30% of retail prices and imposed detailed provisioning rules (decision 15/00/CIR)[2].

In January 2001 (decision 3/01/CIR), AGCOM extended to all authorized operators the availability of T.I.'s wholesale broadband services (formerly reserved by dec. 2/00/CIR to licensed operators). It was a fundamental decision to speed up competition at retail level, answering to several requests by ISPs to have fair and non discriminatory conditions with OLOs in the broadband retail market, regardless of the different authorization regime.

It is important to recall that the declared rationale of all these spare pieces of regulation on wholesale broadband was to speed up competition in the emerging market of retail broadband services up to full availability of LLU; dec. 2/00/CIR explicitly stated that wholesale broadband obligations should have been reconsidered in the light of timeliness and reliability of LLU implementation[3].

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During 2001, also due to delays in LLU implementation process, AGCOM followed on in its monitoring activity on T.I.'s wholesale and retail broadband offers.

In the meanwhile (and during 2002), in Italy, as everywhere across Europe, broadband services had a considerable commercial boost (somehow supported also by governmental incentive policies). Market dynamics substantially changed and higher bandwidth emerged as a fundamental feature of access services for a larger customer base (both business and residential); this made broadband access market the new battlefield for telecom industry.

[2] It is to notice the new perspective adopted for pricing issue; since retail minus aims at ensuring replication of TI's retail offers, but does not imply cost orientation of the wholesale prices.
[3] See Annex B, paragraph 5 of decision 2/00/CIR.

This had a strong impact on the role of regulation, since availability of reliable and non discriminatory wholesale products definitely became a crucial issue.

A less theoretical approach to long term facilities based competition put into evidence that, even with LLU fully operational, the availability of a wholesale broadband products - all of them allowing an adequate level of differentiation to T.I. retail product (e.g. bitstream access services) - would have been anyway necessary in order to guarantee nationwide coverage to OLOs retail offers. In other words, LLU and wholesale broadband services should be considered as complementary regulatory means for competition at retail level, according to each specific business plan.[4]
Therefore, AGCOM followed on in monitoring activity on retail and wholesale T.I.'s offers and with the definition of general regulatory provisions, based on the outcome of supervision activity.

An improvement of general regulatory guidelines has been issued on 2003 (dec. 6/03/CIR); this regulation, today still in place waiting for the NRF remedies, introduced significant innovative provisions, all aiming at enforcing non discrimination principle:

- as far as pricing is concerned, the "retail minus" principle was confirmed. Nevertheless, new criteria introduced to assess the "minus" ratio (e.g. costs of transport infrastructures, interconnection ports, IP connectivity, value added applications were been subtracted to retail T.I. prices; marketing costs were recalculated) led to a new "minus" ratio around 50%[5];
- a larger flexibility of wholesale offers has been imposed, in order to allow greater differentiation of final alternative services[6];
- the notice term has been extended to 90 days for new offers, as well as for modification of technical parameters of existing offers, in order to ensure equal time to market for competitors. 30 days notice has been confirmed for new pricing proposals.

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The experience of recent pricing dynamics of retail and wholesale services has shown that the "retail minus" regime (that even played a crucial role in the start-up phase) could hardly guarantee retail competition in a more mature market.
Actually, the enforcement of a "retail minus" regime requires a cost analysis[7] for each new retail offer presented by the incumbent, this in order to decide if the new retail offer can be

[4] See also the regulatory section of ERG Common Position on bitstream access services. It's to recall that AGCOM was among NRAs who strongly supported the "complementary" approach of ERG documents, in the light of national figures of wholesale access market.
[5] Actually, the retail minus percentage has been assessed at 47% for residential offers and 55% for business offers.
[6] The wholesale offer is composed by a monthly fee depending on the ADSL access speed and a monthly fee for the ATM Virtual Path which collects the accesses in a given area. By varying the VP PCR, (and the corresponding fee function of the PCR), the OLO can differentiate its retail product from TI's one at the expense of a lower margin. The regulatory minus is guaranteed only for the configuration defined by Agcom during the approval of decision 6/03/CIR.

replicated from the current wholesale offer and, in case not, to require a new wholesale offer. Specifically, the determination of the "minus" requires the evaluation of both the costs of the incumbent and the costs that an efficient OLO should sustain in order to provide the same retail offer using the incumbent's wholesale product.
This system is becoming quite complex to put into operational, especially with the wider range of new bundled offers; e.g., application to retail minus principle would be very difficult to apply on new retail combined offers, as triple play packages.
On the other side, pricing for wholesale services set up according to retail minus principle could hinder the ability of OLOs to differentiate their own retail offers.
It is also to take into account that the enforcement of the retail minus principle requires a considerable effort to NRAs supervision offices and it can potentially lead to delays in the approval of retail offers or, in the worst case, to the approval of retail offers with unclear replicability.

Finally, setting wholesale tariffs at too low levels compared to LLU prices can cause possible distortion on "make or buy" decisions of OLO's. Consistency between pricing of wholesale offers (under "retail minus" regime) and of LLU (cost oriented), in the light of NRF, could turn into a critical regulatory issue at national and EU level.

The complementary approach has been consolidated indeed at EU level by the provisions of NRF: it's worth recalling that EU Recommendation includes both LLU (n.11) and bistream access (n.12) as relevant markets. On the other hand, the entire architecture of the new framework aims at achieving a long term infrastructure based competition. This implies that regulation should guarantee finely balanced relative prices of all wholesale services in the "ladder of investments" (full LL, shared access, bitstream services).

According to this leading idea, AGCOM has recently proposed, among general regulatory remedies for market n.12, a revision of the pricing model for bitstream service, moving on from retail minus to cost oriented regime. The transition to cost orientation for bitstream access services should guarantee consistency between different layers of wholesale offers. Cost orientation require regulatory accounting for data. Once defined a properly and reliable accounting system for ADSL and data traffic (which becomes the new regulatory issue), cost oriented regime should make easier AGCOM's control on cross subsidies and non discrimination.

[7] The main critical aspects in evaluating the "minus" concern the estimate of the network and additional costs underlying the incumbent's retail offers without having disaggregate cost accounting and in verifying the actual amount of network resources allocated per user in the incumbent's retail offers (*QoS squeeze*).

CASE STUDY: DEVELOPMENT OF BROADBAND IN SPAIN

Early introduction of bitstream access

When Telefónica's network was ready to provide ADSL services, a Ministerial Order dated March 1999 introduced bitstream obligations and applicable pricing; these prices were not considered to be cost-oriented, though. The bitstream service was open only to third parties, including incumbent ISP subsidiary but not the incumbent itself, who until 2001 did not provide services at the retail level.

Telefónica's bitstream service is called *GigADSL* and its prices have always been regulated. It is ATM-based with 109 connection points to cover the whole territory. The price structure is as follows: a charge per ATM port and a charge per user connection.

After bitstream obligations being introduced in March 1999, in January 2001 the conditions applied to bitstream access were incorporated into the Reference Unbundling Offer (RUO).

Given the low take-up of ADSL services both by Telefónica's subsidiaries and other ISPs (47.950 ADSL connections at the end of 2000), Telefónica requested authorisation to provide ADSL services directly to end-users and at lower prices than the ones offered so far by their subsidiaries. The Ministry approved these prices in August 2001.

Previously in July 2001 the CMT adopted an interim measure to improve conditions of the bitstream offer given the changing scenario where the incumbent was about to enter the retail market. The main decision was the revision of bitstream pricing. CMT applied a retail-minus discount of approximately 40% to avoid margin squeezes. In practice this retail-minus scheme is used to set prices somewhat above costs so that there is enough incentive for alternative infrastructure deployment, which plays an important role in Spain's broadband market (see below).

CMT's RUO revisions in 2002 and 2004 included the review of bitstream ordering processes and service specifications but in general terms CMT has kept the same pricing methodology since July 2001: cost-oriented charge per ATM port a charge and per user connection charge priced using a retail-minus discount of approximately 40%.

Remarkable presence of cable

Although the focus of regulatory activity has been bitstream and unbundled access, the main of source of competition has been so far the presence of alternative operators who provide cable modem services using their own infrastructure.

Spain had only minor cable television networks before telecoms liberalisation, and in 1997-98 exclusive cable television rights in pre-defined areas were awarded. Two groups control these alternative networks which started being deployed essentially in 1998 and which were designed to offer triple play services. This process has led to important geographical differences: in some regions there is very little presence of cable whereas other regions have more cable broadband connections than ADSL lines. Cable connections are currently above 800.000 and account for approximately 25% of the broadband market in Spain.

Problems encountered in local loop unbundling

In June 2000 the Government introduced Local Loop Unbundling (LLU) obligations. Detailed LLU regulations as well as LLU prices were approved by the Government in December 2000.

Telefónica published then in January 2001 its first RUO, where bitstream was also incorporated. Telefónica designed a space allocation process that soon collapsed by May 2001 (and no collocation room had started being built) because the iterative process generated increasing delays, costs were site-specific and far too high and the dimensioning of collocation rooms was too rigid.

CMT reacted by approving a set of interim measures:

- February 2001: Interim measure on space allocation procedure
- June 2001: Interim measure on collocation including comingling; collocation standard-price list approved and comingling introduced
- July 2001: bitstream conditions (commented above)
- November 2001: Interim measure on LLU backhaul services

This led to the first collocation sites and unbundled loops being delivered in October 2001.
In April 2002 these interim measures were confirmed in the first general LLU and bitstream reference offer revision.

LLU remained at modest figures for some time, with new entrants collocated at just 109 sites and only 3.099 fully-unbundled loops (none in shared access) at the end of 2003. Reasons for this may have been the presence of cable networks and the situation of financial markets.

In March 2004 CMT approved its second general LLU and bitstream reference offer revision including pricing, and in July 2004 CMT set the conditions for block migration of bitstream connections to full or shared unbundled loops.

It can be argued that there are now promising perspectives for offerings based on shared access. New entrants are now present at 330 sites and have ordered many more; unbundled loops (full plus shared) are almost 180.000. Three market players are expected to have massive presence in shared access and some innovative ADSL offers are already in the market. The emergence of Voice over IP may have a positive impact although it has not played any major role in broadband developments so far.

Telefónica has marketed ADSL successfully

Telefónica and its subsidiaries control approximately 50% of the broadband market at the retail level, or 75% of the 2.5 million ADSL lines. Telefónica has not changed its ADSL retail prices since 2001 even though in November 2003 the government removed the retail price control applied so far. In practice real prices per Kbit/s are decreasing because in autumn 2004 Telefónica doubled bitrates offered for a given price and is planning a similar move for 2005.

Apart from connections to cable networks, the main sources of competition are bitstream and resale. Resale offers have been available from Telefónica or its subsidiaries ever since ADSL services were introduced. These offers have not been regulated although ISPs have often requested intervention by the NRA arguing these offers should be modified. CMT has stated after its investigations on wholesale ADSL services that direct intervention in resale conditions is not justified because alternative offerings can be built using bitstream access. CMT requests only that Telefónica's resale offer be published and offered on a non-discriminatory basis.

CMT has also continuously investigated new entrants' allegations of margin squeeze by Telefónica or its subsidiaries in its discounts or promotional offers, and CMT has mandated the removal of some of these offers. In July 2004 CMT gave more transparency to the margin-squeeze analysis; it was stated that the approximately 40% retail-minus margin means that in order to pass the margin squeeze test the total value of discounts or

promotional items in any given offer by Telefónica or its subsidiaries can amount to a 19.6% of the retail price, given an estimated two-year permanence period.

Conclusion: searching for right regulatory balance

CMT has tried to find a reasonable compromise between infrastructure and service competition by applying cost-orientation to LLU and a less aggressive retail-minus pricing to bitstream access. CMT has also searched the right balance between regulation and non-intervention by developing a very detailed LLU and bitstream offer but at the same time not regulating resale nor mandating bitstream access to Telefónica's TV over ADSL service called Imagenio.

Obviously these policies can evolve depending on the results of the analysis of the broadband market, which has not been completed yet.

In the field of LLU the main concerns are on enforcement of the approved RUO to allow large-scale developments, and in the context of bitstream it is claimed there remain margin squeeze issues, specially with the new time-based or volume-based offers with low fixed charges which do not adapt well to the usual margin squeeze tests. On the other hand, Telefónica argues bitstream obligations are no longer justified when LLU is becoming widely available and cable connections outnumber ADSL lines in some regions.

April 2005

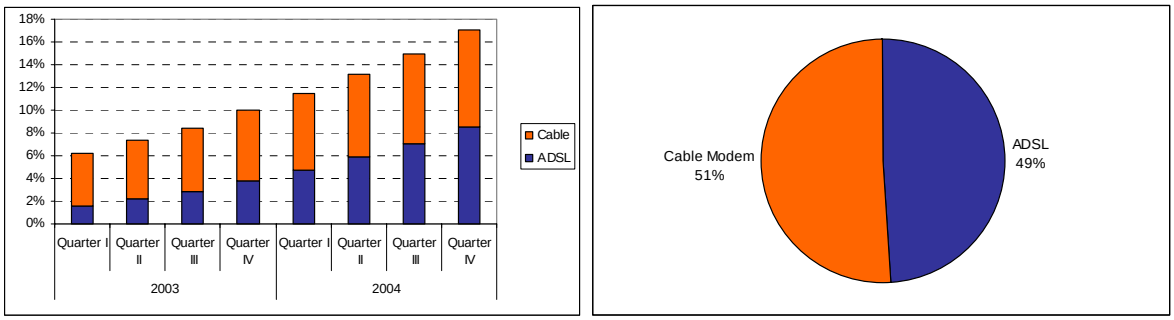
Broadband Market – Country Case Studies

Portugal

The Portuguese Broadband Market

In Portugal, broadband access is mainly achieved through ADSL and cable modem, with, respectively, 415 and 435 thousands accesses[8] (see **Chart 1**).

Chart 1 – Broadband penetration rate in Portugal (per 100 households)



Broadband access through cable modem started earlier (1999) than broadband access through ADSL (2001). Notwithstanding, the number of accesses is currently similar in both technologies.

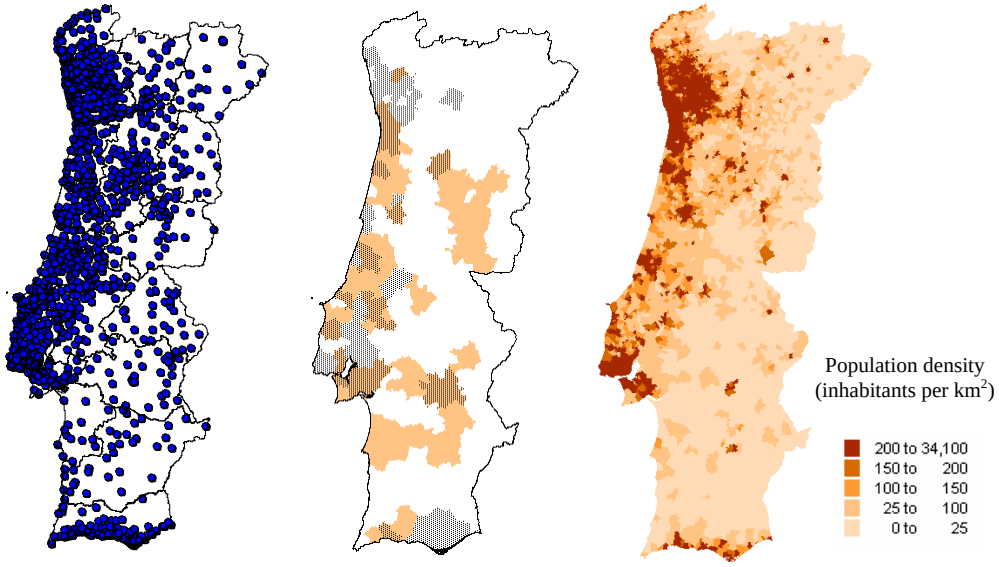
The majority of the country is already covered by broadband networks. In fact:

(a) in 3Q04 about 3.6 million households were already cabled[9], i.e., they were equipped with the infrastructure needed for the distribution of cable television service (more than 70% of households);

(b) more than 90% of active local loops are linked to MDFs with ADSL equipment, being expected a 100% coverage by the end of 2005.

[8] End of 2004 data.
[9] The majority with bidirectional capacity.

Figure 1 – Broadband network coverage (ADSL and cable)



Besides 2 ISPs belonging to the incumbent operator's Group, there are 9 alternative ADSL providers. However, the number of direct accesses provided by OLOs is not significant when comparing with total accesses in Portugal.

Currently, the most representative broadband offer is a flat rate 512/128 Kbps (downstream/upstream bitrate) offer (there are also 4 Mbps and 8 Mbps offers available in the market supported on LLU). Notwithstanding, PT Comunicações has already announced that it will quadruplicate the downstream bitrate of that offer, maintaining the retail price.

It should be noted that the retail prices of broadband service in Portugal compares favourably with similar offers available in other European Countries.

Regulatory activity

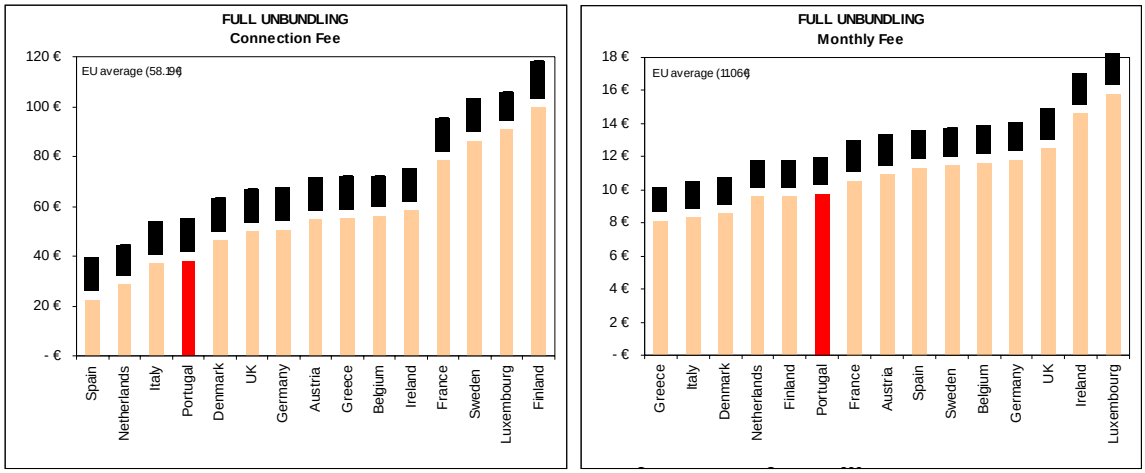
Currently, operators can provide ADSL services at the retail level through their own network (direct access) or through wholesale offers provided by the incumbent operator: the local loop unbundling offer or the wholesale offer based on ADSL technology ("Rede ADSL PT")[10].

In the beginning of 2001, after the publication of the Regulation, PT Comunicações has published the first version of Reference Unbundled Offer and since then ANACOM has been intervening in several areas within this offer, namely in prices and SLAs[11]. In fact, currently, LLU prices in Portugal are below the EU average (see **Chart 2**).

[10] "Rede ADSL PT" is a bitstream offer supported in ADSL technology (in the access network) and ATM/IP (in the backbone network) that offers connectivity to carry ATM/IP traffic between end points of access network and traffic aggregation points. This offer allows aggregation on IP and ATM level – the last one gives the OLO a higher degree of freedom in designing their retail offers.

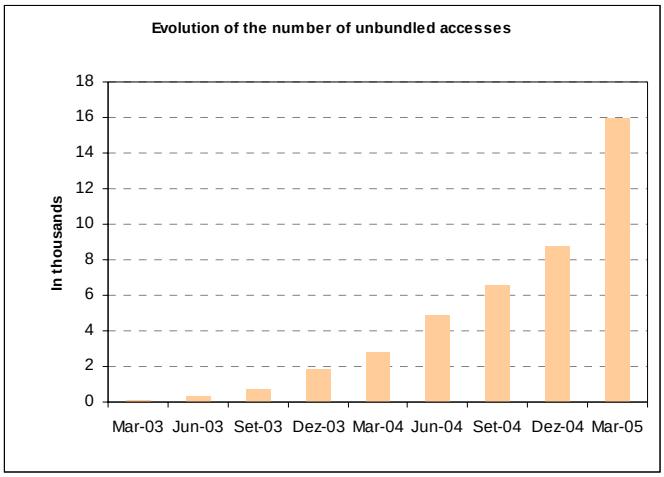
[11] For example, two decisions on delivery times and prices were recently taken.

Chart 2 –Comparison between ULL prices in EU



These regulatory interventions have lead to an increased interest in this offer. Effectively, OLOs are already collocated in more than one hundred MDFs and the number of unbundled accesses has risen gradually and considerably since 2003 (see **Chart 3**)[12]. It should also be noted that some operators have already expressed the intention to provide triple-play services within medium-term, which could contribute to a more intensive use of ULL.

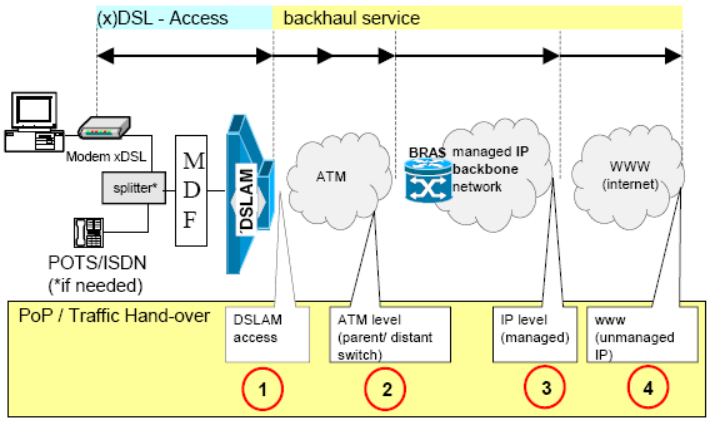
Chart 3 – Number of unbundled accesses



ANACOM has also pursued the objective of promoting infrastructure competition, giving OLOs the opportunity to climb the ladder of infrastructure.

Taking this objective into consideration, ANACOM has also been intervening within the context of bitstream offer, obliging PT Comunicações to offer more points of access in order to enable a more efficient use of available resources and the definition of retail offer features, namely with respect to data rates, contention fees and other components, such as the quality of service. In practice, an ATM level access on a regional and national basis was implemented, and several ATM categories of service were made available.

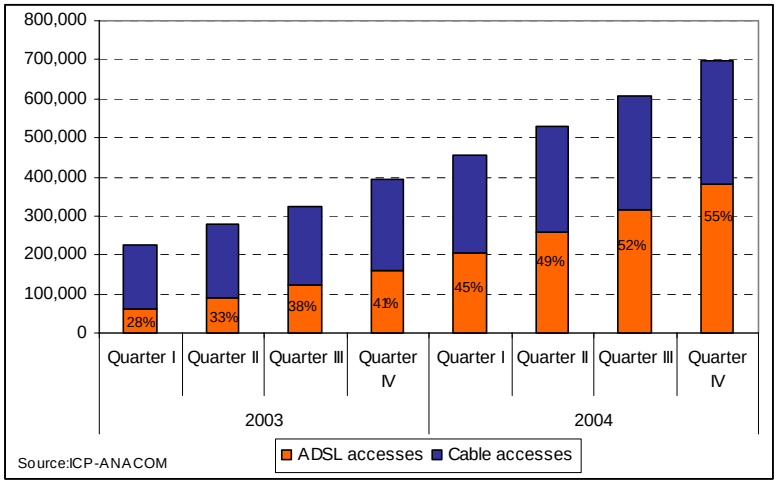
[12] The number of unbundled accesses for broadband use is about 16.000 accesses (end of 1Q2005 data) which represent about 2% of total number of ADSL accesses (about 430 thousands by the end of 2004).



ANACOM has defined the maximum prices of this ATM interconnection offer taking into account the cost orientation principle and taking also into account the coherence between ULL, ATM and IP interconnection offer (IP access offer is regulated according to a "retail-minus" rule, allowing OLOs with a margin to compete with the incumbent's retail arm offers).

Currently, PT Group companies that operate in the broadband markets have market shares above 70% in both technologies (89% for ADSL and 72% for cable – end of 2004 data) presenting currently a balanced distribution of broadband accesses between the two (see **Chart 4**).

Chart 4 – PT Group broadband accesses



It is worth to be mentioned that, within the context of the analysis of wholesale broadband access market, broadband access services provided through public telephone service network and cable distribution network were included in the same relevant market.

ANACOM, recognising the dominant position of PT Group in this relevant market, understood as necessary and proportional to regulate the broadband access through cable modem, imposing a non-discrimination obligation and a price control obligation, based on a broader application of the "retail minus" rule. According to this last obligation the wholesale offer "Rede ADSL PT" should allow alternative operators to replicate and compete (with an acceptable return rate) with retail broadband Internet access provided by PT Group, regardless technology.

In conclusion, the objectives of service and infrastructure competition and the ladder of investment approach have been weighted up by ANACOM. Specifically, ANACOM has pursued the following objectives:

1. Fostering the possibility of gradual investment through development of “Rede ADSL PT” offer with ATM aggregation;

2. Adjusting prices and conditions of “Rede ADSL PT” wholesale offer;

3. Changing prices and provision processes associated to Local Loop Unbundling wholesale offer, ensuring coherence between wholesale and retail offers conditions provided by PT Comunicações.

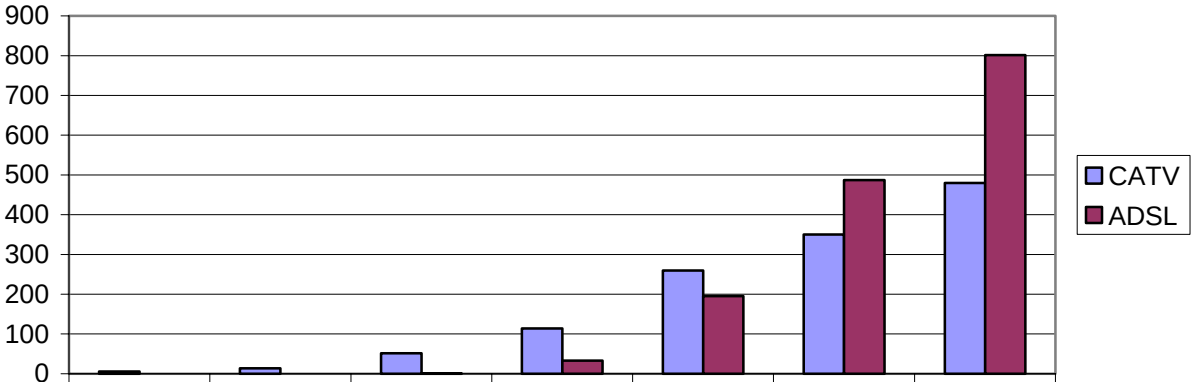
ANACOM will adjust progressively the incentives giving OLOs that invest in infrastructure and in innovative services the possibility to climb the ladder of investment.

Broadband Market / VoIP competition : Switzerland case study

- Describe shortly the typical elements of the broadband market situation in your country (dominant technology, typical speed offered, typical tariff structure etc.);
- Describe the development of the market (with special emphasis to any changes due to the arrival of VoIP service offers);

ADSL has become the predominant technology for broadband internet access in Switzerland. However, it was a cable operator launching the first broadband internet access in 1998. Swisscom, the Swiss telecom incumbent, launched its ADSL offer in 2001 on a retail level and simultaneously its wholesale offer called Broadband Connectivity Service (BBCS). It is a mere product for reselling which does not allow alternative operators any differentiation of their retail products. Until summer 2003, there were more broadband access lines over CATV than over ADSL. Since then, ADSL is the leading broadband technology in Switzerland.

See the following graph for the take up of ADSL and CATV in Switzerland (figures in 1'000).



	1998	1999	2000	2001	2002	2003	2004
CATV	6	14	52	114	260	350	480
ADSL	0	0	1	33	195	487	802

The market structure can be described as follows:

There are 28 ADSL resellers and another 30 operators offering ADSL in cooperation with a reseller. They all base their offer on the same broadband wholesale products, provided by one wholesale operator (Swisscom). The largest reseller (Bluewin) used to be fully owned by Swisscom and has been reintegrated into Swisscom in 2004.

Regarding CATV-broadband access, some 45 CATV operators in Switzerland are providing broadband access via their networks. The coverage of ADSL access is in the range of about 95% of the Swiss households whereas the coverage of CATV is about 75% of all households. Many of the cable operators provide their services on small scale local networks whereas one cable operator (Cablecom) holds a share of about 50% of the cable market.

Currently, most broadband access lines have a bandwidth between 600 to 1200 kbps downstream and 100 or 200 kbps upstream for residential and between 500 to 800 kbps for business customer. Swisscom provides ADSL-wholesale offers with a maximum of 2400 kbps, whereas Cablecom and other cable operators are offering up to 4000 kbps.

The following table lists the prices for broadband access lines to residential customers:

	Swisscom (ADSL)	Low cost reseller (ADSL)	Cablecom (CATV)
600	33 EURO	29 EURO	30 EURO
1200 (ADSL) / 1000 (CATV)	46 EURO	43 EURO	40 EURO
2400 (ADSL) / 2000 (CATV)	66 EURO	63 EURO	50 EURO
3000	n/a	n/a	100 EURO

(1 EURO = 1.5 CHF)

With over 40% of Swiss households currently using broadband access (ADSL or Cable), Switzerland proofs a rather high acceptance of broadband services and technologies. Regarding bandwidth, Cablecom and other cable network operators doubled their offered bandwidth for the last time in November 2003. Swisscom followed the example 4 months later. Since then, the offers in terms of bandwidth remained mostly unchanged and also the end user prices have barely changed during this period (apart from short term marketing activities).

From end of 2004 until the beginning of 2005, Swisscom carried out a customer trial for its TV over ADSL. The commercial offer is to be launched this autumn (triple play).

Swisscom also plans to launch its VDSL offer by the end of 2005 and expects to cover 50% of the population by 2007.

For the time being, besides one very small cable network operator, Cablecom has the only triple play offer. Cablecom launched its commercial voice service after a trial period of more than one year in summer 2004.

For completeness, a brief description of the situation regarding PLC is given. As in the rest of Europe, PLC proved and still proves to have a limited commercial success. EEF (a regional power supplier) in cooperation with TDC Switzerland (sunrise) offers in the region of Freiburg broadband access via PLC. Beginning of 2004, the number of customers amounted to 1'750. Currently, two speed profiles are offered: 384/384 for 39 EURO per month and 768/768 for 136 EURO (prices include the monthly rental charge for the modem).

- Describe the reasons for regulatory intervention (e.g. commercial negotiations failed, or considered too slow, complaints of market players, requests for intervention, others, etc.);

Albeit a complaint filed by TDC Switzerland in 2003, the ComCom (Federal Communication Commission) as the sector specific regulator could not intervene in the broadband access market due to an insufficient legal base. However, the competition authority ruled that the discount scheme applied by Swisscom Wholesale relating to BBCS was unlawful and obliged Swisscom to offer its wholesale products on a non discriminatory base.

- Describe 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?

Switzerland applies the model of an ex post regulation. An amendment of the current legal framework currently treated in parliament is likely to offer OLOs new ways to access the incumbents fixed network and hence improves the chances for OLO to compete with the incumbent. An obligation for dominant operators to publish a reference offer for unbundled local loops as well as for Bitstream access might come into force sometime in 2006.

- Impact of VoIP service offers on the broadband market and on the regulatory intervention;

It is difficult to highlight the influence of IP telephony on the BB market, as the number of VoIP subscribers is not communicated by the VoIP SP (except for Cablecom, the major cable operator with 130'000 subscribers in March 2005). Graph 1 shows a big growth for ADSL lines but the large majority of VoIP subscribers use the cable operator VoIP product. VoIP services on ADSL start to take off now, but not in parallel to the ADSL growth. So there is no clear evidence yet of a possible impact of VoIP on the BB market.

As unbundling is not implemented yet in Switzerland, VoIP services on ADSL have to be offered through the wholesale access of the incumbent (Swisscom). In such VoIP is an add-on product for the subscribers. Only VoIP services offered on cable networks can be considered as potentially cost saving for the subscribers.

VoIP will be regulated in two phases in Switzerland: in the first phase (till end of 2005) some technical prescriptions and decrees will be adapted in order to facilitate the integration of VoIP services in the telephony market. Some obligations (e.g. emergency calls, and carrier selection) require more studies and enquiries.

- Describe 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]; change of strategy or the way of intervention caused by ECNS framework [if possible: point out particular advantages/disadvantages under the new regime], state of market analysis);

No regulatory measures in the field of broadband have been taken by OFCOM / COMCOM so far. In general, the Swiss ex post regime foresees that operators with dominant market positions are obliged to offer cost oriented wholesale prices (LRIC) on a non discriminatory base. As a proxy solution, the regulator can establish a benchmark whenever the regulated operator cannot prove the cost orientation of its wholesale products.

For the time being, there is no naked DSL/bitstream product in the market.

Case Study: Broadband Access in Austria

Historical Development and Regulation:

In 1996 the first broadband access product for the end-customer mass market called "teleweb" was launched by the cable network operator (CATV) "TELEKABEL" located in Vienna. The cable network had been established with the municipal participation and investment of the City of Vienna. After "TELEKABEL" was sold to UPC (City of Vienna is still holding 5%) in June 1999 the broadband access product got the name "Chello" and was rather successful exploiting the first mover advantage.

In November 1999 the voice telephony incumbent "TELEKOM AUSTRIA" (TA) followed with its end customer ADSL product called "AON-speed". On the ensuing first request of internet service providers (ISP), TELEKOM AUSTRIA refused to grant access at the wholesale level. After an informal intervention of RTR threatening to regulate bitstream access, negotiations between the association of the "Internet Service Providers Austria" ("ISPA") and TELEKOM AUSTRIA resulted in a reference wholesale offer ("ISPA-Offer") in March 2000 which is available for all ISPs and has been adapted (mostly due to changes at the end customer level) several times since then.
Prices and the stipulation of contractual terms and conditions are a matter of agreement between ISPA and TELEKOM AUSTRIA and are not based on formal regulatory decisions of the Telekom-Control-Commission (TKK), the decision taking body of the Austrian NRA.
After all, the existence of bitstream can be interpreted as caused by regulatory pressure ("light regulation"), however, TELEKOM AUSTRIA was never formally obliged by a decision (notification) to grant broadband access at the wholesale level.

In spring and summer 2000 TKK decided to make unbundling of the local loop (ULL – in place for telecom providers since 1999) also available to ISPs. Since end of 2000 broadband access is therefore also provided by ISPs via ULL. Nowadays several ISPs have a variety of retail broadband access products in the market, but also offer bitstream services to other ISPs supplied over ULL.

In 2004 RTR investigated in the market definition of wholesale broadband access. In March 2005 a national consultation on the drafted amendment of the telecommunication market ordinance (TKMVO 2003) regarding wholesale broadband access susceptible to ex-ante regulation was started. The draft considers a national market with the inclusion of CATV. The market analysis will start shortly.

Development of Broadband Access Technologies:

Figure 1 illustrates the development of broadband access in Austria over time, differentiated by the mainly used access technologies DSL and CATV. DSL is further distinguished between ADSL retail access provided by TELEKOM AUSTRIA, DSL-bitstream access provided by TELEKOM AUSTRIA to other ISPs and DSL-access over unbundled local loops provided by ISPs. Figure 1 shows a constantly high increase in the number of broadband access. In the past two years 2003 and 2004 the annual growth rate was approximately 35% after approx. 40% in 2002. At the end of 2004 the broadband penetration rate was more than 25% of Austrian households.

Figure 2 shows the relative increase in numbers of broadband access lines. DSL over the unbundled local loop tripled in 2004 (but still at a rather low level), bitstreaming gained 60%, whereas TELEKOM AUSTRIA's retail ADSL grew by 44% and the growth rate of CATV fell behind with an increase of only 15% in 2004.

As shown in figure 3, the share of CATV was 46% (40% retail + 6% wholesale) at the end of 2004. One year before (end of 2003) CATV had a share of about 55%.

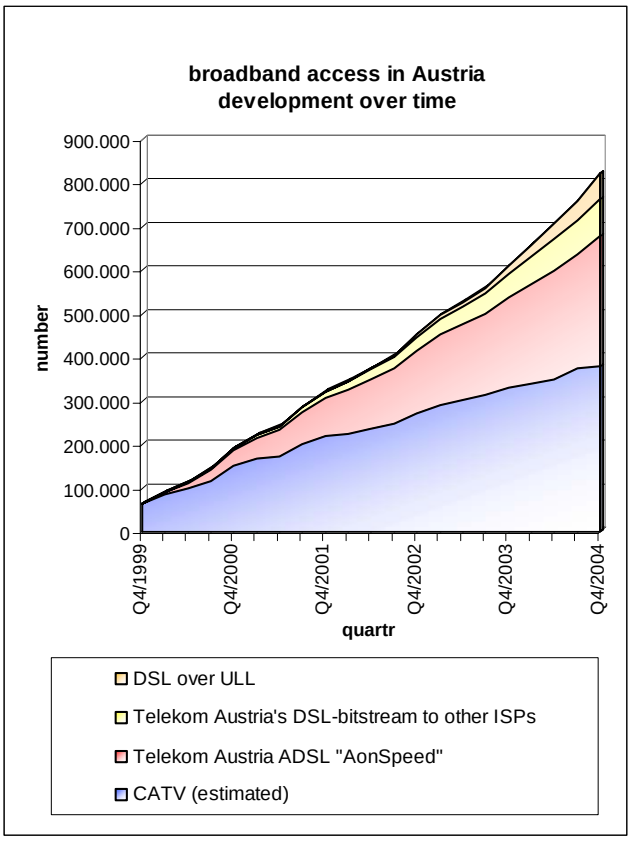


Figure 1

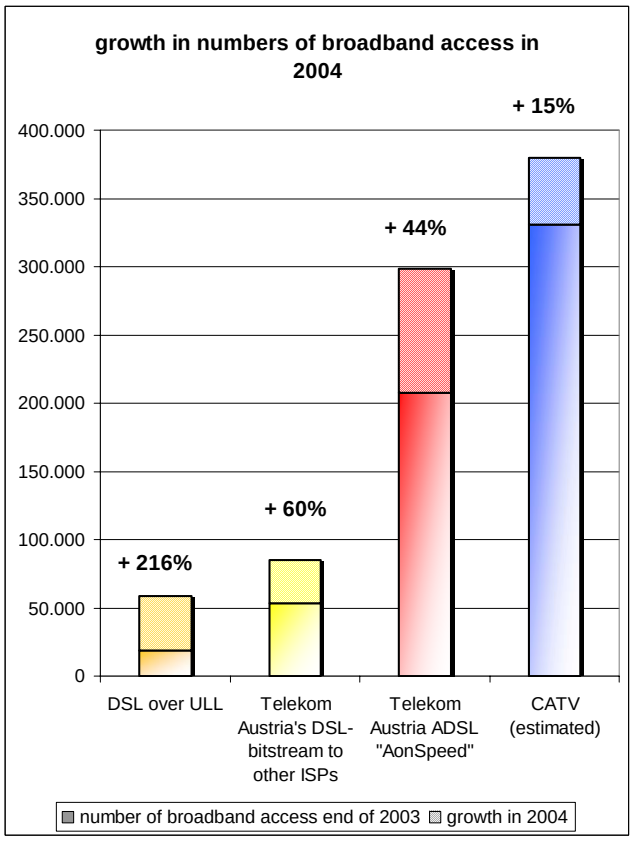


Figure 2

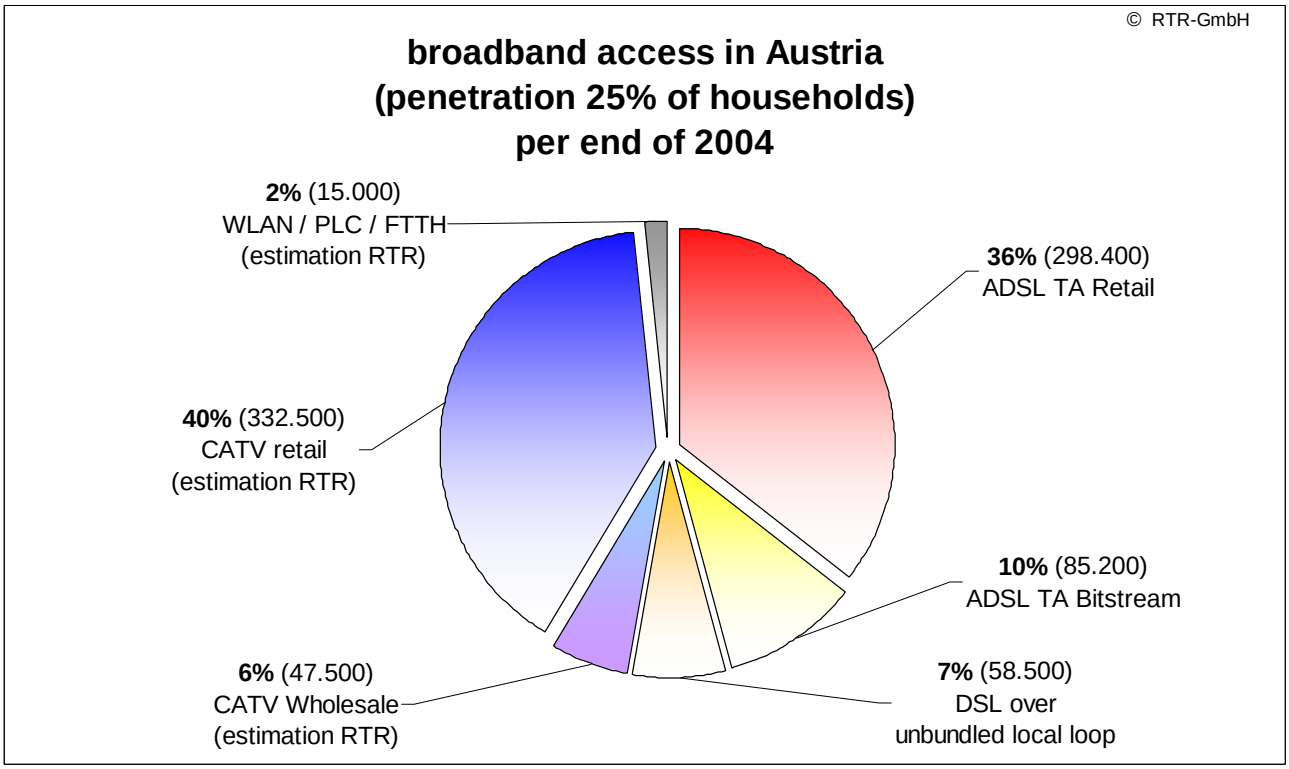


Figure 3

Players in the Market:

Two large ISPs – TELEKOM AUSTRIA (DSL) and UPC-TELEKABEL (CATV) – and a great number (> 120) of undertakings in the "competitive fringe".

DSL:

The largest provider as regards the number of broadband access lines is TELEKOM AUSTRIA. At the retail level it has a market share of about 36% and at the wholesale level of about 46% (10% bitstreaming + 36% self provided service – see figure 3) at the end of 2004.

Other DSL-providers fall well below 10%. About 23 of them (e.g. INODE, TELE2/UTA, SILVER SERVER) use ULL to provide DSL at the retail level or (some of them) to provide DSL-bitstream at the wholesale level. More than 40 ISP rely on the bitstream offer of Telekom Austria. Some ISPs also offer resale of their DSL broadband access products to other ISPs (no figures known).

CATV:

Approximately 46% (end of 2004 after 54% end of 2003) of all retail broadband access lines are realised over CATV networks (figure 3). In Austria about 250 CATV networks provide television to their customers. Almost 100 of these CATV networks also provide broadband access either directly to their customers at the retail level or (more than one third of them!) to ISPs at the wholesale level ("Open Access" on CATV is the equivalent to bitstream access). Most of these often rather small CATV operators are not vertically integrated in the broadband business and offer their broadband wholesale service exclusively to one ISP only. Some others serve their own ISP and additionally further ISPs on their CATV network.

UPC-TELEKABEL is by far the largest CATV operator with approximately two thirds of all broadband connections (retail and wholesale) over a CATV network. The largest 5 CATV providers serve nearly 90% of all CATV-broadband access. All other CATV operators have a market share of less than 1% at the retail or wholesale broadband access market (including self provisioning).

Other Broadband Access Technologies:

Although some other access technologies face an increasing number of customers, their impact on the market is (at least up to now) not very significant (see figure 3).

The spread of W-LAN hotspots developed rapidly in the last two 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. But these nomadic/mobile broadband connections as well as UMTS are not classified as fixed wireless access (FWA) and are therefore presumably not included in the Austrian wholesale broadband access market.

Some ISPs offer fixed wireless broadband access, especially in places where wire line broadband access (using DSL, CATV or other) is not available. These offerings use frequencies in the license-exempt ISM band. 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 offerings on the emerging 3G market add a further wireless broadband access product to the list. UMTS is currently offered by 5 mobile operators in urban areas with a high population density.

Broadband over power line connections (PLC) is provided by the energy supplier of the City of Linz ("LINZ AG") on a commercial basis (approximately 4.600 end of 2004). Other Austrian power companies abandoned their PLC trials due to technical and/or commercial considerations. As PLC frequently is faced with complaints regarding the emission of interfering frequencies it is not foreseeable whether LINZ AG will continue to offer broadband access based on PLC technology in the future.

Fibre to the home (FTTH) is provided by the public power supplier to residential households in Vienna ("WIENSTROM") at a very small scale (less than 1.000 end of 2003). TELEKOM AUSTRIA runs a FTTH trial in small villages providing triple play to residential customers. In a few villages local ISPs operate some FTTH connections. Due to other technologies already in place and the expensive roll out, it is not expected that FTTH will achieve a significant level of market share within the next years.

The Geographical Dimension:

DSL:

The only nationwide broadband access network is provided by TELKOM AUSTRIA reaching of more than 80% of all households. Also bitstreaming is available nationwide, i.e. at least where TELEKOM AUSTRIA has its DSL footprint. Two ULL based ISPs (INODE and TELE2/UTA) each reach a coverage of approximately 50% of households, all together 55% (figures end of 2004).

CATV:

Every CATV operator is exclusively represented in the service area of its own network, i.e. there is no geographical overlapping of CATV-networks. All broadband enabled CATV-networks have a coverage of roughly 50% of all households. The greatest CATV operators are located in the capitals of the 9 Austrian federal states and in the major cities; e.g. UPC-TELEKABEL is represented in Vienna, Graz, Klagenfurt, Wiener Neustadt and in the region of Baden south of Vienna. Nearly every area serviced by a broadband CATV-network is also serviced by TELEKOM AUSTRIA's ADSL, i.e. CATV-areas are a subset of DSL-areas.

In many cases CATV operators clearly dominate the retail market in the metropolitan areas due to their first mover advantage, whereas TELEKOM AUSTRIA dominates the market in non CATV-wired areas (see figure 4). The white areas in figure 4 represent the non broadband serviced regions which correlate with the low density in population there.

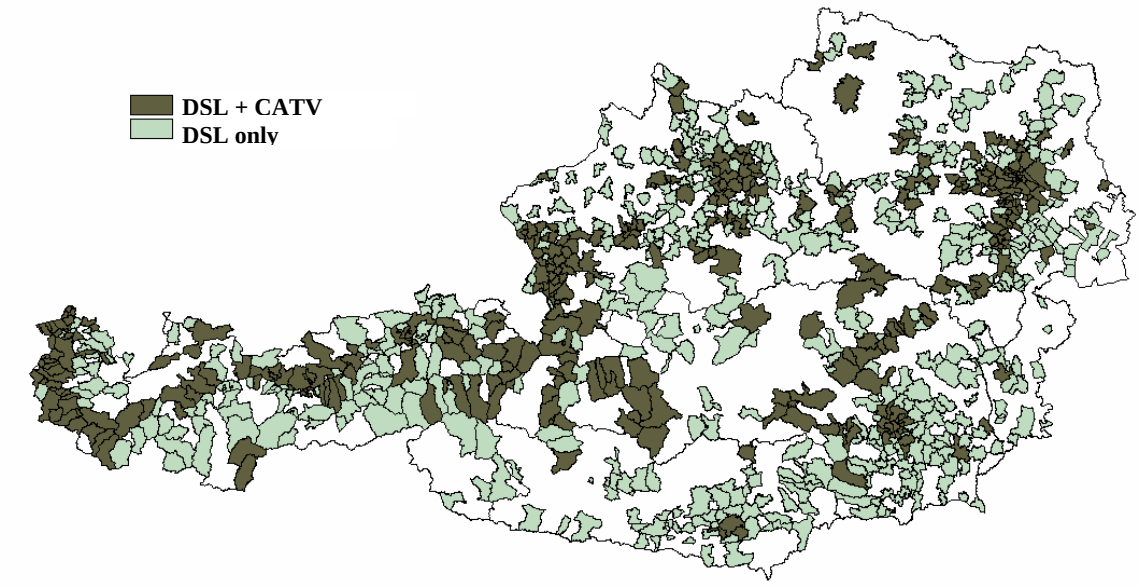


Figure 4

The fact that CATV-operators are exclusively serving their individual areas is again a strong indication for the fact, that wireline based access networks still constitute a regional natural monopoly. Even if nowadays in many regions there are at least two wireline based networks (PSTN/DSL and CATV) represented, this circumstance is due to the fact that CATV-networks originally were built up to provide television services only. Moreover this roll-out of CATV-networks was often undertaken or assisted by the local community and not (totally) by a

private investor. Only the later upgrading of the CATV networks with an upstream ability, made the provisioning of broadband (or triple play) possible.

Products in the market:

In Austria it is always the ISP who provides the broadband access to the end customer. This ISP is either totally vertically integrated (e.g. TELEKOM AUSTRIA, UPC-TELKABEL) or largely vertically integrated by the use of ULL or the ISP uses bitstream access/open access or a resold broadband access to provide a broadband product to its end customer. For the end customer there is no need to buy the access and other ISP-services separately (one stop shopping). The ISP has the advantage to get the full customer ownership regarding all broadband and internet services. Therefore the stipulated examples of tariffs (residential products only) in the table below always include both: broadband access and other ISP services. The following table (first of April 2005) can only show a small fraction of the wide variety of residential retail products available in Austria (also fair use and flat). Business products are also available with symmetrical bandwidth.

ISP	technology	downstream [kbit/s]	upstream [kbit/s]	data volume included	monthly price [€] (incl. 20% VAT)
Telekom	ADSL	256	64	400 MB	19,90
Telekom	ADSL	768	128	0,6/2/5 GB	29,90/39,90/49,90
Telekom	ADSL	1024	256	10 GB	64,90
UPC-	CATV	256	64	1 GB	19,98
UPC-	CATV	2048	256	fair use	49,--
UPC-	CATV	4096	384	fair use	69,--
Inode	ULL - DSL	256	64	250 MB	18,90
Inode	ULL - DSL	1024	128	4 GB	39,--
Inode	ULL - DSL	2048	384	20 GB	49,--
Inode	ULL - DSL	3072	512	20 GB	59,--
Inode	ULL - DSL	768	128	flat	59,--
Inode	ULL - DSL	1024	128	flat	69,--
Inode	ULL - DSL	1280	256	flat	79,--
Inode	ULL - DSL	5120	512	30 GB	89,--
Tele2/UTA	ULL - DSL	768	128	1/3 GB	36,44/41,44
LIWEST	CATV	1024	256	10 GB	42,15
LIWEST	CATV	2048	512	20 GB	48,--
LIWEST	CATV	3072	768	25 GB	69,--
Kabelsignal	CATV	2048	256	20 GB fair	43,--
Kabelsignal	CATV	2048	512	30 GB fair	60,--
Kabelsignal	CATV	2048	1024	40 GB fair	84,--
blizznet	FTTH	10 Mbit/s	10 Mbit/s	10/30/100	69,--/119,--/299,--

At the wholesale level TELEKOM AUSTRIA offers bitstream with different features:

- ADSL residential: Overbooking 1:30, UBR+, 256/64, 768/128, 1024/256, 2048/512.
- ADSL business: Overbooking 1:5, UBR+, 256/256, 512/256, 768/128, 1024/256, 2048/512
- SDSL business: Overbooking 1:5, UBR+, 512/512, 768/768, 1024/1024 , 2048/2048, 4096/4096

Bitstream traffic can be handed over at one or up to nine points of presence (POP). Dependent on the origination of the traffic and the service region of the connected POPs regional or national prices are applied.

Naked DSL (DSL without voice telephony access) is not available from TELEKOM AUSTRIA (but other ISPs) up to now.

Infrastructure based Competition:

In regions with a high density of population at least 3 or even more wireline network operators offer broadband access to customers: TELEKOM AUSTRIA, a CATV-operator and one or more ULL-beneficiaries (ISPs). 54% of the Austrian households can be served by at least one ULL-beneficiary (additionally to a CATV-operator and TELEKOM AUSTRIA) and still 42% of the Austrian households can be served by at least two ULL-beneficiary, i.e. there is also (a certain degree of) competition between ULL based ISPs.

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. Bitstreamig enables ULL based ISPs to complement their ULL-products to offer services to end customers on a nationwide basis. As shown in figure 2 ULL catches up against bitstreaming.

In general there should be a preference for neither service competition nor infrastructure competition. Both should be equally allowed to facilitate the “ladder of investment” (or regional complementarity respectively). In this context the right pricing on all stages of the value chain is critical, i.e. the higher risk of investment in the expensive ULL infrastructure (collocation, backhaul) should be reflected in a sufficient price gap between ULL and bitstreaming not to cannibalise ULL. The intensity of regulation should not only depend on the degree of competition but also on the level of the value chain where the regulatory intervention takes place.

Additional infrastructure based competition in the future can be expected from the new WLL frequencies auctioned in October 2004 with an obligation on the providers to meet a certain minimum coverage until end of 2007 and 2008.

A stimulus to competition could also come from triple play over DSL to compete against CATV networks. TELEKOM AUSTRIA offers a service called “AON.TV” which allows users to watch TV on the PC. For autumn 2005 TELEKOM AUTRIA announced a “cable”-TV product via ADSL, which allows watching TV channels via a set top box on the TV-screen and could be a real substitute to CATV.

Conclusions:

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. Bitstreaming is not a regulated wholesale product, however (indirectly) caused by regulation. Up to now no significant implications caused by VoIP could be observed at all.

UK broadband case study

The retail broadband market

Take-up of broadband is growing strongly in the UK. This has been helped by the introduction of new services, including higher speed services, and a number of price cuts. The number of UK broadband subscriptions is currently around 7 million and is growing by 60,000 subscribers per week.

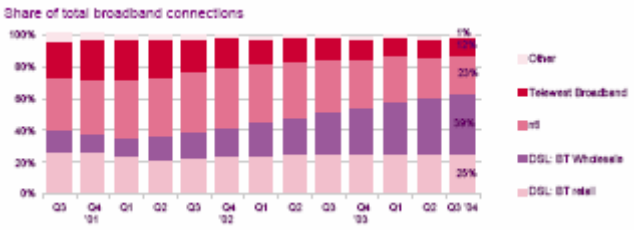
Access technologies

BT will have rolled out DSL to nearly all of its exchanges across the UK by the end of 2005. There is competition to DSL from cable in around 50 per cent of households, as well as pockets of competition from fixed wireless networks. However, current evidence suggests that these other access technologies in the UK are unlikely to attract the funding necessary for mass roll-out and are likely to serve only particular consumer segments in the short to medium term. Similarly, 3G networks could also provide some competitive constraint to fixed broadband networks but the lower speeds and higher costs is likely to mean that it is only a substitute in some segments of the fixed broadband market and a weak substitute for fixed networks overall.

Market shares

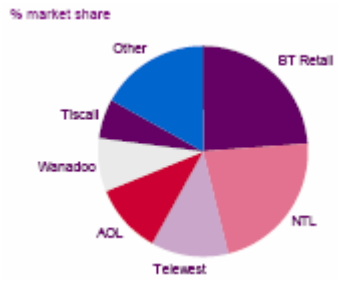
Figure 1 shows that at the retail level BT's market share has been slowly but consistently eroding, as have those of the two cable companies, ntl and Telewest. Other ISPs, using BT's wholesale products (around 90% use IPStream), have managed to gain just under 40% of the retail broadband market. BT's wholesale DSL services (whether retailed by BT or another ISP) now account for just under two thirds of the broadband market. Figure 2 shows that together, AOL, Wanadoo and Tiscali account for around 25% of the total retail broadband market.

Figure 1:



Source: Ofcom/operators

Figure 2:



Source: Ofcom/operators

Broadband products

Competition in the broadband arena remains strong and there is a clear trend among ISPs to increase the basic speeds available to consumers. Services are now available in some areas at speeds of up to 8 Mbit/s and BT has recently commenced a trial to assess the viability of offering higher speed wholesale products over its network. Demand for such speeds seems certain to increase if recent patterns of broadband use are a guide. Ofcom research shows

that downloading music and video and playing games are more than twice as popular among broadband users as dial-up users.

The last few months have also seen the emergence of some combined voice and broadband products, signalling that providers are looking to utilise the potential of LLU. ISPs are also now beginning to see VoIP as a vital tool in growing their subscriber base.

In the UK, residential entry level services are priced at around £17 a month, mid-speed services (500Kbit/s to 1Mbit/s) around £23 a month and over 1Mbit/s services around £28 a month. A number of higher speed services have also started to emerge. UK Online has launched an 8Mbit/s service for £39.99 a month capped at 4GB per day. Telewest and Bulldog are offering uncapped services at 4Mbit/s priced at £50 and £40 per month respectively. There is also a number of 2Mbit/s services available based on BT wholesale products with prices starting from £19.99 and capped at 1-2 GB per month, additional GBs are charged at around £2 per GB. Uncapped services start at around £40 per month.

VoIP Services

Ofcom believes that while the number of VoIP subscribers in the UK is currently quite low, numbers are likely to grow rapidly during the next year. Recent announcements include the launch of VoIP services by US VoIP specialist Vonage and the UK's largest ISP Wanadoo.

Broadband regulation

Ofcom's regulatory strategy

Ofcom's proposed regulatory strategy, as set out in its ongoing strategic review, is to promote competition at the deepest level of infrastructure where it will be effective and sustainable. This could mean regulation which promotes competition at different levels of the value chain for different geographies, such as LLU in dense customer geographies and bitstream products in geographies with lower customer densities.

Ofcom does not consider that currently it would be appropriate to base its regulatory policy on the expectation that there will be new mass-market access networks providing effective competition to the existing copper and cable networks between now and the end of the decade. Ofcom therefore considers that it needs to complement competition from these alternative networks with regulation which allows third party access to existing BT infrastructure where this is a bottleneck.

Specific regulatory measures on a product basis

Introduction

Many of the specific regulatory measures in the UK that relate to the broadband markets have evolved in response to changing market developments over a period of time. However, Ofcom's recent market reviews and its ongoing strategic review have provided Ofcom with opportunities to ensure that its overall regulatory strategy in relation to broadband is consistent.

Ofcom completed the wholesale local access (LLU) market review in December 2004, the wholesale broadband access (DataStream) market review in May 2004 and the leased lines market review in June 2004.

The following sets out Ofcom's approach to regulating the different products in the broadband value chain which include local loop unbundling (LLU); DataStream (ATM interconnect); IPStream (resale); and leased lines.

LLU

Although there are other wholesale products that provide competing providers with access to BT's network enabling them to provide downstream broadband services, such as DataStream and IPStream (see below), Ofcom considers that LLU services are important to allow competing providers to innovate, differentiate their product offerings to a greater extent and provide higher bandwidth services, a better range of applications and improved service levels.

Ofcom has found BT to have SMP in the wholesale local access market in the UK excluding the Hull area and Kingston Communications to have SMP in the wholesale local access market in the Hull area. Ofcom has imposed on both BT and Kingston a general set of remedies that includes a requirement to provide network access on reasonable request, a requirement not to unduly discriminate, a requirement to publish a reference offer and requirements to notify charges, terms, conditions and technical information. Ofcom has also imposed a specific requirement on BT to provide LLU services and imposed charge ceilings that have meant significant reductions in BT's connection and rental charges.

Ofcom believes that, since competition in this market is limited and this is an established market, there is a concern that BT or Kingston might exploit their position of SMP to earn excessive profits. Charges based on LRIC plus an appropriate mark-up to allow the recovery of common costs and a reasonable return on the capital employed (LRIC+) correspond more closely to the charges that would occur in a fully competitive market and also encourage efficient entry at the network level. Ofcom has therefore required BT's and Kingston's LLU charges to be based on LRIC+.

Ofcom has appointed an independent Telecommunications Adjudicator (the "Adjudicator") to work with industry to accelerate the implementation and delivery of fit for purpose and appropriately industrialised LLU products and processes.

Although BT has been required to offer fully unbundled loops since August 2000 and shared access since December 2000, take-up of LLU in the UK has in the past been limited as a result of high charges and poor processes. However, LLU charge reductions and the work of the Adjudicator and BT have already had a significant impact on the take up of LLU and operator's plans to invest, such as attracting interest from AOL, Wanadoo, ntl and C&W. Since August 2004, the number of unbundled loops has increased from 16,000 to 35,000 and industry forecasts indicate that there will be 250,000 unbundled loops by June 2006.

Wholesale Broadband Access (DataStream)

Ofcom considers that there is a need for ATM interconnection ('DataStream') at the current time, as it allows for competition in the provision of broadband services where the economics of LLU may not make LLU a cost-effective option. The availability of DataStream allows competition in the provision of broadband in less urban areas where population density makes LLU less attractive.

DataStream was originally mandated by Oftel in June 2002 following disputes in order to allow operators to compete with BT in offering intermediate services to ISPs. Take-up of DataStream was slow partly as a result of margin squeeze concerns and partly as a result of process issues which discouraged take-up. Oftel conducted a Competition Act investigation into margin squeeze allegations between April and September 2003 but no breach was

found. However, in order to provide certainty to the industry, Ofcom decided to set a margin squeeze rule, which was finalised in August 2004.

Ofcom's wholesale broadband access market review found BT to have SMP in the wholesale broadband access market in the UK excluding the Hull area and Kingston Communications to have SMP in the wholesale broadband access market in the Hull area. Ofcom has imposed a general set of remedies (see LLU) on both BT and Kingston.

Ofcom has directed BT to provide DataStream on a retail minus basis. The decision to adopt retail minus rather than cost based pricing is based on the expectation that competition from LLU and alternative networks will develop and that a retail-minus pricing approach will provide the right incentives to ensure competition develops.

Ofcom's no margin squeeze rule is a retail-minus rule between BT's DataStream product and intermediate (resale) IPStream product. The rule prohibits BT from reducing the margin between the two products beyond a minimum stipulated by Ofcom. Since the margin squeeze rule was finalised, the number of end users subscribing to broadband services based on DataStream has doubled and now stands at around half a million.

IPStream

In comparison to DataStream and LLU, BT's IPStream product is essentially an end-to-end resale product that allows little scope for differentiation. It is generally purchased by ISPs. These products have not been the subject of a formal market review and are therefore currently unregulated. Ofcom considers that the regulation imposed in upstream markets i.e. in respect of LLU and DataStream are sufficient to promote competition downstream.

Leased lines

Leased lines provide dedicated symmetric transmission capacity between two points and are generally used by larger businesses or those with high data transmission requirements. They are capable of being used to provide broadband Internet connectivity as well as being used for voice and data transmission.

Ofcom's regulation of leased lines is aimed at ensuring that business consumers are able to obtain retail leased lines on fair and reasonable terms by promoting competition and ensuring that where competition does not exist, that the dominant provider does not exploit its market position. Ofcom has found BT to have SMP in the retail low bandwidth leased lines market in the UK excluding the Hull area, where Kingston was found to have SMP. Ofcom imposed on both BT and Kingston remedies that include an obligation to supply on reasonable request, a requirement not to unduly discriminate and a requirement to publish a reference offer.

At the wholesale level, Ofcom identified markets for two different types of leased lines – traditional interface (SDH-based technology) and alternative interface (typically Ethernet-based technology). Ofcom concluded that in the UK (excluding the Hull area), BT had SMP in the markets for traditional interface leased lines with bandwidths up to and including 155Mbit/s and in the market for alternative interface leased lines for all bandwidths. Ofcom similarly concluded that Kingston had SMP in these markets in the Hull area. As a result of the SMP findings, Ofcom imposed on both BT and Kingston the general set of remedies (see LLU) and a requirement to price on a LRIC+ basis.

Ofcom additionally imposed a price control on some partial private circuit (PPC) charges in order to constrain BT's prices and provide an incentive for it to reduce costs. The price control applies a variety of RPI-X% caps on different baskets of PPC charges.

Although BT has been required to provide PPCs on cost oriented terms since 2002, BT's share of the retail leased lines market remains high in what is now an established market. It is expected that the price control will encourage greater take up of PPCs by providing greater certainty to competing operators of the costs that they will face in providing retail leased lines and ensuring that these costs reduce over time.

Migrations

Migration to LLU

The Adjudicator has been addressing the processes for migrations to LLU and Ofcom will consider whether to set charges for migrations later this year.

Broadband Access Migrations

Broadband Access Migrations include migrations between any of the intermediate services of BT and other operators (i.e. migrations to and from IPStream and DataStream products). In August 2004, following a dispute, Ofcom directed BT to provide Broadband Access Migration at a charge of £11 per migration and on reasonable terms and conditions.

Retail migrations

On 30 July 2004, BT implemented a process for retail DSL broadband migrations. The process was designed to enable end users to move from one broadband service provider to another without terminating and re-provisioning, hence removing excessive downtime and the costs associated with cessation and re-activation. The process works by means of an 'authorisation code' which customers obtain from their existing provider and give to the new provider they have chosen. The process is voluntary and not all ISPs have signed up, although Ofcom continues to encourage them to do so.

While the process for migrations between service providers using IPStream has been successfully implemented, those using either DataStream or LLU are unable to use the process. A process to deliver migrations between wholesale products (IPStream/ DataStream/LLU) is still being developed by BT. In addition,Ofcom has an ongoing migration project to review the current processes and its voluntary nature.

Other regulatory developments

Voice over IP - regulatory decisions and their impact on VoIP services

In September 2004, Ofcom decided that VoIP services could use geographic numbers and also introduced a new non-geographic number range (056) for such services. Ofcom has since allocated 056 number blocks to 40 communications providers and geographic number ranges to approximately 10 communications providers.

In October 2004, Ofcom proposed a light touch approach to the regulation of VoIP services based on informed consumer choice and also introduced an interim policy for VoIP services. The main aims of the policy are to reduce the extent to which regulation might distort the nascent VoIP market and to remove the disincentive for providers to offer VoIP services without access to the emergency services. Ofcom believes that the interim policy has been a success since several VoIP services now provide access to the emergency services, including the Vonage and Wanadoo services.

Ofcom has asked the industry to develop a code of practice for consumer information for VoIP and good progress has been made on this.

ADSL2+

In January 2005, the industry group responsible for the DSL deployment rules in the UK agreed to the inclusion of ADSL2+ in the frequency plan. Standard ADSL2+ will be deployable from the local exchange and will be fully protected from potential cabinet based deployments.

'Naked DSL/bitstream' – availability, products and regulation

There is currently no 'naked DSL' type product available in the UK although Ofcom understands that there is industry interest in such a product. Ofcom is currently seeking industry views on the matter.

Broadband case study Germany

I. Market data analysis

Retail broadband lines

	DSL-lines	Access lines via cable	Access lines via powerline	Access lines via satellite	BB total
Number of retail broadband access lines Reporting date 01.01.2005	6.7 mill.	0.145 mill.	0.0093 mill.	0.041 mill.	6.9 mill.
Percentage of total	97%	2%	0.13%	0.6%	
Broadband penetration Percentage of population	8.1%	0.17%	0.011%	0.05%	8.4%
Broadband penetration Percentage of households	17.4%	0.38%	0.024	0.11	17.9
Broadband coverage Percentage of lines	~90%*	~14%**	< 1%	100%	

*) of customer with telephone lines (39.4 mill.)
**) of households with cable lines (~ 20 mill)

1,338 mill broadband access lines are provided by new entrants, of which are based on wholesale products:

Reporting date 01.01.2005	Full ULL	Shared access	Bitstream access	Resale	Cable BSA	Total
Number of wholesale products	911,000	2683	0	246,000	0	1,159,683

Market share competitors:
retail level: DSL lines: 17.4%
Broadband access lines: 20%
Wholesale level: ULL < 1%
Broadband origination (Incumbent's products ZISP/GATE): < 20 %

II. Country Case Studies

In Germany the dominating access technology is DSL. At the end of 2004 6.9 mill. broadband access lines were active. 97% of those lines are DSL lines. About 10% of all DSL-lines are SDSL-lines. At that time the competitors' market share of broadband access lines was 20%, which doubled within one year. They held a market share at DSL-lines of 17%.

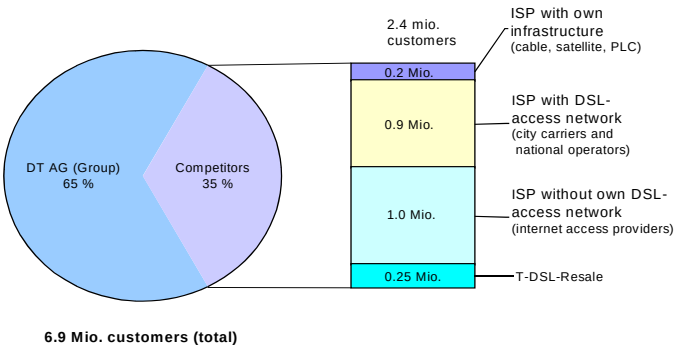
In addition to the DSL line, the end user has to obtain the Internet access from an Internet service provider (ISP). This Internet access includes the transmission service in the IP networks (from the broadband point of presence = BB-PoP) and the retrieval of content from Internet servers. For this purpose, the end user has to conclude a contract with an ISP. The customer can obtain Internet access either from T-Online, DTAG's ISP, or from another ISP. Different tariff models are offered in the market: metered, volume-based or flat-rate tariffs.

Up to summer 2004 before the incumbent put DSL resale products on the market DSL business model in Germany was therefore mainly marked by the fact that customers have to conclude two contracts: one for the DSL line and a second for Internet access. This applied even if customers obtained the DSL line from DTAG and Internet access from T-Online, its subsidiary, because the DSL line (the end user product T-DSL) was exclusively marketed by DTAG itself.

Apart from DTAG there are about 60 other mostly regional providers offering DSL lines. In a few cities competitors could win market shares of about 50%. Their offerings mostly include the telephone line, the DSL line and the Internet access. These providers thus have two functions for a customer wishing to use DSL: they are DSL line providers and ISPs. In these cases customers require only one contracting partner. This implies, that customers of these competitive providers do not have the option of choosing other ISPs. The competitors mostly offer their services on the basis of the unbundled local loop.

As in Germany the incumbent is up to now separately marketing the DSL line and the internet access (supplied by its subsidiary, T-Online) competitive internet service providers were able to offer internet access products despite the incumbent's high market share on the broadband access market. The competitors market share on broadband internet access is higher than the one on infrastructure market, it is at the end of 2004 about 35%. As this year the incumbent will reunite with its subsidiary T-Online it is more likely, that the separated marketing of DSL-lines and internet access will end.

ISP Internet Access



At the end of 2004 in Germany there is a broadband penetration (percentage of households) of almost 18%. The DSL-line penetration is 17.4%, the one of broadband access via cable only 0.38%.

Germany is a country with a high density of population (81 mill. inhabitants), but there is an uneven dispersion. 40.7 % of the population are living in urban areas, 42% live in suburban areas and 17% are located in rural areas, with low density of households and business locations. Distribution density is a very important cost driver for fixed network lines. That is the reason why the DSL coverage in urban areas is almost complete, in rural areas much lower. The DSL coverage in Germany in total is about 90% (percentage of customer telephone lines). There are three reasons why telephone customers in Germany can't get access to DSL lines: 1. technical reason: The distance between customer and DSLAM is to far (>5 km), so that DSL is technically impossible, 2. the customer density per DSLAM is to low, so that in incumbents view the access to DSL lines is economically not feasible. 3. Some regions in Germany have local loops based on a hybrid fibre copper cable, where DSL Technology is not applicable. Point one and two prove that density is important for DSL coverage.

In 2004 the bitrate commonly subscribed by end users at ADSL-lines has evolved from the typical "768 kbit/s access" to the "1 Mbit/s access". Most DSL providers offer access lines with speeds of 1, 2 and 3 Mbit/s. The maximum access bitrate available by ADSL line is 8 Mbit/s. At SDSL lines the average bandwidth did not increase in the past two years. At SDSL-lines there are two typical speeds mostly offered: bitrates of 1024 or 2048 kbit/s.

Wholesale markets

Wholesale products for DSL lines

ULL and Line Sharing

Up to the summer 2004 there were two regulated broadband wholesale products allowing the creation of DSL lines: the unbundled local loop and line sharing. Up to that date line sharing was not accepted by the market (competitors criticised high rates!). That is the reason why up to the summer 2004 almost all competitors' DSL offers in the retail market were based on unbundled local loop. There are only very few new entrants' DSL offers basing on self-provided local loops. Those products are mainly high quality products like for example symmetric DSL-lines. This situation started to change in August 2004, when the incumbent placed a DSL-Resale offer on the market. (See the next but one chapter). At the end of 2004 77% of competitive DSL offers were created via TAL, 21% via DSL Resale and 0.23% via line sharing. The demand for line sharing products also increased a little bit in 2004, as the line sharing rate was decreased by the NRA.

In order to use those wholesale products it is necessary to have own infrastructure reaching to the access network. The new entrant asking for ULL or line sharing as a wholesale product has to collocate at DSLAM location; that means at a very low broadband network level. As none of the competitors in Germany is economically able to duplicate the

ubiquitous broadband network, only providers at regional level invested in local infrastructure. Up to 2004 regional city carriers were the most important competitive suppliers of DSL-lines. They invested in their regions in broadband-infrastructure, besides the last mile. The access lines (local loop) are mainly leased from the incumbent. There are a few providers Arcor, QSC, celox, which have nationwide (supraregional) supply of DSL-lines but far away from total coverage. They supply mainly metropolitan areas.

Broadband origination

In Germany there exists a second regulated broadband wholesale product. It is called ZISP (Zuführung für Internet Service Provider). The product originates broadband traffic over the concentration network to handover points on a best effort basis. For a ubiquitous coverage the ISP has to interconnect at 74 handover points. This wholesale product does not comprise the access to the end customer.
Another broadband origination product (Gate/not regulated) concentrates traffic to one handover point. It comprises the same services like ZISP + origination over the managed IP network of the incumbent. This product as well does not comprise access to the end customer.
Those broadband origination products are results of the German special feature of marketing DSL lines separately from Internet access contracts.
Up to now there are identified three competitors who also offer broadband origination to smaller ISPs. Its origination service often bases on the wholesale product ZISP. Non of the competitors owns a broadband access network in combination with a concentration network being able to create such a service with its own infrastructure.

DSL resale

In Summer 2004 the incumbent started voluntarily with the supply of a DSL-Resale-product (ADSL). This helped Internet Service Providers (operating nationwide) without their own infrastructure to offer to their end customers internet access products together with a DSL line. As this resale product is combined with a relatively high minimum purchasing quantity its use is not reasonable for smaller ISPs or those who offer high quality access lines to a smaller group of business clients. A lot of ISPs claim that the resale product's discount of 11 up to 15 % is too small[13].
Despite this restriction in the end of 2004 almost 250,000 DSL lines basing on DSL-Resale were put on the market especially by nationwide operating ISPs who are marketing broadband access quite aggressively with flat rates thus pushing price competition.

Bitstream access

In Germany a ubiquitous offer of bitstream access products does not exist. The incumbent does not supply a bitstream access product. There are only a few regional providers offering customised bitstream access in a few places. These Bitstream access products are predominantly ATM-based. Deutsche Telekom AG offers only a broadband access product consisting of DSL resale + ZISP (broadband origination on a best effort basis). The NRA

[13] Vgl. Martin Virtel, „Kampf um DSL-Kunden wird teurer" in Financial Times v. 13.07.04

does not agree with the incumbent defining this product combination as Bitstream. As it does not include the essential conditions a Bitstream access product has to fulfil: 1. Access to the customer and creating end customer DSL products with individualised quality parameters.
A Bitstream workshop and a national hearing on Bitstream access showed that there is a demand for Bitstream access products; as well IP based as ATM based.

Wholesale products for alternative broadband access lines

As in Germany alternative broadband technologies are very unimportant, at the moment no wholesale products exist. The next important access technology are (in great distance) access lines via TV-cable. They have a market share at the retail market of almost 2%. Within one year the number of broadband access via cable doubled from 70.000 to 145.000. The market analysis has shown that a few providers are planning to offer a wholesale broadband access product. Because of its unimportance wholesale products based on the HFC (hybride fibre cable) networks are at the moment not able to create a competitive impact at the fixed network.

Regulatory strategy

As infrastructure competition is seen to be important, the NRA has regulated an unbundled local loop product in the very beginning of market liberalisation (1997). Up to 2004 competitors leased almost two mill. ULL, about half of which are high bit rate lines and used as a wholesale product for DSL-lines. For 2005 it is expected that a further 1 million loops will be unbundled. Up to now the second broadband regulated wholesale product, line sharing, is not very much accepted by market players. Both wholesale products require rolling out network infrastructure by competitors which have to reach the main distributing frame (DSLAM) as well as installing collocation equipment, which is now the case in 2700 out of 8000 MDF sites covering appr. 60% of the population. As no competitor is able to double the broadband network ubiquitously, most competitors are restricted to local areas, where they compete with the incumbent. In some metropolitan areas they succeeded in getting high market shares.

Up to now, a broadband wholesale product does not exist in Germany, which brings competitors in the position of offering DSL-lines with own individualised quality of service parameters without the requirement of having an own nationwide infrastructure network. Seeing that the incumbent still has very high market shares at the retail broadband access market, the NRA decided (besides the requirements of EU recommendation) to investigate whether a bitstream access regulation is needed, supplementary to the existing wholesale products.

Market analysis

ULL
In the market analysis of market 11, which is already notified, the NRA has assessed significant market power for the incumbent on the ULL-market. Market share > 90%.

Broadband origination
Market Analysis is pending. Market data are already gathered. They show that the incumbent has a market share of > 70% (volume).

Wholesale broadband access market
With monopoly network infrastructures wholesale markets often exist only after orders have been issued. So in the absence of a ubiquitous bitstream offering, the NRA also looked at

- closely related wholesale markets (local loop and broadband origination);
- corresponding retail markets (broadband access markets: ADSL mass market and Premium Access market)

being able to assess significant market power at the wholesale broadband access market.

Retail markets

The NRA defined two retail broadband access markets:

- ADSL mass market
(ADSL access lines without special quality of service guarantees, cable access lines, wireless access lines, two-way satellite access lines, powerline access lines);
- Premium access line market
(ADSL access lines with special quality of service guarantees, SDSL access lines, Internet fixed connections up to 2Mbps).

At both retail markets the NRA found high market shares of the incumbent (based on volume > 80 resp. > 70%). The incumbent with its high market share is faced by a great number of competitors. The competitive provider with the next highest market share has for instance on the Premium access line market a share of 3%.

Bitstream access markets

According to the situation on the retail markets, the special German network infrastructure and the announced demand of competitors for a ATM and IP based Bitstream product;
the NRA defines broadband wholesale access markets as follows:

– ATM bitstream access market
with handover at the ATM level (layer 2) at various points in the network hierarchy;
– IP bitstream access market
with handover at the IP level (layer 3) at various points in the network hierarchy and HFC with handover at the IP level.

Both markets comprise bitstream access products which could base either on the high bit rate "virtually" provided part of the local loop or on the complete high bit rate "virtually" provided local loop (with symmetric or asymmetric access).

ZISP access to ISP platforms is not found in this market.

As Deutsche Telekom is the only operator in a position to make a ubiquitous offering and which has significant market power as well on the corresponding retail markets as on related wholesale markets the NRA finds, that the incumbent has significant market power in the ATM bitstream access market and in the IP bitstream access market.

Independent of the Bitstream market analysis the NRA plans to analyse and notify retail markets: Broadband access market and Internet access market (narrow and broadband).

Voice over IP (VoIP)

In the beginning of 2004 the first VoIP services for residential customers entered the market. Although some VoIP services existed for many years, it can be said, that these new services were much better in quality and usability. Furthermore they offered access to the PSTN and not only peer-to-peer-telephony with other clients of a specific service.

At the end of 2004 there were about 250,000 active users of VoIP in Germany. 500,000 already had the necessary equipment (hardware or software) at their disposal.

In the meantime (April 2005) there are more than 30 providers of VoIP services for residential customers in Germany. Some of these providers are cable network operators. These VoIP services are based on access lines via cable. As seen above they represent only 2% of the existing broadband lines. So until now they don't play an important role in the broadband competition. This could change in the future but it depends on the actual behaviour of the providers (e.g. upgrading the networks, offering competitive services).

It is very clear that the increasing penetration of broadband lines is one main driver of these new VoIP services. A broadband connection is one of the requirements for a VoIP service offering the quality that consumers expect. The other way around it is possible that VoIP becomes a driver for an increasing broadband penetration. From today's view it cannot be said that VoIP already influences the distribution of broadband lines. But in the last few months the most important providers of DSL lines or of broadband Internet access (T-Online, 1&1 Internet, freenet.de, AOL, Tiscali, WEB.DE) invented a VoIP service and today every provider using the DSL resale product offers VoIP. These VoIP services function as an add-on for the DSL line or the Internet access. Some providers seem to use the VoIP service as a marketing tool to sell more DSL lines (e.g. 1&1 or freenet).

From a customer's point of view there seems to be a demand for "naked" DSL lines. These customers wish to combine "naked" DSL with a VoIP service to get rid of their traditional telephone line. Until now only very few operators are offering this. If there were more comparable offers, VoIP could improve the broadband penetration as there would be more demand for DSL lines. A "standalone" bitstream access wholesale product could enable providers to offer "naked" DSL. The NRA stated in its market analysis that a wholesale product like this would ease substitution between PSTN and VoIP. In its remedies decision the ruling chamber will determine whether Deutsche Telekom AG will be obliged to provide naked DSL.

Broadband market country study: The Netherlands

N.B. OPTA has not yet decided on the fixed telephony and broadband markets. Public consultation for these decisions will expectedly start in June 2005. Up until now these markets are regulated under the old regulatory framework.

1. **Describe shortly the typical elements of the broadband market situation in your country (dominant technology, typical speed offered, typical tariff structure etc.);**

Broadband services in the Netherlands are both offered via cable (1,2 million connections) and DSL (1,88 million connections). 97% of the DSL connections are based on linesharing. The speed of retail offers are in the range of 256 kbps d/ 64 kbps u – 10000 kpbs d/1050 kpbs u for cable and 288kbps d/122 kbps u – 8192 kbps d /1024 kbps u for DSL. As of 1 May 2005 one cable operator will even offer a 20 Mbps download retail connection. The tariff structure is based on a fixed price per month. The average price per month for cable is ca. € 20,- for low-speed and ca. € 70,- for high-speed. The average price per month for DSL is ca. € 20,- for low-speed and ca. € 60,- for high-speed.

Carrier PreSelection is the main contributor to competition on the fixed telephony market. Tens of CPS operators offer CPS to 35% of the 7,4 million PSTN/ISDN subscribers of the incumbent. There is no Wholesale Line Rental offer in the Netherlands. Other competition contributors to the fixed telephony market are cable operators and some new entrants who offer telephony through fibre to large companies. This accounts for less than 10 percent of the total revenues related to fixed telephony.

Typical elements

2. **Describe the development of the market (with special emphasis to any changes due to the arrival of VoIP service offers);**

Since 1998 cable operators are offering broadband connections and the cable operators already had approximately 350.000 subscribers, when DSL was launched in the Netherlands in the summer of 2001. But DSL was growing very fast and took over the number of cable subscriptions in 2004.
Besides the situation that the cable density in the Netherlands is high, there are a few developments which are remarkable for the Dutch broadband market. Firstly there is no legal obligation for the incumbent to offer wholesale bitstream access. Since recently the incumbent is offering wholesale bitstream access voluntarily on a commercial basis. Despite the lack of regulation on bitstream access, there are new entrants who offer DSL via local loop unbundling. Secondly, most of the DSL connections are based on linesharing. The incumbent only offers DSL in combination with a telephony subscription up until now. Also the new entrants prefer to offer DSL in combination with a telephony subscription of the incumbent up until now.[14]
This is changing due to VoIP service offers. A few cable operators offer VoIP services since 2004. There is already one new entrant/DSL operator who offers VoIP services together with ISPs and CPS operators since the summer of 2004. Other new entrants/DSL operators are

[14] One of the possible reasons for this development are the tarrifs. The monthly wholesale subscription fee for a shared access line is € 2,25 and for a fully unbundled line it is € 9,89. In the Netherlands it is possible to offer DSL via linesharing to customers who have a universal service telephony subscription. The monthly (retail) tarrif for a universal service telephony subscription is € 9,67. This fee compared to the wholesale subscription fee for a fully unbundled line, leaves little space for the new entrants to compete with the incumbent through full unbundling.

following this operator with VoIP offers in 2005. Also the incumbent is planning to offer retail IP services in the first half of 2005.
Since it is possible to offer DSL to customers who have a (cheap) universal service telephony subscription, the mostly used construction is as follows: in the first couple of weeks the customers get VoIP and keep their universal service telehony subscription, in case the VoIP service is not working as it should be. After a few weeks, when the VoIP connection has proven itself, the universal service telephony subscription will be ended, the number will be ported and the customer fully uses VoIP for telephony.

3. Describe the reasons for regulatory intervention (e.g. commercial negotiations failed, or considered too slow, complaints of market players, requests for intervention, others, etc.);

Offering retail broadband services, including VoIP, through cable infrastructure is currently not regulated. Under the old framework OPTA was not entitled to regulate this. Under the new framework OPTA has to analyse the market first. Since the number of cable connections is already less than the number of DSL connections, it is not expected that OPTA will mandate access regulation to cable operators in the near future for offering broadband services.

Offering retail broadband services through the access network of the incumbent is not regulated. Only the wholesale level is regulated. OPTA eventually succeeded in considering local loop unbundling as a form of special access under the old framework in 1999. But since there was a lot of discussion about this, OPTA effectively was able to regulate this market since the conversion of the Regulation on unbundled access to the local loop in national law in oktober 2001. Since then OPTA has obliged the incumbent to offer unbundled lines and different types of co-location, has judged the tarrifs, has supported the negotiations about service level agreements and has fined the incumbent on not offering the same information, needed for ordering unbundled lines, to new entrants compared to itself. All in all, local loop unbundling is regulated quite strictly. The result is that almost 25% of all unbundled lines are operated by new entrants. Nine new entrants are using local loop unbundling, three new entrants out of these nine operate 24% of all unbundled lines.

Strict regulation does not apply to bitstream access. Although OPTA tried to regulate wholesale bitstream access by solving disputes between a new entrant and the incumbant, OPTA did not succeed in that. Under the old framework, the court of law did not follow OPTA in considering bitstream access as a form of special access or a type of leased line and declared that OPTA was not entitled to regulate bitstream access. Only bitstream access used for business customers was regulated on the base of non-discrimination.

Besides that OPTA is under the old framewerk not entitled to impose a Wholesale Line Rental offer.

4. Describe 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?

The old framework in a way restricted OPTA to regulate the whole ladder of investment to local loop unbundling. Within that range of possibilities local loop unbundling was regulated strictly, as mentioned above, to encourage new entrants to invest in own infrastructure up to the local level. As OPTA expected the new entrants to invest in the long term in their own local access networks, the wholesale tariffs of fully unbundled lines are partially based on dynamic access pricing. The market analyis decisions on the broadband market will show whether OPTA will hold on to this principle.

The new framework will allow us to investigate whether more steps on the ladder of investment should be regulated or not.

With regard to fixed telephony, OPTA made the following decisions based on the ladder of investment. OPTA decided not to regulate the transit tariffs of the incumbent anymore, because the transit market is regarded as a competitive market. OPTA differentiated the cost regulation of originating and terminating. The regulation model used for terminating tariffs is Bottom Up LRIC, which is a based on a hypothetically efficient operator. The originating tariffs are based on Embedded Direct Costs.

5. Impact of VoIP service offers on the fixed telephony and broadband market and on the regulatory intervention;

Although there are lots of diverse parties (cable operators, DSL operators, ISPs, CPS operators, incumbent) who are offering or planning to offer VoIP services as part of multiplay offers (telephony – fixed and mobile – , broadband internet, television), the impact of VoIP services on the fixed telephony and broadband market is very limited up until now. Since we are planning to publish our concept market decisions on the fixed telephony and broadband market in June 2005, the expectation is that VoIP service offers will not have an impact on the regulatory intervention than. OPTA will however monitor both markets very carefully to see whether VoIP service offers should have an impact on the regulatory intervention. In the meantime OPTA will have a light touch approach towards regulation on VoIP in accordance with the ERG position as stated in February 2005.

For now OPTA considers itself not entitled to regulate retail IP service offers of the incumbent until OPTA has taken decisions on the market analysis. The wholesale parts that will be used by the incumbent for offering IP service offers are already regulated (Regulation on unbundled access to the local loop) and in that perspective OPTA will monitor very carefully in the meantime whether these wholesale parts are 'VoIP-proof'. Another aspect on which OPTA is focusing attention is the interconnection obligation. OPTA is investigating at the moment is the question what kind of regulation applies to interconnection and more specifically what terminating tariffs is the incumbent permitted to ask for terminating telephony access to its VoIP subscribers.

6. Describe 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]; change of strategy or the way of intervention caused by ECNS framework [if possible: point out particular advantages/disadvantages under the new regime], state of market analysis);

A migration problem that is arising now is the impossibility to migrate between operators, from linesharing to fully unbundling and port a number at the same time. OPTA is monitoring now whether this will become a big problem for implementing VoIP services.

7. 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.).

These elements should allow to draw conclusions on the impact of regulatory interventions (see last part) on the broadband market and more specific to assess the impact of VoIP service offers on the fixed telephony- and broadband market and regulatory intervention.

Naked DSL/bitstream is not offered in the Netherlands. The latest development is that the incumbent voluntarily offers wholesale bitstream access to a CPS operator to offer VoIP services.

Country case VoIP Norway

Describe shortly the typical elements of the broadband market situation in your country (dominant technology, typical speed offered, typical tariff structure etc.)

By the end of 2004 it was 676 421 subscribers to broadband services in Norway (total population is about 4.5 million). At the same time 30% of the households had access to broadband. All the figures are preliminary.

The table below show the different technologies used for broadband in 2004.

Technology	Subscribers 2004
Radio	10 433
Fiber	18 066
Fixed access	1 914
Cable TV	93 315
xDSL	553 693

In 2004 the Norwegian subscribers of xDSL access was distributed in the following way:

- Telenors retail customers 53%
- xDSL based on LLUB from Telenor (the incumbent) 20%
- xDSL based on bitstream from Telenor 14%
- Other providers own infrastructure 14%

In Norway the typical speed on the broadband services in the residential market is as follows:

To end user: 0,5 - 2 Mbit/s
From end user: 0,128 - 0,640 Mbit/s
The most common speed for the broadband services in Norway are 704/128 kbit/s.

The typical tariff structure is a flat monthly fee (12 – 300 euro depending on the speed of the connection) and in most cases a connection fee (0-723 euro depending on the speed of the connection). Telenor is offering broadband access with 704/128 kbit/s for a monthly fee of 42,5 euro. The connection fee of this product is 96 euro.

More information about the prices can be found at:

http://www.telepriser.no

Dictionary for the internet site:

Bredbånd – broadband
Tilbyder/produktnavn – service provider/product name
Månedskost - monthly fee
Etabl. Pris - connection fee
Forutsetn.- conditions
Hastighet - speed
Pris kbit/s - price kbit/second
Bindingstid - minimum duration for subscribtion

In Norway it is possible for other suppliers to deliver DSL-services, also to end-users who do not have a telephone subscription (often called “naked DSL”). However, if the end-user does

not have a PSTN/ISDN service the broadband provider has to compensate Telenor for the maintenance of the copper lines etc. This monthly fee is currently at 10 euro including VAT (7,5 euro excluding VAT).

Describe the development of the market (with special emphasis to any changes due to the arrival of VoIP service offers);

There has been a dramatic increase in both the number of broadband subscribers and the number of VoIP subscribers in Norway during last year.

In Norway the monthly fee for VoIP is approximately 17-40 euro for an user with an average consumption of telephone services (96 minutes and 23 conversations a week).
The monthly cost for an ISDN service is 46-69 euro for the average user.
The monthly cost for an average user of analogue service (PSTN) is 36-59 euro.

See: http://www.telepriser.no

Dictionary for the internet sites (includes the sites below):

Fasttelefon – POTS (PSTN/ISDN)
Tilbyder/produktnavn – service provider/product name
Månedskost - monthly fee
Etabl. Pris - connection fee
Forutsetn.- conditions
Tilknytning - connection
Bindingstid - minimum duration for subscribtion

When one takes into consideration the fee of 10 euro which the users have to pay in order to get a naked ADSL service, the majority of users will not be able to save money by installing ADSL and switch to VoIP. However, the users with access that does not belong to the incumbent (Telenor), for example through suppliers of cable TV, do not have to pay the fee of 10 euro. For these customers it might be economically beneficial to change from POTS to VoIP services. Users with a very high consumption of telephone services may also benefit from changing from POTS to VoIP services.

It is not quite clear to what extent the increase of broadband subscribers are driven by the entrance of VoIP in the market. The majority of the new users of broadband do not install VoIP. On the other hand we do not have any statistics over the use of VoIP services that are not adapted or partly adapted for communication with PSTN/ISDN or mobile networks such as MSN messenger, SKYPE etc.

Describe the reasons for regulatory intervention (e.g. commercial negotiations failed, or considered too slow, complaints of market players, requests for intervention, others, etc.);

When it comes to LLUB, the NPT has primarily experienced challenges related to:

- The Reference Offer (Agreement) published by Telenor in 2000:
  - The terms were in our view biased (not reasonable).
  - Based on our comments Telenor made some changes in the agreement
  - Decision made by NPT 3 July 2001 covering i.e.:
    - Fault handling (compensation)
    - Service Level Agreement (SLA)
- Collocation
  - Section 4-7: “Telenor shall comply with any reasonable request for collocation”

  - Inspections made by NPT staff (space in 3 exchanges)
  - For a period of time Telenor had to report to NPT all cases were requests for collocation were “turned down”
- Pricing of shared access:
  - Decision made by NPT 11 April, 2002
  - 50/50 split of costs between telephony and broadband service
  - Finally accepted by Telenor (not appealed)

Regarding bitstream NPT has handled some complaint cases involving potential discriminatory practice by Telenor.

Describe 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?

In the past the objective of the regulatory strategy has been expressed in the Telecommunications Act § 1-3. There has been a special focus on fulfilling national needs for telecommunication and stimulate to effective use of the resources through competition (§ 1-3 a). Furthermore NPT has put considerable weight on protecting the consumers interests (§ 1-3 g). In 2000/2001 NPT put a lot of effort into going through Telenors LLUB offer/agreement, also resulting in some regulatory action. The objective has been to secure that well functioning wholesale products are available to other providers and promote competition in the broadband market.

In the future there is a focus on implementing the remedies recommended by EU and ERG. NPT has found that it is not likely that access lines in market 11 (LLUB) will be duplicated. However, market 11 can be seen as a cornerstone for sustainable infrastructure competition in market 12 (bitstream). NPT has therefore a strategy of supporting possible investments in market 12 according to the “ladder of investment theory”.

Impact of VoIP service offers on the broadband market and on the regulatory intervention.

Today there are 700 000 broadband users in Norway, however only 50 000 of these users are subscribers to VoIP services. NPT has not documented any impact of VoIP services on the sales of broadband yet. There are however reasons to presume that if the number of VoIP users increase it will have a positive effect on the uptake of broadband.

Describe 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]; change of strategy or the way of intervention caused by ECNS framework [if possible: point out particular advantages/disadvantages under the new regime], state of market analysis);

In March/April 2000 Telenor voluntarily launched its LLUB offer before the Regulation (EC) No. 2887/2000 took effect. After some regulatory action in 2000/2001 most providers have been quite happy with the products as such, although the price level has been somewhat higher than in most other European countries. According to the Norwegian regulation access to the local loop shall include full and partial (shared) access, and the Regulation (EC) is adopted as secondary law. The requirement regarding cost orientation shall apply.

From 2001 other wholesale products (bit stream) have been available from Telenor. According to the Norwegian regulation bit stream access to the local loop shall be offered to other providers on equivalent and non-discriminatory terms and at a quality equivalent to that offered to own undertakings. All reasonable requests for specific capacity shall be complied with. No price regulation applies.

In April 2002 NPT made a decision regarding the pricing of shared access, and stated that a 50/50 split of costs between the telephony and broadband service should apply. This resulted in significantly lower prices for shared access.

During last year one broadband provider, in particular, wanted to migrate most of their customer base from bit stream to unbundled lines (LLUB), and after a lengthy process and some NPT involvement Telenor finally accepted to do this migration “under contract” (bulk pricing). This case was one clear indication of “the ladder of investment” theory in practice.

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.);
Impact of VoIP service offers on the fixed telephony.

In 2004 quite a few providers have launched VoIP services in Norway. This has happened without any regulatory action so far. What is often called “naked DSL” has been available (voluntarily) from the very beginning (2000).

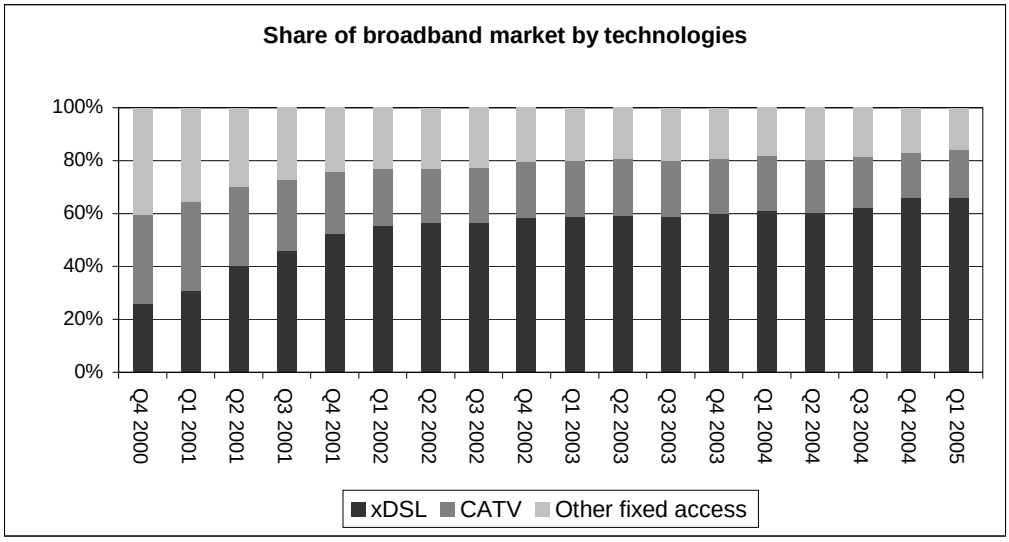
Telenor, the incumbent, has introduced a new POTS product in the market that might be a response to the increased competition from VoIP services. This product (Telenor Mini) has a lower monthly and connection fee.

So far NPT has not registered that the introduction of VoIP services has had any other impact on the prices or services of POTS in any way.

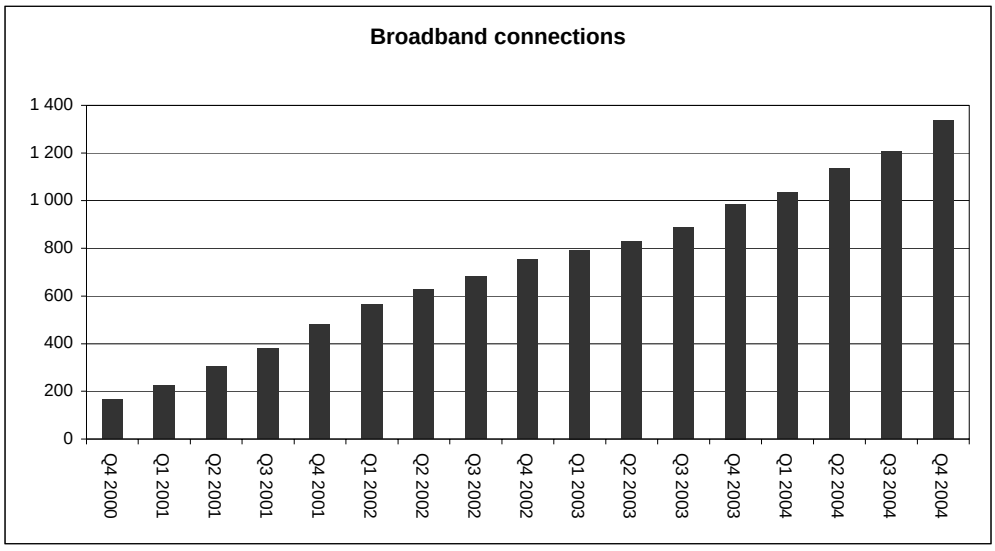
Country Case Study – Sweden

Market situation

The Swedish broadband market constitutes a variety of technologies. The predominant one is xDSL via the copper access network (currently >60 %), however competing technologies such as cable and fibre are also prominent.



The numbers of broadband connections have increased steadily in Sweden in the past years. There is currently no indication that any specific service has had any significant impact on pushing the penetration, e.g. VoIP.



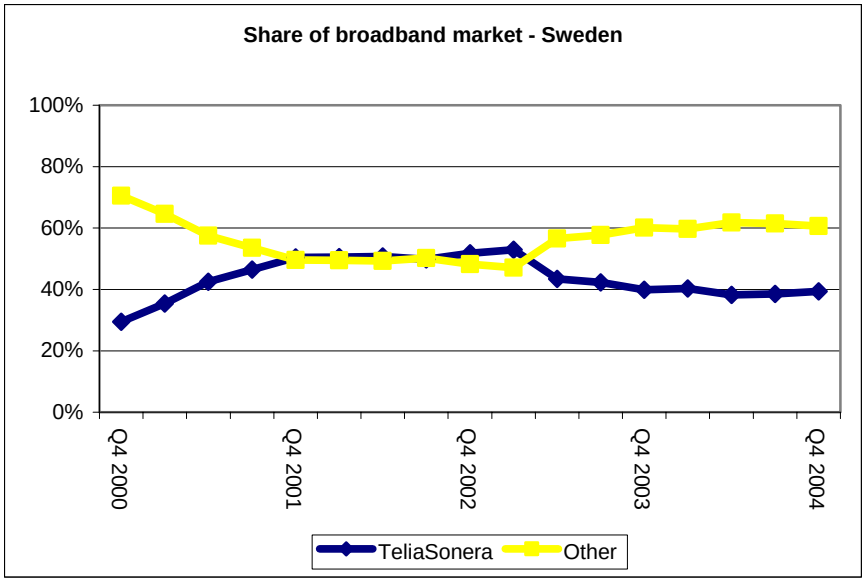
Speeds offered by the operators in Sweden varies from 250 kbit/s up to 100 Mbit/s. Below are some examples of fixed monthly charges for different speeds and operators. As per June

30 2004 some 14,5 % of total broadband connections were 10 Mbit/s or more, 36,5 % were between 2 Mbit/s and 10 Mbit/s and 49 % were up to 2 Mbit/s.

Speed	TeliaSonera	Glocalnet	Bredbandsbolaget
250 kbit/s	30,66 EUR		
500 kbit/s	37,25 EUR	21,87 EUR	
2 Mbit/s	46,05 EUR		
8 Mbit/s	49,34 EUR	27,36 EUR	
10 Mbit/s*			35,16 EUR
24 Mbit/s	49,34 EUR	38,35 EUR	43,85 EUR
100 Mbit/s*			65,38 EUR

*) fibre connection

At the beginning of 2001 TeliaSonera had around 30 % market share. Since the launch of xDSL TeliaSonera gradually increased its share to over 50 % in the beginning of 2003. At the same time they sold off their cable TV operation and have since had a market share of 40 %, slightly decreasing. One aspect of the Swedish market is that 3 operators compete with the incumbent with a resale product based on the LLU wholesale products of the incumbent.



Regulatory situation

On the 2 January 2001 the EU regulation on access to the local loop entered into force in Sweden. TeliaSonera has offered access to the local loop since March 2000. The uptake was very slow the first couple of years. PTS started its supervision beginning of 2001 with primary focus on the pricing (cost orientation). The current price regulation is cost orientation according to LRIC, whereas it up until recently used to be according to FDC. During 2003 interest for the local loop took off. This has produced a number of problems on the way. Intervention from PTS includes non-discrimination relating to delivery times, co-location space etc.

Back in 1999 PTS proposed to oblige TeliaSonera to offer access to a bitstream product in order to increase the competition in the broadband market. This proposal was not passed on to the regulation. A new proposal was made by PTS in 2002 with the same result. Just recently PTS took a decision on market 12, wholesale broadband market. This decision was

appealed by TeliaSonera and also “frozen” by the court, i.e. no obligation in place until the court has reached their final decision. The proposed price regulation principle on bitstream is retail-minus which will be further specified in future supervision.

Included in the latter decision was an obligation for TeliaSonera to offer bitstream access without a precondition for the end customer to have a PSTN subscription. The same wording (reversed) was used in PTS decision to mandate a WLR product.

Broadband/VoIP Case Study: Ireland

1 Overview of the Broadband Market in Ireland

DSL is by far the dominant broadband technology in Ireland with a market share of approximately 84%. Other technologies are also widely available, but each has only a small fraction of the market. These would include Cable Modems (7%), Leased Lines (2%), Fixed Wireless Access (6%) and Satellite (1%). The incumbent operator, *eircom*, has 76% of the DSL market and 66% of the overall broadband market. The vast majority (95%) of OAO DSL lines are provided by the incumbent's Bitstream Access product, with the remainder provided by both full and shared LLU.

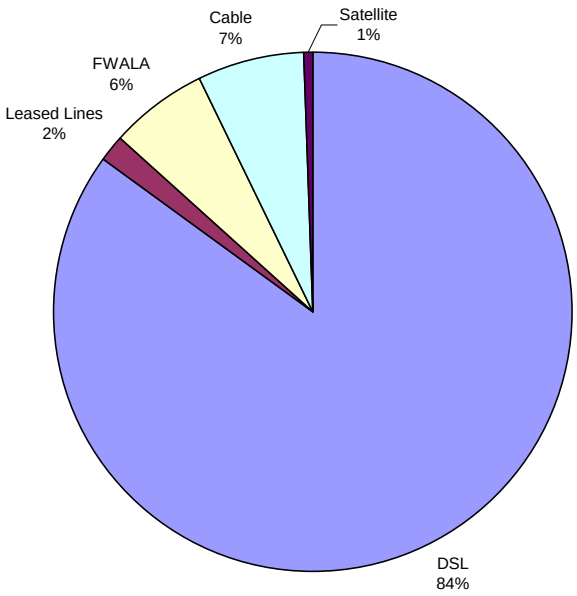


Figure 1: Broadband Technology Market Share

The incumbent operator's basic DSL package of 1 Mbps rate adaptive download, 128 kbps upload, contention ratio of 48:1 and a download cap of 8 GB per month, costs €39.99 per month (excluding line rental of €24.18/month) – they are currently offering a two month free trial and free connection to the service. OAOs are offering similar DSL packages with competitive monthly prices decreasing to €29.99 for broadband only, and between €35 and €49 for both broadband and PSTN line rental. Some OAO offerings may also require the subscriber to sign up for their voice call services to avail of the cheaper broadband.

Higher speed business DSL retail packages of 2Mbps/128kbps, 3Mbps/256kbps and 4Mbps/256kbps, offered by the incumbent, cost €45, €89 and €169 per month (excluding VAT). Similar offerings are available from OAOs using Bitstream access and LLU.

The most innovative broadband product to reach the market recently is from an OAO who are offering a DSL package with 2 Mbps download, 128 kbps upload, no contention and no download cap for €35 per month including free line rental.

Typical tariffs for FWA and Cable Modem products are shown in Figure 2:

Platform	Speed (down/up)	Price per month (€)	Connection Fee (€)
Cable	9M/512k	40	0
	512k/128k	35	50
	1M/0.3M	39.90	0
	0.3M/64k	25	0
	0.75M/128k	35	0
FWA	512k/256k	42.35	180.29
	512k/256k	39	79
	512k/256k	39	199
	512k/128k	29.99	99

Figure 2: Cable/FWA Tariffs

2 Broadband Market Development

Ireland experienced rapid DSL growth in the calendar year 2004 with approximately 120,000 DSL lines installed by the end of the year, representing an increase of approximately 350% on the December 2003 figure. DSL coverage in Ireland is estimated to be 80% with the incumbent operator planning to reach 90% by March 2006.

In terms of prices, the cost of basic DSL services has dramatically improved for residential and small business customers. Business broadband continues to grow with an estimated 30% of SMEs in Ireland now with a broadband connection.

While overall the developments in DSL have been positive, the take-up of other technologies (Cable, FWA, Satellite) remains quite low, with the number of Cable Modem connections for instance at 8950 at the end of 2004 (although this was an annual increase of 83%). Despite the large penetration of cable TV in Ireland, to date, the quality of the network and the operators inability to fund the costs of upgrading it has significantly constrained their capacity to roll-out Broadband services. It is therefore increasingly likely that DSL rather than cable will be the key platform for the delivery of Broadband services in the short to medium term..

The Irish Government has approved a national County and Group Broadband Scheme to address broadband needs in under-served areas. It is envisaged that the combination of local community initiative, private sector expertise and support from Government will accelerate the roll-out and take-up of broadband services. The Government is also providing aid to local authorities to construct fibre-optic metropolitan area networks (MANs) throughout the country with associated co-location sites. The infrastructure will be built by the local authorities, fibre and sub-ducting will then be made available to operators to lease at reasonable prices.

ComReg is committed to extending the availability of wireless broadband services and has successfully launched several initiatives to promote this goal. Licence-exempt services such as Wireless LAN (2.4 GHz band) and broadband in the 5.8 GHz band have been permitted by ComReg and a number of operators have publicly launched products in these bands. Since its introduction in 2003/4, the Fixed Wireless Area Local Area (FWALA) licensing scheme provides opportunities for operators to deploy networks on a local area basis (or nationally by aggregating local areas where possible) in the 3.5 GHz, 10.5 GHz and 26 GHz bands. To date, 90 local area licences have been issued to 10 different operators.

ComReg is also proposing to make spectrum available in both the 420 MHz and 900 MHz bands for up to two national licences in each band with typical speeds of 384 to 500 kbps.

Also in 2005, ComReg will introduce a new licensing regime for radio service and technology trials which will bring Ireland to the forefront as an ideal location for broadband research and development. In addition to relaxing some of the constraints on the existing test licence regime, a new licensing scheme will be introduced which for the first time will allow innovative new wireless services that do not fit within existing licence categories to be offered to the public on a trial basis

3 Regulatory Intervention & Strategy

Regulatory intervention by ComReg was required, in many instances, due to the failure or slow pace of commercial negotiations between the incumbent and OAOs, due to an OAO request or a complaint from an OAO regarding the incumbent's actions. This intervention was to allow other authorised operators (OAOs) compete fairly in the broadband market and to encourage them to develop innovative products. It led to the development of the following products:

- Bitstream
- LLU (both full and shared access)
- Bitstream Port Transfer: an efficient means by which a customer with an existing DSL service can migrate to an alternative operator without the need for a significant break in service)
- LLU/Geographic Number Portability (GNP) Integration: LLU and GNP should be capable of being ordered by an access seeker on a single order – this was requested by OAO's that required more comprehensive product offerings and were prepared to make significant infrastructure investment. This product is currently in the developmental stage but should eventually be available for both bulk and single migrations.

All of these products were implemented to ensure competitiveness, to promote broadband penetration and to improve consumer choice.

4 Impact of VoIP

The impact of VoIP on broadband, to date, has been negligible although ComReg has been proactive in promoting the uptake of VoIP by designating a specific number range (076) for VoIP services. ComReg has also taken recent action to accelerate the activation of these numbers across the PSTN by directing the incumbent to set an initial VoIP price point, issue new contracts to OAOs and incorporate VoIP into the transit price list. Callers to VoIP 076 numbers will be charged a local rate for these calls. ComReg believes that this approach will allow service providers to launch innovative and competitive products offerings in the coming months.

ComReg is aware that many large corporations are utilising Virtual Private Networks (VPNs) based on VoIP technology, and it is clear that interest in the economies associated with VoIP is high. It is difficult to estimate at this time the impact that this will have on the overall telecoms market as private networks are unregulated.

ComReg believes that although there will be a certain market for service-based VoIP; infrastructure-based VoIP is more likely to have a lasting impact on the market. It is likely that over time infrastructure-based service providers will seek to migrate to IP technologies, while simultaneously adding value to basic voice services so as to offer new premium services that can generate incremental revenue streams.

In this way the success of VoIP can be seen as being closely tied to the long-term development of the broadband market. A vibrant broadband market with lots of infrastructure-based competition should lead to VoIP triple-plays and managed solutions with possible converged fixed-mobile services.

5 Access Products Related to VoIP

Naked DSL/Bitstream is currently not available in Ireland and is not envisaged in the near term.

Broadband/VoIP Case Study: Malta

Country Case Study: Malta

Broadband and VoIP Market Development

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1. Overview

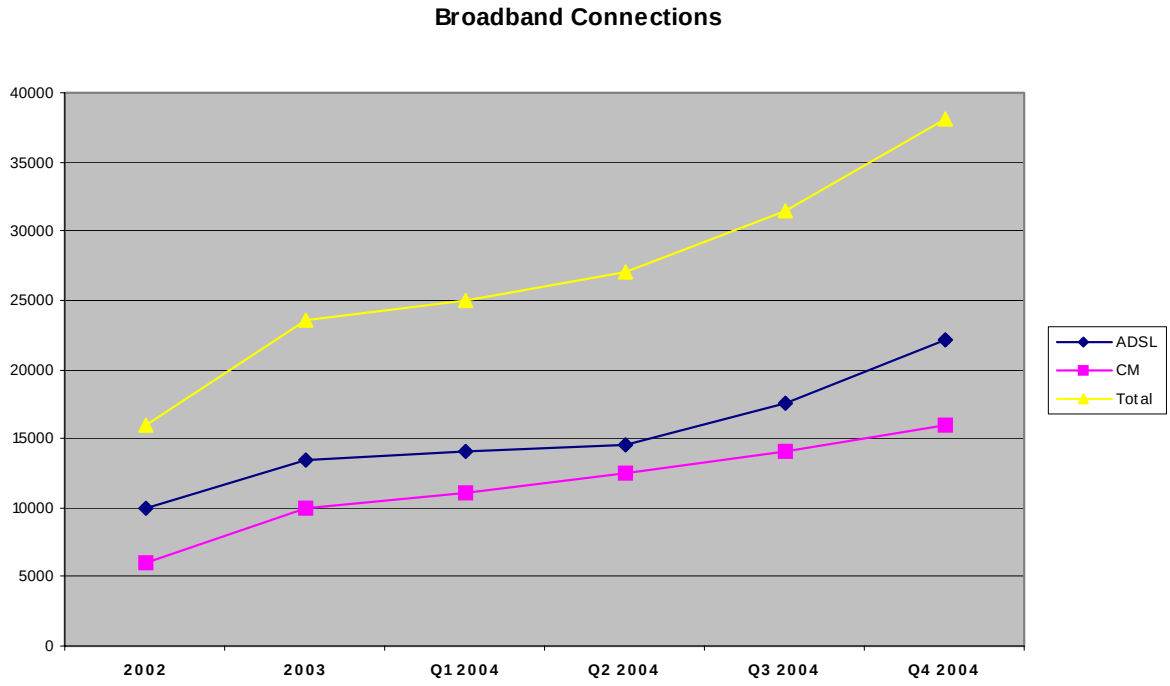
The scope of this country case study is to take a snapshot of the broadband market in Malta as at the end of the first quarter of 2005, taking into consideration also the effects of VoIP services. Malta's position with respect to broadband has been outlined in two important documents published in 2004 – one relating to the national broadband strategy and the other a supply-side broadband blueprint. These documents charted developments so far and also mapped out future actions. This country case study can be considered to build on the previous work carried out.

2. Broadband Market Elements & Development

The two forms of broadband delivery technologies available in the Maltese market today are DSL (Digital Subscriber Line) and Cable Modem Access. Both of these have been available for a number of years. In 2000 both Datastream Ltd (a subsidiary of Maltacom plc, the PSTN operator) and Melita Cable plc (cable TV operator) had commenced provision of broadband access through DSL and cable modems respectively. In just over 4 years, approximately 38,000 broadband connections have been deployed. This equates to a penetration rate of 30% in terms of households or 9.5% in terms of population. Statistically, Malta certainly compares well in relation to other European countries in terms of penetration.

In terms of the overall split between technologies this currently stands at 22500 DSL connections and 15500 cable modems, giving a 60:40 result at this point in time. Since broadband became available in Malta, these market shares have remained more or less constant. The key reason for DSL being the prevalent technology is that while all ISPs can retail the service, cable modems are only provided via the cable operator's own ISP. DSL also has a slightly greater geographic reach and is also stronger in the business segment.

Typical connection speeds vary from 256kbps to 2Mbps with 512kbps being the most widespread. Initially tariff plans were based on monthly flat rates, depending on speed, but recently a pay-per-use scheme for DSL come into operation in the last quarter of 2004. For occasional users, this payment plan works out to be more economical than dial-up and its popularity is increasing rapidly. Take-up was also boosted in October 2004 when both broadband providers doubled the connection speeds with no price increase. The monthly fee (flat rate) for a 256kbps cable modem connection is 30 Euros while that for a DSL modem at the same speed is more or less the same. For pay-per-use DSL at 256kbps, for 35 hours of usage in a 30 day time window, the cost is of 18 Euros.



Both broadband networks also provide data services to corporate clients

In 2005 the MCA will issue three grants of rights of use of spectrum in the 3.5GHz band[15] for the establishment, implementation and operation of nationwide broadband wireless access networks. This will mean that within a few years, Malta will be served by multiple national broadband infrastructures creating one of the most competitive broadband environments (if not *the* most).

3. Regulatory Strategy & Intervention

A national broadband strategy[16] is seen as a key milestone in the achievement of a world-class information society in Malta. The availability of ubiquitous, highly-available and cost-effective broadband infrastructures that will be used to deliver reliable, affordable, secure, enhanced and value-added services in the fields of education, health, business and government and to amplify the economic, cultural and social benefits of broadband connectivity to consumers is vital.

The main strategic supply-side objectives in terms of broadband that need to be attained within the next 24 months are:

a. Malta will have multiple broadband infrastructures in place
b. Coverage via these infrastructures will extend to 99% of the population
c. Each infrastructure will be capable of delivering a minimum of 512kbps in the downstream direction to the end-user
d. 66% of all Internet users in Malta will be accessing the Internet via a broadband connection.

[15] Call for Applications for access to rights of use of radio frequencies in the 3.5GHz band for the development and implementation of Broadband Wireless Access (BWA) networks in Malta http://www.mca.org.mt/library/show.asp?id=568&lc=4
[16] A Broadband Blueprint – Supply Side Initiatives http://www.mca.org.mt/news/show.asp?id=178

Progress towards these objectives is encouraging. Recently three frequencies in the 3.5GHz range have been made available to enable the rollout and implementation of broadband wireless access networks on a national basis. The demand for these grants of rights of use of frequencies was very healthy and it is expected that competition in the broadband access market will increase significantly in the coming years. Other technologies that could soon provide alternative broadband access mechanisms are 3G Mobile[17] and interactive digital television[18], which are currently also in the pipeline.

So far regulatory intervention as far as broadband is concerned has remained relatively light. Under the previous regulatory framework (prior to Malta's EU accession and the subsequent adoption of the new regulatory framework), both Maltacom (DSL provider) and Melita Cable (cable modem provider) were considered dominant in the telecommunications transport market (very broadly similar to the current wholesale broadband access relevant market) and remedies associated with this status included transparency, non-discrimination, accounting separation, cost-orientation and third-party access. Maltacom voluntarily provided DSL services to third parties (mainly ISPs) from day 1, whereas Melita Cable vigorously objected to the imposition of such a remedy, which effectively was never enforced. To date however, no third party has made an official request to Melita Cable for access.

To date the MCA has never mandated the provision of a specific service. The market has been left to develop as freely as possible within the remedy parameters described above.

Therefore, pending the outcomes of the ongoing market definition and analysis exercises, regulatory intervention has effectively paused, as there already appear to be interesting signs of competitive, though duopolistic, effects with lowering of switching costs (removal of installation charges, elimination of modem deposits etc) and improvements in value (doubling link speeds with no increase in price). Once the market analysis is complete, the applicable remedies would be proposed and, if accepted, applied.

A reference unbundling offer[19] has recently been published by Maltacom plc but it remains to be seen what sort of take-up results. Discussions are also underway with Datastream with the objectives of defining some bitstream offers.

4. VoIP Correlations

The MCA issued its first Consultation Document on VoIP in September 2002[20]. At this stage, the proposed regulatory treatment was based on the

- Maltese Legal definition of telephony
- 1998 Commission notice setting out the status of voice on the Internet under Directive 90/388/EEC(2)
- 2000 Communication from the Commission on *"Status of voice on the Internet under Community law, and in particular, under Directive 90/388/EEC"*

[17] Call for Applications for access to rights of use of radio frequencies in the IMT-2000 Band for the development and implementation of Third Generation (3G) Mobile Telephony networks in Malta http://www.mca.org.mt/library/show.asp?id=569&lc=4

[18] Invitation to Participate in a Comparative Process – Beauty Contest Leading to Access for the Rights of Use of Radio Frequencies in the UHF Band for the Development and Implementation of Digital Terrestrial Television Transmission Networks in Malta http://www.mca.org.mt/library/show.asp?id=570&lc=4

[19] http://www.mca.org.mt/news/show.asp?id=213

[20] Voice over IP: Systems, Services & Regulation http://www.mca.org.mt/library/show.asp?id=169&lc=1

Based on the feedback received, Authorisation Guidelines for Packet Switched Voice Services[21] were issued in December 2002 in time for complete market liberalisation on January 1st 2003. Since then several VoIP service providers entered the market (see table below). Most of these focus on the sale of pre-paid cards enabling overseas calls to be made over the public Internet at rates lower than those offered by the incumbent. However, at least two service providers have a VoIP over broadband (VoBB) offering where a soft client on a PC or a SIPor H323 phone can.

In 2004, the MCA consulted for a second time on VoIP[22]. The introduction of legislation transposing the new regulatory framework in September of 2004 used the same definitions for *electronic communications services* and *publicly available telephony services* as in the Directives. Issues covered by the consultation paper included

- Authorisation – "ECS" vs "PATS"
- Status of US provider
- Rights & obligations of depending on authorisation
- IP ←→ IP and IP ←→ PSTN interconnection for VoIP
- Access to emergency services/location information
- Lawful Interception/data retention obligations & expense
- Numbering for VoBB/VoIP services
- Contributions to a US fund
- Consumer education and protection
- Impact of VoIP & WiFi on Mobile market.

While take up of VoIP services in terms of international calls was phenomenal, there was minimal known market penetration for VoBB. There could be several reasons for this including

- local and international rates are now so low that people are not sufficiently compelled by this service

- broadband subscribers are already making use of VoIP services provided by overseas providers such as Skype, Net2Phone, DeltaThree etc

- critical mass in terms of broadband subscriptions has not yet been reached preventing network dynamics from supporting the case for, say, free or very low flat-rate on-net calls

- Clarity in terms of treatment of VoIP under the new regulatory framework has still not been achieved.

So far, therefore, there appears to be no evidence to show that VoIP is currently acting as a driver for broadband take-up, although the opposite may be the case. Correlation at this stage is difficult to establish.

In terms of broadband offers that do not include Internet access, these are currently available from both providers. These are not related to VoBB offers but are primarily used for establishing corporate WANs or VPNs. These products are offered voluntarily and are not mandated.

Service Provider	***URL***	***Type***	***Infrastructure***
Maltacom plc (Incumbent)	http://www.iphone.com.mt/	Voice over IP over Broadband	Yes
Keyworld Ltd (ISP)	http://www.phoneline.com.mt/	Voice over IP over Broadband	No

[21] Packet Switched Voice Services: Consultation Report & Authorisation Guidelines
http://www.mca.org.mt/library/show.asp?id=190&lc=1
[22] Voice over IP: Regulatory Principles for Innovative Services
http://www.mca.org.mt/library/show.asp?id=499&lc=1

Service Provider	***URL***	***Type***	***Infrastructure***
Maltanet Ltd (ISP)	http://voip.maltanet.net/	International Call Services	No
Telemail Ltd (ISP)	http://www.italk.com.mt/	International Call Services	No
Keyworld Ltd (ISP)	http://www.onevoice.com.mt/	International Call Services	No
Euroweb Ltd (ISP)	http://www.unitel.com.mt/	International Call Services	No
Webwaves (ISP)	http://www.phoneup.com/	International Call Services	No
Melitanet (ISP)	http://www.primatel.com.mt/	International Call Services	No
International Call Management (ISP)	http://www.icm.com.mt/	International Call Services	No
Net2Phone/MBIS (ISP)	http://www.net2phone.com.mt/	International Call Services	No