Comments on the Submission: "Telecommunications Amendment Bill Presented to the Finance and Expenditure Select Committee" by B. Howell

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Executive summary

This paper is a critique of the Submission: "Telecommunications Amendment Bill Presented to the Finance and Expenditure Select Committee" by B. Howell and has been commissioned by TUANZ and Internet New Zealand. It is shown that the literature reviewed in the Submission is very selective and far from being accepted within academia. Some of the results quoted are very controversial. Evidence that points to different conclusions to those reported in the Statement is presented.

Contrary to the claims of the Submission it is shown that:

- Infrastructure investment has a strong and positive effect on economic growth; there is no reason to believe that broadband investment should not achieve the same effect.
- Regulation of the unbundled local loop has a positive impact on diffusion. Recent econometric evidence finds that lower prices of the unbundled local loop and of leased lines lead to a wider diffusion of broadband.
- In Europe, virtually all the National Regulatory Authorities have found Significant Market Power in markets for wholesale ULL and for wholesale broadband access, and remedies have been imposed. These are the end results of careful market analyses, despite the room for appeal by incumbent operators and veto power by the European Commission is case the analyses were incomplete or weak.
- Comparison between the US and Europe has to be conducted with great caution, as the US has two strong competing platforms (fixed-lined telephony and

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CaTV), which are missing in many European countries. It is argued that an open access policy is particularly relevant in the absence of competing platforms. It is also pointed out that recent policy changes in the US bear the risk of creating a trajectory towards concentrated market structure (local duopolies) from which it would be difficult to reverse or correct its course.

The Author

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1. Introduction

I have been commission by the Telecommunications Users Association of New Zealand (TUANZ) and Internet New Zealand to provide comments on the Submission: "Telecommunications Amendment Bill Presented to the Finance and Expenditure Select Committee" by B. Howell (henceforth, "Submission").

I am of the opinion that the literature reviewed in the Submission is very selective and far from being accepted within academia. Some of the results quoted are very controversial. I also note in passing that many of such studies have not been published in leading academic journals. Rather, they are more likely to be either at the stage of working papers or appeared in policy outlets. This is not a useless academic remark, but a warning that articles for public discussions, notwithstanding their quality, are often not vetted by the academic community and by referees.

As a big caveat to the opinion expressed in this paper, I have not read the Telecommunications Amendment Bill, nor the 'Stockdate' analysis. Therefore my critique of the Submission should not be interpreted as an endorsement of the documents that the Submission intends to criticize. Also, I do not claim to be an expert of the telecommunications market in New Zealand, thus I will avoid referring to possible specificities of the country.

My intention is not to conduct a comprehensive survey of the literature on access pricing and local loop unbundling. This can be found in previous works of mine.[2] Instead, I want to address some specific claims made in the Submission and point to contrasting results and evidence.

[2] E.g., see Mason and Valletti (2001), Valletti (2003), Peitz, Valletti and Wright (2004), and Valletti and Cambini (2005).

2. Broadband uptake as a driver of economic growth

The claim that there is no empirical or theoretical literature finding a *causal* relationship between broadband uptake and GDP growth is very strong. In fact, also the opposite claim could not be made, for the simple reason that there is no specific study that addresses this problem in an appropriate way. Broadband uptake and economic growth must be studied in a dynamic framework and there are not (yet) enough observations to conduct a proper econometric analysis. The studies mentioned in the Submission are essentially static and suffer from this crucial flaw. In a cross-section, no country fixed-effect could be accounted for, and attributing differences in growth to differences in broadband penetration would be a heroic assumption, to say the least.

I do agree with the author that the simultaneity of the interaction between GDP growth and diffusion of technology must be accounted for. For this reason, I am surprised by not having found any mention of an influential paper by Roller and Waverman (2001). They study how telecommunications *infrastructure* affects economic growth. In the absence of new and reliable evidence, I have no reason to believe that broadband investment should be considered any different from earlier vintages of telecommunications infrastructure. Roller and Waverman use evidence from 21 OECD countries over a twenty-year period to examine the impacts that telecommunications developments may have had. They estimate a structural model, which endogenizes telecommunication investment, jointly with the macro-growth equation. After controlling for country-specific fixed effects, they find evidence of a *significant positive causal link*, especially when a critical mass of telecommunications infrastructure is present.

Their results have been confirmed and strengthened by Datta and Agarwal (2004). The objective of their study is to investigate the *long run* relationship between telecommunications infrastructure and economic growth, using a similar (but not identical) data set as Roller and Waverman, which includes 22 OECD countries. A *dynamic* panel data method is used for estimation, which corrects for omitted variables bias of single equation cross-section regression. Again, country-specific fixed effects are included. Their results show a *significant and positive correlation* between

telecommunications infrastructure and growth, after controlling for a number of other factors.

3. Drivers and determinants of broadband uptake

Empirical evidence in the Submission is sometimes presented in a very ad hoc way. All the plots shown in Section 2 have very little value, as they basically assume that differences in penetration can be unilaterally attributed to one factor alone at a time (univariate analysis). To infer something more valuable one would have to run a multivariate analysis, controlling for unobserved country differences, as some of the academic studies do. Before I turn to these studies, however, I must say that the plots are also presented in a somehow misleading way. Just to give an example, take figure 2.5 (figure ii in the Executive Summary). A quadratic functional form is picked in an arbitrary way to make an (unproven) point about a possible negative effect of competition on broadband uptake. It is sufficient to remove one (and only one!) data point at the bottom right hand side of the diagram and the relationship would be strongly positive (is this data point an outlier? – I have no information about it but I am sure I could make up a story about it, appealing to other differences in regulation, cultural factors, etc.. My point here is not to prove that such a positive relationship exists, but only that neither an inverted U-shaped relationship should be taken seriously). Also, saying that there is a "better" fit (page 74) with this functional form is a bizarre claim. Obviously, including an extra regressor, the fit *must* improve. If a cubic term, instead of a quadratic term, or a higher polynomial were used, then the goodness of fit would be even better as degrees of freedom would be removed. So what? I still have learnt nothing about the chain of causation. Clearly my criticisms apply to any such simplistic univariate results. This section of the Submission contains rather arbitrary claims that are not robust enough to draw any causal inference. I consider these diagrams as largely irrelevant as country fixed-effects would capture most of the heterogeneity in a correct multi-variant regression. Nothing is said about the identification empirical strategy, therefore there is no reason to derive any message from them.

The studies mentioned in the literature review are weak. This is due to the lack of time-series data. Like any process of new technology diffusion, broadband adoption is a dynamic process that evolves through time and this crucial feature is not taken into account in the estimated cross-sectional models. One exception is the work by Di Staso et al. (2006), which is also cited in the Submission. The results of this study, however, are cited in what seems to me a very selective way. Di Staso et al. also find, among other things, the following results:

- The price of the unbundled local loop has a negative effect on the diffusion of broadband. This confirms the importance of local loop unbundling, which is one of the main strategies adopted by competitive broadband access providers in the DSL segment of the market: the price that they pay for each unbundled line affects directly their operating costs.
- The price of leased lines also has a negative and significant effect on the diffusion of broadband. Leased lines are an important input for the provision of DSL services and therefore are expected to be inversely related to the diffusion of broadband services.
- The price of narrowband Internet access constrains the diffusion (through the price) of broadband access, but the coefficient is not statistically significant, which is in contrast with a view that puts these two products in the same markets.

These results are not quoted in the Submission, while I think they deserve serious attention.

Several works by Scott Wallsten are cited in the Submission, claiming that they bring strong evidence that unbundling is negatively correlated with broadband penetration. Having read several papers by Wallsten, I find his views more nuanced. For instance, Wallsten (2006) is a well-executed study, although some exercises conducted there do present limitations for the lack of a sufficiently high number of observations (only 29 data-points are used in some regressions). Still, Wallsten finds that full local loop unbundling is not obviously correlated with broadband penetration. Its estimated coefficient ranges from positive and significant to negative and significant depending

on the specification. Commingling collocation is generally positive, virtual collocation negative, and regulatory approval for collocation charges negative.

It is true that Wallsten's results suggest that *extensive* obligations on the incumbent reduce broadband penetration. Clearly, if regulators price collocation charges below cost, then the incumbents have little incentive to upgrade equipment when they have to provide access at a loss. Other results, however, suggest that regulation can also be an important tool in promoting broadband adoption. According to Wallsten (2006), *milder* regulations ensuring easier interconnection with the incumbent can increase penetration and investment.

4. Unbundling and investment

A parallel is drawn between the diffusion of broadband and mobile telephony (Section 3.1.2 of the Submission). This parallel does not seem to be very appropriate to me. Largely, mobile markets did not start as monopoly markets. In many cases, competition between two or three providers started from the early years of the industry (especially with digital technologies). Technology is also more or less subject to constant returns to scale in mobile telephony (the bottleneck in this industry is the spectrum constraint). This seems to me a different economic context compared to fixed-line telephony where incumbency advantages are often so huge they could kill competition from the very beginning. Open access requirements are less relevant when multiple operators with their *own infrastructure* are present. In any case, let me mention that National Regulatory Authorities *do* impose regulations also in mobile telephony when the market analysis indicates lack of competition. For instance, European NRAs typically mandate national roaming on the incumbents' networks for a certain period when new entrants are awarded licences. Also, Mobile Virtual Network Operators (a sort of equivalent to LLU in mobile telephony) may be used as a remedy in Europe in case SMP is found in the market for mobile access and call origination.

The question analyzed in chapter 3 of the Submission is clearly a very wide one. In general, the primary motivation for open access and unbundling regulations is to prevent incumbent telephone and CaTV companies from foreclosing access to their

lines. For instance, an open access policy increases the incentives for new firms to enter the ISP industry. Regulation may also be needed after this entry occurs to prevent the infrastructure owner from “holding up” ISPs that rely on their facilities in order to do business. Additionally, incumbents may not provide the same level of innovation as competitive ISPs sharing the infrastructure. Incumbents may seek to protect existing markets. For example, Hazlett and Bittlingmayer (2003) argue that CaTV companies might be slow to introduce Internet video services in order to protect cable television revenues. Incumbents might also be less innovative simply due to more entrenched corporate cultures or less competitive pressures to attract new users (Lemley and Lessig, 2001). Critiques of unbundling and open access center on reduced infrastructure investment, which is the only side presented by the Submission. As no reliable empirical study exists on this problem when applied to broadband investment, I will first review the theory, and then report some data on country experiences.

4.1 Theory

The question of how to best balance the aim of encouraging innovative activity by protecting intellectual property against the aim of promoting the competition that such protection inhibits has been an enduring tension in policy debates. A variety of issues emerge once we recognise that competition is not just about maximising profits in the short run (with existing products and technologies) but, instead, is a dynamic process. These issues embrace the incentives firms have to innovate, the relation between R&D efforts and market structure, and the role of public policy in granting temporary monopoly power. Following Schumpeter, it is fair to say that many economists subscribe to the view that perfect competition achieves allocative efficiency in a static sense, but that optimality breaks down when dynamic aspects are taken into consideration. This does not imply that a permanent monopoly is the optimal market structure! Rather, in Schumpeter's words, the optimal system is one of 'creative destruction' where, in the short run, there is some temporary degree of market power, but under the constant threat of potential competition from new products. To see why, the first observation - consistent with Schumpeter's hypothesis - is that large firms are the main source of R&D and have more *resources* to invest. At the same time,

competitive firms have more *incentives* to invest due to the 'replacement effect',[3] although they may not have the capacity to do so. To analyse the full effects, however, one also has to take into account the threat of entry, i.e., the possible change of market structure. Consider the scenario in which an incumbent recognises that the alternative to not adopting the innovation is that an outsider firm will. In this case, the opportunity cost to the monopolist of not adopting is much higher, hence he would be willing to pay a lot for the innovation, certainly more than a competitive firm.

After this quick detour into the dynamics of R&D competition, I now consider the problem of LLU, with a particular attention to the *timing* of investments. This issue is very important in industries with high technological progress. Infrastructure owners may want to maximise the use of their facility since its intensive use would reduce the average cost to all users. However, this desire clashes with another one, since the infrastructure owner would also try to reduce downstream competition, which implies a reduction of access to the infrastructure by its rivals. No matter what type of competition occurs downstream, it is not clear if the investment would occur at the efficient point in time.

While this tension is well-known from the literature on R&D, the specific application to access to telecommunications networks brings another aspect that crucially affects the scenario. The access seeker can in fact become the provider itself and sell access to the rival. There is a potential for both firms – the access provider and the access seeker – to "race" in order to be the first to provide the infrastructure. By doing so, an operator avoids the access payments and receives access revenues. This gives a reason to pre-empt rivals and incentives to invest are then raised. The race to become the "common carrier" speeds up the operators' choices (see Gans and Williams, 1999).

Access issues become of greater concern when firms that use the infrastructure are also direct competitors of the infrastructure owner. If competition effects are extreme, the infrastructure owner will not grant access unless required to. Here regulation plays a

[3] To understand the 'replacement effect', consider that competitive firms are just breaking even prior to adopting an innovation, and so value the innovation at the full additional profits with its existing technology. By contrast, the monopolist would be earning monopoly profits with and without innovation: introducing the new process/product means that the monopolist is effectively 'replacing' itself, which undermines the incentives to investment.

crucial role. The entrant is obviously keen on obtaining access. Without compensation, however, the incumbent will wish to delay investments. This can be solved by requiring the entrant to bear more of the costs. But for the regulator this increase might reduce the possibility of entry itself. The regulator should try to manage this tension between investment incentives and timely competition.

An appropriate access price régime can be used by the regulator to create competition between industry participants over the *provision* of facilities. If a firm "wins" in the provision of infrastructure, it becomes the common provider and receives access payments from other firms. If it loses, it will either pay for access or duplicate the infrastructure. By committing to an appropriate access rule, the regulator can directly determine the difference between winning and losing for operators.

Unbundling of the local loop affects entry decisions in two different ways. Firstly, the terms and conditions of unbundling contracts influence entry decisions, i.e., whether or not to enter, and, hence, the number of new entrants. Secondly, unbundling affects entry strategies, and in particular, whether entrants enter the market by building alternative access networks (infrastructure-based entry) or by leasing loops (service-based entry).

What I have just described is at the core of the "ladder of investment" approach. I find misleading to see service- and infrastructure-based entry purely as *complementary* means of entry (Christodoulou and Vlahos, 2001) or purely as *substitute* means of entry (as in Crandall, Ingraham and Singer, 2002). By endorsing the view of substitutability, one would conclude by saying that mandatory unbundling encourages entrants to delay facilities-based investment. However, complementarity must play a prominent role when there is some uncertainty over demand, technologies or competition and/or when experience improves efficiency. The "ladder of investment" approach requires NRAs to identify which assets competitors find it easiest to replicate, and to construct regulated access products which are complementary to these self-supplied inputs. As competitors acquire market share, more assets become replicable, and the range and scope of complementary access products available from the incumbent will shrink. Access pricing can promote these processes over time, raising the cost of more comprehensive access products, and lowering (or keeping low) the prices of less replicable inputs. The

best known ladder is that in which competitive broadband suppliers graduate from re-selling the incumbent's products to relying on bitstream, and then on building their network out to local exchanges and simply renting loops.

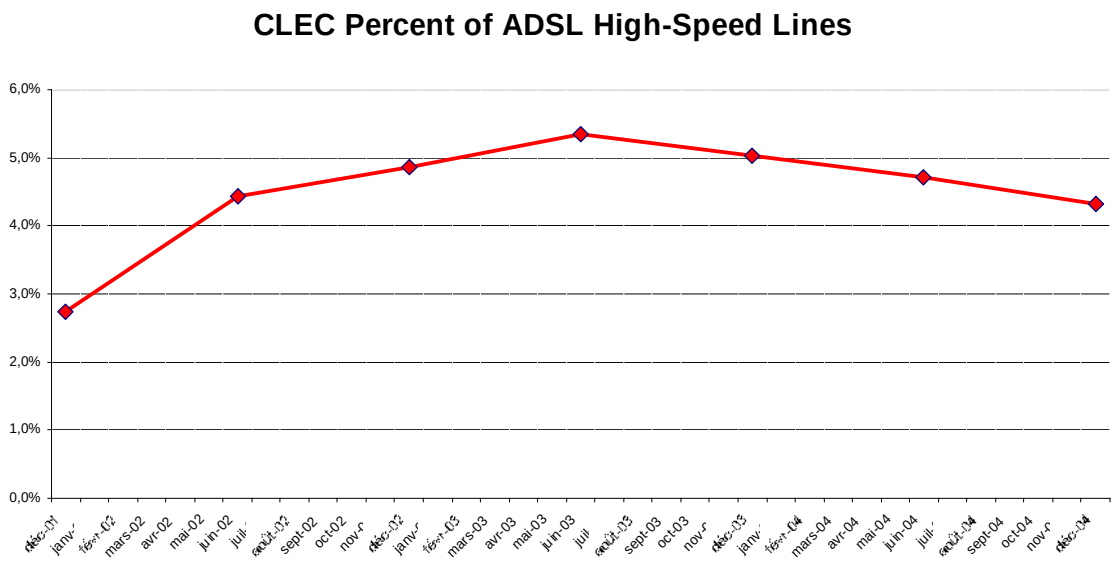
Investments are *incremental*, and can be delayed. This is precisely what an approach based on real option tries to describe. However, the theory of real options presented in the Submission is very selective. In fact, the literature on real options in a strategic context is still in an infant stage to draw any strong policy conclusions. Let me cite one of the few technical papers (not written by consultants) that applies the techniques of real options under uncertainty to the problem of access to networks. Hori and Mizuno (2006) examine the choice between two specific types of competition schemes (i.e., service-based competition and facility-based competition) by focusing on a firm's incentive to invest in network infrastructure. Their analysis firstly shows that service-based competition makes construction of a bypass later than under facility-based competition, so long as the entrant accesses an incumbent's network. The incumbent's incentive to invest in network infrastructure is also examined. This shows that, because of the 'race' to become the access provider, facility-based competition makes the initial introduction of infrastructure earlier than under service-based competition. However, when the degree of uncertainty is small, service-based competition makes the initial introduction of infrastructure earlier than under facility-based competition. In other words, no final judgment can be made in this respect, and careful calibration exercises would have to be conducted.

4.2 Country experiences

It is useful to discuss the recent experiences of the US and of the EU. In most European member states, cable TV has only limited deployment and adoption. In many countries, the wired fixed telephony incumbent controls the largest mobile operator. In the United States, competition between the cable TV industry (and broadcast satellite) with the telephony world provides a richer tapestry. Voice substitution with a competitive mobile industry serves as a further competitive check. Because of these crucial differences, one would have to be very careful when assessing and comparing the impact of LLU policies in Europe versus the US. The presence of inter-platform competition in the US may make open access policies less necessary than in a typical European country.

With all of this in mind, I proceed to consider LLU policies in Europe and in the US. According to Marcus (2005a), recent FCC proceedings have had the collective effect of breaking most of the rungs on the "ladder of investment" whereby new entrants would seek to progressively grow their businesses. European broadband adoption and deployment took off in the 2003-2005 period through the combined effect of (1) local loop unbundling (LLU), (2) shared access, (3) bitstream access, and (4) resale (European Commission, 2006). In the United States, the only rung that solidly remains is the unbundling of copper loops.

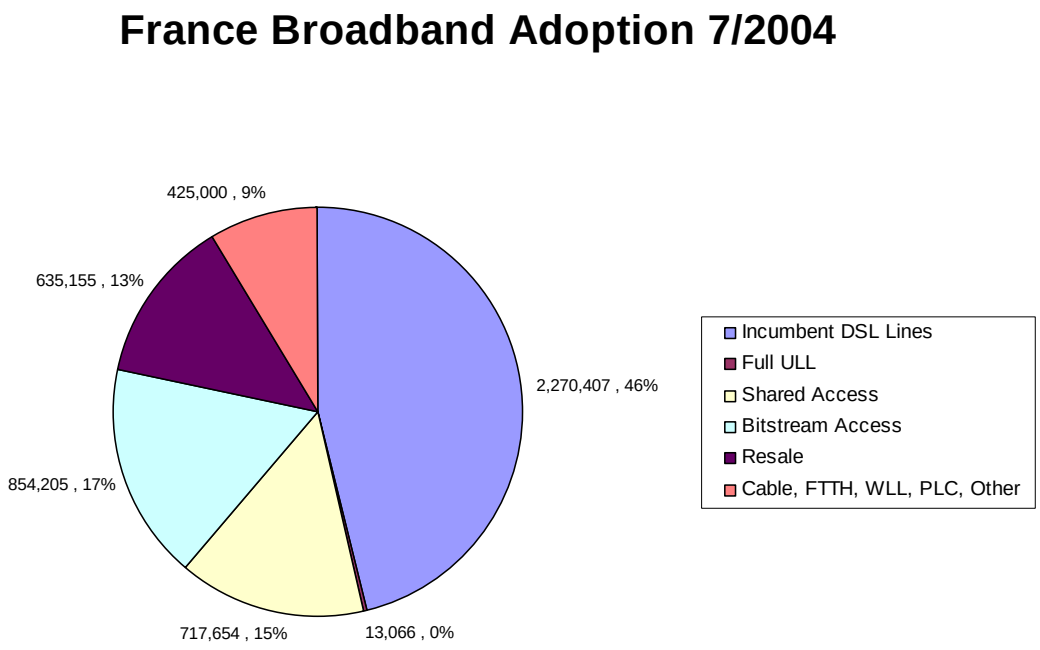
The FCC's elimination of procompetitive regulation appears to have had an impact – the market share of competitive providers (CLECs) has been flat or slightly declining over the past several years. The following graph of the relative proportions of DSL lines provided by CLECs is based on FCC data.



Source: FCC reports based on Form 477 carrier data

To put these US figures into a European context, consider that the corresponding overall figure for the EU25 is more than 35% (and increasing over time), and that by this metric the United States has achieved less competitive market entry for wired ADSL broadband services than 21 of the 25 EU member states, including all EU15 member states.

This competitive DSL supply at the wholesale level is essential in most European countries, as there tend to be few alternatives to the wired telephony network. France, for example, has obtained excellent results in recent years thanks to shared access and bitstream access, which collectively represent a third of the market. Cable modem competition could not have driven sufficient competition in France – only 9% of the domestic broadband market reflects alternatives other than DSL.

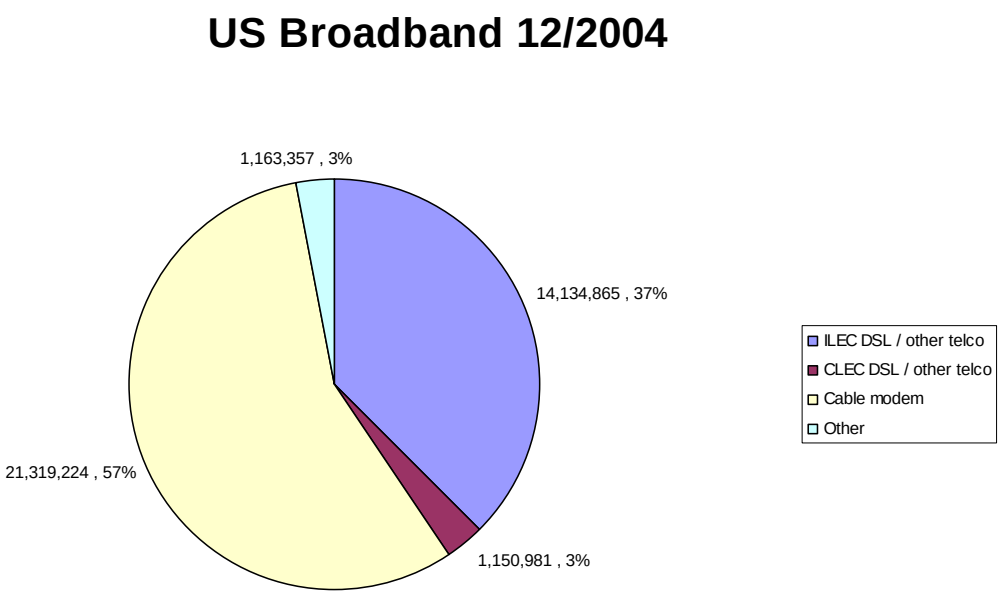


Source: Marcus (2005a) based on 10th Implementation Report

At the same time, European member states that enjoy significant cable TV (or fiber) broadband deployment tend to experience very good broadband roll-out as a result of the combined effects of inter-modal competition and pro-competitive regulation of DSL facilities. This is especially true of Belgium, the Netherlands, and Denmark, all of which enjoy significantly higher overall broadband penetration than the US. Their experiences would appear to contradict any suggestion that the widespread availability of cable broadband necessarily implies that the regulator should suppress the wholesale market on the DSL side.

Despite the lack of competitive ADSL supply at a wholesale level in the United States, most geographic areas enjoy a second source of broadband supply at the retail level. As of December 2004, 56.4% of the 38+ million high-speed lines (over 200 Kbps in at least one direction) in the United States were based on a cable TV service (coaxial

cable). This results in the gross market structure for wired and wireless broadband shown in the figure below.



Source: FCC reports based on Form 477 carrier data

According to Marcus (2005b), the current U.S. approach seems more likely than not to lead to a less competitive environment than that enjoyed in the EU. It has already led to a less competitive environment at the intra-modal wholesale level. At the same time, the US environment differs from that of Europe in ways that might possibly serve to mitigate the potential negative impact. In particular, the competition between ILECs and CaTV companies may be strong enough to deliver good deals to end users. A serious concern is that many of the actions that have been undertaken may be difficult to reverse. For instance, it is not clear that the FCC would have the statutory authority to effectively reverse certain of the changes that it has made. Given the complexities of the political process in the United States, and the asymmetries emerging in the profitability (and thus the lobbying capabilities) of market participants, any actions taken by Congress are more likely to exacerbate problems than to correct them. The US would thus appear to be committed to a trajectory with a concentrated market structure (local duopolies) from which it would be difficult to reverse or correct its course.

The situation in Europe seems to be on a different path. In my view, not only *levels* but also *trends* are to be looked into. According to the 11th Implementation report (EC, 2006):

- Broadband take-up has grown to nearly 53 million lines, a rise of almost 20 million during 2005. More providers are in the market, with prices falling as transmission speeds increase. New entrants now have market share of almost 50%; although many rely on incumbents' networks to provide services, there is a significant move to unbundled local loops.
- After dipping in 1999-2001, investment levels are recovering, with capital expenditure for the sector as a whole conservatively estimated to exceed €45 billion in the EU in 2005, an increase of approximately 6% compared to 2004.
- There was a significant increase in broadband take-up in 2005, with average EU penetration (lines per 100 population) reaching 11.5% in October, compared to 7.3% in October 2004 (with average EU 15 penetration up from 8.4% to 13% over the same period).
- A striking feature is that the number of shared access lines has tripled over the year 2005. This has been a catalyst for broadband growth in the United Kingdom, France and Denmark, where the number of shared access lines has increased dramatically following the reduction of unbundling fees by the NRAs. Many operators may have a preference for shared access because the unbundling process is easier and they can provide VoIP as an alternative to switched voice.

Some further data are reported below (taken from Cave, Stumpf and Valletti, 2006):

- Table 1, shows the distribution of demand by speed for DSL broadband in several EU countries in 2004 and 2005, and table 2 shows the same breakdown for cable.

- Figure 1 shows how broadband prices in the UK have moved (source: Ofcom).

- Figure 2 shows, for the UK, how broadband has overtaken narrowband internet access in the UK, where the early development of FRIACO made narrowband internet access widespread (source: Ofcom).

Table 1: DSL Broadband customers by speed in 2004 and 2005 (%)

	Germany		France		Italy		Spain		Netherlands		Denmark	
Download Speed	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005	2004	2005
128-255	0	0	0	0	0	0	3	0	0	0	76	68
256-511	3	2	49	12	75	50	92	89	11	3		
512-1023	93	4	40		17	40	1	7	0	32	9	8
1024-2047	4	76	11	88	6	8	4	1	54	44	14	20
2048-5999	0	18			2	2	0	2	35	18	2	5
6000 and up	0	0			0	1	0	0	0	3	0	0

Source: H. Schedl *Ifo Schnelldienst* 19/2005 pp 37-39

Table 2: Breakdown of cable broadband customer by speed in 2004 and 2005

	Spain		France		Netherlands		Denmark	
Download Speed	2004	2005	2004	2005	2004	2005	2004	2005
128-255	72	20			13	0	14	19
256-511	22	40			0	0	30	33
512-1023	4	40	12		45	30	31	4
1024-2047	1	0	88	10	14	25	25	43
2048-5999	0	0	0	60	27	44	0	0
6000 and up	0	0	0	29				

Source: i*bid*

Figure 1: UK Broadband prices over time (£ per month)

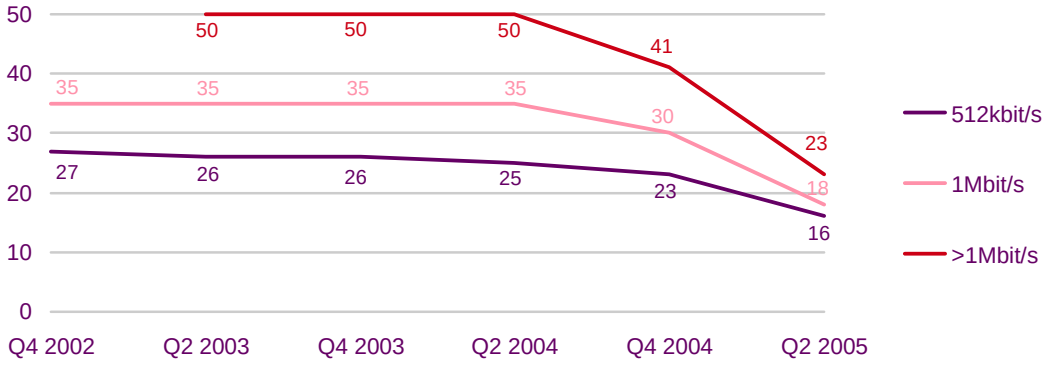
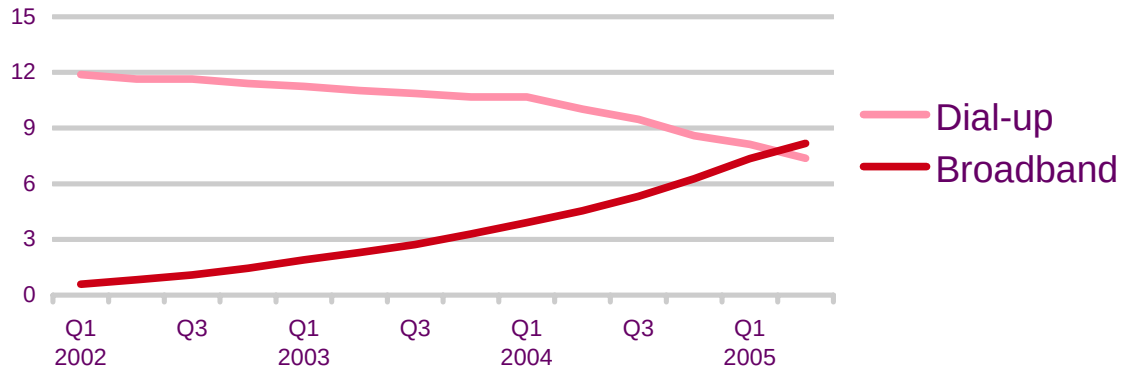


Figure 2: UK Internet connections (millions)



These and other data appear to support the following rather obvious conclusions:

- demand is increasing very quickly in most Member States - accelerating up the rising part of the S curve;
- rankings of broadband penetration among Member States are very volatile, suggesting major disparities in market conditions;
- price per unit of bandwidth is falling quickly, largely because the numerator is constant and the denominator rising;

- operators offer a range of services, presumably in the hope of encouraging upgrading.

In October 2005, entrants' DSL lines in the EU based on unbundled or shared loops exceeded those based on bitstream in the proportion 3:2.[4] At least one Member State, the Netherlands, had found effective competition in wholesale broadband access. Nevertheless, entrants' access by ULL amounted to only 16% of total DSL lines so it would be dangerous to regard that a successful means of entry. Moreover, the ERG analysis of broadband regulation emphasises the importance of intermediate wholesale products as a stepping stone or rung in the ladder towards local loop unbundling.[5]

It is interesting to note that in several countries, access is of one particular type and other forms do not play a role. This may be due to differences in regulatory decisions. For example, in Germany there are no provisions for bitstream access, and effectively no such lines are available (incidentally, I object here to the claim contained in the Submission, pp. 101-102, that numbers provided by Cave might include bitsream – as this has not been available until very recently). In Germany almost all lines come as fully unbundled. This is in contrast to, for instance, the Netherlands, where the vast majority of lines is offered as shared access (and bitstream access is also not used). In other countries the vast majority of unbundling is via bitstream access, for instance in the United Kingdom and Belgium.

We observe that the four types of wholesale access, full LLU, shared-line access, bitstream access and simple resale access, play an important role in the EU. Notice that a high take-up of LLU can sometimes be explained by the absence of alternative local networks (e.g., cable) or differences in the availability of wholesale service (e.g., bitstream access or wholesale line rental).

I now discuss some country experiences in more detail.[6] Denmark was an early mover with respect to LLU. Fully unbundled lines were mandated in 1998, and line-sharing in 2001. By October 2001 entrants had gained a market share of 44% of DSL lines. A bit

[4] EC 11th Implementation Report.
[5] Broadband Competition Market Report, ERG (05) 23, 2005.
[6] See de Bijl and Peitz (2005).

more than one year later (December 2002), their market share was down to 21%. Note that this does not imply that a large number of consumers switched back to the incumbent because the total market was increasing fast. However, the incumbent priced more competitively and entrants were no longer able to gain a large share of subscribers. Note also that in Denmark, LLU was not the only way for operators apart from the incumbent to offer broadband services. In addition, broadband is provided by upgraded cable television networks. Hence competition for the incumbent operator came from facility-based (cable operator Telia Stofa, a subsidiary of TeleSonera) as well as unbundling-based operators (in particular Tiscali and Cybercity).

Belgium also experienced an important role of competition from cable in the broadband market. Actually, it was cable operator Telenet which offered high-speed internet access already in 1997 followed by others in 1998 and 1999, ahead of the incumbent telecommunications operator Belgacom which only started to offer DSL services in 1999. Since almost all households have access to cable and DSL services, facilities-based competition is in place in essentially all geographical areas. In line with European regulation, LLU access was mandated in 2000. By 2002, some ISPs gained a combined 15% share of DSL subscribers through broadband access from Belgacom.

The early success of cable operators in Belgium and partly Denmark contrasts with developments in the same period in Germany. Although also in Germany a large majority of households (86% in 2002) has access to cable, most of these cable networks did not offer high-speed internet access simply because the incumbent telecommunications operator Deutsche Telekom owned most cable networks. Any success in Germany with respect to LLU has therefore to be seen in light of the failure to establish facilities-based competition. Certainly, the regulated wholesale price, in relationship to actual costs, is an important factor determining different penetration rates in different countries and across different access types.

It may be useful to recall that the EC Regulatory Framework is a very structured process that relies on the application of Competition Law principles to telecommunications markets. For a market to be included in the list of markets that *may* be subject to ex ante regulation, substantial competition problems would have to arise in the production of key retail products in an end-to-end value chain in the absence of regulation. Where

such problems are found, a sequential examination is made of the presence or absence of significant market power (SMP) in the underlying wholesale markets. If remedying such SMP eliminates the competition problem, the analysis is concluded. If it does not, other wholesale markets and, in the limit the retailing activity itself, are examined for SMP, until the process is complete. Therefore this approach is well-founded, transparent, and limits regulation as far as possible to wholesale markets, and in any case to the smallest set of markets possible.

Having the read the current rounds of notifications by NRAs, and the Commission's responses under the current recommendation, it is a key information to report the *results* of the market reviews conducted so far with regard to SMP. After consultation processes, market analyses, appeals etc.:

- Wholesale ULL: 18 NRAs found SMP and imposed some remedies (and no single NRA found absence of SMP);
- Wholesale broadband access: 17 NRAs found SMP and imposed some remedies (and 1 NRA found absence SMP).

The Commission is now revising the list of market recommend for ex ante regulation. It is inappropriate to treat a high proportion of past SMP findings as creating a presumption of the need to continue to include the market in question in the Recommendation. Technical development may, and deregulatory strategies pursued by NRAs should, reduce the number over time. On the other hand, a widespread finding of effective competition must cast doubt on the need to resort to *ex ante* regulation. While it is expected that the list will be reduced from the current 18 markets to a lower number (possibly 10), it is also expected that wholesale broadband markets will *continue to be included* in the revised list. European NRAs have so far espoused the idea of the "ladder of investment", generally favouring a version which maintains the availability of a range of cost-based access products over time, rather than the progressive withdrawal of such products. The latter is a feature of a more 'active' implementation of the policy.

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