



DIW Berlin

Deutsches Institut
für Wirtschaftsforschung

DIW Berlin: Politikberatung kompakt

20

Local Loop Unbundling and Bitstream Access: Regulatory Practice in Europe and the U.S.

Pio Baake, Brigitte Preissl (Editors)

Johannes M. Bauer
Per Björstedt
Erik Bohlin
Elena Gallo
Anders Henten
Sven Lindmark
Martijn Poel
Enzo Pontarollo
Knud Erik Skouby
Jason Whalley

Berlin, 2006



DIW Berlin: Politikberatung kompakt 20

Johannes M. Bauer¹

Per Björstedt²

Erik Bohlin²

Elena Gallo³

Anders Henten⁴

Sven Lindmark²

Martijn Poel⁵

Enzo Pontarollo⁶

Knud Erik Skouby⁷

Jason Whalley⁸

Pio Baake⁹, Brigitte Preissl (Editors)

Local Loop Unbundling and Bitstream Access: Regulatory Practice in Europe and the U.S.

Berlin, September 2006

¹ Michigan State University, USA. bauerj@msu.edu

² Chalmers University of Technology, Sweden. Corresponding author: Erik Bohlin, eriboh@mot.chalmers.se

³ Wind Telecomunicazioni, Italy. elena.gallo@mail.wind.it

⁴ CICT, COM•DTU, Denmark. henten@cict.dtu.dk

⁵ TNO Information and Communication Technology, The Netherlands. Poel@stb.tno.nl

⁶ Università Cattolica del Sacro Cuore, Italy. enzo.pontarollo@unicatt.it

⁷ CICT, COM•DTU, Denmark. skouby@cict.dtu.dk

⁸ Strathclyde Business School, United Kingdom. jason.whalley@strath.ac.uk

⁹ DIW Berlin, Department Information Society and Competition. pbaake@diw.de

IMPRESSUM

© DIW Berlin, 2006

DIW Berlin
Deutsches Institut für Wirtschaftsforschung
Königin-Luise-Str. 5
14195 Berlin
Tel. +49 (30) 897 89-0
Fax +49 (30) 897 89-200
www.diw.de

ISBN 3-938762-10-1
ISSN 1614-6912

Alle Rechte vorbehalten.
Abdruck oder vergleichbare
Verwendung von Arbeiten
des DIW Berlin ist auch in
Auszügen nur mit vorheriger
schriftlicher Genehmigung
gestattet.

Contents

1	Introduction	1
2	From facility-based competition to equality of access: The Italian way	6
2.1	Introduction.....	6
2.2	The different levels of LLU	9
2.2.1	Bitstream access.....	9
2.2.2	Full LLU	11
2.2.2.1	Collocation.....	13
2.2.2.2	LLU access charges	14
2.2.2.3	Shared access	17
2.3	The relation between the pricing of different services.....	17
2.4	Delays in LLU implementation.....	19
2.5	The Agcom's market analysis.....	21
2.6	Access bottlenecks and broadband diffusion.....	25
2.7	Some open questions: ladder of investment or equality of access?	28
2.8	References.....	32
3	Regulation of local loop unbundling in the Netherlands: The regulatory strategy, the many difficulties and the impact on infrastructure and services competition.....	34
3.1	Introduction and main points	34
3.1.1	Overview of the regulatory strategy	34
3.1.2	Main features of regulatory framework.....	35
3.2	Regulation of access to the local loop.....	39
3.2.1	The EDC model and its application to LLU	39
3.2.2	Unbundling obligations.....	42
3.2.3	Regulatory provisions with specific dynamic aspects	43
3.2.4	Obligations with respect to the provision of collocation spaces.....	44
3.3	Wholesale and resale obligations and the respective tariffs.....	45
3.3.1	Regulations with respect to consumer prices.....	45
3.3.1.1	The model used.....	45
3.3.1.2	The relation between regulated consumer prices and wholesale tariffs.....	46

3.4	Implementation of regulation.....	47
3.4.1	Impediments of implementation: delays and deficiencies.....	47
3.4.2	Litigation: appeal cases to regulator and court.....	47
3.5	Performance indicators.....	48
3.5.1	Diffusion of broadband technology.....	48
3.5.2	Quality of access.....	52
3.5.3	Division of market between incumbent and new entrants.....	52
3.6	Conclusion and outlook.....	56
3.7	References.....	62
4	Regulation of local loop access – infrastructure versus service competition in fixed broadband access: The case of Denmark.....	63
4.1	Introduction.....	63
4.2	Overview of the current regulatory philosophy.....	64
4.3	Main features of the regulatory framework.....	66
4.4	Regulation models and provisions.....	68
4.5	Regulation of access to the local loop.....	69
4.5.1	The model used by the regulator to determine the access charges.....	70
4.5.2	Unbundling obligations.....	72
4.5.3	Regulatory provisions with specific dynamic aspects.....	73
4.5.4	Obligations with respect to the provision of collocation spaces.....	75
4.6	Regulation of access to higher levels in the network, i.e. BSA.....	75
4.7	Wholesale and resale obligations and the respective tariffs.....	76
4.8	Regulation with respect to consumer prices.....	77
4.9	Implementation of regulatory rules.....	78
4.9.1	Impediments of implementation.....	78
4.9.2	Litigation.....	80
4.10	Performance indicators.....	81
4.10.1	Diffusion of broadband technology.....	81
4.10.1.1	Regional and local broadband initiatives.....	82
4.10.2	Quality of access.....	84
4.10.3	Intermodal competition.....	84
4.10.4	Division of markets between the incumbent and new entrants.....	85
4.11	Conclusion and other issues relevant for regulation of local loop access.....	86
4.12	References.....	88

5	Sweden's telecom liberalisation and local loop unbundling: Moving from consensus to enforcement.....	90
5.1	Introduction.....	90
5.1.1	Overview over the current regulatory philosophy.....	91
5.1.2	Main features of regulatory framework.....	92
5.2	Regulation of access to the local loop.....	93
5.2.1	Cost models.....	93
5.2.2	Unbundling obligations.....	96
5.2.3	Obligations with respect to the provision of collocation spaces and related topics which affect the costs of the access seeker.....	98
5.3	Regulation of access to higher levels in the network, i.e. bit stream access.....	99
5.4	Wholesale and resale obligations and the respective tariffs.....	100
5.5	Regulations with respect to consumer prices.....	101
5.6	Implementation of regulatory rules.....	102
5.6.1	Impediments of implementation: delays, deficiencies of implementation rules.....	104
5.6.2	Litigation (law suits, arbitration, complaints to regulator).....	104
5.7	Performance indicators.....	108
5.7.1	Diffusion of broadband technology.....	108
5.7.2	Quality of access (waiting lists for broadband connection, capacity of lines, lock in practices etc.; conditions for switching suppliers).....	110
5.7.3	Intermodal competition (alternative infrastructures).....	111
5.7.4	Division of market incumbent and new entrants.....	114
5.8	Other issues relevant for regulation of local loop access.....	114
5.9	Final Remarks and Conclusion.....	116
5.10	Appendix – Cost results from the LRIC Hybrid Model.....	118
5.11	References.....	120
6	Local loop unbundling and the strategic review of telecommunications in the United Kingdom.....	122
6.1	Introduction.....	122
6.2	Three phases of UK regulation.....	123
6.3	UK broadband market.....	125
6.3.1	Market share.....	125
6.3.2	Broadband availability.....	127
6.4	Strategic review of telecommunications.....	130
6.4.1	Real equality of access.....	132
6.4.2	Outcome.....	134

6.5	Other regulatory developments	136
6.5.1	Office of the Telecommunications Adjudicator	137
6.5.2	Wholesale local access market	138
6.5.3	LLU pricing	140
6.5.4	IP Stream and ATM interconnection pricing.....	141
6.6	Discussion and conclusion	142
6.7	References.....	147
7	From static efficiency to innovation focus: The turnaround of U.S. unbundling policy	150
7.1	Introduction.....	150
7.2	Conceptual foundations of unbundling	151
7.3	Searching for a sustainable approach.....	155
7.3.1	The early unbundling regime.....	155
7.3.2	Changing course: The Triennial Review Order.....	158
7.4	The present unbundling policy.....	159
7.4.1	The overall unbundling framework	160
7.4.2	Mass market unbundling.....	161
7.4.3	Dedicated interoffice transport market unbundling.....	162
7.4.4	High-capacity loops	163
7.4.5	Next-generation networks.....	164
7.5	Drivers of the new unbundling rules.....	165
7.5.1	From a static to a dynamic approach	166
7.5.2	Inter-modal competition	167
7.5.3	The experience with narrowband unbundling	168
7.5.4	The experience with broadband unbundling.....	169
7.6	Assessment and outlook.....	170
7.7	References.....	173

Tables

Table 2-1	Broadband market in Italy (July 2005).....	27
Table 4-1	Broadband subscriptions, June 2005	81
Table 4-2	Market shares of TDC, primo 2004.....	85
Table 4-3	DSL connections used by new entrants, primo 2004	86
Table 5-1	The transition from historical costs to LRIC.....	96
Table 5-2	IT infrastructure with high connection speeds, network kilometres, 2001-2003	112
Table 5-3	Internet subscribers per access technology (thousands).....	112
Table 5-4	Market shares – active customers with fixed Internet access.....	114
Table 5-5	Selection of IT initiatives by public authorities	116
Table 6-1	UK broadband connections (000s)	126
Table 6-2	Proportion of population (households) covered by broadband technology, Q2 2004	129
Table 6-3	Applying equivalence to existing regulated wholesale products	134
Table 6-4	Equivalence of access timetable for existing products.....	136
Table 6-5	Throughput Capability for Orders.....	138
Table 6-6	Local Loop Unbundling Charges, 16th December 2004.....	141
Table 6-7	Residential broadband prices, June 2004 and January 2006	143
Table 6-8	Details of price charges, August 2004 and January 2006	144

Figures

Figure 2-1	LLU implementation times	21
Figure 3-1	Development of broadband internet in the Netherlands, 2001 – Q3 2004.....	49
Figure 3-2	DSL lines per 100 inhabitants, 2000 – Q2 2004	49
Figure 3-3	DSL availability in the Netherlands (% lines per operator), June 2003–November 2004	50
Figure 3-4	ULL-average monthly tariffs, 2002–2003.....	51
Figure 3-5	% DSL lines via ULL, 2002 – Q2 2004	53
Figure 3-6	Supply of DSL lines in the Netherlands (network level), 2001 – Q2 2004	53
Figure 3-7	Full unbundling – lines per inhabitants, July 2001–July 2004.....	54
Figure 3-8	Shared Access – lines per inhabitants, October 2002–July 2004.....	55

Figure 3-9 Development of broadband ISPs market shares in the Netherlands (retail), 2001 – Q2 2004	56
Figure 5-1 The PTS staircase of action and the possibilities to appeal the decisions of the regulator.....	103
Figure 5-2 Broadband subscribers in Sweden.....	109
Figure 6-1 Broadband retail market share.....	126
Figure 6-2 DSL enabled exchanges, 2001-2004	127
Figure 7-1 Direct and indirect effects of unbundling.....	153

1 Introduction

Pio Baake, DIW Berlin

Despite new developments and improvements in different telecommunication infrastructures such as the upgrade of cable and mobile networks and the increasing use of WLAN connections to the internet, the regulation of traditional narrow- and broadband networks continues to be one of the major issues in telecommunications policies. In view of the vertical structure of telecommunication markets and presumably inefficient investments associated with the duplication of fixed network infrastructures, regulatory policies in many countries continue to focus on access and interconnection provisions as well as on wholesale obligations in order to establish conditions that allow efficient market entry and competition.

Taking the New European Regulatory Framework established in 2002 and national differences with respect to institutional settings and initial market structures as a starting point, the following chapters analyse regulatory policies and experiences in five European countries, namely: Netherlands, Italy, Denmark, Sweden and the United Kingdom. The final chapter considers the regulatory approach employed in the U.S. where the regulatory policy changed dramatically during the last few years.¹

All the chapters focus on regulation concerning local loop and bitstream access. Impediments to the implementation of regulation and litigations thereof will be also described. Additionally, regulation of downstream wholesale and retail markets will be discussed to the extent that the respective regulatory measures can be expected to affect firms' investment and entry decisions. In analyzing market structures and the development of competition between national incumbents and new market entrants, the chapters also provide an assessment of the actual impact of regulatory interventions.

In Europe the implementation of the New Regulatory Framework established in 2002 provides a uniform legal framework.² The main policy objectives of the new framework are 'to

¹ All chapters are based on reports prepared on behalf of the DIW Berlin during 2004/2005. In order to ensure comparability, the outline of the reports was given by the DIW. Former versions of the reports were also presented at the 16th European Regional ITS Conference in Porto, Portugal.

² The new regulatory framework mainly consists of EU Directives 2002/19/EC to 2002/21/EC: Directive 2002/21/EC is on a common regulatory framework for electronic communications networks and services (OJ L

promote competition in the provision of electronic communications networks, electronic communications services and associated facilities *inter alia* by:

- (a) Ensuring that users, including disabled users, derive maximum benefit in terms of choice, price, and quality;
- (b) Ensuring that there is no distortion or restriction of competition in the electronic communications sector;
- (c) Encouraging efficient investment in infrastructure, and promoting innovation [...].³

To this end the new framework defines seven retail markets and eleven wholesale markets that should be subject to market analysis. If significant market power is found in one of the proposed markets, regulation should be imposed on that market in order to stimulate competition.⁴ To this end, the new framework proposes a series of remedies such as unbundling and collocation obligations as well as provisions to establish wholesale markets.

While the procedural steps and specific provisions of the new framework lead to a largely harmonised set of regulatory measures in Europe, the new framework nevertheless provides enough room for national policies to differ not only in diverging rhythms of implementation and diverse situations at the point-of-departure. National policies may be also distinguished with respect to their emphasis on infrastructure or service based competition. More specifically, while the new framework considers access to the local loop and interconnections as relevant markets for sector specific regulations, the potential impact which regulation of other wholesale and retail markets may have on the firms' investment and entry decisions is not extensively addressed. Provisions concerning the relation among access, wholesale and retail prices mainly deal with margin squeeze, potential vertical leveraging and anticompetitive

108 of 24 April 2002, p. 33), also known as the "Framework Directive"; Directive 2002/20/EC is on the authorisation of electronic communications networks and services (OJ L 108 of 24 April 2002, p. 21), known as the "Authorisation Directive"; and Directive 2002/19/EC is on access to, and interconnection of, electronic communications networks and associated facilities (OJ L 108 of 24 April 2002, p. 7), known as the "Access Directive". The new legal framework also includes two further Directives, the so-called "Universal Service Directive" and the "Data Protection Directive"; however, these are not relevant for our study.

³ See Article 8, Framework Directive (Directive 2002/21)

⁴ See the European Commission's Recommendation on relevant product and service markets (C(2003) 497). The criteria which have to be satisfied are: a) there must be "high and non-transitory" structural or legal barriers to entry, b) there must be no tendency towards effective competition within a certain time horizon and c) the market failure cannot be addressed with competition law alone.

bundling of products. However, there are no explicit specifications aimed at the investment incentives of regulated incumbents or their competitors.

Similarly, the new frameworks' provisions on regulation of new markets mention the protection of first-mover advantages as a reason to exclude new markets from the list of relevant product and service markets. The European Regulatory Group (ERG), however, focuses on the 'ladder of investment' approach proposed by Cave and Vogelsang and tends to favour more restrictive regulations of new infrastructures.⁵

Given these ambiguities and comparing the national regulatory policies in the considered European countries, regulation of access to the local loop, unbundling obligations and line sharing provisions are essential remedies which are implemented in all countries. National differences, however, occur with respect to the cost models used, collocation obligations and the speed of implementation. For example, in Italy the use of historic costs is justified by the observation that increased labour costs would lead to higher access charges if other cost models were employed. Regulation in other countries relies on analytical cost models in order to reflect actual costs and to spur efficient investments. Going a step further and emphasizing the concept 'real equality of access', the UK regulator also forced an operational separation of access services and other market activities of the incumbent.

National differences also exist with respect to bitstream access. In Sweden, a retail minus approach is employed. The regulator in the UK uses the same concept but in combination with the costs of an efficient new entrant. Concerning access at the DSLAM, Italy relies on cost orientation using historical costs. In the Netherlands, an initial attempt by the regulator to implement bitstream regulation failed due to Court intervention.⁶ Since then bitstream has not been regulated. Furthermore, in a recent market analysis the Dutch regulator states that line sharing, full local loop unbundling and broadband connections offered by cable operators lead to effective competition on both the wholesale and retail market for low quality broadband connections most commonly used for households. Therefore, it can be expected that low quality bitstream will remain unregulated in the Netherlands.

⁵ See ERG(03)30 – Common Position on regulatory remedies – 1st Version (published April 2004). For the 'ladder of investment' approach see Cave and Vogelsang (2003).

⁶ OPTA, the Dutch regulator, decided to regulate bitstream in May 2003. This decision was overruled by Court in December 2003.

A rather slow implementation of unbundling provisions took place in Italy, where the incumbent was accused of avoiding regulatory interventions by using a denial, detail and delay strategy. This strategy led to a delay of effective local loop unbundling regulation for about three years. In other countries the process of implementation was more efficient and induced earlier market entry.

Finally, retail markets are also regulated quite differently. The Swedish regulator focuses on regulation of access and interconnection charges and thus has lifted regulation on consumer prices entirely since 2001. In the Netherlands, fixed telephony services such as regional calls and ISDN subscriptions are regulated by a price cap with an efficiency factor equal to zero and price floors based on cost oriented prices and anticompetitive behaviour. In contrast, in Denmark only subscription tariffs are regulated.

Taken together these observations show that while national differences exist with respect to specific regulatory measures, the overall approach in the European countries is quite similar inasmuch as regulation in all countries adheres to the new framework and there are no conceptually significant differences. Costs models and specific regulations of wholesale and retail markets may differ, but no country employs an explicit dynamic approach or tries to spur infrastructure based competition by using dynamic tariff schemes or sunset clauses. The only attempt in this direction was made in the Netherlands. Starting with historical costs, the regulator initially intended to switch to current costs within five years starting from 2000 on. While this would have implied a step-by-step increase in the respective tariffs and an according increase in the investment incentives of competitors, actual investments in alternatives infrastructure remained rather low and the regulator didn't follow its initial plan. In fact, regulated access charges remained largely constant.

In contrast to the current European approach, regulation in the U.S. has recently turned around dramatically. After a period of rather restrictive regulatory interventions on access and wholesale markets, the national regulator, FCC, now emphasises the potentially adverse effects of regulation. Focusing on infrastructure based competition, considering fixed line networks and cable networks as close substitutes and taking mobile networks into account, the FCC has almost completely repealed regulation of broadband access and wholesale markets. Additionally, the obligations with respect to access to narrowband network elements have been significantly reduced.

While it is certainly too early to assess the effects of this turnaround, the experience in the European countries as well as some empirical evidence from the U.S. suggest that restrictive regulation of access and wholesale markets does at minimum not foster investments in new and competing infrastructures. Despite the different specific provisions used in Europe, the development of competition is quite similar in all countries. Although regulation has been successful with respect to service based competition and the induced decrease in consumer prices, infrastructure based competition is still weak. Persistent market dominance of incumbent operators in narrow- and broadband access markets exists in all countries where upgraded cable networks do not lead to inter-modal competition. Low investments in alternative or new infrastructures such as VDSL networks seem to indicate that the new regulatory framework and its implementation in Europe may not lead to market structures which support effective and sustainable competition.

2 From facility-based competition to equality of access: The Italian way

Elena Gallo, Wind Telecomunicazioni, Italy

Enzo Pontarollo, Università Cattolica del Sacro Cuore, Italy

2.1 Introduction

Whether to choose competition on infrastructure or competition on services is a crucial issue in the debate on the most suitable mechanisms through which the development of a competition-based market may be favoured in the telecommunication industry. Such an objective can be ensured, according to many, only through facilities-based entries, while other researchers consider “... competition based on infrastructures as the cause of extensive social costs” (Laffont et al. 2000, 22). Both positions stem from a reflection on the economic characteristics of network industries, even though they reach antithetical conclusions.

In Italy, there was no real debate about which of the two ways was the most suitable to facilitate the liberalisation process. For this reason, the *Autorità per le Garanzie nelle Comunicazioni* (Italian Authority for Guarantees in the Communications Sector), or Agcom, had to decide independently on which path to follow. The first annual Report submitted to the Parliament on 30 June 1999 indicated the basic criteria, times and characteristics for the measures to be adopted, including the competition model to be introduced. The report started with an important consideration, that the Community Directive dated 13 March 1996 number 96/19/EC “... adopts a decision of essential importance for the creation of alternative networks (...). Until then, as a matter of fact, (...) the Commission had deemed it better to avoid the expensive duplication of existing networks, whereas this Directive was an acknowledgement of the technical progress made (...) in that it opted for the creation of new networks based on the best possible use of the competitive opportunities offered by new digital technologies” (Agcom 1999, 18). As a consequence, the Authority, in its transposition of the Community guidelines, indicated its own preference for an infrastructure-based type of competition, even though, as shown by the RIO 1998 events, this was seen in a medium-term perspective. Conversely, in the short run, Agcom has approved double transit interconnection, which has substantially opened the market to those entities who, being only provided with switching equipment and a few points of presence (sometimes even only one), have an inter-

est in offering voice services on the domestic market and focus their efforts on price competition.

However, as early as one year later the approach became more complex and more sophisticated, when the issues of competition on the local market and access were taken into consideration. As highlighted in the second annual Report "... the Authority's actions (already) in the short-term aim at facilitating the use of the distribution network and of Telecom Italia users landline by offering the different resources of the notified carrier's access network to third parties, through a disaggregated and efficient offer", while "... in the longer term (... they) should also favour a growth of competition and innovation through alternative methods and technologies, both for access and for transport" (Agcom 2000, 89).

Such an approach has led to the decision to accelerate the LLU process, while, at the same time, Agcom authorised an extension of access to and unbundling of the fibre-optic network, but only temporarily because, as pointed out by Resolution 2/00/CIR, "... establishing a permanent regular supply obligation may lead to the risk of discouraging a greater spread of fibre-optic infrastructures, that is to say, discouraging both the incumbent operator and new entrants".

As seen in this Resolution, the Authority is walking a rather narrow path, since it is trying to avert the risk that the desirable acceleration of competition on services could jeopardise the perspectives of medium/long term investment in alternative infrastructures. *Non-aggregated (unbundled) access, as the deliberation states, "... is the statutory prediction that achieves the best balance between the need to favour the development of new infrastructures and the need to exploit existing infrastructures efficiently (...). As a matter of fact, the implementation of unbundling requires new entrants to invest significantly in order to be able to operate with their own infrastructure in the incumbent's local loops. However, entrants are not forced to duplicate the expensive and extensive infrastructure that starts from the local loops to reach individual end-users, as they can selectively rent the twisted pair lines needed to reach only their own clients ..."* (Leporelli et al. 2001, 254–255).

This approach is reiterated in Resolution 3/03/CIR of 27 February 2003, where it is highlighted that the "LLU is the key element allowing effective competition to be ensured in fixed telephony. Such a condition can be accomplished only with the arrival of operators capable of offering services based on their own infrastructure. The absence in Italy of a significant dissemination, throughout the country, of access infrastructures alternative to the copper network

makes the LLU regulation particularly important for the purpose of a further development of a competitive market”.

The results achieved with the first phase of the introduction of unbundling are to be considered not fully satisfying. “ (...) In this regard, it should be highlighted that this assessment is shared by the Antitrust Authority, who underscored the strategic importance of LLU, considered to be “the most suitable tool to ensure elimination, in the medium-long term, of incumbent positions in the infrastructure markets and, in particular, of those network components that are difficult to duplicate but would ensure end-user access”.

The significant obstacles that still hamper the development of LLU-based competition require a revision of the technical and economic conditions of service supply. *Such a revision, however, should not be prejudicial in the long term to investment in access networks.* For we may assume that, especially in the residential market segment, short-term competition based on carrier selection and pre-selection could be the prelude to a transition, in the medium-term, towards a competitive model based on unbundled access, and that in the long term – expecting more favourable economic cycles than currently – that it may be desirable to establish regulatory incentives for the construction of alternative networks. Therefore, the Authority will focus on measures that may favour greater development of disaggregated access in order to spur an effective and stable competition based on infrastructures, without hampering the development of alternative networks in the long period” (Considering E, point 3).

Obviously this approach will have to be fine tuned – from time to time – according to technological developments: at the beginning of the liberalisation process everyone was convinced that every operator (incumbent and new entrants) should develop (sooner or later) their access networks in fibre optic technology, then technological developments gave new life to the copper line, enabling it to support even TV services. It is up to the demand requirements (new bandwidth request), on one side, and to technological developments, on the offer side, to say if the copper access network will continue to be sufficient or not (continuing or not to give an advantage to historical operators), and if new technologies can start to represent a viable,

economic substitute for new entrants⁷. Until the copper access network represents by far the most economic solution to satisfy consumers requests, the bottleneck problem persists.

2.2 The different levels of LLU

Local loop unbundling comes in different versions: full unbundling, line sharing and bitstream access.

“With an initial focus on voice telephony, full unbundling was required, as it gives entrants sufficient control of the copper pair to provide voice telephony ...

In contrast, with line sharing, the incumbent remains in control and can still provide (voice) services to consumers, since entrants only lease part of the copper pair spectrum (the high-frequency, non voice spectrum, which can be used for broadband internet access). Hence, shared access loops remain connected to the incumbent’s network and consumers continue to receive voice services from the network ... Bitstream access is similar to line sharing in the sense that the copper pair spectrum is also shared by the incumbent and the entrant. The difference is that it is the incumbent that provides the ADSL technology and modems; entrants do not have control over the physical line nor are they allowed to add other equipment. Thus, entrants are restricted to supply services designated by incumbent (usually broadband internet access)” (de Bijl and Peitz 2005, p.36).

Given the different forms that LLU can assume, it is important to describe in details the regulatory framework which has been adopted in Italy.

2.2.1 Bitstream access

The provision of bitstream access has been foreseen by the Italian NRA, but the process leading to a correct implementation of this provision has been a long and tortuous one. In the spring of 1999, the incumbent, Telecom Italia (TI), started an exclusive offer of ADSL broadband access as a retail service to its customers without making a wholesale offer available for its competitors.

⁷ For example, nowadays great emphasis is given to Wi-Max technologies, but until they are developed it is difficult to say if they will be able to counteract the copper access monopoly.

In the wake of this development, Infostrada, the main competitor of TI on fixed telephony, reported the incumbent's abusive behaviour to the Antitrust Authority.

The investigation, concluded in April 2001, produced a decision against TI, and the latter was fined for about 59.5 million €. According to the Antitrust Authority, "TI adopted a strategy that violated the non-discrimination principle with the purpose of hampering competition and occupying the markets in advance", thus seriously damaging its competitors on the end markets of data transmission and high-speed Internet access.

Meanwhile, on 21 December 1999 Agcom had issued Resolution 407/99 to authorise TI to provide wholesale Internet access services based on ADSL technology at transparent and non-discriminatory conditions as compared to TI's offers to its own companies and divisions, so as to allow OLOs to promptly provide a service of equivalent quality and at competitive conditions.

In addition to regulating LLU, Resolution 2/00/CIR of 16 March 2000 also provided for the start of the bitstream service. As a consequence, TI was required to supply OLOs with this service in all cases where xDSL access systems are in effect used by its own commercial divisions to provide services to customers.

According to the Authority, the introduction of bitstream should spur competition in the local loop and at the same time promote the spread of new broadband services. But, as Agcom pointed out, the risk still exists that the availability of such a service may induce OLOs to "remain dependent on the engineering/commercial and network development decisions made by TI". Therefore Agcom reserves the right to review service supply conditions in the light of the progressive development of LLU.

As to the economic conditions of the wholesale service, they "should be determined based on the price charged by TI to its end customers, net of non-associated costs such as offer marketing costs (i.e. advertisement, marketing activities, and sales network) and customer management costs (i.e. invoicing and customer support)" (Art. 5, paragraph 4).

Twice during 2000 Agcom filed a report stating that TI's final offers were not replicable by OLOs. Agcom thereby forced the incumbent to reformulate its wholesale offer.

In particular, Resolution 15/00/CIR of 21/Dec/2000 highlighted that the DSL offer proposed by TI "did not fully meet transparency, non-discrimination and reasonableness principles (...) as some elements that were indispensable in order for OLOs to be able to use the service were

not included in the configuration proposed and necessarily had to be purchased separately from other TI commercial divisions, while those elements were nevertheless included by TI in the price offered to final customers”.

In the above-mentioned resolution, Agcom carried out a very detailed analysis of each individual cost component stated by TI and concluded that the wholesale offer should be determined on the basis of a discount not lower than 30% compared to the offer to the final customers (at equal service offer conditions). Furthermore, the Resolution stated that the wholesale offer should include two different rate options, one as retail price and the other on a lump sum basis.

During 2003, however, Agcom intervened again with Resolution 6/03/CIR of 15/Apr/03 on the offer conditions for xDSL services and ADSL tariffs.

The Resolution provides for four important measures: the first is the introduction of a formal authorisation process requiring that each new wholesale offer be notified to Agcom ninety days before its submittal, or thirty days before if they are mere tariff changes.

The second measure regards the applicability of a price test, designed to ensure that Telecom Italia’s offers are repeatable, and therefore based on the *retail minus* principle.

In the third place, the incumbent is required to inform the Authority even when it provides additional services to its final customers relating to offers that have been already approved. This requirement is designed to prevent operators from eluding the notification obligation.

The fourth principle stated in the Resolution concerns equal treatment for *Service Level Agreement* (SLA), with the purpose of avoiding damage to service quality levels for OLO customers as well.

This Resolution provides for a good way to enforce the equal treatment principle that lies at the basis of the EU directive.

2.2.2 Full LLU

LLU is one of the tools available to favour local loop competition, as suggested by the European Institutions with the Regulation on unbundled access to the local loop⁸ dated 5 Decem-

⁸ Regulation of the European Parliament and of the Council on unbundled access to the local loop, 2000/0185.

ber 2000⁹, which set out the obligation for incumbent operators to provide the other operators with physical (usually consisting of the copper twisted pair) or logical access to the connection between the end-user and the main local exchange, within 31 December 2000. This course of action was to be based on fair, transparent and non-discriminatory conditions. Agcom anticipated the EU guidelines by making the provision compulsory as early as its Resolution 1/CIR/98 dated 25 November 1998, which also specified that a Committee was to be set up to examine the aspects concerning all the possible technical solutions and procedural and economic issues regarding the service in question. These various aspects were subsequently defined with Resolution 2/00/CIR of 16 March 2000.

The aim of the latter resolution was to enforce unbundling of both the copper and fibre-optic networks, that is to say a physical type of transmission resources, and a numerical channel service, which is a type of access defined as logical. “The forms of physical access are more suitable to foster competition and innovation, as they allow the alternative operator (...) to manage its own technological activities in full autonomy. On the other hand, logical access forms may be useful (...) to kick-start competition (...) since they allow operators to enter the end service market before full vertical integration” (Agcom 2000, 90).

However, the obligation to provide the numerical channel is constrained by the non-availability of physical transmission resources.

Furthermore, some ancillary services have been identified, namely:

1. co-location, that is, the supply of equipped spaces situated in the areas of Telecom main exchanges, suitably arranged to host apparatus belonging to OLOs;
2. backhaul, consisting in the supply of a connection between a peripheral network location (Line Stages – LS) and a more centralised location, corresponding to the Urban Group Stage – UGS.

The Authority considered the backhaul service essential for the actual implementing of unbundling, particularly taking into account the lack of sound alternatives capable of setting up this connection in the short/medium term. In addition, the Authority established that backhaul services and fibre-optic access services were to be provided for three years only, so that the implementation of alternative infrastructures to replace those of the incumbent operator could

⁹ Preceded by EC Recommendation 2000/417/EC, dated 25 May 2000.

be adequately fostered in the medium/long term while at the same time allowing new entrants to invest gradually. TI bitterly opposed the introduction of these two possibilities into the unbundling mechanism, refusing to recognise that these services should be characterised as essential facilities, but the outcome was negative.

Resolution 2/00/CIR was only the first step of a very complicated adventure where the main challenges in opening up the market concerned the preparation of co-location spaces within the incumbent's main facilities and economic conventions between operators. It is very important to highlight Agcom's view on two issues: according to Telecom, if the space in the main exchange or the physical carrier are not available, disaggregated network access to the local loop is impossible, while according to the Authority, when that space is lacking, Telecom Italia should ensure virtual co-location and, in the absence of a physical carrier, the numerical channel should be used. Furthermore, the Authority monitored and guided the co-location space allocation process based on the conviction that this issue was the key to a rapid and effective implementation of unbundling services.

2.2.2.1 Collocation

One very complex issue to deal with was proved to be the issue of collocation costs, particularly referring to site preparation costs. Agcom, like the NRAs of other countries, had determined monthly rental prices for copper twisted pair lines, but had failed to pay sufficient attention to collocation costs. This was partly due to the fact that while the cost of twisted pair lines could be inferred from regulatory accounting or from bottom-up network models, site preparation costs had to be assessed on a case by case basis in relation to external factors such as operators' requests and the specific features of each individual site.

Agcom intervened in order to decrease collocation costs and set more equitable criteria for:

1. Determining the rental price for collocation spaces: at first, in setting the charge for collocation spaces, TI demanded the rental fee charged for commercial/residential spaces per square meter in the area. But it was evident that in the centre of the major cities this price was unfair for a space whose original cost was very low, so the NRA corrected this distortion by imposing prices equal to the cost charged internally (see Resolution 2/03/CIR, considering E, point 1: "As far as economic conditions for the collocation service are concerned, Telecom Italia may charge interconnected operators charges equal to those used to define the transfer cost of the services to access their own commercial structure).

2. Collocation charges: collocation charges must be assessed exclusively for the portion of site under the collocated operators' control, therefore excluding common areas, which are deemed to be non essential by the operator for the delivery of its services.
3. Cost of ancillary services (surveillance, consumption, ...): such costs are based on the real costs borne and are equal to internally applied transfer costs.
4. Activation and termination fees: these fees for connection and termination should be consistent with the corresponding values applied at the retail level. This means that in order to ensure a reasonable margin linked to marketing and sales activities and, in general, to operating charges associated with end-user management, the unbundling start-up cost should be placed in the range defined by the international best practice.
5. Termination fees: termination fees can be accrued only if the terminated line is not activated by another operator.

In order for alternative infrastructures to be implemented, the Authority established that collocated operators be allowed to install equipment for the implementation of transmission systems toward their own network with no technological restriction (fibre-optic, backhaul with WLL, ...).

For the payment of site preparation costs, the Authority requested that TI spread over time the recovery of investment made by the company. This would reduce economic barriers to accessing collocation services.

In order to reduce the initial investment needed to implement the collocation service and favour LLU expansion, Agcom provided for "co-mingling", that is, collocation in a shared room.

2.2.2.2 LLU access charges

According to Art. 8 of Resolution 2/00/CIR

"The economic conditions for the supply of LLU services must be based on the methodology of *fully allocated historical costs*." (FDC/HCA)

The resolution states that the technological and competition conditions characterising the local network differ significantly from transport-related conditions, and it is unlikely that such differences will be eliminated in the short term. As a consequence, the long-run or forward-

looking incremental costs principle (LRIC) used for interconnection costs cannot be applied to unbundling services.

Agcom deems it very important to promote alternative networks compared to those of the incumbent: within such a perspective, taking a cost standard based on “replacement costs” would have the benefit of not discouraging OLO investments. On the other hand, this would not allow alternative carriers to share the economies of scale that characterise the SMP (Significant Market Power) carrier’ position in the local network. This explains the decision to use the FDC/HCA methodology, which was further facilitated by the fact that it was the methodology used by TI at that time.

The same resolution also includes the option of passing to current costs for access as well. In general, thanks to technological progress, these costs are lower than historical costs. But this is not true where significant building and construction work has to be undertaken, involving heavy labour costs, as is often the case for the local network. And it is precisely due to the elevated impact of labour costs for access that Agcom continues to base its reasoning on fully allocated historical costs.

Within the framework of the RIO 2002 assessment (Resolution 2/03/CIR of 27 February 2003), Agcom carried out an extensive analysis of the costs considered by RIO for LLU, in order to check whether the costs imposed on interconnected carriers were consistent with those imposed by TI on its own commercial divisions, according to the criteria established by the internal-external parity principle.

The analysis showed that interconnected carriers “were charged many expenses that were not reflected in the supplies to TI’s commercial divisions”. Consequently, an obligatory reduction of considerable portion of those charges was imposed, again based on historical costs.

As far as activation costs are concerned, the resolution established that they must be within the range defined by international best practices (Resolution 2/03/CIR, considering E), while twisted pair line rental fees should be established based on the best European rate, namely the fee of €8.30 set in Denmark (Resolution 3/03/CIR, considering D, point 3).

The problem regarding which cost method is most suitable to favour competition in LLU was reviewed within the framework of the unbundling market analysis required under the new regulatory framework. Resolution 415/04/CONS dated 1 December 2004 (Annex B) analysed the issue of access and control of the relevant prices. According to this resolution, “it is neces-

sary to make it compulsory for the incumbent carrier to offer the LLU service to the copper network and to ancillary services at cost-related conditions.”

Currently, disaggregated access service costs are assessed using the fully distributed historical cost method (FDC/HCA-Fully Distributed Cost/Historical Cost Accounting).

Due to the absence of alternative infrastructures that can replace the infrastructure of the incumbent carrier, the accounting method chosen for the access network is decisive with respect to the possibility for alternative carriers to operate in such a market by developing competition but without fostering ineffective investments.

According to Agcom, before making this choice one should consider, on the one hand, that alternative carriers have no incentive to build copper access infrastructures, as they believe that access through the existing infrastructure of the incumbent carrier is the only economically sustainable choice open to them. On the other hand, it should be kept in mind that the incumbent carrier, in the absence of competitor infrastructures, has no incentive to seek to operate with greater efficiency and can, at the same time, count on a more contained base of real costs (represented by HCA/FDC historical costs) compared to the costs that would be generated by using other accounting methods.

In the case of the access network, in fact, cost assessment made by using the long run incremental cost method (LRIC) based on current costs (CCA) generally shows that the value of assets is overestimated compared to their assessment at historical costs (HCA). As has been recognised several times, including internationally, this overestimation would be required in a market where alternative infrastructures could be expected to grow, so that carriers would be provided the right *make or buy* indication. In contrast, such an overestimation could be detrimental to competition in the Italian market, which is characterised by a single access infrastructure owned by a vertically integrated incumbent carrier.

The use of different accounting methods, not based on historical costs, would therefore exclusively lead to an increase of retail market prices, without bringing any benefit in terms of competition and development of infrastructures. In such conditions, TI itself, for equality of treatment, would have to impose on its commercial divisions a higher transfer charge compared to that obtained with the HCA method, and would offload the higher costs onto the line rental fee paid by consumers.

In Agcom's view, the use of historical costs to determine the price of access services allows, on the one hand, a full recovery of the incumbent carrier's costs, with a reasonable profit margin on investments and, on the other, the development of competition to the benefit of consumers.

2.2.2.3 Shared access

With Resolution 24/01/CIR of 29 November 2001, Agcom introduced the obligation to provide shared access services in the local loop. This was a possibility that had not been contemplated during the unbundling start-up stage. In this form of direct access, two operators can jointly use the same twisted pair line, one for voice telephony services and the other for xDSL services. This means that when an unbundling contract is agreed to, the user is no longer under the obligation to utilise the same operator for voice calls and broadband services.

In several countries, the shared access price is set at half the full unbundling price. This is due to the fact that LLU price was established for the complete local loop, while line sharing implies only the use of the upper frequency spectrum, for DSL purposes, and therefore the price should be half the full price.

However, in other European countries, the price for shared access is set under 50% of the price for full unbundling, since OLOs pointed out that in any case the subscriber of voice telephony already covers all the costs.

In Italy the price of shared lines has been set at 2.8 €, i.e. 33% of that of full unbundling, but the issue was not controversial since, strangely enough, shared access has not been taken in great consideration by OLOs (but the situation is changing rapidly now).

2.3 The relation between the pricing of different services

The principle contained in Art. 82 (ex art. 86), paragraph C of the Treaty of Rome is explicitly invoked for the telecommunications sector by Directive 92/44/EC (Considering 17) on the supply of leased lines and, in considerable detail, in Art. 6, paragraph 1, letter *a*), of Directive 97/33/EC on interconnection. It requires that SMP operators comply with the "non-discrimination principle regarding the interconnection offered to others" by applying, for interconnecting entities, similar conditions to those applied for their own affiliates. These directives have been incorporated in Italian legislation in such a way that enforcement of the

principle represents one of the main elements allowing OLOs to be able to compete with the incumbent in the end-service market.

The problem of a genuinely equal treatment emerged immediately in the first years of liberalisation, in particular in June 2000, when a few weeks after the presentation of RIO 2000, TI launched “Teleconomy 24” and “Teleconomy Non-Stop” campaigns, which offered dramatic reductions to final prices and were characterised by the application of an at least partial lump sum principle.

The competitors expressed bitter opposition to the incumbent’s offer, and 26 competitors went so far as to file a complaint to Agcom about TI’s tariff policies, arguing that TI’s tariffs were anti-competitive and such as to hamper development and the maintenance of a real competition in the market. In particular, the OLOs believed that “... *TI’s behaviour seems to be characterised by a single overarching strategy whose purpose is to create a price squeeze between retail prices below cost and rather high intermediate tariffs, with the risk of triggering the complete elimination of OLOs from the scene. This development would, in turn, lead to price increases and would stifle any incentive to technological development of services*”.

In reply to this complaint, Agcom decided to start an audit process aimed at ensuring correct implementation of the internal/external equality principle. This audit was concluded with the approval of Resolution 152/02/CONS of 15 May 2002, i.e. almost two years after the introduction of Teleconomy tariffs and the new entrants’ complaint.

In spite of the huge delay, Resolution 152/02/CONS is of fundamental importance in that, when correctly enforced and supported by a systematic surveillance activity, the possibility is opened up of miming a competitive scenario where operators equipped with “similar” networks have the opportunity to enter into competition with one other, thus creating a total and extended competitive framework.

In this perspective, there is an essential part of the Resolution that describes an approach to be used in order to ensure that SMP operator offers are compatible with competitive market conditions. We refer here to the so-called “price tests”, which have to be enforced in order to assess the offer prices proposed by the SMP operator for its end-services in order to avoid the repetition of those “price squeeze” situations that originally gave rise to the investigation.

The focus on the equality principle led Agcom to establish some very significant policy orientations, in particular a general principle was consolidated, according to which each new retail

offer proposed by TI necessarily had to include a corresponding wholesale offer, so as to allow OLOs to compete under equal opportunities.

The condition for the application of this principle was the nature of the intermediate asset as an essential facility and the lack of competition in the reference market. As a consequence, in the course of 2001 and in the first few months of 2002, wholesale offers were introduced for dedicated circuits, ADSL and HDSL/SDH services. Both these offers were made on a retail minus basis.

The application of the internal/external equality principle (i.e. between the incumbent's commercial divisions and OLOs) regarding the range of services offered in a competitive context led to the consolidation, in the regulatory practice, of a sort of general rule that can be summarised as follows:

LLU cost < wholesale product cost (bitstream) < resale product cost < retail price

This general rule is consistent with the “ladder of investment” approach, where the alternative operator is encouraged to “climb the ladder” investing more and more, as its investment reduces its dependency against the dominant operator and opens up to save money also in the short-medium term.

If tariffs are not correctly set, it could be more profitable for an OLO to simply resell the incumbent's services, which is also a less risky activity, but it is not socially desirable in the medium-long term, as it does not allow for a qualitative differentiation of OLOs' offers, thus rendering them totally dependent on the incumbent's strategies.

However, a correct enforcement of this general rule is hampered by SMP operators' natural incentive to adopt anti-competitive behaviour. A strategic leveraging of tariffs is capable of triggering excessive prices, predatory prices, squeeze prices, and price discrimination that make it impossible for OLOs to replicate the incumbent offers.

2.4 Delays in LLU implementation

One of the major problems repeatedly raised in the Reports on the Implementation of the Telecommunications Regulatory Package published annually by the European Commission concerns the timing of Agcom decisions. In particular, the European Commission has complained that the completion of the investigations and inquiries to be carried out by the Authority has often been postponed and the implementation of the instruments aimed at favouring

the opening of markets has been very problematical. This constitutes a serious difficulty: every delay, in a context characterised by very fast technological renewal can be deleterious and become an advantage for the dominant operator.

To all this one should add the obstructionist tactics adopted by TI.

The newcomers and the Authority are drawn in by a so-called “three d” (hereinafter called 3D) behaviour model: denial, detail, delay (Beltel 2001). This strategy translates into the initial denial of the newcomers’ requests, which forces the Authority to intervene.

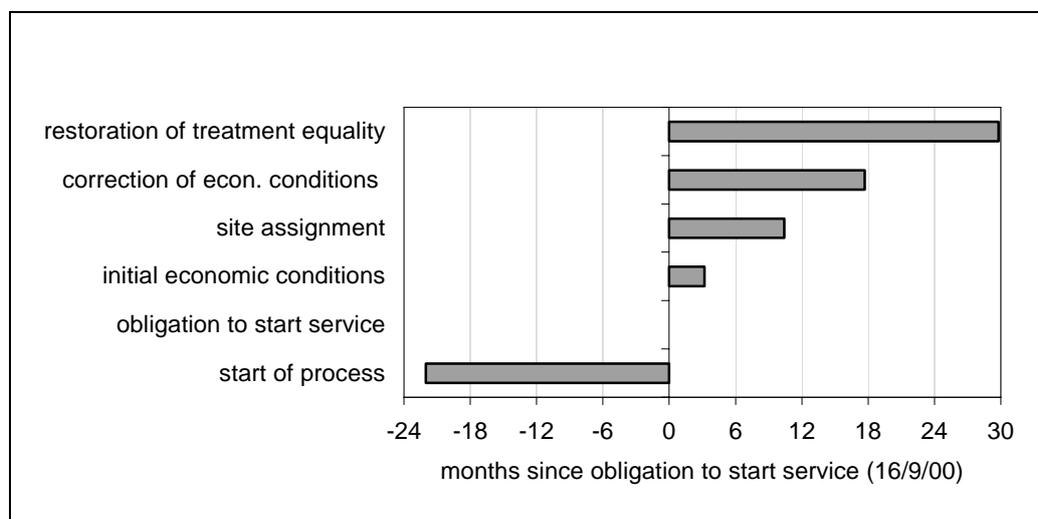
Following this is the imposition of a large number of constraints to make the liberalisation process more convoluted and, last but not least, a delaying strategy, which involves the delayed fulfilment of the obligations sanctioned by the Authority. The events relative to unbundling confirm *ad abundantiam* the existence of such a strategy, which actually reduces the scope and effectiveness of the regulatory intervention.

There are numerous examples of the delaying strategy: it has been translated into the systematic slowing down of all of the provisioning processes in which the acquiring subject is a rival operator. The case of unbundling comes to mind: the dominant operator first of all denied the possibility of introducing this service and, therefore, once the regulatory Authority expressly provided for it (and the European Commission confirmed it with an *ad hoc* regulation), the dominant operator tried to reduce its scope, highlighting all of the details of the possible technical criticalities, trying to induce the Authority to adopt a ‘light’ decision. Once this strategy, which certainly delayed the adoption of detailed regulations, had been exhausted, the ex-monopolist operator proceeded to systematically delay the implementation processes, in particular the setting up of the sites and customer activation. Following the strategy of disregard, on the other hand, TI systematically interpreted in its own favour even rules that very clearly expressed the opposite meaning, thus delaying the implementation processes and forcing the Authority to intervene several times on the same topic.

The incumbent’s strategic behaviour undoubtedly resulted in a dramatic lengthening of the times for putting the directives into effect, whereas the regulatory activity basically forces the making of decisions, which are to be adopted following strict timetables.

Figure 2-1 graphically documents the delays in LLU implementation through the adoption of the 3D strategy.

Figure 2-1
LLU implementation times



Source: Authors' calculations

2.5 The Agcom's market analysis

On 25th September 2005, Agcom notified to the European Commission the draft measures relating to the market for wholesale unbundled access (including shared access) to metallic loops and subloops, according to article 7 of the Framework Directive. This document summarised the results of the analysis of market 11 carried out under the new regulatory framework for electronic communications networks and services. The analysis developed by Agcom confirms the facility-based approach, considering it a precondition for a sustainable competition in the medium and long term (paragraph 350).

In this context, LLU represents an essential element for supporting the development of broadband services, based on infrastructure competition. This is a crucial stance of Agcom which confirms the almost exclusive role of the copper access network, due to the lack of alternative networks. Agcom states, in fact, that bitstream is not a product substitutable to local loop unbundling, as well as unbundled access to fibre optic is not part of the LLU market. Moreover, as we will see afterwards, the impact of fibre optic lines on the total access lines is residual. (EC, SG-Greffé (2005) D/205874).

At the same time, Agcom confirms the dominant position of the incumbent: TI satisfies all the criteria which are used for assessing SMP, in particular market share (100%), but also lack of potential competition and high barriers to entry, size of the undertaking, control over infra-

structure difficult to duplicate, easy or privileged access to financial resources, economies of scale and scope, vertical integration and absence or low countervailing buying power.

Therefore, Agcom, in the notification to the European Commission, proposes the imposition of appropriate regulatory remedies on Telecom Italia, improving the obligations imposed under the 1998 regulatory framework. In other words, Agcom considers that the previous remedies have not reached the expected results, and intends to reinforce them.

The remedies envisaged by Agcom are the following:

- Provision of full and shared unbundled access to the local loop and subloop, together with accessory services, such as co-location services, and provision of updated information on the availability of network resources;
- Publication of a LLU Reference Offer including also a service level agreement (“SLA”);
- Transparency;
- Non-discrimination.

The NRA considers not fully satisfied the obligation of non-discrimination, which requires that the SMP undertaking “*applies equivalent conditions in equivalent circumstances to other undertakings providing equivalent services and provides services and information to others under the same conditions and of the same quality as it provides for its own services, or those of its subsidiaries or partners*” (Art. 10, Directive 2002/19/EC – Access Directive).

This principle is also embedded in Resolution 152/02/CONS on internal/external equality of treatment, but it has not been completely fulfilled, because of the strategic behaviours adopted by the incumbent, which clearly represent a violation of the non-discrimination principle.

- Accounting separation;
- Price control (based on a network cap mechanism) and cost accounting.

As to the price control obligation, the prospective costs for the years 2006–2007 are estimated on the basis of TI’s accounts of 2004. In order to calculate the network cap to be applied to the reference offers for 2006 and 2007, the price of the reference offer for the full unbundling access service in 2005 (8.3 EUR/month) serves as the basis in order to apply a “reduction constraint”.

As to the cost accounting obligation, Agcom proposes to maintain the methodology based on Fully Distributed Costs/Historical Cost Accounting (FDC/HCA) due to the fact that the local loop is an essential infrastructure which cannot be easily duplicated. Agcom considers that the Long-Run Incremental Costs model (LRIC) based on Current Cost Accounting (CCA) would lead to an increase of retail prices due to an over estimate of network's costs.

Additionally, as far as the prices of shared access are concerned, AGCOM proposes to confirm the regulation¹⁰ currently in place on shared access service provision. AGCOM also regulates customers' migration between TI and OLOs (and *vice versa*), and between two OLOs with the view to apply the same regulation to all end users in order to avoid any likely irregularities during the migration process.

It is interesting to stress that the new Agcom's measures heavily dip into the engagements taken by Telecom Italia during the antitrust investigation A/351. Just before the closing of that investigation (October 2004) in fact, Telecom Italia proposed to adopt some measures "*in order to solve the competitive problems raised by the investigation itself*". Many of these measures (which are summarised at the pages 8–11 of the Agcom proposed Resolution) concern LLU, and have been included in the remedies envisaged by Agcom for solving the persistent discrimination problems, which have emerged in the market analysis.

With this offer, the incumbent itself has recognised the inadequacy of the existing remedies, paving the way to the new set of obligations, which should guarantee fair and equal terms to alternative operators and the consolidation of a competitive market once for all.

Despite the difficulties due to the incumbent's resistances, there is no doubt that LLU represents the main instrument for reducing TI's dominance in the access network, and therefore Agcom has followed this path. The reinforcement of the measures already imposed upon the dominant operator is clearly consistent with this approach.

Another important feature of the analysis for market 11 concerns the wholesale access fibre optic market. As we said before, fibre optic has not be considered by Agcom as part of market 11, nevertheless Agcom intends to monitor competition conditions in the wholesale access fibre optic market in order to verify if there may be a need for further intervention. However, in its notification, Agcom also provides information with regard to previous TI's obligation to

¹⁰ Decision 2/03/CIR (Article 2b, point 3) and 3/04/CIR (Article 2, par.15).

offer unbundled access to its fibre optic connections, which expired in 2005 (decision 2/00/CIR). Agcom has not *imposed, renewed or withdrawn* any remedies on fibre within the context of the analysis for market 11. But it indicates that as result of antitrust proceeding (case A/351) Telecom Italia has, inter alia, committed itself to provide unbundled fibre optic access until 2010 (EU, SG-Greffe (2005) D 205874, note 11).

The attitude of Agcom could appear rather contradictory, given its previous decision to impose a time limit to this form of unbundling, aimed at fostering the implementation of alternative infrastructures.

However, the benign neglect of Agcom can be explained, on the one side, by the voluntary nature of TI's commitment, but especially by the fact that the deployment of fibre to end-users, does not represent a real alternative to the copper. However, the Agcom's shift of opinion must be seriously taken into account.

During 2005, Agcom has also completed the analysis for markets 1 and 2 (access to the public telephone network at a fixed location for residential and non residential customers) which include measures relevant for our discussion. Among the most significant ones, we have to mention the introduction of Wholesale Line Rental (WLR). In the framework of the above mentioned analysis, Agcom has designated Telecom Italia as having SMP on such markets: moreover, it reached the conclusion that the remedies existing at wholesale level, such as LLU, were unable to curb TI's market power, therefore it decided to adopt supplementary measures, aimed at neutralising the incumbent's power.

The new remedy is the Wholesale Line Rental, i.e. the offer by the incumbent of access lines to its competitors.

According to Agcom, this measure should favour the entry into the access market of alternative operators, without compelling them to go to great investments. According to Agcom, WLR could widen the number of operators providing access, and in this way could increase the consumers' welfare.

Agcom is well aware that the WLR's introduction could cut the incentives for the incumbent to invest in the maintenance of the access infrastructure, and also those which induce OLOs to invest into LLU. However, a solution to this problem lies in a price able to balance the need to promote competition (which requires a high differential between WLR's price and that of

LLU) and at the same time able to stimulate service competition (which requires a large differential between line rental and WLR).

According to Agcom, the introduction of WLR can be considered a step forward towards LLU; in fact, the alternative operator could invest in WLR in order to create a significant customer base and then invest in LLU. Agcom considers WLR a service complementary to LLU, combining either the facility based business model and the service based one. Such a situation exists already in the UK, Denmark and Republic of Ireland, and it has been envisaged in Portugal, France, Austria, Germany and Sweden.

The introduction of WLR was a much debated issue during the public consultation, after which Agcom found a brilliant solution: WLR has been introduced only in those areas where LLU is not provided, preserving in this way the incentive both for those operators more involved in LLU (Wind, Fastweb, Albacom that control 99% of the unbundled lines) and for those mainly interested in service-based competition, like Tele2.

A rather similar problem has emerged in the framework of the analysis for market 12 (wholesale broadband access) that covers bitstream access, allowing the transmission of broadband data. As we have already pointed out, bitstream is a very poor form of LLU, since the ADSL technology and modems are provided by the incumbent and OLOs do not have control over the physical line nor are allowed to add other equipment. Also in this case the Italian NRA decided to limit Bitstream 1 (interconnection at the DSLAM) to areas where LLU is not provided, in order not to decrease the incentive of more facility-based operators¹¹.

2.6 Access bottlenecks and broadband diffusion

The central role and the weight of the TI access network is clearly shown by some simple data. In Italy, almost 25 million twisted pair lines converge in the access network toward about 10,000 local concentration loops (called Line Stages, LS). From there, traffic flows leave the access network and are directed to 626 local switching exchanges (Urban Group Stages, UGS), and then, in the case of long distance calls, toward 33 pairs of switching exchanges (Transit Group Stages, TGS). In Line Stages, the twisted pairs used with DSL tech-

¹¹ Market Analysis 12 – proceeding notified to the European Commission, art. 4, co. 2.

nology are connected to high-performance data networks, which allow for their communication with ISP networks, and therefore with the Internet.

The access network is an infrastructure difficult to duplicate and, as a consequence, a facility-based competition in access services may emerge only in very peculiar market conditions and segments. The most interesting examples are generally represented by the adaptation of cable TV networks for telephone and Internet access uses, and the new fibre-optic networks which, in densely populated and high-income metropolitan areas, offer not only access destined to business users but also a triple play offer (telephone, broadband Internet and television) addressed to the wealthier residential users.

In Italy, however, no cable TV networks exist¹², so the first and simplest chance for competing on local loop facilities is factually impossible. This explains why direct access to OLO networks through fibre-optic-cables concerns only 70.000 business users, and about 100.000 Fastweb residential clients in Milan plus a few other major cities (Genoa, Turin, Bologna, Naples, Reggio Emilia, Rome, Padua, Venice, Bari and Modena). Given the slow development of LLU, most OLO clients still use indirect access, founded on carrier selection and pre-selection.

Obviously, the problems concerning the access market risk to affect the diffusion of broadband technology. Table 2-1 presents some data periodically published by COCOM (COCOM5-34 – Broadband access in the EU) updated to July 2005.

This table shows that the BB line percentage out of the total number of NB lines available in the 25 EU countries is approximately 25% (26% in EU15). However, excellence situations exist, such as the Netherlands (70%), Belgium (42%) and Finland (41%). The data referring to Italy (21%) are below European average, below UK (27%) and France (25%) and slightly below Germany (22%).

The second interesting finding concerns the percentage of BB lines controlled by the incumbent out of the total number of lines. The European average is 52% (51% in EU15), and Italy is positioned largely above average (incumbent share 71%), together with Germany (72%),

¹² The reason for this can be identified in the television system reform law approved in 1975, which allowed cable systems to be established in user bases with less than 150,000 inhabitants, provided that the cable supported a single channel and under very strict internal production obligations. This choice put a stop to the development of cable TV.

but differing sharply from the UK and Sweden, where the incumbents respectively control 25% and 39% of the total number of BB lines, or France (44%).

Table 2-1
Broadband market in Italy (July 2005)

Country	Incumbent's PSTN activated main lines	DSL lines retailed by the incumbent	OLOs' DSL lines			Incumbent's other access lines	OLOs' other access lines ²
			full LLU	Shared Access	Bitstream ¹		
Belgium	4.317.833	880.393	3.872	1.874	227.502	0	688.525
Czech Republic	3.249.000	151.000	n.a.	n.a.	30.000	1.000	254.000
Denmark	3.310.209	519.377	55.553	52.933	86.666	135.662	330.275
Germany	36.000.000	6.000.000	1.400.000	3.941	735.000	3.683	252.600
Estonia	411.000	72.216	2.854		63	4.502	70.611
Greece	5.500.000	41.317	3.823	1.405	45.324	0	329
Spain	15.642.543	2.180.994	121.842	175.119	790.647	3.811	955.452
France	33.440.000	3.661.192	255.584	2.073.942	1.811.724	0	520.000
Ireland	1.590.000	109.328	1.903	1.424	31.721	0	26.390
Italy	25.449.000	3.854.408	496.654	80.398	743.810	55.971	285.330
Cyprus	420.000	17.994	n.a.	n.a.		951	0
Latvia	624.000	48.749	507	1	208	306	34.752
Lithuania	801.144	66.963			2.841	62	99.474
Luxembourg	241.000	40.657	1.553	59	4.779	568	5.253
Hungary	3.420.000	219.148	n.a.	1	78.088	17.020	138.300
Malta	205.000	10.283			13.516	0	17.752
Netherlands	5.200.000	1.620.005	60.811	523.251		0	1.438.248
Austria	2.875.900	349.000	81.255	75	94.900	0	412.600
Poland	8.967.000	532.284			0	0	159.318
Portugal	3.871.189	500.405	27.623	6	48.224	352.463	142.055
Slovenia	700.000	94.192			1.740	1.316	59.421
Slovakia	1.219.589	64.539			0	0	15.672
Finland	2.267.706	516.710	118.277	48.559	79.737	133.863	77.468
Sweden	5.400.000	599.000	38.441	260.106	141.200	0	494.900
UK	29.600.000	2.002.405	38.418	34.722	3.708.457	0	2.279.109
EU15	174.705.380	22.875.191	2.705.609	3.257.814	8.549.691	686.021	7.908.534
EU10	20.016.733	1.277.368	3.361	2	126.456	25.157	849.300
EU25	194.722.113	24.152.559	2.708.970	3.257.816	8.676.147	711.178	8.757.834

¹ The column "bitstream" include also resale agreements.

² "Other access lines" includes WLL, cable modem, FTTH, satellite, PLC.

Source: COCOM05-34, Broadband access in the EU, Update July '05.

Hence the central position of LLU as an essential instrument to open local access. However, so far LLU has had a rather limited development: there are 497,000 fully unbundled DSL lines (which represent a large increase compared with the previous year, but still not a large amount as a whole), while totally unbundled ones (including NBs) amount to 1,163,195, i.e. 4.6% out of the total number of lines installed in Italy. Such a value corresponds to “a drop of water in an ocean of 25 million telephone lines” controlled by the SMP operator.

If we limit our field of observation to DSL lines, TI's share reaches 74%.

2.7 Some open questions: ladder of investment or equality of access?

In the debate concerning the best ways to create a sustainable competition, it has been observed that LLU could undermine the incentives to invest and innovate, both for new entrants and for the incumbent, thus damaging the long term development of competition. If unbundling is implemented at very low prices, incentives to invest in proprietary networks will be reduced, while, on the contrary, high retail and access rates would strongly encourage the construction of proprietary infrastructures. In other words, the relation between final and intermediate rates greatly impacts the type of competition which is going to develop.

The solution to this problem has been the “*ladder of investment*” theory, described in a 2003 paper of Martin Cave and Ingo Vogelsang.

The mechanism is simple. At the beginning, the regulation should encourage the access to wholesale markets (where SMP companies exist) through fixing very low access prices for the network elements too expensive for new entrants to replicate. As soon as new entrants consolidate their market positions, regulatory Authorities should increase access prices, starting from network elements easier to duplicate.

The price increase of these network elements should induce new entrants to invest on these elements, thus to migrate to higher steps of the investment scale in infrastructure.

According to Oldale and Padilla (2004, p.71): “*The ladder of investment presupposes that the regulator will lead entrants through a clear sequence of investments. It will first identify the bottom rung—a replicable asset that it considers a suitable basis for entry. Then the regulator will encourage a cohort of new suppliers to invest in that asset and start providing services by making sure they have cheap access to all the other assets of the incumbent (including espe-*

cially those that are not-replicable) which are needed to complement the one they have invested in themselves. Once the cohort of entrants have finished building their first asset, the regulator will decide what assets they should invest in next and raise the price of access to them while keeping access to the remaining ones low. And so on.”

In this sense, the decision taken by Agcom in 2000 to allow the use of backhaul and the unbundling of the fibre optic network for only 3 years is coherent with the objective not to disincentive the diffusion of fibre optic both from the incumbent side and from new entrants’ one.

Despite the success of the ladder of investment model among the opinion leaders and the European Commission, recently some scholars have expressed many doubts about its real feasibility, concerning two important aspects.

The first one is linked to the inability of the Regulatory Authorities to manage the details of regulation, in such a way to guarantee the success of the strategy of progressive investment in infrastructure.

Regulators find it very difficult to decide the right sequence of rungs to construct the ladder and further difficulties arise because different sorts of entrants are favoured by different ladders, and it is impossible, from the regulatory point of view, to construct a number of different ladders and let entrants choose which are to use.

The second objection concerns the fact that a *service-based* competition, as it is the one linked to LLU in its less developed shapes, cannot transform a fragmented competition, much dependent on the incumbent technical choices, in a robust *facility-based* competition.

To support their considerations, Oldale and Padilla quote the results of various works of Bob Crandall of the Brookings Institution, who, analysing the US experience, reaches very negative conclusions about the possibility for new entrants to guarantee, through LLU, the product differentiation, which is the only way to make traffic profitable.

If product differentiation is not provided, the entrant will not be able to profit from the business stolen to the incumbent, because to retain its customers it must keep, time after time, the same low prices that were used to attract them, and will not be able to recover its costs.

Oldale and Padilla conclusion is that a contradiction exists between an *access-based competition* and a *facilities-based one*, which remain, de facto, alternative, since regulators are un-

likely to have the detailed knowledge that is required to micro-manage the investment ladder that could transform the service providers of today into the facilities based competitors of tomorrow. These considerations provide the theoretical justification for the current wave of deregulation which marks the regulatory action of the FCC, which has led not only to the elimination of the most popular and cost-effective form of local loop unbundling, UNE-P, but also of the obligations to offer DSL at wholesale, considering them not essential to effective competition.

Oldale and Padilla observations are relevant, but they don't help to solve the crucial issue obstructing the liberalisation processes, that is how to guarantee an infrastructure competition in the access segment, where infrastructure replicability is not economically viable, especially in those countries where cable TV and the deployment of fibre optic do not represent a real alternative to the copper access.

The answer to this problem can perhaps come from the new approach of the UK regulator, Ofcom, which, more than any other European NRAs, has strongly supported the model of a *facilities-based* competition.

The Strategic Review of Telecommunications, recently concluded by Ofcom, *de facto* assumes that it is economically impossible to overcome access bottlenecks through alternative infrastructures.

The solution to this problem has been found in a regulatory approach that requires BT to deliver “real equality of access” to its network, which has two dimensions:

- BT's own downstream operations must use the same products, processes and prices as those used by their rivals (equivalence of input);
- BT must implement substantial internal changes including an operational separation, that would ensure that those responsible for overseeing BT's bottleneck assets have real incentives to serve other operators with the same zeal, efficiency and enthusiasm as they serve the remainder of BT's downstream activities.

As far as equivalence of inputs is concerned, BT is committed to deliver equivalence of inputs for a number of legacy products, including LLU, WLR, IP Stream, WES, while for other wholesale products where BT has SMP, it shall make them sufficiently comparable to allow competition to take place. Three important products in this category are Private Partial Circuits, Carrier Pre-Selection and ATM interconnection.

BT, then, has created a new access service division, named Openreach, organised as a separate business unit with its own management structure and substantial operational independence. The equality of access implies also the existence of various conditions, which create Chinese Walls between Openreach and BT. All these commitments, then, are meaningful, enforceable and binding.

In our opinion, what has been established represents a radical shift in Ofcom's regulatory approach. The British Regulatory Authority emphasises once more its overall approach, which aims to create a regulatory framework which seeks to encourage and incentivise sustainable, scale, infrastructure competition at the deepest extent possible. However, Ofcom acknowledges that *“some assets in the network are either economically impossible or highly economically inefficient to try to replicate: the so-called enduring bottlenecks, mainly, though not exclusively, in the access part of the network”*. Therefore *“without open and truly equivalent access to such assets, sustainable infrastructure based competition would be too risky and too easily frustrated”*.

It is too early to assess the impact of these measures, which are envisaging new and innovative ways for getting over the bottlenecks which have hindered the development of competition in the local loop.

A first consequence is visible in Italy, where Agcom's measures for market 11 seem to go in the same direction.

Article 8 imposes some requirements of “administrative separation” to Telecom Italia which should guarantee a real equality of access in a more binding way. Among them, particularly relevant are the following:

- the staff involved in running the access wholesale services has to be different from the staff occupied in the commercial services;
- the commercial divisions are not allowed to know the data concerning the OLOs which use wholesale products and so on.

Article 15 authorises the backhaul services, which had to be interrupted after 3 years: this implies that Agcom recognises that there are enduring bottlenecks, which cannot be removed.

Paragraph 348 establishes to uniform the costs of the distribution network for the commercial division of TI and those of the OLOs requiring LLU, as if the access network was effectively

separated. It is not clear, however, if all specific costs for invoicing, managing and maintaining the distribution network have been uniformly distributed, or if the uniform distribution regarded only the costs for corrective maintaining, still leaving a disparity of treatment against OLOs.

Article 39 provides for more balanced conditions concerning provisioning and assurance.

These measures, together with those we mentioned before, go in the direction of putting all telcos on the same footing, and represent therefore the right step towards that real equality of access, which however is still far away.

2.8 References

Autorità per le garanzie nelle comunicazioni, Annual reports, from 1998 to 2004.

Beltel (2001), *L'oracolo di Beltel*, July.

Cambini, C., Ravazzi, P. and Valletti, T. (2000), *Regolamentazione e mercato nelle telecomunicazioni*, Carocci editore, Roma.

Cambini, C., Ravazzi, P. and Valletti, T. (2003), *Il mercato delle telecomunicazioni*, Il Mulino, Bologna.

Cave, M. and Vogelsang I. (2003) How access pricing and entry interact, in "Telecommunications Policy", 27, 717–727.

COCOM05-34 – Broadband access in the EU – Update July '05

Crandall, R.W., (2005) *Competition and Chaos. US Telecommunications since the 1996 Telecom Act*, The Brookings Institution, Washington.

De Bijl, P.W.J. and Peitz M. (2005), Local loop Unbundling in Europe: Experience, Prospects and Policy Challenges, in "Communications & Strategies", n.57, 1st quarter 2005, 33–58

ERG (2004), Common Position on the approach to appropriate remedies in the new regulatory framework, ERG (03), 30, rev.1.

Frova S., Nova A. and Pontarollo E. (2004) *Lame liberalisation. The case of Italian Fixed Telephony*, Vita e Pensiero Università, Milano

Hardt, M. (1995), The Non-Equivalence of Accounting Separation and Structural Separation as Regulatory Device, in *Telecommunications Policy*, vol. 1.

Laffont, J.J. and Tirole, J. (2000), *Competition in Telecommunications*, The MIT Press, Cambridge (Mass.).

Leporelli, C., Nastasi, A. and Reverberi, P. (2001), *L'accesso e lo sviluppo di nuove infrastrutture*, in Garrone, P. and Mariotti, S. (editors), *L'economia digitale*, Il Mulino, Bologna.

Leporelli, C. and Reverberi, P. (2003), *Infrastrutture e servizi di telecomunicazione: quali opportunità di sviluppo, oltre la crisi?*, in "L'Industria", n. 1 January–February.

Oldale A. and Padilla A. J., (2004) From state monopoly to the "investment ladder": competition policy and the NRF, in "Swedish Competition Authority", *The Pros and Cons of Antitrust in De-regulated Markets*, 51–77.

Pontarollo, E. and Oglietti, A. (editors) (2003), *Regole e regolatori nelle telecomunicazioni europee*, Il Mulino, Bologna.

Vaitilingam, R. (editor) (1998), *Europe's Network Industries: Conflicting Priorities*, CEPR & SNS, London.

3 Regulation of local loop unbundling in the Netherlands: The regulatory strategy, the many difficulties and the impact on infrastructure and services competition

Martijn Poel, TNO Information and Communication Technology, The Netherlands

3.1 Introduction and main points

3.1.1 Overview of the regulatory strategy

Infrastructure and services competition continue to be key regulatory objectives in the Netherlands. The importance of infrastructure investments and infrastructure competition is listed in the motivations of the former and new Telecommunications Law (1997 and 2004). So are services competition and the protection of customers. OPTA underlines the importance of infrastructure competition and often refers to ‘sustainable competition’. In several documents and cases OPTA addressed the balance between infrastructure and services competition. Besides, OPTA tried to develop regulatory strategies to (better) enable cable operators to increase infrastructure based competition. Cable is available in around 95% of Dutch households.¹³ However, this does not imply that OPTA has been able or willing to strongly prioritise infrastructure competition, including trade offs with services competition (at least in the short term). The old European framework and its Open Network Provision (ONP) doctrine, implemented in the 1997 Telecommunications Law, obliged OPTA to impose stringent access obligations and to facilitate services competition.

Studies commissioned by OPTA, policy notes of its Economic Analysis Team and specific decisions indicate that OPTA acknowledges that services competition can prelude or otherwise complement infrastructure competition.¹⁴ Services competition can stimulate market

¹³ This refers to OPTA initiatives that were intended to facilitate digitisation of cable networks. One of the elements was a clear split between cable network capacity and end user services, where the revenues of basic end user packages (e.g. analogue TV and radio) would cover most of the common network costs (whereas the network could be used for digital TV, internet access and telephony). The proposal was triggered by slow progress in digitisation of cable networks (especially take up by consumers) and concerns on high and non transparent end user tariffs for the basic analogue TV and radio package (Poel, 2003). Elements of the OPTA proposal are used in the 2005 market analysis and proposals by OPTA (in progress).

¹⁴ Studies include *The Relationship between Access Pricing Regulation and Infrastructure Competition* (March 2001, by Cave et al.) and *Wholesale Line Rental as a Potential Remedy on the Market for Fixed Telephony* (October 2004, by WIK, Neumann). OPTA's Economic Analysis Team published an *Economic Policy Note on Economic considerations on balancing infrastructure and services based competition* (December 2003) and a

entry and gradual roll-out of alternative infrastructures. The next section will focus on a selection of OPTA interventions that are related to infrastructure and services competition, inside and outside the area of local loop unbundling.¹⁵

3.1.2 Main features of regulatory framework

The 2004 Dutch Telecommunications Law is a sufficient albeit delayed implementation of the new EU framework (2002 framework directive, access directive, etc.). The main implication of the delayed legal implementation was that OPTA's market analysis started relatively late. OPTA is expecting to finish the analysis of markets, dominance and remedies in 2005. The existing regulations of LLU and other services are still based on the old Telecommunications Law (1997) and the European documents that were published before the new framework, e.g. the Regulation on unbundled access to the local loop (December 18th, 2000). Therefore, this section will not focus on the legal framework. Instead, it will provide an integrated summary of the main regulatory decisions related to infrastructure and services competition, mainly in local loop unbundling and – to some extent – in general.¹⁶ The main topics will be elaborated on in chapter two (regulation models), chapter three (implementation) and chapter four (performance indicators). Chapter five contains conclusions and outlook.

OPTA has opted for differentiated regulation of originating and terminating access services. Tariffs for originating access are based on Embedded Direct Costs (EDC). Terminating access tariffs are based on Bottom Up LRIC (BU-LRIC). In general, (F)LRIC models can be perceived as relatively 'tough towards the incumbent' and leading to low interconnection tariffs. The rationale is that terminating access can not be circumvented, if an entrant and its subscriber seeks to contact a subscriber of KPN (see also the debate on Mobile Terminating Access). Originating access can be circumvented by means of infrastructure investments and infrastructure competition, e.g. telephony via alternative infrastructures such as cable, mobile and fibre. Originating access charges are set at a level that is intended to preserve or increase

Regulatory Policy Note on Infrastructure and services based competition in the broadband access market (April 2004).

¹⁵ For theoretical perspectives on infrastructure and (or versus) services competition, applied to LLU, see Baranes & Bourreau (2005). De Bijl & Peitz analyse LLU regulation in Europe (2005).

¹⁶ This paper integrates and analyses a large number of OPTA decisions. Nearly all decisions are in Dutch. For detailed references, do not hesitate to contact the author. LLU regulation is one of the cases in the OPTA evaluation (2001–2004) prepared by Berenschot, Ecorys & TNO (2005). Section 1 of the full report analyses OPTA's regulation in a selection of cases, including LLU. This paper has benefited from this part of the OPTA evaluation.

the incentives to invest in alternative infrastructures. EDC builds upon the actual, current costs of the incumbent (KPN). Although the implementation by OPTA allows for specific (forward looking) corrections, the EDC model does lead to high originating tariffs, compared to other European countries (see chapter four on performance indicators).

As mentioned above, a forward looking model is used for terminating access (BU-LRIC). This forward looking model includes some historic elements, for example the actual location of KPN's local switches ('scorched node instead of scorched earth'). Up until 2005, OPTA does not use benchmarking or yardstick instruments as formal regulatory tools. Benchmarking is mainly used to identify differences between the Netherlands and other countries (in regulation and markets) that require an explanation and/or additional analysis. Ultimately, this might lead to changes in the EDC and BU-LRIC model and KPN's interconnection tariffs

The majority of new entrants have urged OPTA to no longer use the EDC model and to apply the BU-LRIC model to originating access. It is expected that BU-LRIC would result in lower originating access tariffs. This point is also made by entrants that are investing in infrastructure, and do connect (business) subscribers to their own network. As mentioned earlier, services competition can complement infrastructure competition. Infrastructure based entrants might require originating access for specific regions, services and customers, to support a broad portfolio that is offered and marketed at a national scale. In the meantime, the infrastructure based entrants can gradually and selectively roll out their infrastructure (demand led). OPTA did not yet evaluate (publicly) whether the differentiation between originating and terminating access actually stimulated investments and competition at the level of infrastructures (and services).

The main feature of the EDC model, to start from the current costs of KPN, has implications for the regulatory process. To some extent, the cost structure of KPN contains confidential elements. Furthermore, the cost structure, strategic decisions and forecasts of KPN are the starting point for the regulatory process. Entrants have heavily criticised the transparency of the process to develop, update and apply the EDC model ('black box'). It is stated that the burden of proof lies on entrants, whilst they are the stakeholders with little information (compared to KPN and OPTA). This has been a central element in a December 2004 decision by the administrative Court of Rotterdam. This decision concerns several (combined) appeal procedures (see below). The court noted that OPTA recognised the disadvantages of the EDC model and process, and announced (in 1999) to switch to an LRIC approach such as BU-

LRIC. However, following a consultation procedure, OPTA did continue to use the EDC approach. The court concludes that OPTA should have motivated more thoroughly (in post 1999 decisions) why the EDC approach was continued. The court urges OPTA to improve the motivation in the relevant decisions. In the next chapter (section 2.1.1), we will address some of the issues related to the application of the EDC model.

The EDC model is also used for local loop unbundling, one type of special access (rather than originating access). OPTA uses the EDC model to set cost oriented, non-discriminatory and transparent tariffs for unbundled local loops (full unbundling and shared access). OPTA has followed this regulatory strategy, explicated in the March 1999 guidelines on local loop unbundling (*richtsnoeren*, revised into the 2002 policy guidelines, *beleidsregels*). The specific application of the EDC model on LLU will be addressed in section 2.1.1. The analysis includes a description of OPTA's strategy to increase LLU tariffs in a time frame of five years, to stimulate investments in alternative infrastructures.

The EDC model is also used to determine the tariffs for collocation facilities: one time installation/delivery of collocation facilities *and* annual rental fees. Collocation tariffs have been heavily debated. This will be commented on in the next chapter.

An interesting case in the context of infrastructure and services competition is bitstream access. OPTA made a formal decision to regulate the tariffs and other conditions of bitstream access (May 2003). Although this case was mainly related to non-discrimination (the ability of entrants to compete with KPN in wholesale DSL markets) the decision is linked to incentives to invest in infrastructure. Why regulate bitstream access if the underlying access services (line sharing and full unbundling) are regulated, and if KPN's facilities to provide bitstream access are new investments rather than existing, historical network elements? To what extent does bitstream access increase or decrease incentives for entrants to invest in line sharing, full unbundling and deployment of alternative infrastructures? Following appeal by KPN, the Court of Rotterdam reversed OPTA's decision (December 2003). The administrative court focused on formal legal issues (especially OPTA's legal powers) rather than the economic motivation of the decision. The case is on appeal with the Trade and Industry Appeals Tribunal (CBB). The case may be withdrawn because OPTA has recently proposed to no longer try to regulate bitstream access (see chapter five, conclusion and outlook).

Another relevant case is OPTA's decision to no longer regulate the tariffs of KPN's transit services (in 2000 and subsequent years). Transit services are interconnection services that are

located at the national network layer (backbone). Transit services provided by KPN are mainly used by entrants to connect their own network, via KPN, to the network of another entrant. OPTA concluded that transit services constitute a competitive market, with several infrastructure based competitors of KPN. OPTA stated that regulation would decrease the incentives to invest in alternative infrastructure, including direct interconnection between entrants (not via KPN). This decision has been criticised by several operators. This included operators with limited infrastructure but also operators with extensive infrastructure. These operators stressed the lack of alternative infrastructures in specific regions, in the short term and maybe even in the long term. OPTA did not adapt its decision.

Service provider Tele2 and several operators took the issue to the Court of Rotterdam. The transit service issue was part of a package of nineteen (!) appeal procedures, initiated by six entrants (see above). The package covered the period 2002–2004 and included issues related to the elements and application of the EDC model and the BU-LRIC model. December 2004, the court took a decision. With respect to transit services, the court decided that OPTA must revise its decision. To some extent, the court agrees with OPTA. Although transit services fall under the definition of interconnection services, OPTA has regulatory freedom to decide on the proportionate type of (tariff) regulation. Light regulation is an option. However, based on the 1999 Telecommunications Law, OPTA is obliged to make a formal judgement on all interconnection services that are proposed by KPN, and that build on network elements in the cost calculation models. OPTA did not provide a formal judgement on transit services, and did not integrate transit services in its cost calculation model (EDC) and its overall judgement of KPN's interconnection services.

The bitstream access case and the transit case are mentioned by OPTA's Economic Analysis Team in its Economic Policy Note on infrastructure and services competition (Economic Policy Note No.1, December 2003). The Economic Analysis Team was set up in 2003 to stimulate economic reasoning and discussions on key regulatory issues. The notes are intended to stimulate discussion. The first note states:

“In its individual decisions, the regulator in the Netherlands has taken the issue of infrastructure and service competition into account. These considerations must, however, be made systematically and consistently.” (p.17)

Two examples are mentioned:

“It must be clear why for example transit does not require regulation because the national network layer is sufficiently competitive, while the incumbent is forced to provide ‘national origination’. Or, how local loop unbundling, bitstream access and line sharing are related and what the different investment incentives are.” (p.17)

The Economic Analysis Team suggests a number of criteria to develop such an analytical approach. In a 2004 Regulatory note, the EAT applies the approach to LLU and broadband in general. Several insights will be used throughout this case study.

As mentioned above, the next chapter will focus on the regulation of local loop unbundling, including the application of the EDC model (to set tariffs), unbundling and collocation obligations and tariffs, and issues related to infrastructure and services competition. Subsequently, chapter three will address the implementation of LLU regulations, impediments and litigation. Chapter four will focus on the performance indicators in LLU, DSL and broadband. In chapter five, conclusion and outlook, the performance indicators will be linked to the regulatory interventions that are described in chapters one to three.

3.2 Regulation of access to the local loop

3.2.1 The EDC model and its application to LLU

OPTA has opted for differentiated regulation of originating and terminating access services. Tariffs for originating access are based on Embedded Direct Costs (EDC), rather than a forward looking model, mainly to stimulate investments in alternative infrastructures (see above). EDC is based on the current costs of the incumbent (KPN).

April 2001, OPTA published guidelines (*richtsnoeren*) on the regulation of tariffs for interconnection and special access services. The guidelines were triggered by mixed experiences in previous years (with EDC and BU-LRIC) and were based on a formal market consultation. As mentioned in section 2.1, OPTA did reconsider the EDC approach. Disadvantages of the EDC approach include the regulatory process (‘black box’) and the fluctuation of tariffs – year by year – because of changes in KPN’s traffic volumes, forecasts and costs. New entrants stressed that interconnection tariffs that are difficult to predict do not stimulate investments in infrastructure. The guidelines present OPTA’s decision to stick to the EDC model and to not (yet) introduce multi-annual tariff regulation (e.g. four year time frames, in line

with four year time frames for retail price caps). OPTA did explore but did not introduce a multi-annual system for regulation of interconnection tariffs.

The EDC model includes a reasonable profit margin for KPN (Return on Assets), based on the WACC methodology (Weighted Average Cost of Capital). The demarcation between peak and off-peak hours (and tariffs) for interconnection services should be consistent with KPN's retail services, mainly to prevent a price squeeze. The EDC model differentiates between set-up and conveyance costs (and tariffs).

The specific implementation and changes of the EDC model are debated in annual tariff discussions, organised by OPTA. The 2003 discussions have been relatively problematic. July 2003, OPTA decided to *not approve* KPN's annual proposal on interconnection tariffs, based on EDC (and BU-LRIC). The issues included:

- Tariffs for LLU (including collocation),
- Calculation of WACC,
- Costs and tariffs for local interconnection (demand was less than expected),
- Carrier Preselection (KPN's Voice Response System and other procedures to process registration of CPS customers),
- Number portability (KPN's costs such as personnel to process requests).
- To summarise the issues related to LLU tariffs, besides collocation:
- OPTA concluded that KPN had proposed a too conservative/low prognosis of the number of unbundled lines (mid 2003–mid 2004 period), that would lead to a too high tariff per line.
- LLU project costs (e.g. automatisisation of ordering and delivery procedures) and the proposed allocation of project costs to specific LLU services (e.g. one time installation/delivery and monthly rental fee).
- Reasonable profit margin, based on WACC (e.g. whether and how to include a profit margin on labour costs).
- Tariffs for one time installation/delivery (e.g. number of FTEs and other costs related to installation/delivery of unbundled local loops).

- Tariffs for monthly rental fee for fully unbundled lines and line sharing (e.g. the impact of the above issues and the allocation of joint and common costs in KPN's network and the organisation unit that provides interconnection services (carrier services)).
- Whether or not to include KPN's costs related to spectral management.

The balance between infrastructure and services competition appears to play a small role in the above discussions on LLU tariffs. Rather, OPTA tried to rightfully implement the EDC model to LLU services. Based on the Regulation on unbundled access to the local loop (December 18th, 2000), OPTA obliged KPN to change its reference offer. The same is true for collocation. Issues are highly operational and technical (e.g. cost breakdown of configurations, footprints, cabling and electricity).

KPN and other operators appealed to OPTA. OPTA did not change its EDC decisions. KPN and other operators took the matter to the administrative Court of Rotterdam. The 2003 EDC issues are part of a larger package of appeal procedures (see above). Before 2003, the updates and application of the EDC model have also provoked appeal procedures. However, 2003 is perceived as a relatively problematic year. This has been one of the reasons for OPTA to choose a different approach in 2004 (tariffs mid 2004–mid 2005). OPTA did not start the annual and extensive consultation process to update the EDC model (and the BU-LRIC model). Instead, OPTA started bilateral discussions with KPN, complemented by discussions with other operators. OPTA decided on some adaptations of the 2004 decisions (and the tariffs for mid 2003–mid 2004). The so called interim tariffs for mid 2004–mid 2005 are intended to efficiently bridge the gap between existing regulation and the (delayed) implementation of the new Telecommunications Law (market analysis, etc.).

June 2004, OPTA published tariffs for mid 2004–mid 2005 (VAT excluded):

- *Full unbundling*
 - Installation/delivery: 28,81 € (same tariff for discontinuation)
 - Monthly rental fee: 9,59 €
- *Line sharing*
 - Installation/delivery: 37,44 € (same tariff for discontinuation)
 - Monthly rental fee: 1,91 €

- *Installation/delivery of new access lines*
 - Without welding: 60,22 €
 - With welding: 235,41 €

3.2.2 Unbundling obligations

KPN is obliged to provide full unbundling and line sharing. This is complemented by obligations to install new access lines (with and without welding), cancellation (before the operational/physical activities have started) and removal/discontinuation of unbundled lines. KPN is also obliged to offer sub loop unbundling. However, year end 2004, there has been no formal demand for this type of unbundling. OPTA allows KPN to describe its sub loop offer at a general level, until one DSL operator demands sub loop unbundling. This might happen in 2005, for example to use sub loop unbundling to provide high bandwidth (V)DSL services.

To comment on line sharing: KPN is obliged to provide line sharing that includes the option in which KPN operates the splitter. This implies regulated access to a new facility of KPN (the splitter). This decision appears to stimulate competition that is closer to services competition than infrastructure, facilities based competition. OPTA did address this issue. OPTA took into account efficiency considerations related to the use of KPN's splitter (rather than three or four splitters) and the use of scarce and expensive collocation facilities that would be increased if each DSL operators had to install its own splitter.

To comment on new access lines: KPN is obliged to install new access lines, that are not used (yet / any more) but that have been deployed ('lying in the ground'). The obligation does not cover the deployment and installation of entirely new access lines (e.g. digging). This distinction is related to the incentives for infrastructure and services competition, as has been noted by OPTA's Economic Analysis Team (Regulatory Policy Note, No.2).

As mentioned in chapter one, OPTA made a formal decision to regulate the tariffs and other conditions of bitstream access (May 2003). Following appeal by KPN, the Court of Rotterdam reversed OPTA's decision (December 2003). The case is on appeal with the Trade and Industry Appeals Tribunal (CBB). In the meantime, KPN does provide bitstream access (at regional level) to some DSL operators. The service is not regulated, but KPN did take into account OPTA's tariff analysis.

3.2.3 Regulatory provisions with specific dynamic aspects

An interesting element in the context of infrastructure and services competition, is that OPTA intended to increase the tariffs for full unbundling in a time frame of five years, to migrate from historic costs to current costs (EDC). This should have implied a step by step increase of tariffs for fully unbundled lines that is a migration from very stringent to less stringent regulation. With LLU, historic costs can be lower than current costs due to (very) old local loops and inflation. The migration allowed KPN to – step by step – incorporate the costs and tariffs for its local loop into the overall EDC model (current costs). The migration should have influenced the incentives for infrastructure competition. LLU tariffs that increase – year by year – might facilitate entry in the crucial introduction phase of LLU and DSL, and maintain incentives to invest in alternative infrastructures. This approach has been announced in OPTA's 1999 guidelines on LLU. The guidelines addressed full unbundling; line sharing was not yet addressed. OPTA stated that following the five year period, tariff regulation for LLU was likely to end (sunset clause) and replaced by price squeeze monitoring. The latter implies, among other things, that LLU tariffs may not be higher than retail PSTN subscriptions.

Due to delayed and troublesome implementation of LLU, P-0 (period/year 0) has been 2000 instead of 1999. Furthermore, actual LLU tariffs (2000–2004) indicate that the five year schedule is influenced by other developments that are relevant for KPN's LLU tariffs. The tariffs for fully unbundled local loops did hardly change; the tariffs for line sharing have fallen. It is difficult to comment on OPTA's original decisions and the actual LLU tariffs. On the one hand, the five year time frame for local loops appeared to be (far) too optimistic to accommodate any serious erosion of such a persistent bottleneck in upcoming broadband markets. On the other hand, less stringent regulation of LLU tariffs *might* have reoriented investments towards alternative infrastructures that can be operated independently of the incumbent. This is highly uncertain because actual market dynamics, at least in the Netherlands, indicate that operators that provide DSL connections *also* invest in alternative infrastructures. The two approaches are combined to develop a portfolio of access technologies and retail services, with national coverage.

In its note on broadband and LLU, OPTA's Economic Analysis Team proposes a realistic market analysis and a prudent and integrated regulatory approach. The EAT differentiates between the types of unbundling and proposes a relatively strict and stable regulation, at least for *full* unbundling:

“There do not appear to be any short-term alternatives available for full unbundling. Tariffs will therefore need to be set on a strict cost-oriented basis. Given the far-reaching roll-out and investments on the part of a new entrant, the rates will need to be relatively lower (compared with other types of access requiring less investment). (...) In view of the rather slow development of local loops in the past and the technological uncertainty of future alternatives, dynamic regulation appears to be too risky for the moment.” (Regulatory Policy Note No.2, pp. 17/18).

OPTA’s Economic Analysis Team proposes an integrated regulatory strategy (including cost accounting) for full unbundling, line sharing and bitstream access. To summarise four elements:

- If full unbundling is a substitute for line sharing, the regulation of line sharing might be less strict or abandoned,
- If bitstream access via full unbundling is a substitute for bitstream access via line sharing, the regulation of bitstream access via line sharing might be less strict or abandoned,
- The regulation of full unbundling remains proportionate as long as no real alternatives are available (cable and other alternative infrastructures),
- Cost accounting for full unbundling and line sharing (local level) should be strict, with a low mark-up; cost accounting for bitstream access (regional level) should include a mark up on (forward looking) costs.

Other than the five year schedule, OPTA did not introduce dynamic elements in LLU regulation. OPTA did not introduce (or allow) dynamic or flexible approaches such as LLU tariffs that are dependent on the size or infrastructure investments of the access seeker.

3.2.4 Obligations with respect to the provision of collocation spaces

KPN is obliged to provide a broad portfolio of collocation services. This includes a mini, half and full configuration, with each DSL operator in a separate part/room of the local switch building (‘caged collocation’). One time installation/delivery tariffs are 16.990, 28.836 and 34.516 €, respectively (VAT excluded). KPN also provides footprints in parts/rooms of the building that are shared by several DSL operators (‘co-mingling’). KPN also provides adjacent collocation. Furthermore, KPN provides related services such as tie cables (200, 400, 600 pairs), SIP cabinets (Service Interface Point) and electricity.

The annual rental fees for collocation services are among the issues in the appeal procedures on the EDC model and its application to mid 2003–mid 2004 tariffs. In 2004, tariffs are based on an October 2002 decision by OPTA (dispute between KPN and BaByXL). Annual tariffs for collocation services are, VAT excluded:

- Full configuration: 2.315,35 €
- Half configuration: 2.084,33 €
- Adjacent collocation: 1.737,80 €

The outcome of the appeal procedure might effect the annual rental fees for collocation, although the implementation of the new framework might probably be more relevant. Collocation is part of OPTA's 2004/2005 analysis of relevant markets, dominance and remedies.

3.3 Wholesale and resale obligations and the respective tariffs

KPN's wholesale offer to ISP's is not regulated. This wholesale service, launched as Mxstream ('powered by KPN') has been successful during the introduction phase of DSL. KPN provides its wholesale service to KPN ISPs and third party ISPs. Subscribers receive a contract and bill from KPN and from the ISP. This is called the agent model, with many similarities to the resale model. With increased roll out of three main competing DSL operators, competition for these ISP deals has increased.

3.3.1 Regulations with respect to consumer prices

3.3.1.1 The model used

Consumer prices for DSL services are not regulated. At retail level, KPN ISPs such as Planet Internet compete with other DSL ISPs such as Tiscali, cable ISPs such as Chello (UPC) and cable and DSL ISPs such as Wanadoo. The market structure is commented on in chapter four on performance indicators.

To summarise the overall framework for retail regulation: OPTA uses a price cap to regulate basic fixed telephony services (local, regional/national and fixed to mobile) and PSTN and ISDN subscriptions. For the mid 2002–mid 2006 period, the efficiency factor (X) is set at 0. KPN is allowed to increase prices with inflation. However, the price cap is losing its relevance, even for PSTN and ISDN subscriptions, due to fixed-mobile substitution, and the growing importance of DSL, Voice over DSL and VoIP (via cable and broadband).

The price floor is becoming more important. OPTA did not set a price floor but (ex ante) evaluates KPN's pricing proposals by analysing the relevant network elements and other costs. OPTA uses a similar framework to (ex ante) evaluate discounts that KPN intends to provide to specific types of customers, for specific services and/or time frames (*kortingenkader*). OPTA is to determine whether the proposed pricing proposals and discounts are consistent with KPN's obligation to set cost orientated prices (for specific services) and to prevent predatory pricing. Following a consultation in 2002/2003, OPTA decided to not change the above frameworks and procedures. OPTA will reconsider in the context of the (current) analysis of markets, dominance and remedies.

Furthermore, OPTA uses a price squeeze check to address the margin and interplay between wholesale tariffs and retail prices (see below).

3.3.1.2 The relation between regulated consumer prices and wholesale tariffs

In seeking an integrated approach, OPTA does address the interplay between regulation at the wholesale and retail level, and seeks to focus on the wholesale level. In 2000, OPTA and the competition authority have published an analytical tool to prevent a price squeeze in telephony and other markets (price squeeze check). This tool mainly served to allow or 'protect' services competition, e.g. competition from CPS operators and ISPs that use KPN's network. The interplay between wholesale and retail level was a central issue in 2002 discussions with KPN (and other operators). The discussion resulted in a July 2002 decision to relax retail regulation (price cap) and to insist on KPN's collaboration to quickly implement several obligations at wholesale level (to tackle some bottlenecks). One of the obligations is to develop and provide local interconnection services. Since this type of interconnection services was expected to be relevant for entrants with relatively extensive infrastructures, the July 2002 package was intended to support both infrastructure and services competition. To date, local interconnection for voice services is used to a limited extent.

OPTA supports the approach of the new EU framework (and the Dutch Telecommunications Law) that stimulates regulation of wholesale rather than retail level, whenever feasible. In 2003 and 2004, the flexibility for KPN to reduce retail tariffs was heavily debated (general tariffs for existing voice services and new VoIP services, and discounts for specific customers). OPTA sticks to the existing regulations and tariffs, based on the price squeeze check, cost orientation for telephony services and the guideline to assess (KPN) discounts. This will

be reconsidered as part of the current analyses of markets, dominance and remedies. It is expected that because of increased competition in retail markets, OPTA will focus (even stronger) on regulation of KPN's retail price floor and wholesale tariffs.

3.4 Implementation of regulation

3.4.1 Impediments of implementation: delays and deficiencies

The introduction of LLU in 1999/2000 has been delayed and troublesome. In the preceding sections, we have addressed the five year time frame to increase tariffs for full unbundling, that started in 2000 instead of 1999. Poor ordering and delivery procedures were among the main obstacles in the roll out of LLU and DSL. Uncertainty on scarcity of collocation services (physical limitations) and uncertainty on tariffs for collocation services did also frustrate new entrants. A large number of issues had to be resolved in disputes between KPN and DSL operators. The European Regulation on unbundled access to the local loop (December 18th, 2000) enabled OPTA to act on those issues and to oblige KPN to adapt its Reference offer.

3.4.2 Litigation: appeal cases to regulator and court

The number of LLU cases is very high, compared to other interconnection and special access services (Fixed and Mobile Terminating Access have a high ranking as well). The total number of LLU decisions by OPTA, following a dispute or appeal procedure, lies above 30. This number includes decisions on the specific cost calculation and tariffs for collocation. This number does not include OPTA's guidelines on LLU (and collocation) and OPTA's (dis)approval of KPN's Reference offer for LLU (several years with several versions). Besides, LLU tariffs have been among the issues in general cases related to the EDC model (and BU-LRIC model).

The preceding chapters have addressed the LLU decisions that are directly linked to the regulatory strategy on infrastructure and services competition (EDC model, bitstream access, dynamic tariffs, etc.). The majority of LLU cases are not directly linked to the balance between infrastructure and services competition. Rather, the cases have focused on operational, technical and implementation issues. To summarise the main issues in LLU cases.

- Collocation (tariffs, features, potential scarcity, walk through procedures),
- Bitstream access (e.g. refusal of KPN to provide regulated bitstream access; non discrimination between KPN ISPs and DSL operators),
- Line sharing (e.g. splitter),
- New access lines (e.g. scope of KPN's obligations),
- Spectral management (e.g. costs and possibility to recoup via LLU tariffs),
- LLU tariffs (e.g. non discrimination between DSL operators),
- Access to information systems (e.g. non discrimination between KPN ISPs and others),
- Tariffs for tie cables,
- Switching/migration of end users from DSL operator A to DSL operator B (e.g. time frame between disconnection and new DSL connection).

Following the original decisions of OPTA and appeal procedures at OPTA, a large number of OPTA's decisions is brought to the Administrative Court of Rotterdam. One example is the package of nineteen appeal procedures related to the EDC model (and BU-LRIC) and interconnection tariffs in general. Specific LLU court cases addressed collocation (above 10 cases), bitstream access, tie cables (tariffs) and non discriminatory access to information systems (KPN was fined).

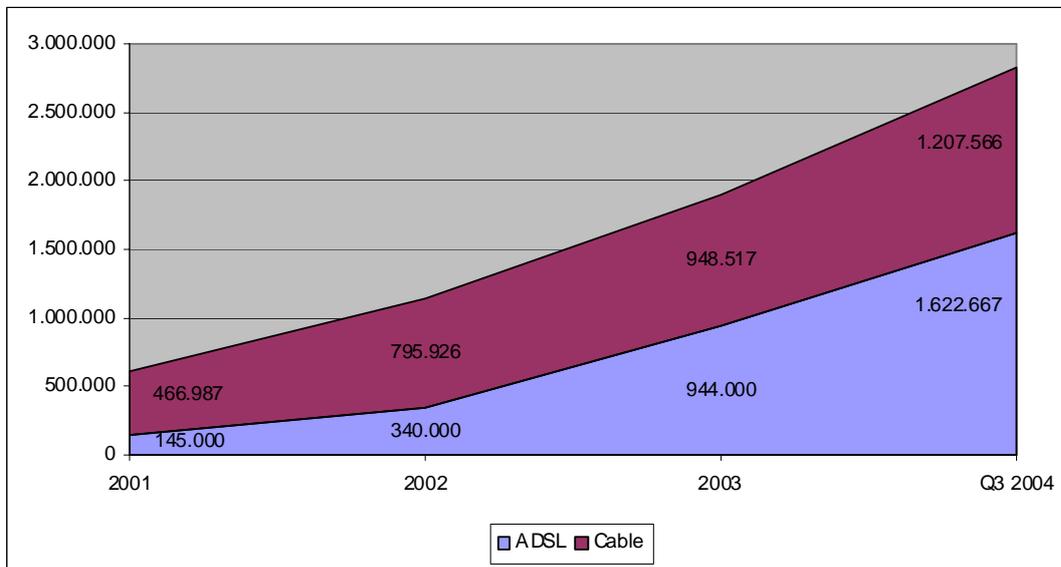
3.5 Performance indicators¹⁷

3.5.1 Diffusion of broadband technology

Broadband penetration in the Netherlands continues to be at a relatively high level. See for example the European Commission's Tenth Report on the Regulatory Package (EC 2005). This position is partly based on a combination of cable internet access and DSL. Other infrastructures such as fibre and wireless play a much smaller role. Year end 2003, DSL overtook cable (Figure 3-1).

¹⁷ TNO colleague Silvain de Munck provided valuable support to this chapter.

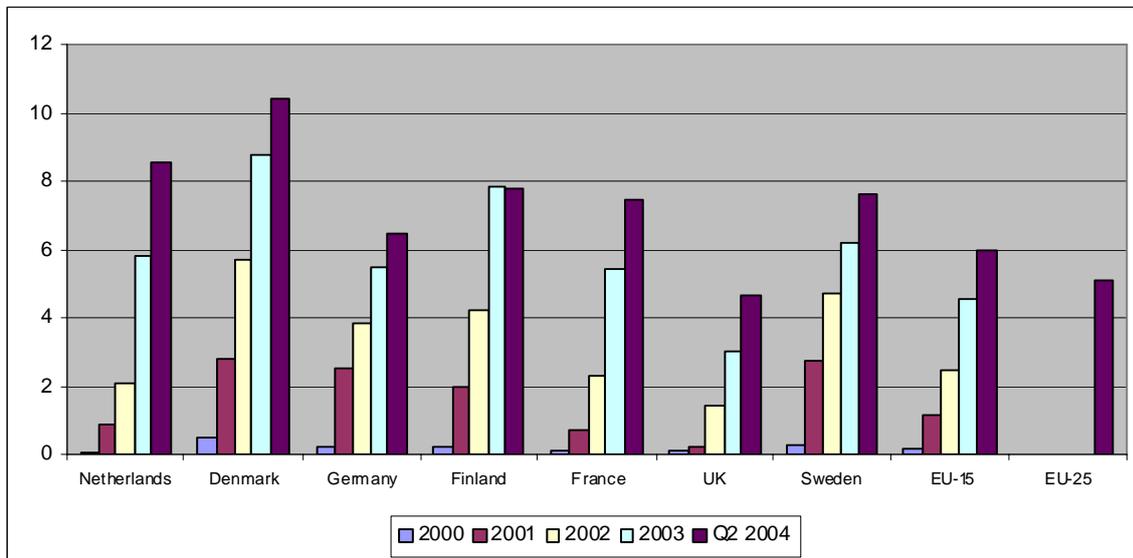
Figure 3-1
 Development of broadband internet in the Netherlands, 2001 – Q3 2004



Source: TNO Information and Communication Technology

The number of ADSL connections in the Netherlands is relatively high (Figure 3-2).

Figure 3-2
 DSL lines per 100 inhabitants, 2000 – Q2 2004



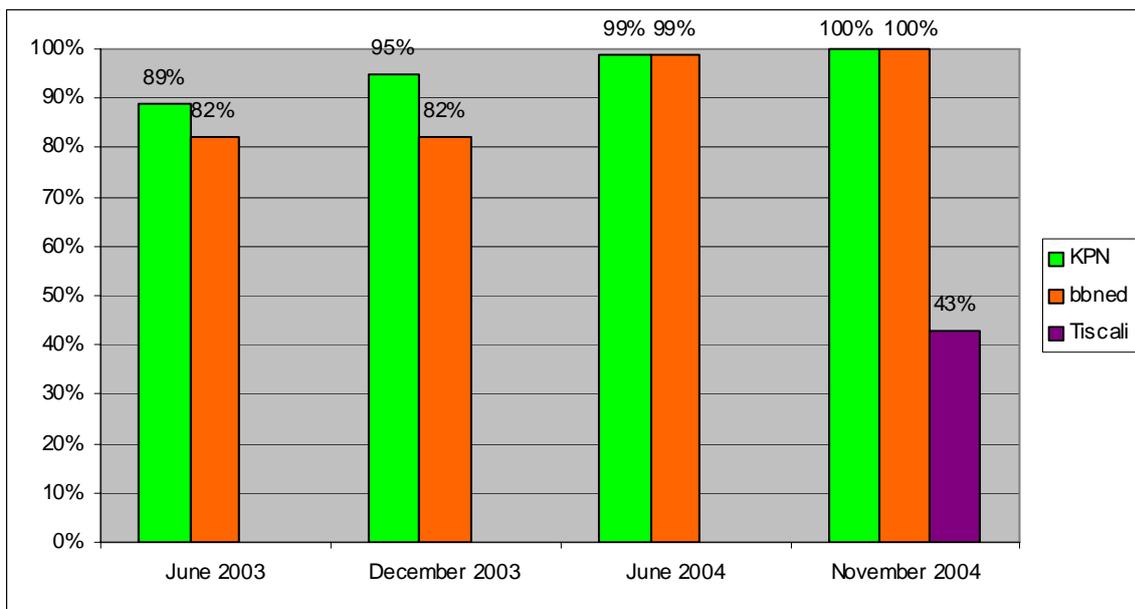
Source: TNO Information and Communication Technology / European Commission (2005)

To comment on the impact of OPTA’s regulation of LLU, one should stress the role of cable internet access. Cable has been leading for several years (e.g. Chello / UPC). This could have provided KPN and other DSL operators with incentives to aggressively roll out DSL, invest in marketing, decide on low pricing levels and attractive offers for new users.

One can also point at the acceleration of ADSL in 2001. Following the Regulation on unbundled access to the local loop (December 18th, 2000), OPTA had stronger legal powers to regulate LLU and enable ADSL activities by DSL operators others than KPN. This had an impact on the quality and tariffs of LLU services. Ordering and delivery procedures have been improved. LLL tariffs decreased (see below).

Competition has stimulated the availability/coverage (Figure 3-3). KPN has rolled out to all local exchanges and main distribution frames (100% coverage). This implies that only one or two percent of households can not be connected due to the length of access lines and other technical limitations. Coverage of a third DSL operator (Versatel) is in between the coverage of bbned and Tiscali. A fourth DSL operator, Wanadoo, is also increasing its DSL coverage, in addition to its cable coverage. The figures include coverage via bitstream access. Bitstream access is not regulated, but KPN has commercially negotiated a bitstream access contract with bbned and other DSL operators.

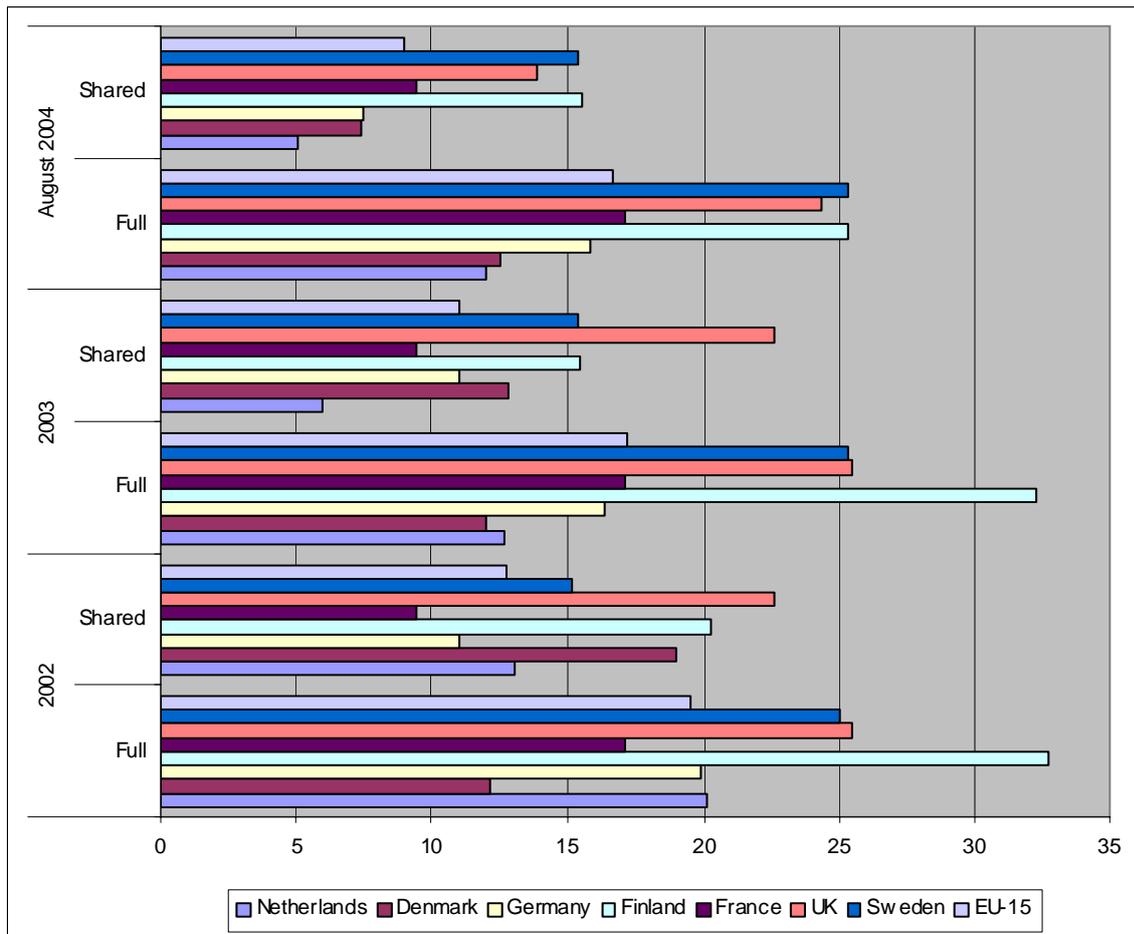
Figure 3-3
DSL availability in the Netherlands (% lines per operator), June 2003–November 2004



Source: TNO Information and Communication Technology

The introduction, coverage and pricing of ADSL services urged cable ISPs to reduce prices and/or increase bandwidth. This has stimulated the penetration of broadband. The competition between cable and DSL has benefited from relatively low LLU tariffs in the Netherlands (Figure 3-4).

Figure 3-4
ULL-average monthly tariffs, 2002–2003



Source: European Commission (2005)

From 2003, tariffs for full unbundling are below EU average. Tariffs for line sharing are well below EU average. Line This might have tipped the balance for some DSL operators to focus on line sharing and internet access, and to not build on full unbundling to enter telephony markets. We will touch upon this point later.

The low tariffs for LLU in the Netherlands are partly due to the (low) historic cost accounting approach and the priority that OPTA attached to LLU regulation. The direct and full applica-

tion of the EDC model would probably have led to higher LLU tariffs (as it did with respect to originating access tariffs).

3.5.2 Quality of access

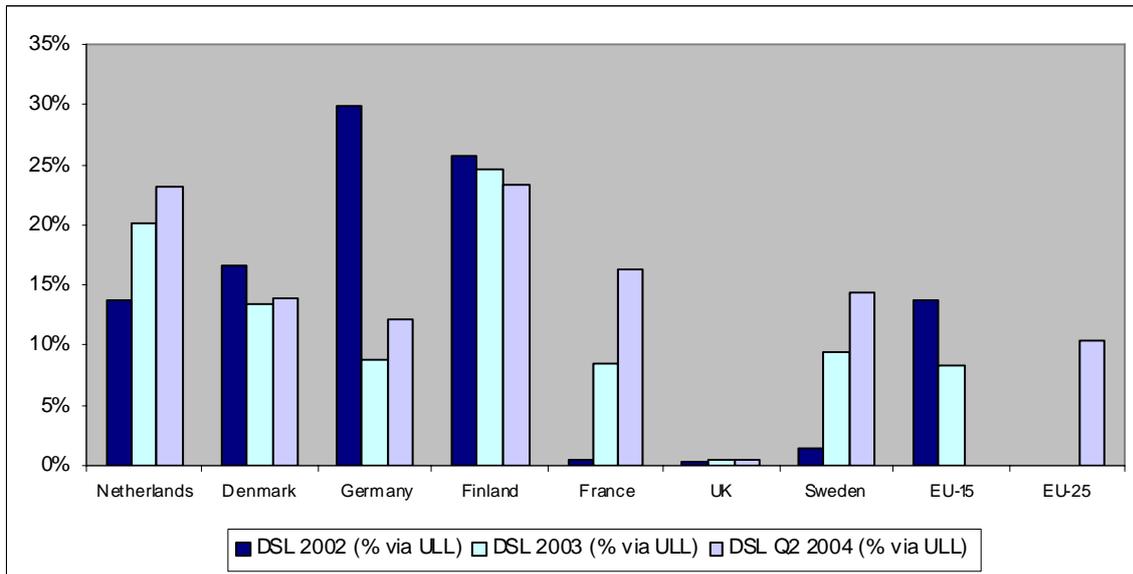
At retail level, bandwidth and other quality parameters appear to not be problematic. Waiting lists only emerged in the period with limited roll out, e.g. areas and local switches that had not yet been provided with DSLAMs and DSL offers.

The available bandwidth appears to be sufficient, at least for residential customers, at least for the moment. KPN figures support a general indication that the majority of (residential) customers appears to be satisfied with around 1 Mb/s. Q3 2004, 74% of KPN's DSL connections is at or below 1,120 Kbit/s downstream (KPN Facts & Figures, Q3 2004). KPN does provide higher bandwidth options. The majority of customers prefer less bandwidth and a lower price. Apparently, existing access services are able to facilitate existing and emerging online services (communication, peer-to-peer content, entertainment and information services, gaming, teleworking, etc.).

3.5.3 Division of market between incumbent and new entrants

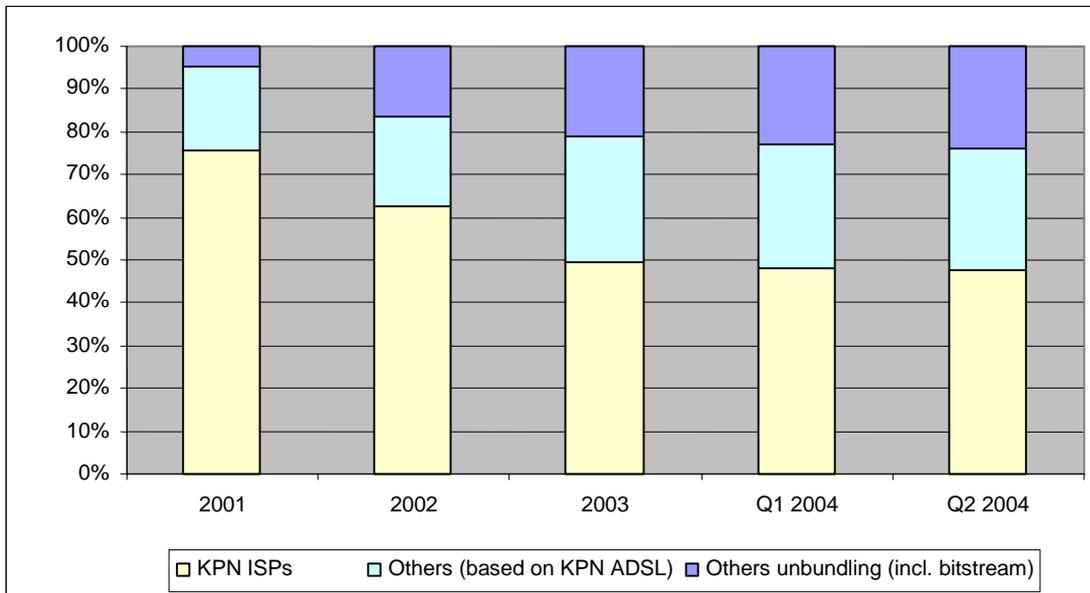
This section will focus on LLU and DSL market structures. Compared to other European countries, a relatively large part of Dutch DSL connections is based on LLU (instead of full vertical integration by KPN or KPN's wholesale/resale model). Figure 3-5 provides an indication that OPTA has been more successful (or less poor) than other NRAs, in facilitating LLU. Close to 25% of DSL connections are based on local loop unbundling. Figure 3-6 differentiates between the DSL connections that are provided by KPN, for its own ISPs, and for third party ISPs. In discussing the impact of regulation, we can mention that regulation is one of many factors that influence DSL dynamics. Just to mention the structure of the incumbent's network, strategies of incumbents and entrants, and general characteristics of the country (geography, population density, economic structure, etc.).

Figure 3-5
% DSL lines via ULL, 2002 – Q2 2004



Source: TNO Information and Communication Technology based on European Commission (2005) and ECTA.

Figure 3-6
Supply of DSL lines in the Netherlands (network level), 2001 – Q2 2004



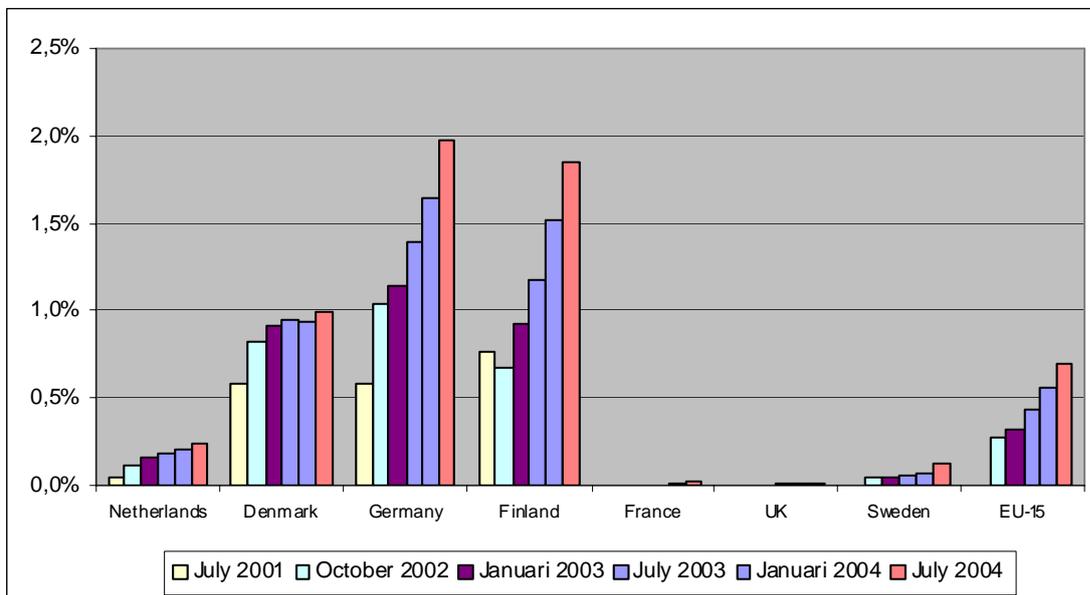
Source: TNO Information and Communication Technology

Figure 3-6 indicates that the first mover advantages of KPN (scale, knowledge, etc.) are difficult to compensate in the years that have followed. Conclusions based on these data need to

be preliminary. Especially if the data is used to analyse the impact of OPTA’s regulation. For example, DSL operators might have significantly increased their position in business markets, via line sharing that has become cheaper in 2003. DSL operators might have slightly increased their position in residential markets, via bitstream access that was introduced in 2002. These developments would add up to the general data that is presented in Figure 3-6. Overall, the position of entrants has slightly improved.

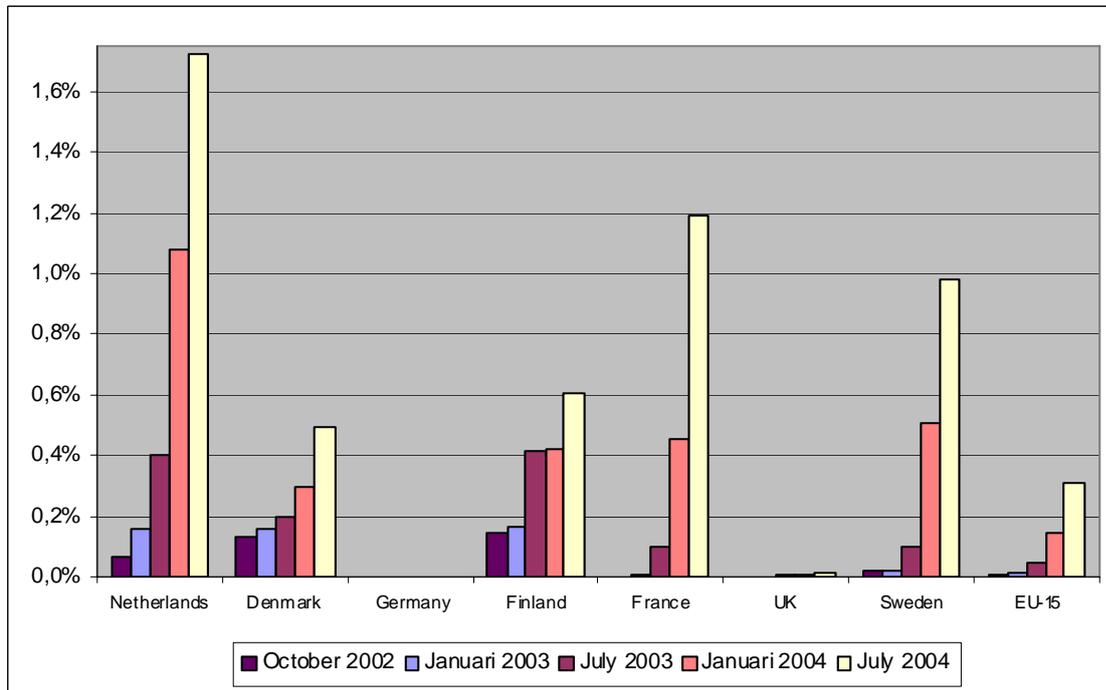
In the Netherlands, line sharing is by far the most popular type of LLU (Figures 3-7 and 3-8).

Figure 3-7
Full unbundling – lines per inhabitants, July 2001–July 2004



Source: TNO Information and Communication Technology / European Commission (2005)

Figure 3-8
 Shared Access – lines per inhabitants, October 2002–July 2004



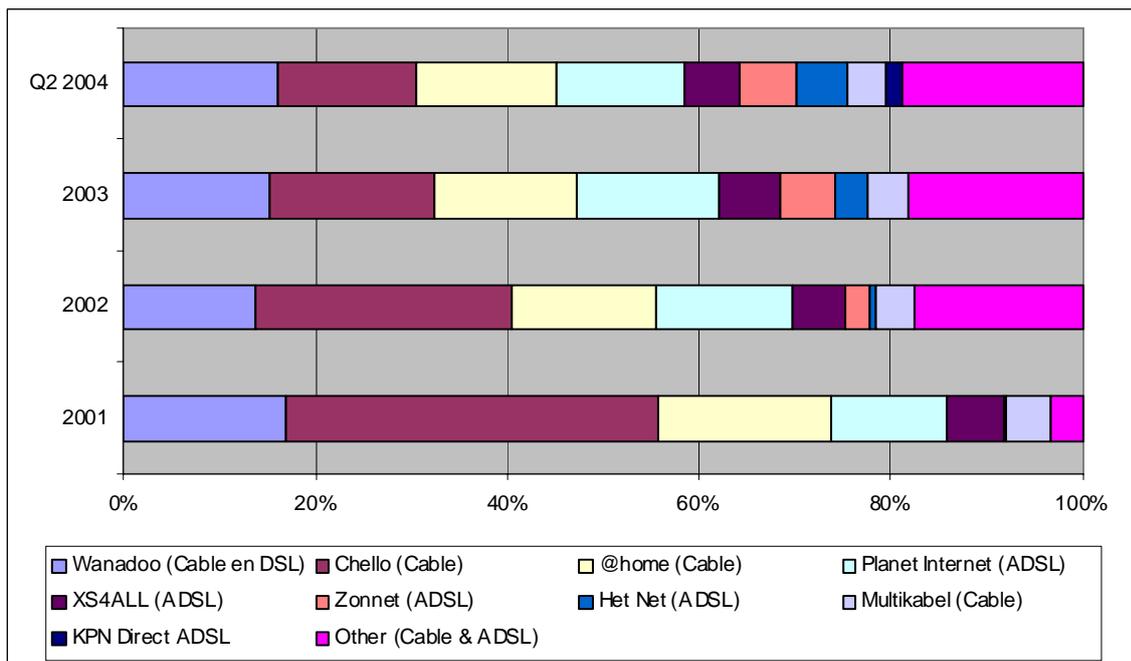
Source: TNO Information and Communication Technology / European Commission (2005)

Apparently, DSL operators are not highly interested in fixed telephony markets, at least not via full unbundling. This issue has been addressed in an October 2004 study on Wholesale Line Rental.¹⁸ Early 2005, it appears that DSL operators and ISPs are using VoIP and VoDSL to expand their role in telephony markets. At the same time, cable operators are (re)launching telephony services based on VoIP. It is difficult to comment on whether OPTA should have increased the incentives to opt for full unbundling. The monthly rental fee for line sharing is much lower than the monthly rental fee for full unbundling. Should OPTA have decreased the difference between full unbundling and line sharing tariffs? The delayed entry of DSL operators and ISPs into telephony markets might be a future oriented and efficient strategy, in a market that is declining (fixed mobile substitution) and that can be entered via new technologies such as VoDSL and VoIP. This might weaken the case for full unbundling (and for Wholesale Line Rental).

¹⁸ Wholesale Line Rental as a Potential Remedy on the Market for Fixed Telephony (October 2004, WIK).

To conclude, Figure 3-9 presents the market shares at retail level (ADSL and cable). The position of KPN at retail level is less strong than its position at wholesale level. The four KPN ISPs combined, have a market share of around 26%. Cable ISPs also play a strong role in this market. If the ADSL market is taken separately, the market share of KPN ISPs is around 50%.

Figure 3-9
Development of broadband ISPs market shares in the Netherlands (retail), 2001 – Q2 2004



Source: TNO Information and Communication Technology

3.6 Conclusion and outlook

The chapter on performance indicators precluded on the conclusions. Here, we will focus on the main points: the impact of LLU regulation on infrastructure and services competition, and how the regulatory strategy was ‘mediated’ by a complex web of practical and legal difficulties. Furthermore, we will sketch OPTA’s draft decisions to implement the new regulatory framework.

Although LLU is not an example of infrastructure competition, line sharing and especially full unbundling provide DSL operators with a substantial amount of technical and commercial autonomy. On the investment and competition ladder, LLL is ‘close to infrastructure competition’. Line sharing enables DSL operators to compete with KPN in wholesale and retail DSL markets. Competition did take up, although KPN still operates above 75% of DSL connec-

tions. These connections are sold via KPN and third party ISPs. At retail level, KPN ISPs provide around 50% of DSL subscriptions. These figures are changing, partly because KPN acquired small DSL ISPs or groups of customers that were owned by DSL ISPs but that were connected via KPN's DSL network (the agent, resale model). This makes the impact of LLU regulation more difficult to assess. If firms agree on acquisitions, and if competition authorities approve, large firms can increase their market share. Here, market share refers to the broadband access markets. Because DSL and cable compete, competition authorities will be less sceptical on acquisitions within the DSL value chain.

At the same time, Wanadoo and other DSL operators try to migrate customers (that are connected via KPN) to their own DSL networks. Because four entrants have significantly increased coverage of their DSL networks, they can now connect more customers directly to their own DSL network. This is in line with the expectations of OPTA and other stakeholders that models that are close to services competition (such as the agent, resale model) can complement or prelude models that are close to infrastructure competition (such as LLU). The fact that Wanadoo provides internet access via its own cable network and via its own DSL network and via the DSL network of others, further supports the claim of infrastructure *and* services competition. This is not to say that there are no trade offs between infrastructure and services competition or that regulation can not tip the balance.

The direct impact of LLU regulation in the Netherlands scores well above EU average. In most EU countries, the incumbent operates more than 75% of DSL connections. In the context of the recent OPTA evaluation, entrants referred to LLU regulation as "collective failure" of all NRAs in Europe.¹⁹ Entrants valued the timely initiatives that were taken by OPTA (1999, 2000) and criticised the late implementation of the EU Regulation by Dutch government (2000). Entrants stressed the importance of a solid and capable team of LLU experts at the regulator, *and* at the relevant courts. This is required to quickly tackle the many difficulties that are inherent to LLU and the interests and strategies of the incumbent. Collocation, Service Level Agreements and ordering and delivery procedures, are just three of many examples.

It is difficult to conclude on the impact of LLU regulation and DSL dynamics on Dutch broadband access markets. The penetration of internet access via cable has stimulated invest-

¹⁹ Berenschot, Ecorys & TNO (2005).

ments in DSL (and vice versa). Cable internet access has also influenced performance indicators such as broadband availability, penetration and tariffs.

OPTA did not succeed in implementing its strategy of dynamic access tariffs. Contrary to OPTA's strategy, line sharing tariffs decreased substantially. Full unbundling tariffs decreased as well. As mentioned above, several factors were relevant. One of the factors has been the forecasts and actual number of DSL connections, and the consequences for the costs per DSL connection. Especially for new and complex interconnection and special access services, it is difficult to design dynamic and predictable tariff regulation. With the benefit of hindsight, one can also state that the intention to end the regulation in five years (2000–2004) was based on very optimistic expectations of competition between DSL operators and take up of alternative infrastructures such as fibre and wireless.

Regulation of LLU tariffs is also relevant for services other than DSL. International comparisons have raised the question whether low tariffs for line sharing (compared to full unbundling and compared to other countries) provided DSL operators with weak incentives to opt for full unbundling and to provide telephony services? Above, it was already stated that full unbundling provides DSL operators with a substantial amount of technical and commercial autonomy. This includes the possibilities to offer bundles of internet access, telephony and other services, that are different from KPN's offerings. LLU has increased the possibilities to compete in telephony markets. LLU access models are 'closer to infrastructure competition' than Carrier Preselect and wholesale line rental. Entry strategies may be influenced by line sharing tariffs or rather the difference between line sharing and full unbundling tariffs. Still, the 'poor' score of the Netherlands on full unbundling may not be a consequence of regulation (or a problem at all). DSL operators could have been right to resist the temptation of entry in (declining) fixed telephony markets, based on full unbundling. In the meantime, mature VoIP and Voice over DSL technologies enable entry via line sharing. Furthermore, if consumer demand for high broadband services such as TV takes up, DSL operators can migrate to ADSL-2 and VDSL, via full unbundling and subloop unbundling. In 2005, high broadband via ADSL-2 was introduced by Versatel, one of the largest DSL operators. Furthermore, competition in fixed telephony markets is increasing. VoIP and VoDSL were introduced in consumer markets, following its success in business markets. Cable operators have intensified marketing efforts in telephony and triple play markets.

Regulation of bitstream access also influences the level of infrastructure and services competition. As mentioned above, the Court did not allow OPTA to regulate bitstream access. It would be interesting to analyse whether this Court decision stimulated the number of line sharing and fully unbundled lines, *or* the number of lines that are operated via KPN's agent/resale model. Did the 'missing rung' half way down the investment ladder, stimulate more infrastructure or more services competition?

Bitstream access also brings us to OPTA's recent draft decisions on LLU regulation. Following the analysis of relevant markets and dominance, OPTA decided that KPN is not dominant in the national market for low quality wholesale bitstream access services (WBA).²⁰ This refers to 'mainstream' WBA, with a contention ratio under 1:20 (more than 20 users may at the same time use a given amount of bandwidth). This type of bitstream access is used for around 97% of DSL connections for internet access. This figure includes internal supply by KPN and cable operators. To include cable operators and to include internal supply in the relevant market, has been crucial in the decision that KPN is not dominant. For low quality WBA, the market share of KPN is less than 45% (between 30 and 40%).

OPTA intends to regulate high quality wholesale bitstream access (contention ratio of 1:20 and higher). This type of WBA is mainly used by business users, for data communications and – to some extent – for Voice over DSL. Again, the relevant market is national. KPN is dominant (60/70% in 2004) for high quality WBA. Other providers are bbnded, Versatel, No-vaxess and MCI. National coverage is crucial to provide data communication services. All DSL operator, other than KPN, lack national coverage. Some are making progress (see chapter four). Given the risk of anti competitive behaviour, KPN's high quality WBA services will be regulated: non discrimination, transparency and access obligations (no tariff regulation).

The draft decision to not regulate low quality wholesale bitstream access, is closely linked to other elements of LLU regulation. OPTA identified effective competition at low quality WBA level and at retail level, and stressed that – to a large extent – the effective competition is based on regulation of line sharing and full unbundling. OPTA intends to continue regulation of line sharing and full unbundling.²¹ The relevant market is defined in line with EC Recom-

²⁰ OPTA (2005a). Analyse van de markt voor wholesale-breedbandtoegang. Ontwerpbesluit, 1 juli 2005. (Analysis of the market for whoelsale boradband access, draft decision).

²¹ OPTA (2005b). Analyse van de markt voor ontbundelde toegang op wholesaleniveau (inclusief gedeelde toegang) tot metalen netten en subnetten, voor het verzorgen van breedband- en spraakdiensten. Ontwerpbes-

mentation: wholesale unbundled access (including shared access) to metallic loops and subloops for the purpose of providing broadband and voice services. In the Netherlands, this is: unbundled access to KPN's access network (national). KPN is dominant. Several risks for anti competitive behaviour have been identified. The proposed remedies are in line with existing LLU regulation:

- Access obligations
- Non discrimination
- Reference offer
- Tariff regulation (cost orientation)
- Separate accounting for LLU activities (including LLU services that are provided to KPN ISPs and third party ISPs).

OPTA states that LLU is “close to infrastructure competition” and contributes to services competition in several wholesale and retail markets. Cost orientation (especially EDC) and efficiency discounts are expected do *not* decrease efficient entry, infrastructures investments and infrastructure competition.

OPTA proposes efficiency discounts as an instrument to be able to set tariffs below the direct results of the EDC model.²² Whether OPTA applies an efficiency discount (and the size of the discount) will be determined by existing and expected investments in competing infrastructures and facilities. To a large extent, the size of the efficiency discount will be based on a Comparative Efficiency Analysis (CEA). KPN will be compared to the US Local Exchange Carriers (LECs).

With the combination of the EDC model and efficiency discounts, OPTA will no longer use the BU-LRIC model to add forward looking or efficiency considerations to the tariff setting process. This implies that the clear differentiation between the regulation of originating access (EDC) and terminating access (BU-LRIC) will be abandoned. However, the analysis of (po-

luit, 1 juli 2005. (Analysis of the market for unbundled access at wholesale level (including line sharing) to metallic loops and subloops, for the provisioning of broadband and voice services. Draft decision).

²² OPTA (2005c). Tariefreguleren en gescheiden boekhouding. 1 juli 2005. (Tariff regulation and separate accountings).

tential) infrastructure competition and the CEA might result in relatively strict regulation of terminating access tariffs.

As mentioned above, OPTA proposes to use efficiency discounts for LLU tariffs. OPTA expects infrastructure competition to increase, but not within several years, not before the evaluation of the proposed regulation. OPTA intends to use a tariff scheme for several years based on wholesale price cap system. This should reduce uncertainty, although OPTA wants to be able to change efficiency discounts and take into account other parameters such as volumes.

The next five years, we might see the EU-15 regulators apply their LLU experience to issues such as ADSL-2, VDSL, subloop unbundling and spectral management. Regulators in the new member states and candidate countries may be more prepared and warned for the complex issues in LLU regulation. This includes tariff issues but also operational issues that are less ‘analytical’ but equally important. Furthermore, it is likely that LLU regulation is here to stay, or at least for more years than expected by OPTA and other stakeholders. This holds especially for non cable countries. The main questions are which LLU services should be regulated, how to vary regulation between LLU services, and how to continue tackling issues such as operational procedures and collocation.

One of the reasons for prolongation of LLU regulation is the slow roll out of Fibre To the Home. Local and national governments have become more reluctant to stimulate FTTH, due to government budget cuts, positive market dynamics, uncertainty on the added value of FTTH (compared to DSL, cable and wireless) and state-aid and market distortion concerns. The large majority of consumers prefer cheap and medium broadband, at least in the Netherlands.²³ However, we also see the emergence of DSL-TV and high bandwidth services via internet. One of the issues for governments that invest in FTTH is how to provide access to operators and service providers that do not (partly) own public or public-private FTTH infrastructures. The commonalities between access to dark fibre and full unbundling are among the many parallels between LLU regulation and FTTH regulation.

²³ Networks in the Netherlands 2004. TNO (2005).

3.7 References

- Baranes, E. & M. Bourreau (2005). An Economist's Guide to Local Loop Unbundling. In: Communications & Strategies, No.57, 1st quarter 2005.
- Berenschot, Ecorys & TNO (2005). Een terugblik om van te leren. Syntheserapport onderzoek evaluatie OPTA. 17 januari 2005. Deelonderzoek 1 betreft de uitvoering van wettelijke taken, onder andere regulering van ontbundeling van het aansluitnet. (Synthesis report of the evaluation of OPTA. Section 1 of the full report deals with regulation, including the regulation of local loop unbundling).
- Cave, M.; Majumbar, S.; Rood, H.; Valetti, T. & I. Vogelsang (2001). The relationship between Access Pricing Regulation and Infrastructure Competition. Report to OPTA and DG Telecommunications and Post.
- De Bijl, P.W.J. & M. Peitz (2005). Local Loop Unbundling in Europe: Experience, Prospects and Policy Challenges. In: Communications & Strategies, No.57, 1st quarter 2005.
- European Commission (2005). Tenth Report on the Implementation of the Telecommunications Regulatory Package.
- OPTA (2005a). Analyse van de markt voor wholesale-breedbandtoegang. Ontwerpbesluit. 1 juli 2005. (Analysis of the market for wholesale broadband access, draft decision).
- OPTA (2005b). Analyse van de markt voor ontbundelde toegang op wholesaleniveau (inclusief gedeelde toegang) tot metalen netten en subnetten, voor het verzorgen van breedband- en spraakdiensten. Ontwerpbesluit. 1 juli 2005. (Analysis of the market for unbundled access at wholesale level (including line sharing) to metallic loops and subloops, for the provisioning of broadband and voice services. Draft decision).
- OPTA (2005c). Tariefregulering en gescheiden boekhouding. 1 juli 2005. (Tariff regulation and separate accountings).
- OPTA's Economic Analysis Team (2003). Economic Policy Note on Economic considerations on balancing infrastructure and services based competition.
- OPTA's Economic Analysis Team (2004). Regulatory Policy Note on Infrastructure and services based competition in the broadband access market.
- Poel, M. (2003). Competition and Innovation Markets. Policy Framework for Digital TV. Communications & Strategies, 2nd Quarter 2003. Montpellier: IDATE.
- TNO (2005). Networks in the Netherlands 2004. The Hague: Dutch Ministry of Economic Affairs.
- WIK (2004). Wholesale Line Rental as a Potential Remedy on the Market for Fixed Telephony. Report prepared to OPTA, by K.H. Neumann.

4 Regulation of local loop access – infrastructure versus service competition in fixed broadband access: The case of Denmark

Anders Henten and Knud Erik Skouby, CICT, COM•DTU, Denmark

4.1 Introduction

The present paper on Denmark focuses primarily on competition in fixed broadband access. In mobile access, there is infrastructure competition; conversely, in fixed narrowband access, there is little infrastructure competition. This corresponds to the situation in most other European countries and is the reason for emphasizing fixed broadband access, as this is where most European and also Danish discussions on infrastructure vs. service competition are concentrated.

The line of demarcation between infrastructure (facilities) and service based competition can be discussed. Some observers include complete local loop unbundling (LLU) and shared access in the infrastructure competition category, while others draw the line of demarcation between ownership of the local loop and all the different kinds of renting and leasing of infrastructure. In this paper, the issue of ownership constitutes the basis for drawing the line between infrastructure and service competition. This means that complete unbundling as well as shared access, bit stream access and subloop unbundling will be considered as forms of service based competition. The reason is that the access network owner still has a degree of technical control over the access loop even though competitors, for instance in the case of DSL, put up their own DSLAM equipment when offering their services based on either complete unbundling or shared access. Furthermore, the access network owner charges a fee for leasing out the access path and thus has a ‘cost control’ on interconnecting operators. However, though it is relevant to draw such a line of demarcation between infrastructure and service competition, it is also important to notice that it is not an absolute dichotomy but a continuum of different kinds of competition with re-selling as the purest form of service competition and complete unbundling as being closest to infrastructure competition.

4.2 Overview of the current regulatory philosophy

While Denmark in the first phases of the telecommunications liberalisation processes in Europe wasn't among the first-movers, the Danish government and parliament made a turn in 1994/1995 and decided to liberalise the Danish telecommunications sector one and a half year ahead of the EU 1998 deadline, i.e. in the summer of 1996. The slogan and title of the policy document constituting the basis for the Danish liberalisation process was 'Best and cheapest by way of real competition'²⁴. Focus was on promoting competition as fast as possible, and service competition was seen as the most feasible way to get started. Call-by-call carrier selection was introduced in 1996 and relatively quickly opened the way for operators competing with the incumbent in the fixed telephony market. Pre-selection was introduced in January 1999.

In 1999, a policy agreement was made in parliament with the most important goal being to 'promote access to the network society' and the most important means being to 'increase competition in the access market'²⁵. Simultaneously, the Danish NRA started promoting the idea of 'several pipes to the home', pointing not only to the variety of different technologies, which can be used for accessing telecommunications services, but also to the importance of access infrastructure competition. A political expression of the importance attached to advancing access infrastructure competition was the decision not to award a Fixed Wireless Access (FWA) license to the incumbent TDC in 2000 in a 'beauty contest'. Five other operators were given FWA licenses, and a reason for not assigning TDC was to promote access infrastructure competition. As in many other countries, FWA hasn't really been a success in Denmark with only app. 3,000 FWA-subscribers (mid 2005). But this was not foreseen at the time. FWA was considered as a potentially significant alternative to broadband access via wired communication lines such as PSTN and cable.

It would be a misinterpretation to conclude that priority has been given to infrastructure access competition since 1999. It is more correct to say that both kinds of access competition have been promoted and that the policy has been to 'walk on two legs' – although this expression has never been used. This finds an expression in the latest Danish telecommunications legislation, where the very first paragraph in the law on competition and consumer relations in

²⁴ Ministry of Research: 'Best and cheapest by way of real competition', 1995.

²⁵ 'Telepolitisk aftale – 1999'.

the telecommunications market²⁶ states that the purpose of the law is ‘to promote the establishment of a well-functioning, competition-based market for the supply of electronic communication *networks and services ...*’²⁷. In the law it is, furthermore, stated that price regulation in the interconnection area must a) ensure that providers without a strong market position can obtain a real competition margin in all areas where possible, b) ensure that interconnection prices are not affected by the use of old technology, bad investments and inefficient operation on the part of the operators with interconnection obligations, c) support innovative investments, d) support that new infrastructure investments are made on basis of future oriented technology choices, promoting an optimal infrastructure development, and e) promote capacity oriented investments to the extent that it is likely that there will be an uncovered need for infrastructure and that the pressure from competition and demand will not be sufficient to ensure the necessary development²⁸. In conclusion, an important purpose of the law is to ‘ensure a *balanced competition between service and infrastructure suppliers*, which does not limit the necessary infrastructure investments’ (our italics)²⁹.

In a status from 2004 on the development of broadband access in Denmark it is emphasised that ‘the national broadband strategy is based on a market-driven infrastructure development, *facilitated by an opening of access to competitors through interconnection agreements and by encouraging rollout of several, open and competing broadband access “pipes to the home”*’ (our italics)³⁰.

An overall strategy in the field of infrastructure vs. service competition has never been explicitly formulated by the political and regulatory authorities in Denmark. Statements concerning the necessity of supporting competition in the infrastructure as well as the service fields are common and the importance of infrastructure competition as a more sustainable form of competition in the long run, decreasing the need for sector specific regulation, is recognised. But there is no overall priority given to infrastructure competition, and positions have not been taken on the issue, e.g., as to whether the promotion of service competition is a barrier to infrastructure competition or can be seen as a stepping stone towards infrastructure competi-

²⁶ ‘Lov om konkurrence- og forbrugerforhold på telemarkedet’, 2003.

²⁷ Ibid. § 1.1.

²⁸ Ibid. § 1.3.

²⁹ Ibid. § 1.4.

³⁰ National IT and Telecom Agency: ‘Mapping of Broadband Access Services in Denmark – Status by mid-2004’, December 2004, p. 2.

tion. The Danish policy and regulatory approach in the field can be characterised as pragmatic, promoting infrastructure competition when this is seen as possible and advantageous but also seeking to support service competition, making it possible for competitive suppliers to gain market shares – without limiting the ‘necessary infrastructure investments’, as it is formulated in the above quotation from the law on consumer and competition relations in the telecommunications market, taking into consideration the possible investment distorting effects of too aggressive service based competition.

4.3 Main features of the regulatory framework

With the emphasis on ‘real competition’ already in the policy statement from 1995 on the full liberalisation of the Danish telecommunications sector³¹, the policy-makers and the regulatory authorities have all the while subscribed to the point of view that a liberalisation in itself would not be sufficient to get competition and that asymmetric regulation is necessary until more equal competitive relations have developed in the market. The general liberalisation implemented in 1996 has opened the way to service as well as infrastructure competition, and different kinds of infrastructure competition in the fixed network field are actually developing, first and foremost from cable modem access delivered by Stofa (a Telia-owned company) and from housing associations and city district networks. Lately, electricity grid providers have also put greater effort into offering fibre access with plans for massive investments in the field³². However, policy and regulatory initiatives have also been taken to establish a framework for the development of service competition – with some of the lowest interconnection prices for switched interconnection as well as LLU in Europe.

Prior to the EU LLU Regulation from 2000³³, LLU was already implemented in Denmark in 1998³⁴. In contrast to the European Regulation, which only included unbundling of the ‘raw copper’ of the PSTN (Public Switched Telephone Network) access network, the Danish un-

³¹ Ministry of Research: ‘Best and cheapest by way of real competition’, 1995.

³² Konkurrencestyrelsen: ‘Elselskabernes udrulning af fibernet’, September 2005.

³³ Regulation (EU) no. 2887/2000 on unbundled access to the local loop.

³⁴ Law no. 470 of 1 July 1998.

bundling regulation also encompasses, e.g., optical fibres³⁵. In reality, however, the real implications have only been in the PSTN area.

With respect to POTS (Plain Old Telephony Services), the LLU regulation has not had any noticeable effect on access competition. The margin between the LLU price and the end user prices charged in the market has simply been too small. In the DSL area, margins are larger, and competitive operators quickly after the Danish LLU regulation acquired considerable market shares in the, in the beginning small, DSL market. However, the incumbent operator made a big effort and after a shorter period of time gained market dominance in the DSL market with market shares around 80%. In the beginning (from 1998), there were only regulations for complete unbundling in Denmark, while specific mentioning of regulations for shared access and other forms of unbundling came in 2000.

Another important point concerns the methods of costing. On the basis of the abovementioned political agreement from 1999, the NRA in 2000 started a process leading to the implementation of LRAIC (Long Run Average Incremental Cost) interconnection prices. This process lasted more than two years and resulted in an LRAIC model, which is used in different interconnection areas. Inspired by the UK, the process included the elaboration of a top-down model on the basis of information from the incumbent TDC on the costs of their network in an optimal version and a bottom-up approach with information from competitive operators on the costs of establishing new networks on basis of the existing network topology (the so-called scorched node approach). A consolidation process, thereafter, took place resulting in interconnection prices for a range of interconnection ‘products’, including switched interconnection and unbundled access. Prior to the conclusion of the LRAIC process, regulatory intervention in the setting of interconnection prices was made on basis of historical costs (from 1996) combined with best practice (from 1998). In the present regulatory framework, it is, in principle, up to the NRA to decide which costing method to be used, taking into consideration that prices should ‘seek to increase efficiency and create sustainable competition and increased advantages for consumers’³⁶. The costing methods to choose from are modified historical costs, best practice, end-user prices minus saved costs, and LRAIC. However, based on

³⁵ Cable is also subject to the general interconnection regulation when used for telecommunication purposes, but there are important difficulties for entrants using the cable TV networks because of the lack of technical standardisation in the field and the lack of standardised procedures for the use of the different frequencies.

³⁶ § 51.5 in ‘Lov om konkurrence- og forbrugerforhold på telemarkedet’, 2003.

the political agreement from 1999, the LRAIC methodology constitutes the basis for interconnection cost calculations in the most important interconnection areas.

The anticipation regarding the LRAIC model was that this would result in lower switched interconnection prices but higher LLU prices. The perspective in this being, among other things, to promote infrastructure access competition, as the costs of leasing capacity from the owner of the PSTN access infrastructure will increase. And actually, the process resulted in a lowering of switched interconnection prices and increases in LLU prices. This was the result of a reconciliation process involving the incumbent operator, a number of its competitors, and the NRA, and it cannot be excluded that the result partly was affected by the fact that in the group of competing operators, the operators mostly interested in switched interconnection prices were dominant.

The last point to be mentioned here concerns the market analyses. Already, two market analyses were performed in Denmark prior to the market analysis process initialised by the EU. However, with respect to the EU-initialised process, Denmark has stayed with the markets defined by the European Commission, and the first analyses and decisions were published primo 2005. In some of these analyses and the resulting regulatory interventions, the question of service and infrastructure competition is taken up. The market analysis process, consequently, has an impact on the balance between service and infrastructure competition.

4.4 Regulation models and provisions

The EU regulatory package was transposed into Danish law in mid 2003 as prescribed. The central law in the area and the one which is most relevant with respect to competition and consumer regulation is the ‘law on competition and consumer relations on the telecommunications market’, law no. 450 of 10 June 2003. In addition, there are two major executive orders (and a number of other executive orders and decisions), one relating to interconnection (executive order on interconnection, no. 930 of 19 November 2002) and one on consumer related aspects (executive order on the provision of electronic networks and services, no. 666 of 10 July 2003)³⁷.

³⁷ The interconnection executive order is thus older than the law itself. When the so-called market analyses and the resulting regulatory provisions are published – starting in February 2005 – the executive order will gradually fade away and there will be no general interconnection executive order.

The provisions regarding interconnection include ‘access to or the provision of facilities or services for another provider’ and ‘exchange of traffic between communication networks’³⁸. As mentioned, different costing methods can be used in cases involving SMP operators. However, the LRAIC method has since January 2003 been used regarding exchange of traffic between telecommunication networks and services, leasing of unbundled infrastructure and other network elements in the subscriber networks, and joint use of buildings, equipment at exchanges, etc.

The provisions regarding consumer prices state that the NRA determines the maximum prices for services under the universal service obligation (USO). Furthermore, with the EU-initialised market analyses, service areas where significant market power is found can become subject to, e.g., price regulation. However, services or elements thereof can be exempted from maximum price regulation if competition is deemed to be sufficiently developed in specific areas. This is in accordance with the thinking behind the EU-initiated market analyses, and was already, prior to this market analysis process, performed in Denmark in a limited number of service areas with the result that regulation of tariffs for telephone traffic was repealed in 2003, while price regulation remains for telephone subscriptions.

4.5 Regulation of access to the local loop

Local loop unbundling (LLU) was implemented in Denmark in 1998 – more than two year before the general EU implementation on basis of the LLU Regulation from 2000. This was the result of a process where a competing operator (Mobilix) brought a case before the regulatory authority claiming their right to get unbundled access to the local loop of the incumbent on basis of the then existing legislation. The regulator ruled in favour of the competing operator but was overruled by the complaints board with the argument that unbundling of the local loop was not clearly incorporated in the existing law. As a consequence the law was clarified allowing competing operators to get access to the local loops according to the general interconnection rules. Local loop unbundling in Denmark includes not only the PSTN but also other access infrastructures, but in practice, LRAIC prices are only set for raw cobber (full and shared access).

³⁸ ‘Lov om konkurrence- og forbrugerforhold på telemarkedet’, 2003, § 40.1.

4.5.1 The model used by the regulator to determine the access charges

Access charges regarding local loops are determined by the NRA on basis of an LRAIC costing model. As in the cases of other LRAIC prices (in the areas of switched interconnection and collocation), LRAIC prices are settled on basis of a consolidation process involving a combination of prices from a top-down approach performed by the incumbent operator and a bottom-up approach performed by competing operators. When the basic LRAIC process took place in 2000–2002, the NRA was involved the whole way but received the cost data input from the two parties (the incumbent TDC and the so-called LRAIC group). It should be mentioned that in the top-down approach, new and optimal technology must be used for the calculations, and that the bottom-up approach must take its point of departure in the existing network topology. This means that already in the input from the two different approaches, there is a certain degree of reconciliation. Furthermore, it should be noted that in the consolidation of the two different approaches, the regulatory authority must use the bottom-up approach as the starting point. This contributes to the character and degree of how forward-looking the LRAIC prices will be.

The first LRAIC interconnection prices were implemented in January 2003. As was expected at the start of the process, the LRAIC prices for the unbundled local loop in the PSTN area (the so-called ‘raw copper’) turned out to be higher than the existing price. The rental price charged prior to the LRAIC process was 740 DKK (app. 100 €) per year, and the LRAIC price arrived at in the first LRAIC exercise was 918 DKK (app. 125 €). However, the price for 2003 was set at 740 DKK, as there is to be a transition period for LRAIC prices, which are higher than the prices based on the costing methods used before, i.e. modified historical costs and best practice. In the legislation, it is prescribed that this transition period must be at least 5 years, but the transition period has later been extended, as the development of alternative access paths has not been seen to be as fast as formerly anticipated³⁹. According to the legislation, the starting point for the LRAIC price for an interconnection ‘product’, which is higher than the former price, is supposed to be based on the depreciated price of the existing ‘product’. In the transition period, the interconnection price is, thereafter, increased step-by-step to the new price level settled on basis of the LRAIC system. In the case of the LLU price for the

³⁹ In the 2005 decision on LLU prices, the transition period was extended to 7 years. The incumbent TDC tried to argue that a transition period should also apply to the LRAIC prices, which were lower than the prices based on the former costing models. This, however, received no backing from the political and regulatory authorities.

complete ‘raw copper’, this has meant that the price in 2004 was 769 DKK, and that in 2005 it increased to 803 DKK. However, in 2006 the price has dropped to 770 DKK.

Every year, new LRAIC prices are set by the regulatory authority. Every third year, in addition, there is a re-evaluation of the criteria for setting the LRAIC prices. The annual adjustments are done on basis of the general development in the price index with regard to equipment prices, the index for wages concerning the salary aspects of the LRAIC price, the costs of capital, and on basis of indicators for relevant traffic developments. It is on the basis of this annual adjustment that the 2006 price has been reduced to 770 DKK – the major reason being the lowered cost of capital. In 2006 there will, furthermore, be a re-evaluation of the criteria for setting the LRAIC prices – taking place every three years. A major examination of LRAIC prices has, therefore, evolved. Basically, two approaches are put forward. One is that in a situation with less than previously expected infrastructure competition, LLU prices should allow for service competition. The other approach is that infrastructure competition is on its way and that one should not allow too low LLU prices to discourage infrastructure competition. This last-mentioned approach is taken by the competition authority in Denmark, while the NRA is inclined still to encourage service based competition in the present circumstances.

For shared access, the LLU price in Denmark is set at half the LLU price for complete unbundling. The argument was simply that the LLU price was set for the complete local loop no matter how it is used, and that if it is only unbundled for DSL purposes requiring solely the upper frequency spectrum, the price will be half the full price. Shortly after the end of the first LRAIC process, i.e. in the second half on 2003, this started becoming a contentious issue. Especially one of the operators competing with the incumbent in the DSL market, Cybercity, complained to the NRA claiming that the incumbent in this way gets its costs covered 150%, as the costs are covered 100% by the end-user telephony subscription fee, and the remaining 50% come from the price for shared LLU. The NRA has rejected the claim but is currently re-evaluating the matter – especially taking into account the fact that a number of other European countries have set the price for shared LLU under 50% of the price for complete unbundling. In its ruling the NRA took into consideration that the incumbent TDC had explained that they had already reduced the PSTN price in relation to their actual costs, considering that they would also get their costs covered partly via DSL. Secondly, the NRA had included in its ruling that a lower than 50% shared access price would promote service as opposed to infrastructure competition. Recently, the NRA has put more emphasis on service competition, as

mentioned, which illustrates that the issue of service and infrastructure competition is subject to pragmatic decisions based on the evaluation of present market developments.

4.5.2 Unbundling obligations

Interconnection agreements are made on commercial terms. However, with respect to switched interconnection, all providers of public electronic communication networks and services have the right and obligation to mutually negotiate deals on the exchange of traffic, and SMP providers have the obligation to comply with all reasonable requests for entering and changing agreements on interconnection from other providers of public electronic communication networks and services⁴⁰. Regarding unbundling, the NRA can, to the extent it is necessary for connecting end-users in individual networks, oblige providers of electronic communication networks and services or owners of electronic communication networks, controlling the access to end-users, to meet certain requirements⁴¹. These requirements can include: 1) complying with all reasonable demands for interconnection, 2) non-discrimination, 3) transparency in relation to interconnection, 4) accounting separation, 5) price control, and 6) transparency in relation to new interconnection products⁴².

The requirements to be implemented must take their point of departure in the specific problems and must be proportionate and fair. It must be taken into consideration 1) whether it is practically possible to offer the interconnection requested, taking into account the existing capacity, 2) how extensive the start-up investments of the owner of the facility are, seen in relation to the risks involved, and 3) possible relevant intellectual property rights⁴³. Furthermore, the NRA must take into account: 1) whether it, in light of the present market developments, is technically and economically sustainable to use or install competitive facilities, taking into consideration the character and type of the interconnection arrangements involved, 2) the need for ensuring the free competition in the longer run, and 3) the supply of pan-European services⁴⁴.

⁴⁰ 'Lov om konkurrence- og forbrugerforhold på telemarkedet', 2003, §§41 and 42.

⁴¹ Ibid. § 44.

⁴² Ibid. § 51.1. These requirements also apply to switched interconnection.

⁴³ Ibid. § 51.5.

⁴⁴ Ibid. § 51.6.

These are the general rules and regulations as stated in the law, including the obligations of operators with SMP status but also the limitations on these obligations. Especially relevant in the context of infrastructure and service competition are the provisions regarding economic sustainability and free competition in the long run. The sustainability paragraph could be used as an argument for giving priority to service competition, while the free competition paragraph could be used for prioritizing infrastructure competition.

More specifically, the unbundling obligations include 1) network elements, including unbundled access to subscriber loops and related facilities, 2) connection of network elements and related facilities, 3) physical infrastructure, including collocation or other forms of joint use of facilities, 4) relevant software systems, 5) fixed networks and mobile communication networks, including access for roaming purposes, 6) virtual network services, and 7) free access to services, including technical interfaces, protocols or other key technologies⁴⁵. Operators, which are obliged to comply with all reasonable requests for interconnection, must as a point of departure provide access at all geographical positions, where it is practically possible, including all sub-elements in this network or related building⁴⁶. Furthermore, and relating to the requirement for non-discrimination, the NRA has the right to oblige the operators subject to the non-discrimination paragraph to publish reference interconnection offers (RIO) – in the Danish legislation called standard offers. In the legal provisions regarding standard offers, it is stated that the offers must be sufficiently unbundled to ensure that other operators are not forced to pay for products for services, which are not connected with the interconnection demanded.⁴⁷

4.5.3 Regulatory provisions with specific dynamic aspects

As in all other European countries having implemented the EU regulatory package, the most important dynamic aspects are related to the market analyses, where the aim is to determine to what extent the different markets have dominant operators and should be subject to sector specific regulation of the SMP operator(s). Denmark has, as mentioned, not deviated from the markets set out by the European Commission and has not either deviated in any other way

⁴⁵ Ibid. § 40.2.

⁴⁶ Ibid. § 51a.2.

⁴⁷ Ibid. § 51c.

from the processes of analysis laid down by the Commission. This matter will, therefore, not in general terms be further dealt with in the present paper.

There are, however, a number of minor specific dynamic aspects in the Danish interconnection regulation. One of them has already been mentioned and deals with the length of the transition period for the implementation of LRAIC prices in the case they are higher than the interconnection prices based on modified historical costs and best practice. If alternative access paths are available, this will be an argument for a shorter transition period. This, however, is not relevant presently because of the 2006 lowering of the LLU price.

Another minor specific dynamic feature is that different costing methods are possible, according to Danish interconnection legislation. LRAIC is the new and dominant mode of cost calculation. However, the other three costing methods (modified historical costs, best practice and end-user prices minus saved costs) can also be used. In relation to the market analyses, it is up to the NRA to determine which costing method will best increase the efficiency of the respective markets and provide the best and cheapest services to end-users. And, a return to modified historical costs haven even been discussed in relation to LLU, but was lately rejected in a report commissioned by the NRA⁴⁸.

If the modified historical costing method is used, there is an additional kind of dynamic clause, which may come into action. Five different costing elements can be included in modified historical costs: 1) Direct extra operating costs, 2) a proportional part of the depreciations and payments of interests on the new investments necessary for the interconnection, 3) a proportional part of the depreciations and payments of interests on the investments in the other parts of the network necessary for the interconnection, 4) a proportional part of the share of the operational costs, which are closely connected with the interconnection product, and 5) a reasonable overhead. The proportional parts in 2–4 are calculated on basis of the share of the traffic from the interconnection in question. And, if the share of the network owner is more 80%, only 30% of the proportional costs for 2–4 must be claimed by the network owner, while 100% of the proportional costs can be claimed if the network owner has 80% or less of the traffic.

⁴⁸ Copenhagen Economics: 'Prisen på rå kobber', September 2005, NRA.

4.5.4 Obligations with respect to the provision of collocation spaces

In the ‘law on competition and consumer relations on the telecommunications market’, it is stated that ‘physical infrastructure including collocation or other forms of joint use of facilities, including joint use of buildings and cable systems’ is subject to the provisions on interconnection⁴⁹. Operators, which must comply with all reasonable requests for interconnection, must provide access at all geographical positions, where possible, including buildings, where the requesting party wants to locate switches and other equipment⁵⁰. If it is not practically possible to enter an agreement on collocation on one or several geographical positions, the operator subject to compliance with all reasonable interconnection requests must put transmission capacity at the disposal of the other operator for reaching the position requested free of charge. However, the obligation to ensure the necessary transmission capacity is limited to a distance corresponding to the distance between the buildings and exchange equipment to which access is requested and the closest other access possibility⁵¹.

These are the provisions of the law and collocation issues did not produce a great many cases of complaints in Denmark for a number of years. The NRA has traditionally pointed at the lack of cases related to collocation as one of the reasons for the, in a European context, relatively fast development of DSL broadband access in Denmark. Lately, however, an increasing number of cases has been raised – as can be seen in section 3 (on the implementation of regulatory rules) of this report.

4.6 Regulation of access to higher levels in the network, i.e. BSA

In the case of bit stream access (BSA), the operator owning the network not only provides the physical local loop for the entrant but also installs and operates the DSLAM, and the entrant, therefore, only collects the traffic (bit stream) at the exchange of the network owner. BSA can, thus, be considered as a kind of broadband carrier pre-selection. BSA is, presently, in Denmark a widely used mode of access for operators using the PSTN access network of the incumbent although BSA is a mode of access, where the entrant has no control over the access path, and which must, therefore, be considered as a pure form of service competition.

⁴⁹ Ibid. § 40.2.

⁵⁰ Ibid. § 51a.2.

⁵¹ Ibid. § 51a.3.

When the BSA access mode started appearing in Denmark in 2000, the incumbent TDC put forward the point of view that regulations for BSA (and for shared access) should be postponed until the implications were clarified to a greater extent. The NRA, on the other hand, intended to include BSA in the bearer service executive order treating it as one of the interconnection services, which operators with SMP status would have to provide under the general rules of compliance with reasonable requests for interconnection. The NRA argued that BSA (and shared access) was already foreseen in the legislation, and was also mentioned in 2000 by the EU in its recommendations for national regulation⁵². As argued by the NRA, BSA (and shared access) was included in the bearer service executive order, and the first reference interconnection offer (RIO) from the incumbent TDC regarding BSA came in 2001.

4.7 Wholesale and resale obligations and the respective tariffs

Wholesale and resale is only little used in Denmark in the fixed broadband access area. However, Tele 2 offers broadband access via resale of BSA, and the two largest alternative broadband access providers have also stated that they would like to use resale in some areas but that the price should be lower than the traditional end-user price minus 21%. In fixed narrowband access, wholesale and resale is more widely used, which is the major reason for Denmark having a relatively high percentage of non-incumbent subscriber lines in the PSTN area. In the first half of 2005, TDC had a market share of 80.7% of the PSTN-subscribers⁵³, which is the second lowest figure in the EU after the UK. But in broadband access there is, at present, no wholesale and resale.

There is not either any RIO in the area, but wholesale is foreseen in the legislation as a possible access mode also in the fixed broadband access area, subject to the same obligations for operators with or without SMP status as is generally foreseen in the interconnection regulation, and the tariff for such an interconnection ‘product’ would be set at the retail price minus costs or a cost-plus price depending on the circumstances. Hitherto, the wholesale price has been set at the retail price minus 21% – as mentioned.

⁵² See Telestyrelsen: ‘Notat om høring over udkast til bekendtgørelse om hvilke grundlæggende bærertjenester, tjenester og faciliteter og fysiske og logiske samtrafikgrænseflader, der indgår i samtrafikprodukter’, 2000.

⁵³ National IT and Telecom Agency: ‘Telecom statistics – first half year 2005’, page 11.

4.8 Regulation with respect to consumer prices

Before the introduction of the EU-initiated market analyses, retail price regulation has primarily been used in connection with services under the universal service obligation. The model used has been price capping with best practice as the method to set the prices. In 2003, a market analysis of end-user telephony tariffs was made and led to the abolishment of price regulation on all traffic tariffs. However, the telephony subscription price is still regulated.

With the implementation of the EU-initiated market analyses, retail price regulations can, in principle, be introduced in all the different retail markets included in the market analyses. But with the markets presently included by the European Commission (and used in Denmark), the only retail services dealt with are the ones which are already included in the list of services subject to universal service obligation provisions. This means that broadband retail services are not included in the list of markets to be analysed and will, consequently, not be subject to price regulation following such analyses. One manner in which broadband retail prices can be regulated is if they are seen as predatory in a general competition regulation framework, i.e. ex post and with respect to specific cases. Furthermore, the universal service directive (and consequently Danish law⁵⁴) provides for the possibility of regulating excessive pricing if it is deemed by the NRA to be the situation in specific cases.

With respect to predatory pricing regulation, this has actually been examined in Denmark. The competition authority in Denmark made an investigation in 2001–2002 of the retail prices charged by the incumbent in relation to the interconnection prices in the area. The operators competing with the incumbent TDC on the DSL market had complained that TDC was using unfair methods in the competition for the DSL market and that this was a major reason for TDC winning the dominance in this market. Two different investigations were made following this complaint, one made by the NRA on the procedures used by TDC when delivering DSL interconnection services to competing operators, and the other performed by the competition authority on predatory pricing in the area. The final decision reached by the competition authority was that TDC, indeed, conducted an aggressive price policy but that the costs of TDC were covered and that it was not a case of predatory pricing.

⁵⁴ Ibid. § 21a.

4.9 Implementation of regulatory rules

Since the shift in 1994–95 in the Danish approach to telecommunications regulation, the implementation of regulatory rules has generally been seen as advanced. Compared to other EU countries, this can be seen as justified by the track record including, e.g., the implementation of the new regulatory framework during 2003. Looking into the details of the implementation of the regulatory rules, there has been and is a number of problems and rather different opinions on the character of the problems depending on the position of actors.

4.9.1 Impediments of implementation

The NRA competition report (May 2003)⁵⁵ concluded that there are a few, but no serious, legislative gaps and also that the telecommunications industry does not take sufficient advantage of the opportunities provided to them by the legislation, such as submitting cases to the NRA or requesting mediation.

On the basis of the public consultation, and also the political discussions following the report, steps were taken to eliminate the issues/barriers raised. For instance, new legislation was introduced on 1 April 2004 to clarify that ATM networks are covered by the national legislation already in force. In order to prevent a first-mover advantage for the incumbent operator when it introduces new services, a new legal provision, introducing a higher penalty (based on competition law practices) for infringement of the transparency obligation in relation to the publication of information on new interconnection products, has been included. The alternative operators preferred a so-called ‘standstill’ provision of 6 months to be imposed on the fixed line incumbent operator. This was, however, not considered to be proportionate vis-à-vis the fixed line incumbent operator. Some non-legal initiatives also followed from this report, such as the introduction of a flexible system for customers’ change of DSL-providers and the setting of targets for the measurement of the quality of telecommunications products.

The most important regulatory controversy in the past half decade has been around conditions for operators wanting to use the PSTN access network for DSL purposes. The competing operators complained in 2001 that they were squeezed out of the market, with respect to price squeeze as well as non-price squeezing mechanisms. The price squeeze issue was examined by the competition authority and the non-price squeeze by the NRA. In neither case, however,

⁵⁵ ITST (IT- og Telestyrelsen, the NRA): ‘Telekonkurrenceredegørelse 2003’, ITST.

did the authorities find grounds for accusing the incumbent operator for abusive behaviour. Still, some of the procedures used by TDC when receiving requests for DSL interconnection have been made more efficient.

The issue presently highest on the political agenda is the price of shared access. In Denmark, the shared copper access price is half the price of complete unbundling. This is seen as unfair by the operators competing with TDC, the argument being that TDC in this way gets its costs covered 150%. Furthermore, it is claimed that the unbundling pricing policy holds back the development of VoIP via DSL. If end-users close their PSTN subscription and solely rely on VoIP via DSL, they will still have to pay a fee corresponding to the subscription fee to the incumbent, if they use the incumbent as DSL provider, or to an alternative DSL provider, as these providers will be charged the full LLU price by the incumbent and will pass this on to the end-users to the extent possible.

Even though interconnection is the central issue, there are also two recent non-interconnection cases, which can illustrate the issue of infrastructure and service competition in Denmark. The first case deals with the public utility electricity network suppliers and their telecommunications activities. In their ducts they can also deploy fibres for telecommunications and offer fibre to the curb or building, etc. This activity has hitherto been seen as a positive development by the policy and regulatory authorities. However, in the spring 2004, the incumbent TDC started criticizing this activity with the argument that there is a danger that the electricity suppliers will cross-subsidise from their electricity activities to their telecommunication activities. Furthermore, the argument has been put forward that deploying these kinds of parallel infrastructures is a waste in a societal perspective. Lately, these arguments have had some following, and the competition authority has examined the claim of cross-subsidy from electricity to telecommunications but found it unsubstantiated.

The other case is concerned with the new WiMax (802.16) technology. TDC has acquired a license to operate services in a WiMax band but has not yet the immediate intention to use the frequencies. WiMax is seen as a potentially important new access mode, and TDC has wished to have the opportunity to use this technology at a point of time. Another operator has also acquired a license and has the intention to start operating WiMax based services in February 2005. However, the surge for WiMax frequencies has led to NRA to put a halt on distributing licenses for WiMax in order to get time to examine the potentials in this market segment.

4.9.2 Litigation

The new entrants have stated that there have been and still are three main problems in the implementation of regulatory rules:⁵⁶

- The demand for ‘double subscription’, i.e. a subscriber to a new entrant DSL service using the TDC network has to pay the equivalent of a telephony subscription
- The procedure to acquire full ‘raw copper’ LLU for ADSL and the obstruction of the emerging VDSL by TDC with reference to ‘technical difficulties’
- The collocation procedure is obstructed by TDC with reference to ‘technical difficulties’

The first issue is still not solved seen from the point of view of new entrants; several NRA decisions largely accommodating new entrant views have been made on the two other issues, but the problems keep coming back⁵⁷. Based on this, the new entrants believe that the NRA should focus more attention on new technologies/ services; they claim it is difficult to introduce new products and that they have not always been able to roll out the products they want. Sometimes the products are not yet covered by existing legislation, and by the time they are, the alternative operators normally lag behind the fixed line incumbent operator. This issue should, in principle, be solved now since a penalty has been introduced in relation to the transparency obligation for new interconnection products.

During 2004 the issues of access to full LLU and collocation surfaced again in relation to VDSL. TDC declined to give Cybercity (a leading new entrant on the DSL area) access to deploy VDSL on ‘raw copper’ and it declined Updata access to the so-called ‘forefront technique houses’. These houses are increasingly used to give more subscribers access to VDSL services with their demand for a short distance between the subscriber and the ‘switch’. In January 2005, the NRA ruled that it is not a valid argument that VDSL as such will disturb the network. TDC has to allow alternative operators to offer VDSL over ‘raw copper’. With respect to access to ‘forefront technique houses’, the ruling was that the law/ regulation does not guarantee access to a specific physical location if capacity does not allow for this; if access cannot be granted, the SMP operator (TDC) has to provide transport free of charge to another access point. This is potentially a tricky ruling seen from a new entrant position, as

⁵⁶ All decisions and rulings of the NRA are listed on their website, see <http://www.itst.dk/>

⁵⁷ Interview with the SAT-group (Samarbejdsgruppen af Alternative Teleoperatører) of alternative operators, December 2004.

nothing is said about the quality of service of the transport from the desired access point to the point where TDC actually grants access. Based on experience, the new entrants foresee that this may create problems for high quality/ high speed services, which are offered transport on ‘a below the relevant standard-line’.

4.10 Performance indicators

The common way to get broadband access is by way of fixed lines, primarily as DSL. ADSL accounts for 65% of the fixed access lines with cable modem as number two with 28%, whereas wireless (FTTH, WiFi, FWA, etc.) still is insignificant⁵⁸.

Table 4-1

Broadband subscriptions, June 2005

DSL	714,529	64.8%
Cable modem	308,653	28.0%
FTTH	8,758	0.8%
Satellite	4	~0%
PLC	88	~0%
WLL (FWA)	3,128	0.3%
WiFi	8,943	0.8%
WiMAX	38	~0%
LAN	56,249	5.1%
Others	1,141	0.1%
Total	1,101,531	100%
Source: NITA: ‘Telecom statistics – first half year 2005’, p. 16.		

4.10.1 Diffusion of broadband technology

Denmark had in mid 2005 the second highest penetration rate of fixed line broadband in the EU with 21.8 broadband lines per 100 inhabitants. This also qualifies as top-ranking in the world – number three after South Korea (25.5) and the Netherlands (22.5)⁵⁹.

⁵⁸ Figures are from mid 2005. Source: National IT and Telecom Agency: ‘Telecom statistics – first half year 2005’, page 16.

⁵⁹ OECD Broadband Statistics.

The high level of penetration can hardly be explained by the prices, as they are also among the highest in Europe. Supplementary explanations may be found in the relatively high income level and high level of ‘e-readiness’⁶⁰. Another explanation may be that the relatively low capacity level of connections, which are common in Denmark (cf. section 4.2 below), is sufficient for the current usage of Internet, thereby in combination with the factors mentioned making it – also economically – more attractive to use the Internet in Denmark.

Potentially, 98% of households and enterprises have access (i.e. coverage/availability) to fixed line broadband following the general 144 kbps-definition, and ADSL is available in all municipalities. In a regional perspective, the highest penetration rates (actual take-up) are observed in the Copenhagen area, whereas regions in Jutland each covering a relative large proportion of rural and sparsely populated areas have penetration rates below 20%.

4.10.1.1 Regional and local broadband initiatives

A number of IT-partnerships have been established within the last couple of years. These partnerships are built on co-operation between counties, municipalities, local business councils, residential areas and others.

In the less populated areas there may be technological obstacles to obtain sufficient broadband development. DSL services can be effectively delivered to residents living within a few kilometres from the telephone company’s switch (approximately up to 5 kilometres with the current generation of ADSL-equipment). Residents and businesses located beyond that radius can not be served by their telephone companies with broadband access. Regional IT-partnerships have all issued strategies on how to accelerate establishment of rollout of high bandwidth infrastructure. The strategies primarily focus on rollout of fibre optic networks to local communities, from which residents and businesses can receive broadband services through fibre optics or wireless access.

The regional and local IT-partnerships focus on ways to overcome some of the main barriers for deployment of broadband infrastructure in rural areas and use planning advantages, including initiatives on:

⁶⁰ Cf., e.g., ‘eEurope 2005’, INSEAD 2004.

- Demand bundling: A community can aggregate different user groups (public institutions, businesses and residents) to provide a sufficient level of demand, as a financial basis for broadband providers.
- Co-ordinated planning of broadband infrastructure – ‘Clever digging’: Fibre optics or at least ‘empty pipes’ can be put into the ground whenever digging activities occur. Co-ordination and activity planning between telecommunications providers, energy suppliers and others can lead to more efficient solutions and bring down the overall cost of deploying fibre optic networks.

*Djurslands.net*⁶¹

Djurslands.net is an “umbrella organisation” established in 2001 covering 8 municipalities. The population density in this area is among the lowest in Denmark – 57 inhabitants per square kilometre (average is 125 inhabitants per square kilometre in Denmark). The municipalities involved in Djurslands.net have rented fibre optic capacity from the regional county on a long term basis. Fibre optic coverage is extended by radio chains to remote areas. Remote areas are each covered with broadband services based on wireless technology. More than 200 active local volunteers are engaged in the project. The reason for the initiative taken in 2001 was that citizens and enterprises in the Djursland region found the existing DSL coverage insufficient/ non-existing. A public tender on delivering a commercial solution to the region did not result in any attractive offer.

Djurslands.net offers a guaranteed connection of 256 kbps but the typical bandwidth reaches 1–2 Mbps. Subscriber fee is 13.50 € per month for unlimited access – less than ½ the current commercial fee. Djurslands.net covers many remote areas in the region and more than 1,700 households are connected to the network.

Bryggenet

Bryggenet is established in Copenhagen, where 20 residential communities in cooperation have constructed their own network connecting the communities and giving access to the Internet. Furthermore, TV is distributed and voice telephony offered to all households within the co-operation. The backbone infrastructure of the different residential communities is IP-based and built on fibre. The network is established and managed by GN Residential Network

⁶¹ Source: www.djurslands.net

which is managing several similar networks across Denmark. GN Residential Network expects an increase of 15,000 households per year in their networks. The technology used demands residential units of at least 100 households.

4.10.2 Quality of access

For the majority of customers, a waiting list for a broadband connection is in practice non-existing as the most common way to obtain a connection is a DSL do-it-yourself package. The capacity of the 'normal' actual connections is, however, among the lowest in Europe, as the typical connection is 512 kbps in download rates (mid 2005). Currently, ADSL is, however, offered with speeds from 256 kbps up to 8 Mbps. Cable modem services are offered with speed from 64 kbps up to 4 Mbps.

Generally, there is no limit on the quantity users are allowed to download during a given period. However, some operators are offering services with download limits. In a sense, this is a pricing issue, but unlimited vs. limited access to download is influencing the way the broadband access is used and developed.

4.10.3 Intermodal competition

ADSL is the absolutely dominating mode of access accounting for 2/3 of the broadband users. Cable is second with 28%, and the few remaining percentages of connections are mainly direct Ethernet based connections (LAN), WiFi and FTTH. PLC is only starting to be present.

ADSL is offered to 98% of all businesses and households. In the ADSL area, it is the incumbent TDC which own almost all local access loops. With respect to cable modem, which presently is offered to 60% of all households, alternative operators have a stronger position, first and foremost Stofa (Telia). Furthermore, FTTH is on the way. Power utility companies (PUCs) have launched commercial rollout of fibre optics to residential and business users within their respective power supply areas. The NRA estimates that approximately 9,000 households currently have a fibre optic line based on the commercial rollout of fibre optics by different PUCs. However, the PUC have plans for extending their fibre networks to reach ½ million households in two years time, and 1.2 million households on a longer term⁶².

⁶² Konkurrencestyrelsen: 'Elselskabernes udrulning af fibernet', Konkurrencestyrelsen, København, 2005.

The initiatives primarily include fibre optic networks based on an open access model or partnerships with ISPs. PUCs have laid down fibre optic networks in the past couple of decades to monitor their power grid. In many cases they have installed substantially more capacity than needed to support their electricity operations. An increasing number of PUCs are entering the broadband market by leveraging their customer base, experience in billing and technical support. Fibre optics or ‘empty pipes’ are put into the ground together with the power line cables.

4.10.4 Division of markets between the incumbent and new entrants

The competitive structure on the PSTN-based broadband access market has developed a bit differently in Denmark compared with most other European countries, where the incumbent was the first to introduce ADSL and started out with a market share of 100%. In the Danish case, it was the new entrants that introduced ADSL and obtained significant market shares at first. However, when TDC entered the market it quickly became the dominant supplier, and TDC has, in recent years, had a higher market share than the average of the incumbents in EU15, cf. table 4-2.

Table 4-2

Market shares of TDC, primo 2004

	DSL	Other connections	Total
Denmark	78.8	35.0	65.5
EU 15	73.7	7.7	56.7
Source: ‘Connecting Europe at High Speed: National Broadband Strategies’, Commission Staff Working Paper Brussels, 05/05/2004.			

However, also the form of competition differs. In Denmark, fully unbundled local loops is more common than generally in the EU, where pure resale has been the dominant form for competition, cf. table 4-3.

The competitive situation on cable based access is different. TDC have 43% of the cable based broadband access customers, while new entrants have 57%, and among these Stofa (Telia) accounts for the majority. This implies that service competition – including LLU – on the TDC owned PSTN is the dominating form of competition. It also implies that TDC is the

dominant player on all platforms – and is well positioned to be equally dominant on the emerging platforms including WiMax.

Table 4-3

DSL connections used by new entrants, primo 2004

	Full ULL	Shared access	Bit stream	Resale
Denmark	47.0	16.1	36.9	0.0
EU 15	18.3	11.8	25.7	44.2
Source: ‘Connecting Europe at High Speed: National Broadband Strategies’, Commission Staff Working Paper Brussels, 05/05/2004. Note: The resale figure for Denmark in the table is not entirely correct, as the operator Tele2 is actually reselling BSA. However, the figure is low.				

4.11 Conclusion and other issues relevant for regulation of local loop access

In the paper, there is focus on interconnection regulation. However, other kinds of regulation and policy intervention are also important for broadband local loop development and local loop access. With respect to traditional telecommunications regulation, this applies to frequency allocation and assignment, access to masts for radio communication purposes and right to mount masts, and the regulation of broadband mobile communications (3G). However, the report concentrates mainly on wired communications and does, therefore, not include the specific regulatory issues relating to wireless communications. Other kinds of regulatory issues not dealt with are the possible use of universal service regulations and, more importantly, horizontal and vertical disintegration. Lastly, the report does not either deal with other kinds of policy intervention, for instance public support for boosting demand or for promoting the roll-out of network facilities. Especially the first type of policy intervention (public support for boosting demand) has been important in Denmark, as there is an arrangement where employers may pay for the broadband connections of their employees deducting the establishment and subscription fee from their salaries but without the employees paying income taxes on the broadband fees paid by the employer. The other type of public support plays a certain role in connection with the establishment of broadband facilities in local municipalities.

In this section, only three of these different issues are briefly touched upon. The universal service provisions in Danish telecommunications law includes PSTN and ISDN (and a few other network facilities and services) but not broadband. Suggestions to include broadband access under the universal service provisions now and then surface in political discussions and are related to the emphasis that the EU (the Lisbon process) as well as the Danish policy makers attach to the development of broadband access. But the inclusion of broadband access under the provisions regarding universal service has been rejected by the majority of policy makers.

The second issue concerns horizontal integration/disintegration. In Denmark, the incumbent operator TDC owns not only the overwhelming majority of PSTN access connections but also the biggest cable TV network. The other major cable TV network provider (Stofa) is owned by the Swedish incumbent Telia and actually has more cable broadband subscribers than TDC. This may be a reason why horizontal disintegration has not been a major issue in Denmark. There is accounting separation (as prescribed by EU regulation) but TDC controls both access modes without any greater disputes on this matter.

There have, in fact, been more disputes concerning vertical integration. The idea of vertical disintegration (where the network facilities and the service delivery of the incumbent are separated) has never had any major policy support in Denmark. The issue, though, pops up now and then. Lately, Tele2 – which is the biggest operator in the carrier selection market in Denmark with activities also in mobile as MVNO and in DSL broadband access – has raised the issue, as they believe it would create a more level playing field in Danish telecommunications.

As in most other European countries, the discussions on broadband access have mainly concentrated on issues relating to interconnection and, indirectly, on service and infrastructure regulation. The incumbent TDC clearly favours infrastructure competition – based on the strength which the company has in terms of infrastructure. Most of the competing operators, on the other hand, emphasise the importance of service competition and the regulations promoting service competition. Or that is to say, this applies to the more traditional telecommunications operators, while other kinds of providers and network access organisers such as electricity companies, delivering fibre access, and housing associations are more interested in rights of way or radio frequency questions. With the diversity of different providers of broad-

band access, there are many different interests in the field, but still it is fair to say that inter-connection conditions have been highest on the policy agenda.

There is thus a multitude of regulatory issues, where the challenge is to balance the need for regulatory intervention in relation to the developments in the markets. The general opinion among Danish policy and regulatory authorities is that one should be careful with regulating market developments if it can be foreseen that developments without regulatory intervention in a slightly longer run will remedy present problems in the market. The general position among policy and regulatory authorities in Denmark is that the market should be the driver of broadband access development. Ideas about promoting fibre access to all businesses and homes have been aired from some technology enthusiast, but this idea has generally been rejected among policy decision makers. The market must rule, is the point of view. And, this leads to an emphasis on the applications, services and content, which can be delivered via broadband networks. The policy document still in power in the area of broadband development from 2001 has the eloquent title 'Fra isenkram til indhold' ('From hardware to content')⁶³.

4.12 References

- Bekendtgørelse af Lov om Konkurrence- og Forbrugerforhold på Telemarkedet, LBK nr. 679 af 23/06/2004.
- Bergman, M. (2004) Competition in Services or Infrastructure-based Competition?, Swedish National Post and Telecom Authority, Stockholm.
- Bourreau, M. and Dogan, P. (2004) Service-based vs. Facility-based Competition in Local Access Networks, *Information Economics and Policy*, 16 (2004), pp. 287–306.
- Connecting Europe at High Speed: National Broadband Strategies, Commission Staff Working Paper, Brussels, 05/05/2004.
- Copenhagen Economics (2005) Prisen på rå kobber, ITST. København.
- Falch, M. (2002) TELRIC – The way Towards Competition? A European Point of View, *Review of Network Economics*, Vol. 1, issue 2, pp. 147–154.
- Henten, A. (2003) Telecoms in Denmark: Investment, Performance and Regulation, WDR Discussion Paper 0302, Lyngby.
- IT- og Forskningsministeriet (2001) Fra isenkram til indhold, ITF, København.
- IT- og Telestyrelsen (2002) Afgørelse om fastsættelse af maksimale priser efter LRAIC-metoden, ITST, København.
- IT- og Telestyrelsen (2003) Telekonkurrenceregulering 2003, ITST, København.
- ITU (2002) Competition Policy in Telecommunications: The Case of Denmark, ITU, Geneva.

⁶³ IT- og Forskningsministeriet: 'Fra isenkram til indhold', 2001.

Konkurrencestyrelsen (2005) *Elselskabernes udrulning af fibernet*, Konkurrencestyrelsen, København.

NITA (2004) *Tele Yearbook, Denmark, 2003*, Ministry of Science, Technology and Innovation, Copenhagen.

NITA (2004) *Mapping of Broadband Access Services in Denmark – Status by mid-2004*, Ministry of Science, Technology and Innovation, Copenhagen.

Telecompetition: Towards a Single Nordic Market for Telecommunication services?, Report from the Nordic Competition Authorities, 2004, Nordic Council of Ministers.

Telestyrelsen (2000) *Notat om høring over udkast til bekendtgørelse om hvilke grundlæggende bærertjenester, tjenester og faciliteter og fysiske og logiske samtrafikgrænseflader, der indgår i samtrafikprodukter*, ITST, København.

Ministry of Research (1995) *Best and cheapest by way of real competition*, Ministry of Research, Copenhagen.

5 Sweden's telecom liberalisation and local loop unbundling: Moving from consensus to enforcement

Erik Bohlin⁶⁴, Sven Lindmark and Per Björstedt, Chalmers University of Technology, Sweden

5.1 Introduction

A major milestone in Swedish telecom regulations was the Telecommunications Act⁶⁵ of 1993 which opened up the telecom market for entries from both domestic and foreign actors.⁶⁶ Until then, the Swedish telecom market had essentially been an unregulated monopoly. One year after the law was passed, the incumbent operator Televerket was turned from a public enterprise into Telia and in 2000 the company was listed on the Stockholm Stock Exchange when the state let go of 30% of its shares.⁶⁷

In an international perspective, Sweden was an early starter in liberalizing its telecom market and hence, there was little prior experience to draw from when formulating the new legislation. As a result, the legislation was developed on a best effort basis and it was then modified and improved as new needs arose. The Telecommunications Act lasted for ten years and during its existence, it was modified on 15 occasions.⁶⁸ From the year 1999 and onwards, the government activity in the field of regulation has increased and the Telecommunications Act was replaced in 2003 by the Electronic Communications Act⁶⁹.

Increasingly, the style of the Swedish regulation has moved from being oriented toward consensus and negotiation toward enforcement and mandatory measures. This development is particularly notable in the context of regulation of the local loop, and resulting issues of interconnection, collocation and unbundling.

⁶⁴ Corresponding author. Dr. Erik Bohlin (Head of Division.), Division of Technology and Society, Department of Technology Management and Economics, Chalmers University of Technology, 412 96 Göteborg, Sweden. E-mail: eriboh@mot.chalmers.se; Ph: +46-31-772-1205; Fax: +46-31-772-3783

⁶⁵ Telelagen (1993:597) in Swedish, available online at www.pts.se

⁶⁶ This paragraph is based on Ewertsson and Hultkrantz (2004)

⁶⁷ In 2002, Telia then merged with Finland's incumbent Sonera to form TeliaSonera

⁶⁸ PTS (2003d)

⁶⁹ Lagen om elektronisk kommunikation, EkomL (2003:389) in Swedish, available online at www.pts.se

This paper elaborates upon various issues related to the regulation of competition in the local loop. The paper covers issues such as:

- Regulatory model for computing access charges
- Unbundling obligations
- Collocation conditions
- Regulatory implementation issues
- Service vs. infrastructure competition

The paper also considers performance issues such as broadband diffusion, quality of access, development of infrastructure and service, and incumbent dominance issues.

5.1.1 Overview over the current regulatory philosophy

The Swedish Electronic Communications Act (EkomL) states the following general objectives:⁷⁰

“To ensure that private individuals, legal entities and public authorities have access to secure and efficient electronic communications and the greatest possible benefit regarding the range of electronic communications services and their price and quality. This objective shall mainly be achieved through the promotion of competition and the international harmonisation of the sector. However, universal services shall always be available for everybody on equivalent terms throughout Sweden at affordable prices.”

According to Bohlin et al (2004), the Swedish Electronic Communications Act of 2003 focuses on competition as the critical variable to regulate the telecom market. For instance, both investments and innovations seem to be treated as natural consequences of increased competition in the act. Consequently, focus is on how the regulating authority PTS can monitor and adjust levels of competition in the various regulated markets. Moreover, in later years there has been a general shift in Sweden away from regulating consumer tariffs and subscription fees with price caps, towards regulating fees on the wholesale level for interconnection and shared access between operators.

⁷⁰ As set out in section 1 of the act.

One could argue that the mandate of PTS has certain contradictions built into it, since PTS must both act to increase competition and at the same time somehow control competition levels so that operators can still achieve reasonable rates of return.

5.1.2 Main features of regulatory framework

The new Electronic Communications Act takes account of telecom networks as well as cable TV and other broadband networks and it is intended to be more flexible than its predecessor. Therefore, it contains relatively few general obligations for the actors; instead it enables the National Post and Telecom Agency (PTS) to use a range of tools if competition does not work properly or if consumers' interests are neglected by the market actors. In fact, the new regulation is based on PTS tailor-making obligations and announcing a decision regarding a specific case or controversy. The reason why such a procedure is more flexible is that PTS can announce or change a decision more rapidly than the parliament can alter legislation.⁷¹ Recently, we have seen some examples of PTS taking action, primarily against Swedish incumbent operator TeliaSonera for not complying with the obligations imposed on an actor with significant market power (SMP). The most interesting of these actions will be described later on in this report.

As an example of the workings of the new act, consider the procedure for obligating an SMP-operator to provide access for other operators to the local loop. This possibility is regulated in the 8th paragraph of the 4th chapter of EkomL. As mentioned before, a significant difference from the preceding LLUB-regulation is that the new law does not explicitly state so many general obligations for an SMP-operator to provide access to the network. Instead, PTS is provided with certain tools and a three step procedure for dealing with market problems. The procedure is made up of three steps as follows:⁷²

1. Establishing a relevant market and assessing the competitive situation
2. If there is not efficient competition on the market in question, PTS examines whether there are any SMP-actors on this particular market.
3. Finally, PTS decides which obligations should be placed on the SMP in order to encourage efficient competition on the market.

⁷¹ PTS (2004i)

⁷² PTS (2004c)

PTS has applied this procedure on two occasions of particular relevance to this report, thereby adding to the collection of regulations that, in addition to the Electronic Communications Act, governs the Swedish telecom market. In two decisions dated November 24, 2004, PTS ruled the market for LLUB and the market for bitstream access as relevant markets. Furthermore, TeliaSonera was deemed an SMP-actor on both markets and certain obligations were imposed on the company. The implications of the decisions are further explained in chapter 2.

5.2 Regulation of access to the local loop

5.2.1 Cost models

The European Parliament regulation (EC) No 2887/2000 concerning Local Loop Unbundling (LLUB) recommends using the Long Run Incremental Cost (LRIC) methodology. This is also the standard that the Swedish regulator PTS adopted originally. The reason why LRIC is advocated is that when access charges are based on this model, they tend not to distort the build or buy decisions of new entrants. Supposedly, when charges are based on the LRIC-model, infrastructure competition is encouraged in those areas where it is efficient to have competing infrastructure whereas service competition is supported in areas where investment in competing infrastructure is not efficient. In this way, whether an area is suited or not for infrastructure competition will be determined by the market rather than by the regulator PTS. However, a general problem related to LRIC-based pricing is to decide which costs should be included in the model, since shared access is provided over a subset of the full frequency spectrum of the copper line and hence, a significant portion of the costs is shared between the PSTN service (on the low frequency band) and the shared access service (on the high frequency band).⁷³ Almost all countries have a pricing methodology under which the price of shared access increases to the price of full access when the PSTN subscription with the incumbent operator is terminated.

Throughout 2002 and 2003, PTS has collaborated with operators on the Swedish telecom market to develop a model for calculating costs of providing interconnection services and LLUB. The model is based on the principles of Long Run Incremental Cost (LRIC) as promoted by the European Union. During the fall of 2004, PTS has updated this model together

⁷³ Based on AMI (2004)

with the operators that wanted to participate in the process. On October 14, a draft hybrid model was presented and operators were invited to suggest improvements and adjustments.⁷⁴

PTS expects the following effects from implementing the LRIC-based hybrid model:⁷⁵

- To encourage the use of existing facilities of the SMP-operator on locations where this is desirable, thereby avoiding inefficient duplication of infrastructure from new entrants. (Incentive to buy.)
- To encourage investment in new facilities and infrastructure where this is justified from an economic point of view by either the new entrants investing in competing infrastructure or TeliaSonera upgrading and expanding its existing networks. (Incentive to build.)
- To increase the transparency of cost calculations underlying the access and interconnection charges.
- To increase predictability for both the SMP operator and the other operators with regards to future determination of access and interconnection charges.

In order to send the right investment signals and promote efficient competition, PTS states that prices should reflect the LRIC of an efficient operator facing the demand of the existing SMP operator, which is currently TeliaSonera. The efficient operator is defined as *the theoretical operator that would exist if it were in a fully competitive market in Sweden, but with the same scope and demand as the existing SMP operator*. This approach aims to ensure that the economies of scale and scope are divided equally between the SMP operator and the interconnecting operators, allowing competition on equal terms.

PTS published the *cost results* from the hybrid LRIC-model on December 10, 2004. These cost results will then provide the framework for PTS' supervision of cost based prices for interconnection services and access through LLUB. Appendix A reproduces the cost estimates derived from the model. It should be noted that the results are cost estimates and not prices. Based on the costs established in the LRIC hybrid model version 2.1, TeliaSonera are then requested to determine prices in accordance with the LRIC pricing methodology for wholesale products.

⁷⁴ PTS (2004c)

⁷⁵ PTS (2003e)

The following general principles are valid for *pricing* according to LRIC:⁷⁶

1. The SMP-operator's average price per service should correspond to the average cost per service according to the hybrid model. Installation and rent are considered separate services. A compilation of the services that should be priced through LRIC and the calculated costs for these at this particular point in time are reproduced in the tables in Appendix A.
2. The pricing of the interconnection services metro segment and region segment are based on the total cost of the services. A lower price for the metro segment compared to the cost can therefore be compensated by a higher price for the region segment as long as the average price of the services correspond to the total average cost.
3. In order to secure an efficient use of the network, the SMP-operator should be allowed flexibility in its pricing decisions.
4. The SMP-operator may not use the flexibility as described above in a way that hampers competition.

PTS also makes a number of recommendations regarding specific pricing issues related to the LRIC hybrid model. A selection of these is presented here:⁷⁷

- *Price for peak-period traffic and low-period traffic*

In order to smooth traffic over the day and create incentives for users to make calls when the network is sparsely utilised, operators set different prices for peak-periods and periods with low traffic. Since the SMP-operator has easier access to data on demand and network capacity, the SMP-operator should decide the ratio between the price for peak-period traffic and low-period traffic. As a starting point, the ratio should be the same for interconnection as for end-customer traffic. Any departure from this standard must be reported by the SMP-operator.

- *Originating and terminating traffic*

The LRIC hybrid model makes no distinction between originating and terminating traffic. In practice, the costs for these two kinds of traffic can differ since originating traffic use the network somewhat more for number analysis. The general rule however, is that the

⁷⁶ PTS (2004o)

⁷⁷ PTS (2004o)

same price should be the same for originating and terminating traffic. Only if the SMP-operator can prove that one or the other has higher costs should it be allowed to set differing prices between the two.

- *Pricing of shared access*

PTS has decided that the pricing of shared access should be dependent on whether there is a PSTN subscription or not. The price for shared access is therefore only applicable if the connection is simultaneously used for fixed telephony. PTS finds it sensible that the price for shared access amounts to half the price for full access given that two products make use of the access.

- *The transitional period*

Switching from today's model based on historical costs to a model based on present costs may have a significant impact on prices for interconnection services and access prices. As a consequence, PTS finds it reasonable to gradually introduce the LRIC-model over a period of four years. The LRIC-model will then be completely implemented by January 1, 2007. Until then, the price will be a weighted average of the cost from the LRIC-model and the costs on December 31, 2003. The weightings over time are shown in Table 5-1.

Table 5-1

The transition from historical costs to LRIC

	1.1.–31.12.2004	1.1.–31.12.2005	1.1.–31.12.2006	1.1.–31.12.2007
LRIC price	25%	50%	75%	100%
Price as of 31.12.2003	75%	50%	25%	0%
Source: PTS (2004o)				

5.2.2 Unbundling obligations

The European Parliament regulation (EC) No 2887/2000 concerning Local Loop Unbundling (LLUB) went into force on January 2, 2001. For Swedish conditions, this regulation meant that TeliaSonera, which was considered the only SMP-actor on the market for the public telephone network, had to accept every reasonable request from other operators to gain access to the local loop. PTS then carried out supervisory actions to ensure that TeliaSonera lived up to these requirements.

However, recently there has been a slight change as on November 24, 2004, PTS announced two decisions on LLUB which are based on the new Swedish Electronic Communications Act.⁷⁸ Since then, TeliaSonera's obligations of providing access through LLUB are regulated in these decisions rather than in the initial regulation from the European Parliament.⁷⁹

To begin with, the PTS Decision of November 24, 2004 (No 04-6948/23, *a*) regards the establishment of LLUB as a relevant market and the identification of actors with significant power on this particular market. PTS' conclusion on the matter is the following:

1. PTS decides, based on chapter 8, § 5 of EkomL, that the Swedish market for LLUB is considered a relevant market.
2. PTS finds that TeliaSonera has an influence such as referred to in chapter 8, § 6 of EkomL on the relevant market for LLUB and therefore, *TeliaSonera is to be considered an SMP-actor.*

Furthermore, the second part of the PTS Decision of November 24, 2004 (No 04-6948/23, *b*) establishes certain obligations for actors with significant market power on the relevant LLUB-market. It thereby sets the following five obligations for TeliaSonera on the LLUB-market:

1. Based on chapter 4, § 8 of EkomL, TeliaSonera is obligated to accept any reasonable request from other operators to gain access to conventional metal subscriber lines (i.e. the physical connection in the form of a twisted pair cable connecting the subscriber's premises to the cross connect point or an equivalent connection point in the public telephone network). This obligation includes both full access which allows the use of the entire frequency range in the twisted pair cable, and shared access which means the use of parts of the frequency range of the twisted pair cable. Furthermore, the obligation includes access to installations relevant for full or shared access, for instance collocation. Finally, the obligation includes access to support systems, information systems or similar functions necessary to provide for the purpose of the access. All the above types of access should be granted without delay and without irrelevant conditions being imposed for allowing access.

⁷⁸ PTS (2004g) & PTS (2004h)

⁷⁹ PTS (2004c)

2. TeliaSonera is obligated on the basis of chapter 4, § 11 of EkomL to apply cost-based pricing according to the LRIC-model for access to conventional subscriber lines and related installations.
3. TeliaSonera is obligated, based on chapter 4, § 6 of EkomL, to apply non-discriminating conditions for access to conventional subscriber lines and related installations.
4. TeliaSonera is obligated, based on chapter 4, § 7 of EkomL, to present separate accounting for its business in relation to the provision of access to conventional subscriber lines and related installations to PTS on a yearly basis or on demand. The company must also hand in its reports, including information on revenue from other business, to PTS.
5. TeliaSonera is obligated on the basis of chapter 4, §§ 5 and 9 of EkomL to publish a reference offer specifying the information on access to conventional subscriber lines and relevant installations.

5.2.3 Obligations with respect to the provision of collocation spaces and related topics which affect the costs of the access seeker

The obligation for an SMP-operator to provide collocation spaces and such is part of the decision by the Swedish regulator on LLUB that was presented above. It is considered a relevant installation for providing access to the local loop and hence, it is included among the obligations imposed on TeliaSonera. TeliaSonera's costs for providing collocation should be estimated through the LRIC-model and TeliaSonera's pricing of the service should then depart from this cost calculation. The cost results regarding collocation are presented in Appendix A.

On December 22, 2004, PTS informed TeliaSonera that it suspects the company to not fulfil its obligations according to the PTS Decision of November 24, 2004 concerning LLUB. The issue in question was directly related to collocation, as one operator had complained that TeliaSonera reserved space in its local exchanges and denied access to other actors that wanted to install equipment. TeliaSonera was informed by PTS that it may not reserve space, deny access for other operators and thereafter install its own equipment in the local exchange. The company was given until January 24, 2005 to correct this.⁸⁰

⁸⁰ PTS (2004k)

5.3 Regulation of access to higher levels in the network, i.e. bit stream access

Bitstream access permits other operators to provide end-customers with access to the Internet through xDSL transmission over existing copper wires. The operators use the incumbent operator's existing DSLAM equipment in the local exchange and do not have to install their own equipment. In general, bitstream access services will include the following:

- Lease of capacity on the copper wires (similar to shared access);
- Lease of capacity in the incumbent (SMP) operator's DSLAM equipment;
- Transport of traffic from the DSLAM to the nearest point in the SMP operator's ATM network.

Bitstream access may be a viable alternative to LLUB, especially on locations where the number of potential unbundled local loop lines per local exchange is low. In these areas, new entrants may find it economically questionable to install their own xDSL equipment and forcing them to do so would be very inefficient. It would in fact be more efficient to purchase bitstream access from the incumbent TeliaSonera. Since bitstream access requires less investment than do shared access and LLUB, it might constitute a natural first step for other operators to enter the market for broadband services. A new entrant is then allowed to build a customer base and eventually proceed to more capital intensive service provision.

It is worth pointing out that although the market for LLUB was included in the original regulation from the European Parliament, bitstream access was not and there had in fact been no regulation regarding bitstream access in Sweden whatsoever prior to PTS' decisions in November 2004.

To start with, the PTS Decision of November 24, 2004 (No 04-6949/23, *a*) regards the establishment of the market for wholesale broadband access in the form of bitstream access as a relevant market and the identification of actors with significant power on this particular market. PTS' conclusion on the matter is the following:

1. PTS decides, based on chapter 8, § 5 of EkomL, that *the Swedish market for wholesale broadband access in the form of bitstream access is considered a relevant market.*

2. PTS finds that TeliaSonera has an influence such as referred to in chapter 8, § 6 of EkomL on the relevant market for wholesale broadband access in the form of bitstream access and therefore, *TeliaSonera is to be considered an SMP-actor*.

Furthermore, the second part of the PTS Decision of November 24, 2004 (No 04-6949/23, *b*) establishes certain obligations for actors with significant market power on the relevant market for wholesale broadband access in the form of bitstream access. It thereby sets the following five obligations for TeliaSonera on the market in question:

1. Based on chapter 4, § 8 of EkomL, TeliaSonera is obligated to accept any reasonable request from other operators to gain bitstream access. Bitstream access involves physical access to a point of interconnection (“överlämningspunkt” in Swedish) for delivery of bitstream accesses in connection to TeliaSonera’s access and transport network. Furthermore, the obligation includes access to installations relevant for bitstream access, for instance collocation. Additionally, the obligation includes access to support systems, information systems or similar functions necessary for the purpose of the access. Finally, it includes access to technical interfaces, protocols and other key technology needed for bitstream access. All the above types of access should be granted without delay and without irrelevant conditions being imposed for allowing access.
2. TeliaSonera is obligated on the basis of chapter 4, § 11 of EkomL to apply margin-based pricing, so called *retail-minus pricing*, for bitstream access.
3. TeliaSonera is obligated, based on chapter 4, § 6 of EkomL, to apply non-discriminating conditions for bitstream access.
4. TeliaSonera is obligated, based on chapter 4, § 7 of EkomL, to present to PTS separate accounting for its business of providing bitstream access on a yearly basis or on demand. The company must also hand in its reports, including information on revenue from other business, to PTS.
5. TeliaSonera is obligated on the basis of chapter 4, § 5 of EkomL to publish a reference offer specifying the information on bitstream access.

5.4 Wholesale and resale obligations and the respective tariffs

Wholesale line rental is yet another way for operators to supply network access. However, it should not be considered a direct substitute to bitstream access or copper access services,

since a wholesale subscription service will offer customers PSTN services and not broadband access. This kind of arrangement gives new entrants the opportunity to offer both line rental and calls to end-users, thereby competing against TeliaSonera's retail subscription service.⁸¹

Below is a summary of PTS' decisions concerning access to the public telephone network at a fixed location for residential and non-residential customers.⁸² The decisions are identical when it comes to the regulatory obligations and are therefore presented as one. The relevant market for residential customers is included in the Commission's Recommendation on relevant markets as market no. 1, and that for non-residential customers is included as market no. 2. On both markets, TeliaSonera is designated an undertaking with significant market power (SMP). TeliaSonera has a market share exceeding 99% on the residential market, and around 91% on the non-residential ditto. The following obligations for TeliaSonera were proposed on both the aforementioned markets:

- *Requirement to provide WLR (Wholesale Line Rental)*
- *Obligation concerning pricing (retail-minus)*
- Requirement not to unduly discriminate
- Requirement to publish a reference offer
- Accounting separation obligation
- Obligations concerning calls not comprised by carrier pre-selection
- Obligation to provide unbundled broadband access

5.5 Regulations with respect to consumer prices

The Telecommunications Act of 1993 introduced the possibility for the government to establish a price cap for certain products or services.⁸³ Initially, the price cap concerned a basket of various telephony services but in 1997, the scope was narrowed down to include only subscription fees and related services such as installing or moving a phone line.⁸⁴ The grounds for not including traffic charges in the regulation were that there was already competition on

⁸¹ Based on AMI (2004)

⁸² PTS (2004I) & PTS (2004m)

⁸³ As regulated in 31 § of the Telecommunications Act.

⁸⁴ This was regulated in (SFS 1997:400)

international calls at the same time as the possibility for increasing tariffs on local calls was considered to be limited. According to the regulation, the price change for household and business subscriptions could not exceed the yearly change of the net price index.⁸⁵ The reason for introducing price cap regulations was the lack of competition on certain sectors of the Swedish telecom market. The regulation was aimed at protecting consumers against too severe price increases.⁸⁶ The 1997 regulation on a price cap on subscription fees expired on January 1, 2001 and since then, Swedish legislation and regulatory efforts have been entirely focused on interconnection and access charges. In other words, at the time of writing there is no regulation with respect to consumer prices in Sweden.

5.6 Implementation of regulatory rules

If a telecom market actor does not comply with the regulations in the Electronic Communications Act, the Swedish regulator The National Post and Telecom Agency (PTS) can take action in different ways. Some conflicts are resolved through information efforts while others require supervision in some form or decisions. PTS collects complaints from consumers but it also conducts its own investigations to control the functioning of the market. Provided that PTS becomes aware of a problem in the market and it has authority to act according to the relevant legislation, it can initiate supervision. PTS will then contact the company in question in order to receive its view on the issue. Many controversies and issues are in fact resolved this way, for instance through the company voluntarily changing routines and procedures that are not working.⁸⁷

In other cases, PTS can inform the company and stipulate that it takes certain actions. If the company fails to correct itself, PTS can issue a warning of imposing a fine. PTS' decisions can be contested by appealing to the Swedish County Administrative Court. Below is an illustration of the different actions that can be taken by PTS together with the process for appealing its decisions.

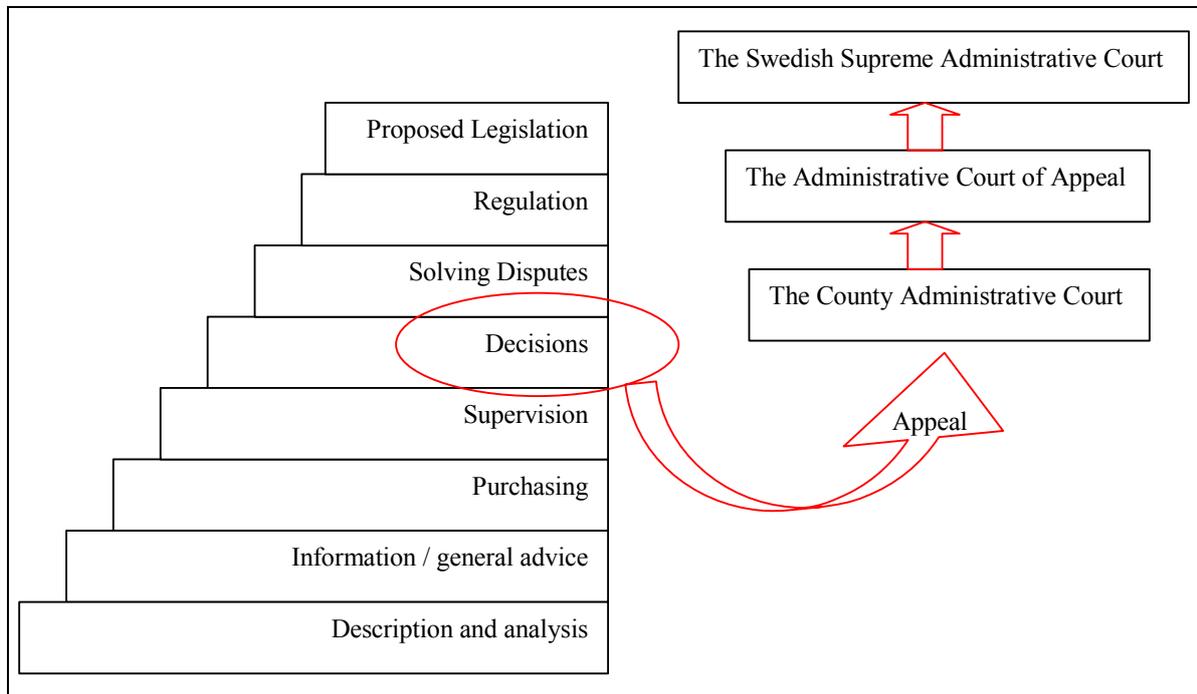
⁸⁵ The net price index shows the average development of consumer prices adjusted for indirect taxes and subsidies.

⁸⁶ PTS (2000b)

⁸⁷ This paragraph is based on PTS (2005)

Figure 5-1

The PTS staircase of action and the possibilities to appeal the decisions of the regulator



Source: PTS (2004p) and interviews with officials at PTS

Apart from PTS, other authorities involved on the telecom market are the following:

- *Konsumentverket (The Swedish Consumer Agency)*

The Consumer Agency works on a wide variety of consumer issues. Its fields mainly relate to advertising and contract terms, consumer information and education, domestic finances, product safety, product quality and environmental impact.

- *Allmänna reklamationsnämnden (The National Board for Consumer Complaints)*

Its main task is to impartially try disputes between consumers and business operators. Petitions are filed by the consumer.

- *Konkurrensverket (The Swedish Competition Authority)*

The Swedish Competition Authority works to safeguard and increase competition in Sweden. In addition to applying the Competition Act, the Authority provides proposals for changes to rules and other measures to eliminate obstacles to effective competition. An example of the Competition Authority taking action against a violation of the Competition

Act, came on December 21, 2004, when it sued TeliaSonera for SEK 144 million.⁸⁸ This lawsuit is further described below.

5.6.1 Impediments of implementation: delays, deficiencies of implementation rules

There is a natural delay in the implementation of PTS' decisions that comes from the possibility to appeal its decisions in court as described earlier. This is however justified by arguments of legal security and it should not be confounded with the regulation not functioning properly. Nevertheless PTS has on at least one occasion moved to adjust a clause that was considered ineffective. The clause in question had to do with fines for delays in delivery and the issue is described below.

Clause on fines for delays in delivery

With respect to the supervision of TeliaSonera's reference offers according to the LLUB-directive. PTS has pointed out that the original wording of the LLUB-regulation was ineffective. Thereafter, TeliaSonera has suggested voluntary actions on their part to change the clause. PTS is yet to say something about the suggestion. The question is whether or not the clause has sufficient power considering the fact that the number of delayed deliveries is still high.

The new reference offer basically implies that TeliaSonera Network Sales has to pay a fine for each week of delay that exceeds five days. The fine is SEK 50 for copper access and for collocation SEK 250 multiplied by the number of 100 pairs of copper wires out/ingoing to the local exchange. In addition to this, the operator shall receive compensation for proved costs. This only applies if TeliaSonera is responsible for the delay.

5.6.2 Litigation (law suits, arbitration, complaints to regulator)

As pointed out earlier in this report, the market for telecommunications in Sweden is regulated by the Electronic Communications Act. Based on this act, the regulator PTS intervenes on the market when it finds that competition is not working properly or when it receives complaints from the actors involved. PTS can then take decisions that basically serve as amendments to the original act. The decisions can be contested in a court of law. Below is a review

⁸⁸ Konkurrensverket (2004)

of some of the more significant litigations in the form of lawsuits, actions taken by PTS and complaints to the regulator during the last couple of years.⁸⁹

The Swedish Competition Authority sues TeliaSonera

On December 21, 2004, The Swedish Competition Authority sued TeliaSonera for SEK 144 million for breaking Swedish competition law.⁹⁰ According to the lawsuit, TeliaSonera has abused its dominant position during the period from April 2000 to January 2003 by applying too low a margin between the wholesale price of retail products for ADSL and the price for ADSL services that TeliaSonera offers consumers. This margin was not even sufficient to cover TeliaSonera's additional costs for providing the service to customers, thereby making the wholesale price too high in comparison with the price for consumers. Such a situation makes it virtually impossible for other operators to compete with TeliaSonera's offerings to consumers and this is regarded by the Swedish Competition Authority as margin squeezing and abuse of a dominant position.

PTS investigation: One time charges for LLUB-access

During the fall of 2003, PTS carried out an investigation of the one time fees that TeliaSonera charge for request, order and delivery of access to copper wire and collocation. Obviously, LLUB-access involves more charges than these, but since most are included in the LRIC-model described previously, on this occasion PTS focused on the ones that do not enter into the model. PTS audited TeliaSonera's cost estimations and verified them by visiting the units at the company that handle the various tasks in question. The audit led to PTS informing TeliaSonera on December 16, 2003 that it had to correct its pricing of requests for collocation and installation of wires etc. TeliaSonera subsequently adjusted its prices.⁹¹

PTS investigation: Access to local exchanges

TeliaSonera is obligated to provide access for other operators to its local exchanges if they receive a reasonable offer. Access to the local exchange is a prerequisite for other operators to be able to offer xDSL-services and it is therefore crucial to the development and competition

⁸⁹ The overview is based on PTS (2004c)

⁹⁰ Konkurrensverket (2004)

⁹¹ This paragraph and the following draw heavily upon PTS (2004c:17–20)

of the market. Since May 12 2004, PTS are conducting an audit to investigate whether TeliaSonera accepts every reasonable offer to access the local exchanges. Today, TeliaSonera denies access to many of the most strategically important stations, arguing that the stations are full. In order to check the situations in the stations, PTS together with consultants have made several visits to selected locations. The conclusion from these visits was then used as the base to construct a new proceeding where TeliaSonera now has to present and motivate the reasons for not granting access to other operators. The other operators can also demand a deeper investigation on possible actions to increase the capacity of a particular station.

PTS informs TeliaSonera: Collocation in reserved spaces

TeliaSonera was informed on December 22, 2004 that the company in order to comply with PTS decision of November 24, 2004 regarding obligations for an SMP-operator on the LLUB market is not allowed to reserve space in its local exchanges, deny other operators access and then place its own equipment to offer broadband services to end customers. Such actions are discriminating towards other operators since it gives TeliaSonera considerable competitive advantages by reserving space in advance and later offering broadband services while other operators lack this opportunity and are potentially shut out of the market. From a consumer's perspective, it could also mean that potential customers have to wait for broadband services even if there are actors prepared to supply them. If TeliaSonera does not correct its behaviour according to the PTS information by January 2005 at the latest, PTS can impose a fine.

PTS informs TeliaSonera: Switching xDSL- operator without time gaps

PTS informed TeliaSonera on October 6, 2003 that switching operators from one xDSL-supplier to another should take place without time gaps since it would otherwise hinder competition. TeliaSonera presented an interim solution and has since established procedures for switching without time gaps.

PTS informs TeliaSonera: Switching from ISDN to xDSL

If a private customer wishes to change from ISDN-services to xDSL with an operator other than TeliaSonera, there is a waiting period of two weeks when the customer has neither ISDN-access, nor xDSL-access. If the customer on the other hand switches to TeliaSonera's xDSL-services, there is no waiting time. Hence, the conditions for competition on the market are unbalanced. PTS informed TeliaSonera on December 1, 2004 that the company is thereby

failing to fulfil its obligations to offer other operators access to the local loop on the same conditions and with the same quality that TeliaSonera offers in their own services and xDSL-products. If TeliaSonera fails to act up by January 10, 2005, PTS can impose a fine.

PTS informs TeliaSonera: Delivery of copper access at end customer relocation

PTS informed TeliaSonera on December 22, 2004 that it suspects that TeliaSonera does not provide adequate access to the copper wires when customers move, keep their phone number and wish to bring their broadband subscription with them. For other operators, there is a lead time of two weeks, during which the end customer has no broadband access at the new address. This should be compared to operators offering broadband services through TeliaSonera's more refined product "Skanova Bredband ADSL" which is based on access to the copper wires. In this case there is only a one day lead time which makes it more advantageous to switch to TeliaSonera's product and thereby, competition is not balanced.

If TeliaSonera does not respond properly to this PTS information by January 24, 2005, PTS can impose a fine.

PTS informs TeliaSonera: Halt on orders for copper access

PTS informed TeliaSonera on July 30, 2004 that the company, by introducing a halt on orders for copper access between July 16 and July 30 2004 had failed to live up to its obligations to accept every reasonable request and thereby acted against the principle of non-discrimination since TeliaSonera had continuously provided copper access for internal use. PTS informed the company that it had to reach full capacity in accepting orders by August 30, 2004 to the same extent that it accepts internal orders. TeliaSonera has taken actions in accordance with the PTS information.

Complaints to the regulator from the public

PTS has been commissioned by the Swedish government to produce a yearly report on the type and extent of public complaints made to telecom operators or to PTS. In the report covering complaints filed during 2003,⁹² PTS also included summaries of complaints filed to the Swedish Consumers Agency and the National Board for Consumer Complaints. During 2003, PTS received slightly more than 4000 complaints, of which 1900 concerned bills and in-

⁹² PTS (2004j)

voices. Roughly 1600 of these were from consumers who had received invoices for services they claim not to have used or agreed to purchase. Many also had to do with so called modem hijackings. Of the remains, around 130 concerned ADSL. Most commonly, the latter complaints are about not being able to receive broadband access, about the operator not living up to the promised connection speed, about terms and conditions that are considered unrealistic or about problems when switching operators. A few of the complaints are explicitly on competition not working properly on the market for ADSL-access to the Internet.

Turning to the operators, out of the 4000 complaints filed to PTS during 2003 a company named Callmedia received 1341, of which the vast majority had to do with illegitimate invoicing for Internet services. TeliaSonera was subject to a total of 431 complaints and 88 of these concerned ADSL whereas 63 were related to subscription in general.

5.7 Performance indicators⁹³

The first commercial broadband services in Sweden were launched in the late 1990s. Although trials had been carried out by Telia in 1995 and by Cable TV operators later on,⁹⁴ the year 1999 was in many respects the year that marked the inception of the Swedish broadband market.⁹⁵ The term broadband to households was introduced that year when, among others, Swedish Internet entrepreneur and broadband evangelist Jonas Birgersson launched the idea of building new access networks to households in order to be able to offer high transfer rates and eventually broadband services.

5.7.1 Diffusion of broadband technology

Sweden was an early leader in the take-up of broadband technology, having the third highest penetration in the OECD by 2001. Two years later though, Sweden had fallen to position number eight. The early rapid take-up of broadband coincided with Sweden having among the lowest broadband access prices in the OECD in 2001. Prices subsequently rose at a time when

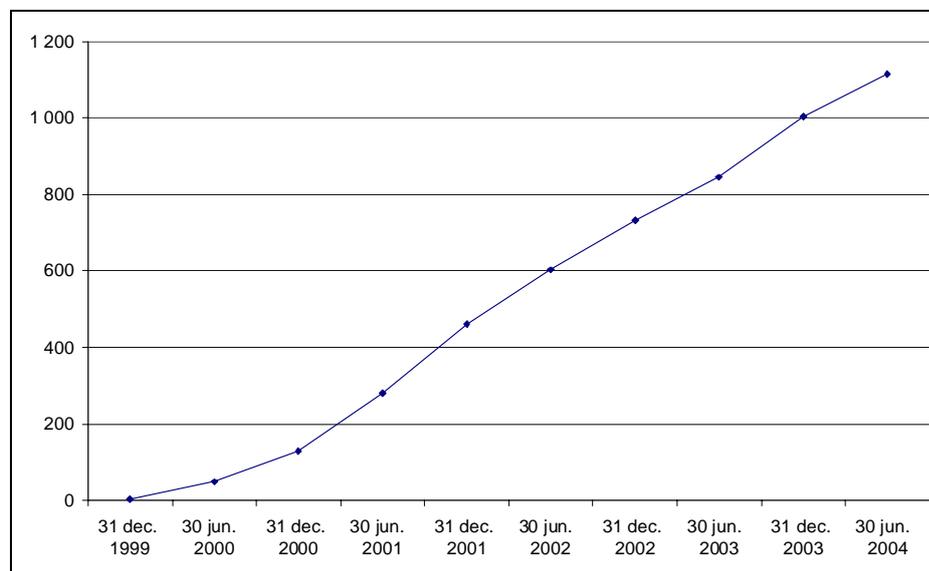
⁹³ This entire chapter is based on Lindmark et al. „*The Swedish Broadband Market*” to appear in the forthcoming publication *Broadband, Information Society and National Systems*, edited by Martin Fransman for Stanford University Press

⁹⁴ PTS et al (2001:13)

⁹⁵ At the end of 1999, there were approximately 3,800 connections via leased lines to the Internet in Sweden, so-called fixed access. All of these were commercial subscriptions. The three largest parties Telia, Tele2 and Telenordia were even more dominant in the market for fixed accesses than for dial-up accesses, together having some 80% of the market. The other companies included Sonera, WorldCom, Global One, and also IT companies, as for example WM-data, Enator and others normally not acting as ISPs. (PTS 2000a:59–69)

they were generally falling in other countries.⁹⁶ As indicated in Figure 5-2, diffusion rates slowed down slightly in 2002 and the first half 2003, to gain pace again in later in 2003.

Figure 5-2
Broadband subscribers in Sweden



Source: www.pts.se

One of the chief reasons for Sweden's early success with broadband diffusion was the new entrant (Bredbandsbolaget) that began offering high speed access at relatively low prices. This in turn made the incumbent Telia's own offers far more competitive. Bredbandsbolaget began by offering broadband access (10 Mbps) to apartment buildings, using Ethernet LANs at what was then the least expensive price for broadband access in the OECD. Responding to Bredbandsbolaget's offer, Telia kept their prices for broadband access low, at least compared to operators in other countries. As the market developed, Telia started to differentiate prices for apartment buildings and individual dwellings which were not served by Bredbandsbolaget.⁹⁷ During the second half of 2003, the Swedish market showed signs of becoming increasingly competitive. One influencing factor was probably that Telia had to divest its CATV company Com hem following its merger with Sonera. Com hem then quickly started to offer broadband services significantly undercutting the prices of TeliaSonera.⁹⁸

⁹⁶ OECD (2004:53–54)

⁹⁷ OECD (2004:53–54)

⁹⁸ OECD (2004:53–54)

5.7.2 Quality of access (waiting lists for broadband connection, capacity of lines, lock in practices etc.; conditions for switching suppliers)

How competitive are the offerings of the Swedish broadband providers in an international perspective? Starting with price, it is notoriously difficult to obtain any comparative tariff data but according to a study made by IDC for the Danish IT and Telecom Agency in September 2004, Sweden ranked among the cheaper European countries on broadband tariffs. The study compiled average tariffs for three broadband categories (512 kbps, 2Mbps and 4 Mbps). Swedish tariffs were 273 Dkr (SEK 332, € 37), 338 Dkr (SEK 412, € 45) and 359 (SEK 438, €48) per month respectively (including taxes). This put Sweden as the 3rd to 5th cheapest broadband country in Europe, with only France and Belgium being less expensive in all three classes.⁹⁹ Thus it seems fair to claim that Sweden's prices are comparatively low.

Proceeding to lock-in practices, note that in the early days of the Swedish broadband market, a de facto ceiling for how high the monthly charges should be was established. Framfab founder Jonas Birgersson played an important role as a carrier and speaker of this vision and the SEK 200 (€ 22) "the price of a monthly bus ticket", became something of an axiom.¹⁰⁰ As it turned out however, this price was too low, since it was based on operators' expectations on revenue streams coming from content and on more rapid adoption rates. When this did not happen as expected, the operators felt compelled to compensate with long-term exclusive contracts with the customers, creating lock-in effects for the consumers.¹⁰¹ In the spring of 2001 several of the network operators increased of their monthly charges. Telia has increased its charge ADSL from SEK 250 per month to SEK 325 in September 2001, and then to SEK 375 in March 2002. Telia claimed that price rises were necessary to cover the cost of expanding DSL access to areas not covered by their initial deployments¹⁰². UPC increased its monthly charge from 250 kronor to 299 kronor and Bredbandsbolaget from SEK 200 to SEK 320 in March 2002.¹⁰³

As far as quality of access is concerned, there has been a trend in recent years towards offerings with higher data rates. Bredbandsbolaget for instance is primarily offering services with

⁹⁹ <http://www.itst.dk/static/Markedsundersogelser/EuroprisBenchmark.pdf> (Accessed 28 December, 2004).

¹⁰⁰ Engren & Kronberg (2003).

¹⁰¹ This paragraph is based on PTS (2001:32,33) and PTS et al. (2002)

¹⁰² OECD (2004:53–54)

¹⁰³ PTS (2003a:36)

high data rates. Bostream (which is now a part of Bredbandsbolaget) offers *Scream*, a VDSL service with up to 26 Mbps, available only if located within 300m of an exchange however. For long TeliaSonera did not seek to offer exceptional broadband access speeds. Nevertheless, in late 2003 they launched a new range of higher speed offers. These are available in major cities in Sweden, and where municipal authorities are investing in ADSL technology as part of the Swedish government's broadband initiative or (for the VDSL service) in Stockholm only.¹⁰⁴ Here it should be mentioned, that the capacities of the broadband connections have been claimed to be exaggerated. For the purpose of counteracting faulty claims and establishing correct performance measures, the Swedish IT-commission developed software that allows users to measure the performance of their own connections. The software is called TPTEST and was made available on a number of authorities' websites.¹⁰⁵

When it comes to waiting times and conditions for switching suppliers, the incumbent operator TeliaSonera has been accused of anticompetitive behaviour such as deliberately delaying other operators' installations of broadband. On this issue (and quite a few others), the National Post and Telecom Agency (PTS) has taken action as is described earlier in Chapter 3 of this report. Other factors restraining competition have been house owners having limited choice regarding, which area network to connect to, even if they had not signed an exclusive deal with an Internet service provider. Customers faced difficulties if they wanted to switch ADSL provider, both practical difficulties of service providers making this switch difficult, and in the form of long subscription contracts, as well as high investment cost in equipment if they wanted to switch between access technologies (e.g. from ADSL to Cable TV access).¹⁰⁶

5.7.3 Intermodal competition (alternative infrastructures)

Networks based on fibre-optic cable and radio links now total 175,000 network kilometres in Sweden. This is an increase of ten percent compared with the previous year. The increase has been in fibre as shown in Table 5-2.

Table 5-3 shows Internet subscribers are distributed over the various access technologies available on the market. Recently xDSL has been taking market shares from the other tech-

¹⁰⁴ OECD (2004:53–54).

¹⁰⁵ PTS et al. (2002:25); TPTEST is available for free download at www.tptest.se

¹⁰⁶ PTS et al (2002:36–39)

nologies. In Q2 2004 for example, some 75% of new subscriptions were xDSL,¹⁰⁷ of which a large majority was ADSL. Since mid 2003, xDSL via LLUB has grown rapidly, and by now it constitutes the most rapidly growing form of broadband access, although still at low level.¹⁰⁸

Table 5-2

IT infrastructure with high connection speeds, network kilometres, 2001-2003

Technique	2001	2002	2003
Radio	62000	64000	64000
Fibre	83000	96000	110900
Total	147000	160000	174900
Source: PTS (2003c)			

Table 5-3

Internet subscribers per access technology (thousands)

	02-06-30	02-12-31	03-06-30	03-12-31	04-06-30
PSTN	2 264	2 235	2 187	2 149	1 925
ISDN	123	117	102	90	76
xDSL*	337	421	484	581	661
* of which ADSL		417	478	566	641
* of which VDSL				7,8	12,3
PLC (power line)	0,3	0,4	0,4	0,3	0,1
Cable TV	128	157	179	212	229
Radio	2,5	3,0	4,3	6,2	6,3
Satellite			0,5	0,7	0,8
Other*	136,0	151	177	204	217
* of which LAN		141	167	194	208
Total Internet	2 990	3 084	3 134	3 243	3 115
Source: PTS (2004b)					

The FTTH market has been difficult to map but a modest attempt is provided here. When it comes to fibre LAN, in June 2003 there were 153.300 access subscriptions in Sweden (of which 145.300 private customers), up from 130.300 in December 2002.¹⁰⁹ Bredbandsbolaget had established 270 000 fibre LAN accesses in August 2003, of which 100 000 were signed

¹⁰⁷ PTS (2004c:10)¹⁰⁸ PTS (2004c:10)¹⁰⁹ PTS (2003b)

up as Internet connection customers.¹¹⁰ Since the company had only sold VDSL connections since June 2003¹¹¹, it can be assumed that almost all of these were fibre LAN customers. This would give Bredbandsbolaget a 65% market share in mid 2003 (69% if only the private customers are counted). Since Bredbandsbolaget only started offering Internet connections to corporations in April 2003¹¹² the vast majority of the customers were private.¹¹³ TeliaSonera claims to have 80% market share in fibre access connections (physical cables). We presume that TeliaSonera counts the number of business users connected, rather than the number of connections. Since the number of connected consumers is very low, this would give TeliaSonera a large market share. As we have not received any statistics from the company other than the “80%” figure, we cannot determine how the calculations are made. It is not known to the authors how the remaining market shares are distributed.

Alternative network technologies (besides XDSL, LAN and Cable) have raised serious interest from time to time, although they have been adopted a very low degree. For instance, during 1998, much attention was paid to the use of the electricity supply network as an access network for telecommunications services.¹¹⁴ However, the technology has taken longer than anticipated to develop, and is currently (late 2004) offered on a limited basis only. Satellite is also used only on a limited scale, to customers with no other option for broadband access. FWA (fixed wireless access) enables large broadband coverage to a relatively limited infrastructural cost. PTS (2004c) states that from the consumers view, the investment cost is rather large and FWA is therefore likely to address the corporate segment initially.

The technology that in recent years has gained most attention is WLAN. WLAN access is offered in several ways and with different business model. The most common ones are probably (1) public access through an operator; (2) broadband access through an ISP; (3) private access. In 2003, there were six public WLAN operators: Telia (more than 700 surfzones all over Sweden), Powernet (around 50 in South Sweden), Firstnet (circa 10 in three towns), Default (7 in Stockholm), Amazing Ports (Stockholm) and Firstnet (1 in Stockholm). In addition, there are a number enthusiast establishments (e.g. Stockholm Open, Elektrosmog and

¹¹⁰ Svenska Dagbladet (2003-08-07)

¹¹¹ Computer Sweden (2003-05-21)

¹¹² www.bredbandsbolaget.se, accessed 2004-03-25

¹¹³ Note: The PTS statistics used indicate a small number of corporate subscriptions. It might be the case that Telia calculates the number of actual users, rather than connection lines in their statistics.

¹¹⁴ PTS (2000a:63)

Nora Wireless) offering WLAN access for free. Telia's Homerun service launched already 1999, is by far the most ambitious one in Sweden, including roaming agreements with 9 countries in Europe. Fixed WLAN based broadband access is offered to households by a handful of ISPs, including some of the above mentioned.¹¹⁵

5.7.4 Division of market incumbent and new entrants

At the time of writing, there are almost 100 broadband service providers in Sweden. A majority of those are small and local, and also differentiated in terms of market segments served and access technology used.¹¹⁶ The three largest broadband suppliers, i.e. the incumbent operator TeliaSonera, Bredbandsbolaget, and com hem, together hold more than 75% of the market. This market share has been fairly stable over the last three years. Table 5-4 below shows the market shares of the major broadband players.

Table 5-4

Market shares – active customers with fixed Internet access

ISP	2000	2001	2002	2003
TeliaSonera	41%	54%	54%	42%
Bredbandsbolaget		15%	12%	14%
com hem				11%
Bostream		9%	9%	9%
UPC	20%	11%	8%	7%
Glocalnet			0,1%	3%
Spray			1%	2%
Others	39%	11%	16%	12%

Source: PTS (2004a:79).

Note: Fixed Internet connections include xDSL, PLC, Cable TV, radio, satellite and other fixed access forms. During 2004 Bostream and Bredbandsbolaget merged. Tele 2 is excluded from these statistics, but had only a 3% market share in 2002.

5.8 Other issues relevant for regulation of local loop access

Although the regulatory framework for telecommunications has emphasised competition, the Swedish government has played a rather large role in a wider notion of IT and E-policy both

¹¹⁵ Based on PTS (2004d) and <http://internetworld.idg.se>

¹¹⁶ PTS (2004a:46).

directly and indirectly. For example, through the ownership of companies such as Telia, Vattenfall, Svenska Kraftnät, Banverket and Teracom, the state still controls a large share of the total communication backbone systems.

IT as a whole has received an important place on the political agenda in Sweden in recent years, through the specific development of an "IT-policy". In 2000 the Swedish government expressed ambitious goals for broadband development. It was established in the government's IT Bill that the goal for Swedish IT policy would be that Sweden, as the first country, should become an information society for all.¹¹⁷ In the first instance this was to take place under the auspices of the market but the state had an overall responsibility to ensure through various measures that an IT infrastructure with a high data rate would become available throughout Sweden.¹¹⁸ The exact phrasing of the bill was a bit vague and consequently, the proposition was later perceived by the public as a promise of "broadband for all".¹¹⁹ As a result, many were disappointed since they have still not received a broadband connection, and may not be able to do so for quite some time.

Three areas are prioritised in Swedish IT policy: IT trust, competence to use IT, and accessibility to IT services. In recent years, stimulating activities have been performed in all three areas, summarised in Table 5-5 below.

In order to achieve the ambitions declared in the IT-bill, a national infrastructure program was prepared which, among other things, contains proposals for a number of state support measures aimed at facilitating investment in, above all else, sparsely populated parts of Sweden.¹²⁰ The proposed measures that were associated with financial undertakings included (1) support for regional and local telecommunications networks in areas that were not supplied with ICT infrastructure through the market, (2) tax allowances for natural and legal persons for broadband connections, and (3) a basic network with high levels of access for all municipalities in the country.¹²¹ The government support was not targeted to any specific market actor, in compliance with the Rome Treaty.

¹¹⁷ Regeringens proposition 1999/2000:86, *Ett informationssamhälle för alla* (An information society for all)

¹¹⁸ This paragraph is based on PTS (2001:32,33)

¹¹⁹ ITPS (2003)

¹²⁰ PTS (2001:32)

¹²¹ ITPS (2004a:67)

Table 5-5
Selection of IT initiatives by public authorities

IT trust	Competency to use IT	Accessibility to IT services
<ul style="list-style-type: none"> • Jointly developed standards for electronic signatures by public administration authorities • New electronic communications laws, placing Internet communications alongside television and radio 	<ul style="list-style-type: none"> • Tax reductions on company computers bought for employees' private usage • ITiS project (SEK 1.7 billion during 3 years) to raise IT literacy among school-teachers 	<ul style="list-style-type: none"> • Tax reductions for broadband access installations • Proposal of opening up channel space in state-owned infrastructure for telecom operators • State-owned companies obliged to build high-speed backbone infrastructure • Implementation of the "24/7 authorities"

Source: Compiled from various government reports and proposals.

The first ordinance of the ICT infrastructure program entered into force on July 1, 2001. In this and subsequent ordinances, it was laid down, among other things, the conditions (co-financing and an approved IT infrastructure program) for receiving support for networks that link different places together and for area networks. Initially, support was intended up until 2004, but this was extended to 2005.¹²² However, recently the government froze the broadband support payments to the municipalities to be paid out during 2005. This decision has created protests from the rural municipalities.¹²³

5.9 Final Remarks and Conclusion

As pointed out in this paper, Sweden was an early starter in liberalizing its telecom market and consequently, Sweden has come quite a long way in increasing competition. On the same note, Sweden was an early leader in the take up of Internet and broadband technology and the government has played an important role in recent years to create incentives to stimulate

¹²² ITPS (2004a:67–68)

¹²³ Sveriges Radio – Ekot „Kommuner kräver pengar för frysta bredbandsbidrag" (Radio broadcast in Swedish 2005-01-28).

broadband diffusion. Nevertheless, the market is not yet functioning without friction as is indicated by the many actions taken by the National Regulatory Agency (PTS) against the incumbent operator TeliaSonera.

One of the issues of this paper has been to address service versus infrastructure competition. Clearly, there are many trade-offs to be considered in this context, both from theoretical and empirical vantage points. Among others, relevant measurements are not always easy to define. For example, effective infrastructure competition is often preferred to service competition because of the fact that it allows for direct competition between operators while at the same time requiring only a minimal need for intervention on the part of the regulating authority since the competitors do not rely on the infrastructure of the incumbent operator (i.e. TeliaSonera in Sweden). For infrastructure competition to be sustainable however, the new entrants must be able to compete against the incumbent on a level playing field. This is not always the case due to the substantial economies of scale involved in constructing an access network. If regulations are designed so as to stimulate infrastructure competition at the expense of service based competition, for example through stipulating relatively high access charges, it might give rise to inefficient duplication of access network infrastructure by new entrants. High access charges may also, provided that they are high enough to discourage entry, cause underinvestment in competitive broadband infrastructure such as DSLAM equipment located in TeliaSonera's local exchanges, collocation and backbone networks. If on the other hand access charges are set relatively low, there may be too little investment in alternative access infrastructure which may eventually lead to lower infrastructure competition.¹²⁴ So, basically new entrants on the market have to choose between investing in their own infrastructure in order to service end-users and buying access from TeliaSonera. For PTS, the issue is to apply the right kind of regulation that creates the right kind of incentives to maximise economic efficiency and encourage operators to make appropriate build or buy choices. The regulatory goals and strategies will undoubtedly be discussed many times in the future.

¹²⁴ This paragraph draws heavily on AMI (2004)

5.10 Appendix – Cost results from the LRIC Hybrid Model¹²⁵

Core services

Service, öre	Avg. cost per min.
IC Local segment in & out	4,47
IC metro segment in & out	4,86
IC region segment in & out	4,86
IC double segment in & out	5,61
IC single transit	0,66
IC double transit	1,52

Service, SEK	Installation	Annual costs
Regional POI*	69 236	39 070
Local POI	34 218	19 535
Interconnection capacity	6 314	635
Note: *) includes two POI		

Access services

Service, SEK	Installation			Quarterly costs
	First line	2-20 lines	>21 lines	
Full copper access	1 199	715	550	338
Shared copper access	839	503	380	169

¹²⁵ The tables are based on PTS (2004n)

Collocation services

Service, SEK	Installation	Quarterly costs
Location of equipment		
Installation fee	2 713	
Mounting (set-up) of SMP rack	7 109	
Mounting (set-up) of operator owned rack	1 924	
Station wiring		
Installation of first copper cable (<=50m)	15 293	
Installation of first copper cable (51-100m)	17 529	
Installation of additional copper cable (<=50m)	6 295	
Installation of additional copper cable (51-100m)	8 531	
Placing		
1/4 Rack space (type A)		357
2/4 Rack space (type A)		714
3/4 Rack space (type A)		1 070
4/4 Rack space (type A)		1 427
1/4 Rack space (others)		507
2/4 Rack space (others)		1 015
3/4 Rack space (others)		1 522
4/4 Rack space (others)		2 030
Operator owned copper		186
Operator owned opto cable		186
Connection plinth at SMP cabinet (DP)		30
Power, cooling and ventilation		
1-250 watt		669
251-500 watt		1 337
501-750 watt		2 006
751-1000 watt		2 675

5.11 References

- AMI (2004) Pricing Shared Access in Sweden, Discussion note for PTS (available online at www.pts.se)
- Bohlin E. et al (2004) Investment, Innovation and Telecommunication Regulation: What is the Role of the NRA?, prepared for PTS, 1 October 2004
- Computer Sweden (2003-05-21) "Het konkurrens på bredband", (in Swedish) (Swedish weekly magazine Computer Sweden, "Fierce competition in broadband")
- Engren, J. and Kronberg, T. (2003) The Market for Broadband Communications in Sweden – Its features and Development, Master Thesis, Dept. of Industrial Economics and Management, Royal Institute of Technology, Stockholm, Sweden.
- Ewertsson, L. and Hultkrantz, L. (2004) Informationssamhällets institutioner, SNS Förlag, Stockholm
- ITPS (2003) En lärande IT-politik för tillväxt och välfärd – ITPS slutrapportering av uppdraget att utvärdera den svenska IT-politiken, A2003:015
- Konkurrensverket (2004) Ansökan om stämning, 21 December 2004, Dnr 1135/2004
- OECD (2004) Benchmarking broadband prices in the OECD, (available at www.oecd.org)
- PTS (2000a) The Swedish telecommunications market 1999, 16 June 2000 (available online at www.pts.se)
- PTS (2000b) Analys av prisreglering på telemarknaden, June 2000 (available online at www.pts.se)
- PTS (2001) The Swedish telecommunications market 2000, (available online at www.pts.se)
- PTS (2003a) The Swedish telecommunications market 2002, 5 June 2003, PTS-ER-2003:21 (available online at www.pts.se)
- PTS (2003b), Telemarknaden i Sverige första halvåret 2003, (in Swedish) (Post and Telecom Agency, The telecom market in Sweden in the first half of 2003)
- PTS (2003c) Bredband i Sverige 2003 – Tillgänglighet till IT infrastruktur med hög överföringskapacitet, 15 August 2003, PTS-ER-2003-27 (available online at www.pts.se)
- PTS (2003d) I backspegeln – erfarenheter av tio år med teleregulering, 17 February 2003, PTS-ER-2003:5 (available online at www.pts.se)
- PTS (2003e) LRIC The final hybrid model, 19 December 2003, PTS-ER-2003:45 (available online at www.pts.se)
- PTS (2004a) The Swedish telecommunications market 2003, PTS-ER-2004:24 (available online at www.pts.se)
- PTS (2004b) Svensk telemarknad första halvåret 2004 (in Swedish), 22 December 2004, PTS-ER-2004:43 (available online at www.pts.se)
- PTS (2004c) Konkurrensen i accessnätet (in Swedish), 29 December 2004, PTS-ER-2004:42 (available online at www.pts.se)
- PTS (2004d) Trådlösa LAN, En teknisk marknadsbeskrivning, PTS-ER-2004:12 (in Swedish), (available online at www.pts.se)
- PTS (2004e) Beslut 24 november 2004, 04-6949/23, a (available online at www.pts.se)
- PTS (2004f) Beslut 24 november 2004, 04-6949/23, b (available online at www.pts.se)
- PTS (2004g) Beslut 24 november 2004, 04-6948/23, a (available online at www.pts.se)
- PTS (2004h) Beslut 24 november 2004, 04-6948/23, b (available online at www.pts.se)

- PTS (2004i) Faktablad: Lagen om elektronisk kommunikation (available online at www.pts.se)
- PTS (2004j) Allmänhetens klagomål på området för elektronisk kommunikation 2003, 28 May 2004, PTS-ER-2004:21 (available online at www.pts.se)
- PTS (2004k) Underrättelse 04-14965, 22 December 2004 (available online at www.pts.se)
- PTS (2004l) Summary of PTS' decisions concerning access to the public telephone network at a fixed location for residential customers, 17 November 2004 (available online at www.pts.se)
- PTS (2004m) Summary of PTS' decisions concerning access to the public telephone network at a fixed location for non-residential customers, 17 November 2004 (available online at www.pts.se)
- PTS (2004n) Cost results of the LRIC Hybrid Model version 2.1, 10 December 2004, 04-11709/23 (available online at www.pts.se)
- PTS (2004o) LRIC prismetod för grossistprodukter, 10 December 2004, 04-11709/23 (available online at www.pts.se)
- PTS (2004p) PTS aktivitetsplan 2004-2005, 21 January 2004, PTS-ER-2004:4 (available online at www.pts.se)
- PTS (2005) Faktablad Konsumenters och operatörers rättigheter och skyldigheter enligt lagen om elektronisk kommunikation (available online at www.pts.se)
- PTS, KKV and KV (2002) Alltid på! Bredbandsmarknaden ur ett konsumentperspektiv, Report from the Post and Telecom Agency, the Swedish Competition Authority and Konsumentverket (in Swedish) (available online at the home pages of the respective authorities)
- Svenska Dagbladet (2003-08-07), "Lägre mobilpriser kan göra det svårt för Bredbandsbolaget", (in Swedish) (Swedish daily newspaper Svenska Dagbladet, "Lower mobile communications prices can pose problems for Bredbandsbolaget")

6 Local loop unbundling and the strategic review of telecommunications in the United Kingdom

Jason Whalley, Strathclyde Business School, United Kingdom

6.1 Introduction

The UK telecommunications regulatory environment is presently in a transitional phase. Ofcom, the UK's regulatory authority, announced in December 2004 its decision to conduct a 'fundamental review of the telecoms sector and how it is regulated' (Ofcom, 2004a: 2). After an extensive consultation period, the review reported in mid-June 2005 suggesting significant and far-reaching changes to how the relationship between BT, the incumbent operator, and those companies wishing to access its network should be regulated.

Although the review may have come as a surprise to some, with hindsight it was probably inevitable. The creation of Ofcom, which brought together five separate regulatory bodies into a single authority, was a milestone in the regulation of the UK telecommunications market and was thus a natural point to stop and reflect on the nature and effectiveness of regulation.¹²⁶ Secondly, although the continued pace of technological advance had facilitated the development of competition in some parts of the telecommunications industry there were concerns that this was not developing as it should in other parts of the market. Thirdly, several EU directives had just been incorporated into UK law.

One area where concerns were being expressed was the relationship between wholesale and retail markets. More particularly, concern was expressed at the relationship between BT and those companies wishing to access its network to provide telecommunication services to their customers. Many of those companies wishing to gain access to BT's network, voiced their frustrations not only at the process but also the cost of such access. As a consequence, companies left the market and the broadband market did not develop as swiftly as anticipated.

This chapter focuses on the relationship between broadband, local loop unbundling (LLU) and the strategic review of telecommunications conducted by Ofcom. The remainder of this

¹²⁶ The five regulatory bodies that combined to form Ofcom were Office of Telecommunications, Radio Communications Agency, Independent Television Commission, Broadcasting Standards Commission and the Radio Authority.

chapter is structured as follows: in the following section, three phases in the regulation of the UK telecommunications market are identified and is followed by a brief overview of the broadband market. The fourth main section of the chapter concentrates on the strategic review of telecommunications, whilst the fifth examines other regulatory developments. Conclusions are drawn in the final section.

6.2 Three phases of UK regulation

In recent documents Ofcom has taken to identifying three distinctive phases of regulation.¹²⁷ Whilst it is not necessary to describe these three phases in detail, it is useful to recount them as the transition that they highlight from duopoly to competitive markets and from infrastructure to service competition inform recent regulatory developments. The three phases identified by Ofcom are as follows:

1. Duopoly: 1984–1991. The key characteristics of this period were the duopolies that existed in both fixed and mobile telecommunication markets as well as the desire to reduce the price of voice telephony services.
2. Post duopoly market and infrastructure competition: 1991–1997. Throughout this period regulation aimed to promote infrastructure competition. Two additional mobile licences were issued, and a range of investments were made in the fixed telecommunications market. A distinction can be made between that investment which focused on the access network (cable operators, business district focused operators) and that which focused on the core telecommunications network.
3. Service competition: 1997 onwards. Partly due to the implementation of EU directives, regulation since 1997 has sought to encourage infrastructure as well as service competition.

Ofcom notes that in the third phase of regulation, both service and infrastructure competition has been slow to develop. Infrastructure competition has been slow to develop as new entrants lack scale whilst service competition has been frustrated by ‘delays and inadequacies’ in the wholesale market (Ofcom, 2004e: 53). This latter area, the relationship between wholesale

¹²⁷ See, for example, Ofcom 2004a, 2004d or 2004e.

and retail markets has been a central component of UK regulation over the last couple of years.

New entrants have consistently complained that BT has abused its position in the wholesale market to enhance its competitiveness in retail markets. Whilst the range of complaints is extensive, it has been frequently alleged that BT Wholesale is slow to respond to the requests of new entrants, that the quality of service enjoyed by new entrants is less than that of BT Retail, that wholesale products are not industrialised and mass market and that prices charged for wholesale products place them at a competitive disadvantage vis-à-vis BT Retail. In addition to these complaints, Freeserve implied that the separation of BT Wholesale from BT Retail was not functioning as it should:

“The Chinese walls ... may be fooling Oftel. But to the rest of us who understand the lead times needed to bring new products to market, it’s obvious that these walls are paper thin. John Pluthero, former head of Freeserve” (Wilsdon and Jones, 2002: 53f).

Whatever the merits of the complaint, the quote does highlight the depth of hostility felt by some towards BT. The numerous delays that BT placed in the way of new entrants saw the number of companies interested in launching broadband products fall from 40 to 5 between 1999 and 2002 (Turner, 2003: 6). The relationship between BT and Oftel during this period were also strained if the following quote from David Edmonds, Director General of Oftel, is anything to go by:

“We have had some almost bitter conversations with BT during all of this year ... You hit BT with the club five times and on the sixth they finally come up with what you want. We have had almost trench warfare for much of the summer in trying to get this right” (Trade and Industry Committee (2000) cited in Wilsdon and Jones (2002: 47)).

One consequence of the declining number of companies willing to offer broadband was that BT became increasingly central to the deployment of broadband in the UK. Although BT’s move to the centre of broadband developments was accompanied by wholesale prices reductions and attempts to facilitate new entrant access to exchanges, the complaints noted above have been frequently repeated by new entrants.

6.3 UK broadband market

It is clear that BT is central to the development of broadband within the UK. Not only is BT a large Internet Service Provider (ISP) in its own right, but it also provides wholesale services to a substantial proportion of the broadband market and is the only fixed access operator with national coverage. Moreover, in some parts of the country BT is the only network provider.

6.3.1 Market share

In June 2005 the number of broadband Internet connections exceeded those of dial-up for the first time. There are 8 million broadband connections compared to 7.5 million dial-up connections (Ofcom, 2005c: 33).¹²⁸ As shown in Table 6-1, the market share held by each of the main broadband access methods has changed considerably over the course of the last year. Whilst the market share accounted for by BT retail has remained more or less constant, that accounted for by cable has declined as BT wholesale has grown. BT wholesale now accounts for 46% of all broadband connections and when other DSL providers are included it is arguably the case that DSL has driven the growth in broadband connections.¹²⁹

The products and services sold by BT wholesale support a considerable array of other broadband service providers. Some of these companies have been active in the market for a number of years, have sophisticated marketing campaigns aimed at residential and business users alike and are household names. One such service provider would be AOL, whilst Wanadoo or Tiscali would be another. Because many service providers use BT's network, the retail market share picture is somewhat different from that at the wholesale level. As can be seen from the diagram below, the three main infrastructure providers (BT, NTL and Telewest) control just over half of the retail market and three main DSL based competitors (AOL, Wanadoo and Tiscali) a quarter. The remaining quarter of the retail market is divided between numerous small ISP.¹³⁰ These vary in their market focus, geographical reach and size and cannot be described as being household names.

¹²⁸ More recent estimates announced at the start of 2006 suggest that the UK has almost 10 million broadband connections though the split between technologies is unknown (IT Week, 2006).

¹²⁹ In the second quarter of 2003, the number of broadband connections was roughly evenly split between DSL and cable modem. Since then the number of DSL broadband connections has grown at a faster rate, with the result that by the third quarter of 2004 the split was two-thirds DSL and one-third cable modem (Ofcom, 2004e).

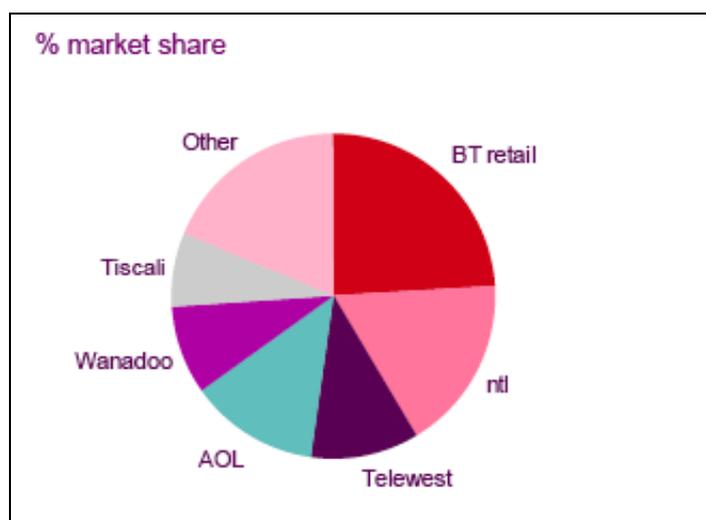
¹³⁰ A comprehensive list of service providers can be found at www.adslguide.org.uk, whilst a full list of all those companies that use BT Wholesale broadband products and services can be found at www.bt.com/broadband then click 'directory of suppliers'.

Table 6-1
UK broadband connections (000s)

	Jun 04	Sep 04	Dec 04	Mar 05	Jun 05
BT retail	1102	1283	1491	1752	1940
BT wholesale	1585	2011	2616	3180	3658
Other DSL: LLU & Kingston	29	38	53	71	105
Cable	1625	1781	1950	2119	2247
Other: Satellite & FWA	9	9	9	9	9
Total	4350	5122	6119	7131	7959

Source: Ofcom (2005c: 42).

Figure 6-1
Broadband retail market share



Source: Ofcom (2005c: 43)

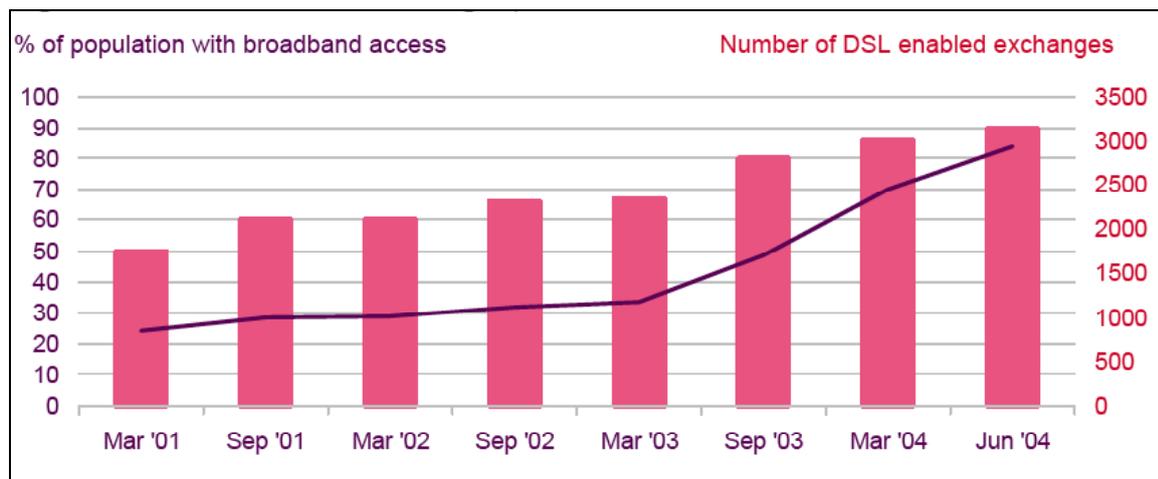
It is worth noting that many of the service providers that use BT wholesale target both the residential and business markets. Those service providers that target just one of these markets are more likely to concentrate on the business than residential markets. As they are reliant on BT’s network that covers the entire UK, they could be national in scope. Although some service providers can be identified that have purposefully limited their geographical scope to either specific regions, urban areas or business districts, it is hard to determine whether such a strategy is commonplace as no definitive and comprehensive information is publicly available. Having said this, a reasonably safe assumption to make is that more service providers,

and by extension more competition, can be found in urban areas and business districts than other parts of the country.

6.3.2 Broadband availability

There are two aspects to broadband availability: the number of DSL enabled exchanges on the one hand and alternative access technologies on the other. Since 2001 BT has steadily increased the number of its exchanges that are DSL enabled. As shown in the figure below, the number of DSL enabled exchanges has increased from 750 in March 2001 to almost 3000 by June 2004 (Ofcom, 2004d: 39). In part this increase in DSL enabled exchanges was driven by registration campaigns that sought to encourage would-be subscribers to register their interest, and through doing so breach ‘trigger levels’ that would result in BT making the necessary investment to enable the exchange.

Figure 6-2
DSL enabled exchanges, 2001-2004



Source: Ofcom (2004d: 39)

On the basis of these 3000 or so DSL enabled exchanges, around 85% of the population had broadband access as of June 2004 (Ofcom, 2004d: 39). It is worth noting that the 85% figure quoted is slightly misleading as it masked the considerable regional variation that was evident. Broadband was available across all of London and almost all of the south-east and north-west, whilst all of the English regions displayed greater access than Scotland, Wales or Northern Ireland (Ofcom, 2004d: 39).

On 27 April 2004 BT announced the immediate end of its trigger scheme. Those exchanges that had reached more than 90% of their trigger level were given a ‘ready for service’ date sometime in the following weeks (Analysys, 2004: 3). This was then followed by a June 2004 announcement that BT would systematically upgrade all those exchanges that had a trigger level by the summer of 2005 and that several exchanges would be upgraded earlier than anticipated. When completed, broadband access would be available to around 99.6% of businesses and homes (BT, 2004a). At the same time as announcing this expansion plan, BT also noted that around 100,000 premises would remain without broadband access due to the small size of the exchange. These premises are to be found in rural and remote areas across the UK. Significantly, BT stated that the delivery of broadband to these communities was dependent on the support of external partners. Such a statement clearly underlined BT’s view that the delivery of broadband to such communities is uneconomic.

External partners have come forward to support BT. In Scotland the Scottish Executive signed a contract in April 2005 with BT to upgrade 378 exchanges under its ‘Broadband for Scotland’s Rural and Remote Areas’ initiative.¹³¹ These upgrades were completed by the end of 2005, and were funded by a combination of Executive and European Regional Development Funds.¹³² In Wales, similar assistance has also been forthcoming. In 2002 an ambitious £100 million Broadband Wales programme was launched and as part of this financial assistance has been provided to BT to upgrade exchanges in rural and remote Wales.¹³³ As a consequence of these programmes, the 100,000 premises that were without broadband access has been reduced though how many still do not have access is unknown.

The second aspect of broadband availability is the variety of access technologies that are available in the UK. These range from DSL and cable modem on the one hand to FWA, WLAN and satellite on the other. Such a distinction is useful as DSL and cable modem are more widely available than FWA and WLAN.¹³⁴ The considerable variation in access technology coverage is shown in Table 6-2.

¹³¹ The Scottish Executive is the devolved government of Scotland. For details of the twenty local authorities which would benefit see, Scottish Executive (2005).

¹³² The upgrades were part of the Scottish Executive’s £24 million broadband initiative and received up to £5 million from the European Regional Development Fund (Public Technology, 2006).

¹³³ £3.6 million of European Structural Funding has been awarded to BT in Wales to upgrade 40 exchanges (Bourne, 2005). For further details of the Broadband Wales programme see, Wales Assembly Government (2005).

¹³⁴ Satellite is not included in the discussion because, due to its premium price, it is a niche product.

Table 6-2

Proportion of population (households) covered by broadband technology, Q2 2004

Technology	Current population coverage (%)
ADSL	89
FWA	13
Cable modem	45
Satellite	100
Total (ADSL, cable modem, FWA)	90
Source: Analysys (2004).	

That the coverage of cable modem is substantially less than that of DSL can be explained in part through reference to structure of the cable-TV industry. The UK awarded around 100 franchises across the country, with each franchise being a regional monopoly. These franchises were split between around a dozen different companies, though over time these have largely consolidated into two: NTL and Telewest.¹³⁵ As a consequence of the consolidation process, while NTL and Telewest operate across the UK they do not operate a national infrastructure. Cable passes around 55% of households in the UK and the majority of these have access to cable modem services. Telewest has upgraded 95% its network and NTL 70% (Analysys, 2004: 14).

The extensive upgrading of their networks is not a surprise when it is remembered how important revenue sources other than cable-TV have been to both companies in the past. From 1990 onwards cable-TV companies have been able to offer telephony services, a service that has proved to be remarkably popular with consumers and has helped offset the difficulties that they have faced in their core TV market where they face entrenched competitors like the BBC and Sky.¹³⁶ More recently telephony has been joined by Internet access to create the so-called ‘triple play’ of cable-TV, telephony and Internet access. The importance of ‘triple play’ to cable-TV operators can be seen in their annual reports where they emphasize how many of their subscribers take all three services. For instance, Telewest prominently highlights that its

¹³⁵ This is not to suggest that other operators cannot be found in the marketplace, but rather to say that these other operators are minnows in comparison. See Curwen (2004) for a discussion of the consolidation that has occurred and the precarious financial situation that cable TV companies find themselves in.

¹³⁶ In October 2005 Sky announced its intention to acquire Easynet, a pan-European ISP, for £211 million. The acquisition was approved by the Office of Fair Trading in December 2005, and went unconditional in January 2006. This purchase will allow Sky to deliver content via the Internet.

‘triple play percentage’ increased from 16.8% at the end of 2003 to 27.4% at the end of 2004 (Telewest, 2005a).¹³⁷ The ‘triple play percentage’ was 35% for the third quarter of 2005 (Telewest, 2005b).

In November 2004, PCCW announced that it would not be extending its FWA coverage (Guerrera and Budden, 2004: 29). Although PCCW acquired licences that cover the entire UK, it initially focused on the Thames Valley region with the expectation that the service would be rolled-out nationally at a later date. Instead PCCW said that it was likely to launch in an unspecified major city by mid-2005 and that the expansion would be less aggressive than anticipated. In August 2005 PCCW launched a wireless broadband service in parts of London under the ‘now’ brand name (UK Broadband, 2005).

Given the variety of access technologies that are used, a natural question to ask is to what degree does the coverage of these technologies overlap? According to a report undertaken by Analysys for the Department of Trade & Industry, only a handful of locations in the UK have access to three or more terrestrial access technologies (Analysys, 2004). A more common scenario is that either one or two terrestrial access technologies are available in a given location. Whilst the report does not identify which technologies are available, it can be surmised that when one technology is available this is DSL and when two are available the second is cable. This is not to suggest that where only DSL is available there is no competition, but rather whilst there may be no infrastructure competition service competition is possible. According to www.samknows.com there is a considerable amount of overlap between operators providing broadband through unbundled exchanges as they are all targeting the same areas.

6.4 Strategic review of telecommunications

The first phase of the strategic telecommunications review was announced in June 2004, with the consultation period lasting until November 2004. The second phase was then launched on the 16 November 2004, with the consultation period closing in early February 2005. The second phase expanded on the themes identified in the first and included feedback from the first consultation period.

¹³⁷ The financial importance of each triple play component can be seen in 2003, the last year for which detailed financial figures are available before the company was re-organised as Telewest Global Inc. Telewest had cable-TV revenues of £317 million, telephony revenues of £470 million and other revenues of £120 million (Telewest, 2003). Only the latter revenue category grew during 2003.

At the heart of the strategic review are five fundamental questions, namely:

1. In relation to the interests of citizen-consumers, what are the key attributes of a well functioning telecoms market?
2. Where can effective and sustainable competition be achieved in the UK telecoms market?
3. Is there scope for a significant reduction in regulation, or is the market power of incumbents too entrenched?
4. How can Ofcom incentivise efficient and timely investment in next generation networks?
5. At varying times since 1984, the case has been made for structural or operational separation of BT, or the delivery of full functional equivalence. Are these still relevant questions?

Both of the consultation documents are, unsurprisingly, wide ranging in nature. The growth of mobile and wireless networks is discussed, as is the economic significance of the telecommunications industry, the potential impact of VoIP and growing pressures on universal service. With respect to broadband, the following issues are identified in the phase 1 document:

- The anticipated progression of broadband from a niche to mass market product
- The observation that LLU involves some access infrastructure competition
- That broadband is encouraging the migration to all IP networks
- That further investment is required to support new services
- That the possibility of backhaul interconnection should be investigated

These were clarified and elaborated on in the phase two consultation document, as well as complemented by new issues. The phase 2 document suggested seven regulatory principles,¹³⁸ and suggested three options that fulfil these principles. The first option identified is ‘deregulation’ whilst the second is a reference under the Enterprise Act. Ofcom concluded that there is a case for continued sector specific regulation of the telecommunications industry, not least

¹³⁸ The seven regulatory principles are: 1) promote competition at the deepest levels of infrastructure where it will be effective and sustainable; 2) focus regulation to deliver equality of access beyond those levels; 3) as soon as competitive conditions allow, withdraw from regulation at other levels; 4) promote a favourable climate for efficient and timely investment and stimulate innovation, in particular by ensuring a consistent and transparent regulatory approach; 5) accommodate varying regulatory solutions for different products and, where appropriate, different geographies; 6) create scope for market entry that could, over time, remove economic bottlenecks; and 7) in the wider communications value chain, unless there are enduring economic bottlenecks, adopt light-touch economic regulation based on competition law and the promotion of interoperability (Ofcom, 2004e: 12).

because the Competition Act lacks both precision and speed of intervention required. The second option identified is a reference under the Enterprise Act to the Competition Commission. Ofcom notes that such a reference would result in a wide-ranging review that could impose structural remedies.¹³⁹

The third option identified by Ofcom, and the one that is preferred by them, is termed ‘real equality of access.’ In essence, this means that those companies who use BT Wholesale products should have access to them on the same terms as BT Retail. If adopted as described by Ofcom, this would go a long way towards addressing the complaints made against BT noted above. Equality of access is described further below.

6.4.1 Real equality of access

Ofcom identify two dimensions to real equality of access. The first is equivalence whilst the second is behavioural changes on the part of BT. In the phase 2 consultation document, Ofcom states that equality of access implies that BT’s wholesale customers should have access to:

- The same or a similar set of regulated wholesale *products* as BT’s own retail activities;
- At the same *prices* as BT’s own retail activities; and
- Using the same or similar transactional *processes* as BT’s own retail activities (Ofcom, 2004e: 14).

According to Ofcom these are not static, with equivalence necessary throughout the entire product development and life cycle. However, how the notion of equivalence would be implemented dynamically is largely overlooked in the consultation process.

Equivalence may be either of outcome or of input. In the case of equivalence of outcome, BT is required to offer its wholesale customers products that are comparable to those offered to its own retail operations *but* the processes inherent to each do not have to be the same. In contrast, equivalence of input means that wholesale customers of BT receive exactly the same products as BT retail through the same process (Ofcom, 2004e: 67f). Whilst Ofcom does not

¹³⁹ After the phase 1 consultation document had been published but before the phase 2 consultation document had been published, Stephen Littlechild (the first electricity regulator in the UK) argued in an Financial Times article that BT should be structurally separated (Littlechild, 2004: 19). Ian El-Mokadem, managing director of Centrica Telecommunications, noted that if equivalence was whether BT was integrated or split became less important (cited in Budden, 2004a: 6).

explicitly say that it favours one or the other of the two types of equivalence, the consultation document does imply that equivalence of input would deliver several advantages over equivalence of outcome and is potentially a more sustainable solution to the equality of access problem that has been encountered (Ofcom, 2004e: 68).

It is proposed that the application of equivalence will be guided by the following principles:

- Equivalence of input should be enforced when the cost is proportionate such as for all new wholesale products, processes and systems;
- When the cost is significant, equivalence of input should be used at specific levels in the value chain; and in this case equivalence of input should be introduced at the deepest levels in the network at which competition will be effective and sustainable going forwards;
- Although the points at which competition will be effective and sustainable may change, the points at which equivalence of input should be applied should nonetheless be clear, simple, and provide certainty; and
- If it is appropriate to enforce equivalence of input, equivalence of outcome should be required

Table 6–3 details those existing products that Ofcom felt equivalence *could* be applied to.¹⁴⁰

There is also a behavioural dimension to equivalence as well. In response to the phase 1 consultation document, BT's wholesale customers identified a range of issues that they believed placed them at a competitive disadvantage vis-à-vis BT. Of the issues cited in the phase 2 consultation document, some relate to the potential for the wholesale and retail parts of BT to collude whilst others are more process orientated. For instance, one respondent suggested that over 40% of BT WLR appointments were missed. The phase 2 consultation document effectively delegated responsibility to tackling these complaints to BT.¹⁴¹

¹⁴⁰ There are some products that BT does not use where equivalence is required. Ofcom suggests that alternative ways of achieving equivalence will be considered such as the imposition of price equivalence or process re-engineering (Ofcom, 2004e: 69).

¹⁴¹ Interestingly BT Wholesale falls outside of the recent quality of service parameters notification (Ofcom, 2005a).

Table 6-3

Applying equivalence to existing regulated wholesale products

Product	Rationale
Local loop unbundling	LLU is likely to be a key regulated wholesale product and it is critical to achieve equality of access
DataStream	Will be the key broadband access product in areas where LLU is not viable but is likely to be superseded by a next generation bit-stream product
Wholesale leased lines (TISBO)(e.g. PPCs)	Critical access product today for operators serving business customers. For equivalence of input to be applied substantial product re-engineering would be required and products such as a PPCs may have a relatively limited life as demand moves towards Ethernet-type products. This might limit the justification for major re-engineering to deliver equivalence of input.
Wholesale leased lines (AISBO)(e.g., wholesale LES, backhaul extension service)	These products will be critical going forward both for LLU operators and also for operators serving the business market.
Wholesale line rental	Product is critical for competition in voice telephony which can be carried through under the 21 st Century Network. Current product is not fit-for-purpose, but product design lends itself to equivalence of inputs.
Carrier pre-selection	Product now provides reasonable level of equivalence
FRICAO	Product for unmetered internet access increasingly superseded by broadband access products, with declining usage
Indirect access	Product increasingly superseded by Carrier Pre-Selection
Source: Ofcom (2004e: 69).	

6.4.2 Outcome

In June 2005 Ofcom announced the outcome of the strategic review of telecommunications and launched a consultation as to whether it should accept the offer made by BT. Broadly speaking, BT would make a series of undertakings in lieu of a reference under the Enterprise Act and significantly these undertakings would be enforceable (Ofcom, 2005b: 2). BT agreed to create an access service division (ASD) that will:

- Control the ‘last mile’ of the telecommunications network.
- Be operationally independent of BT, although it will continue to be owned by BT.
- Be branded differently from BT.

- Have its own five member board headed by a non-executive of BT. Three board members will be independent.
- Account for 15,000 of BT wholesale's 28,000 employees (Odell, 2005a: 23).

In addition, BT agreed a schedule for delivering equivalence of input for legacy products and a commitment to clearly state those principles on which the 21st Century Network (21CN) will be developed (Ofcom, 2005b: 2ff). At the same time that BT was making these undertakings, Ofcom was also stating that it would look again at large business pricing, leased lines and retail price controls (Ofcom, 2005b: 5). In other words, Ofcom made a commitment to deregulating certain markets in the future.

The proposals were widely welcomed, with only the National Consumer Council stating its preference for a referral to the Competition Commission (Odell, 2005b: 23). In late September 2005, the board of Ofcom accepted the undertakings made by BT who simultaneously established Openreach, the re-branded independent ASD (Ofcom, 2005e). The operation of Openreach is governed by 236 undertakings that collectively aim to ensure that competing companies wish to use the last mile of the incumbent's network are treated no differently than BT retail.¹⁴² The launch of Openreach underlined the scale of the undertakings made by BT – it will be the second largest of BT's four business units, with revenues of £4 billion and assets of £8 billion, and operate a network covering 120 million km. Perhaps recognising the enormity of the task, Francesco Caio, the CEO of Cable & Wireless, noted that “there is still a difficult journey ahead” (cited in Odell, 2005c: 23).

In addition to the establishment of Openreach, BT also undertook to deliver equivalence of access for existing and future products. Equivalence of access will be provided to eight existing products and five future products.¹⁴³ Ofcom highlights the delivery date of equivalence of input for six legacy products. These dates are shown in Table 6-4.

If BT is unable to deliver LLU and WLR on the PSTN equivalence of input as scheduled, it will pay a rebate of 25p per month per line to operators (Ofcom, 2005b: 3). For those wholesale products where BT has SMP, such as partial private circuits and ATM Interconnection, they should be made available to competitors using equivalence of outcome. (Ofcom, 2005b: 3).

¹⁴² Full details of the undertakings made can be found in, Ofcom (2005f).

¹⁴³ See section 3.1, Ofcom (2005f) for a full list of the products where equivalence of access is required.

Table 6-4
Equivalence of access timetable for existing products

Product	Timetable
LLU	Ready for service June 2006
WLR on the PSTN	Ready for service mid-2007, migration complete June 2010
WLR on ISDN2	Ready for service September 2007, migration complete end March 2009
WLR on ISDN30	Ready for service December 2007, migration complete December 2009
IPStream	Ready for service end-December 2005, migration complete end December 2006
Wholesale Ethernet Service and Backhaul Ethernet Service	Ready for service September 2006, migration complete March 2007
Source: Ofcom (2005b: 3).	

Finally, BT also agreed to clearly state those principles on which the 21CN will be developed. Next generation networks, such as the 21CN that BT is developing, have been a concern of Ofcom since 2004 when it launched a consultation into their impact on interconnection and access. Ofcom has also highlighted the need to ensure regulatory clarity, not least to encourage investment in next generation networks.¹⁴⁴ BT agreed to design its 21CN in such a way as to allow competitors access to key bottlenecks, support equivalence of input and launch retail products only when equivalent wholesale are available. Any charges levied by BT will reflect the efficient design of the 21CN (Ofcom, 2005b: 3f).

This does not, however, represent a final settling of how next generation networks should be regulated. Ofcom recognised that an incomplete debate had occurred, and thus proposed a more detailed consultation process concluding in Autumn 2006. Although the first phase of this consultation closed in August 2005, Ofcom has yet to announce its preliminary thoughts or launch the second phase.

6.5 Other regulatory developments

The regulatory efforts described above have been complemented by other initiatives that have sought to encourage unbundling and broadband uptake. Perhaps the most prominent of these

¹⁴⁴ See, for example, sections 8.41–8.74, of Ofcom (2004e), for a discussion of how next generation networks may be regulated.

has been the creation of the Office of Telecommunications Adjudicator, though consultations have also reduced the price of various wholesale products as well.

6.5.1 Office of the Telecommunications Adjudicator

Ofcom created The Office of the Telecommunications Adjudicator (OTA) in May 2005 to oversee the development of LLU *processes* (Ofcom, 2004a). The remit of the Adjudicator was more fully described in guidelines published in October 2004 as:

“... to ensure the rapid delivery of products and services which are, and remain, equivalent in terms of outcome to that which BT delivers to itself, so that the products and processes allow LLUOs to compete on a level playing field with BT in downstream markets based on LLU products; are, and remain fit for purpose and appropriately industrialised; and support broad take-up of LLU (including hared and fully unbundled loops)” (OTA, 2004b: 3).

It is possible to identify several pertinent developments that have occurred since the OTA was formed. Firstly, the membership of the adjudication scheme has increased with four more companies joining. As a consequence, 15 companies are now members of the scheme. Included within the membership are some of the largest ISPs in the UK (e.g., Wanadoo and Tiscali) as well as alternative infrastructure providers (Kingston and NTL). Bulldog, a prominent LLU operator, is also a member.

Secondly, OTA has set a target of 1 million lines to be unbundled by June 2006. This is very ambitious given the slow growth in LLU to date. However, the target outlined by OTA is for *capacity* and does not necessarily mean that there will be 1 million unbundled lines in operation by June 2006. Between December 2003 and December 2004, the number of LLU lines increased from 8,200 to 26,000 respectively (Ofcom, 2004a: 15). Since December 2004, the growth in LLU has accelerated so that by December 2005 there were 210,000 unbundled lines (OTA, 2005b). Although the growth in unbundled lines between November and December 2005 does suggest that the target of 1 million unbundled lines by the end of 2006 may be achieved, it is by no means clear whether such a rate of growth can be maintained over the coming months. OTA has made aggressive forecasts in the past, only to abandon them in subsequent months when growth was less good. For example, in August 2005 OTA forecast that there would be 1.5 million unbundled lines by the end of 2006. Subsequent updates from the OTA have not repeated such a forecast, perhaps due to the difficulties that were experienced in September and October 2005.

Thirdly, some of the processes identified have been prioritised as being more important than others. The more important processes are throughout (order per day), right first time, telephony migration, broadband migration and backhaul for LLU (OTA, 2004a). Of these, right first time, was singled out as a measure of quality as it measures both the ability to deliver on time and at the quality level sought. A target of 50% was immediately set, with incremental increases rising to 99.8% by January 2006.¹⁴⁵

Table 6-5
Throughput Capability for Orders

Date	Lines unbundled
January 2005	50,000
June 2005	250,000
September 2005	400,000
January 2006	550,000
June 2006	1,000,000
Source: OTA (2004a).	

Since the OTA was established, the right first time target has rarely been met.¹⁴⁶ After a steady increase in the right first time figure during the first half of 2005, a combination of automation and operational problems saw the figure decline each month until October 2005. Since October, the figure has improved so that by November 2005 it stood at 90%. This was, however, less than the target figure set by OTA. At the time of the update, OTA argued that automation and operational problems had been overcome and a more robust set of processes developed that should in the future allow for faster growth in LLU lines.¹⁴⁷ The December 2005 figures seem to support such an assertion: the number of unbundled lines per week was reported as being substantially more than in November, and right first time was 98%.

6.5.2 Wholesale local access market

The wholesale local access market review should be understood in the context of the desire of Ofcom to increase the availability of broadband services, encourage competition where infra-

¹⁴⁵ The incremental increases are 75% by November 2004, 85% by January 2005, 95% by March 2005, 98% by June 2005 and 99.8% by January 2006 (OTA, 2004a).

¹⁴⁶ Details of key performance indicators used by OTA can be found at <http://www.offta.org.uk/charts.htm>

¹⁴⁷ OTA (2005a).

structure based competition would not necessarily emerge and address concerns raised during phase 1 of the strategic review of telecommunications. A useful summary of these concerns can be found in the phase 2 consultation document, where Cable & Wireless are quoted as stating that:

“In the world of broadband, BT was allowed to create an LLU product which was prohibitively expensive, not industrialised and not fit-for-purpose, which meant that it was entirely unsuitable for mass-market take-up. The result is that there is currently virtually no competition in broadband based on LLU” (Ofcom, 2004e: 66).

In essence the review imposed SMP provisions on both BT and Kingston (in the areas of wholesale local access market and co-location), specified the LLU obligations to be placed on BT, determined an appropriate costing methodology and the charges that could be expected. The SMP obligations placed on both companies were six fold:

- Requirement to provide network access on reasonable request
- Requirement not to unduly discriminate
- Basis of charges (i.e., cost orientation)
- Requirement to publish a reference order
- Requirement to notify charges and terms and conditions
- Requirement to notify technical information.

In addition, two more conditions were placed on BT: quality of service and requests for new network access (Ofcom, 2004g: 4). Ofcom describes these conditions as general regulatory requirements before going onto detailing the specific LLU obligations that it imposed on BT. The specific LLU obligations that BT should provide the following are:

- Metallic path facilities / fully unbundled local loops;
- Shared metallic path / shared access;
- Subloop unbundling;
- Internal tie cables;
- External tie cables;
- Site access;

- Co-location;
- Co-mingling; and
- Ancillary services as may be reasonably necessary for the use of the services above (Ofcom, 2004g: 5).¹⁴⁸

The wholesale review identified a range of costing methodologies that could be used before opting for LRIC+ (long run incremental cost plus a mark up for common costs). LRIC+ was preferred because it is more transparent and more accurately reflects the charges that would occur in a competitive market.¹⁴⁹ This methodology was used to calculate the LLU charges detailed in the following sub-section.

6.5.3 LLU pricing

LLU prices have fallen significantly since early 2004 due to a combination of regulatory action on the one hand and the effect of cost reducing investment by BT on the other hand. In May 2004, BT announced that it would re-design and simplify its LLU product as well as reduce its prices to encourage uptake of LLU products (BT, 2004b). Prices were reduced twice more by BT in 2004, in June and September, as reduced costs were passed onto wholesale customers (BT, 2004c). That these price reductions occurred whilst Ofcom was conducting a review into wholesale local access is perhaps not a coincidence. Quite simply, BT was attempting to remove the justification for Ofcom to impose sweeping price reductions act.

Ofcom did act in December 2004 when the wholesale local access review reported. Ofcom extended the price reductions announced by BT with the consequence that prices between May 2004 (column A in the table below) and December 2004 (column C) fell by at least 36%. The charges outlined by Ofcom, effective from the 1st January 2005, are shown in the table below.

¹⁴⁸ A more detailed discussion of the LLU requirements placed on BT can be found in section 7 Ofcom (2004g).

¹⁴⁹ See Ofcom (2004g: 58–63), for a discussion of the various costing methodologies and why LRIC+ is preferred.

Table 6-6
Local Loop Unbundling Charges, 16th December 2004

	A: Old	B: Current	C: Final	D: % change from A to C
Shared access				
Connection	£117	£37.00	£34.86	70%
Rental	£53	£27.12	£15.60	71%
Fully unbundled				
Connection (transfer)	88	88	34.86	60
Connection (new provide)	265	223.33	168.38	36
Rental	119	105.09	TBD	N/A
Source: Ofcom (2004f).				

Ofcom did not state what the fully unbundled rental ceiling charge would be. Instead, attention was drawn to the fact that such a charge is largely determined by the cost of laying and then maintaining the copper between the exchange and home or business premises. The consultation on how copper should be valued closed in April 2005, with Ofcom reporting in August 2005 that it would adjust the accounting life of copper and duct access (Ofcom, 2005d). When combined with the cost of capital consultation that also reported in August 2005, Ofcom argued that it was possible to reduce the cost of copper to £58.51 per line for wholesale line rental and £60.11 for LLU (Ofcom, 2005d: 4).

Ofcom drew on these findings to set the fully unbundled rental charge in September 2005. Although in August 2005 BT had voluntarily reduced its fully unbundled rental charge from £105.09 to £80, Ofcom slightly raised the charge ceiling to £81.69. This increase left little scope for BT to increase its charge as it was a ceiling, and reflected, according to Ofcom, the costs of laying and then maintaining copper (Ofcom, 2005h: 2). This new ceiling charge came into effect in January 2006.

6.5.4 IP Stream and ATM interconnection pricing

Although not as prominent as other pricing discussions, it is worth mentioning the ongoing debate over the pricing of IP Stream products and ATM interconnection. Ofcom has sought to regulate the margin between these products in order to ensure that those companies using

ATM interconnection have room to compete and are *not* subject to a cost/price squeeze by BT (Ofcom, 2004c: 3).

In April 2003 BT reduced the price of IPStream products without also reducing ATM interconnection prices. Ofcom investigated the resulting complaints only to conclude that BT had not engaged in a cost/price squeeze. However, Ofcom did conclude that there were shortcomings with the margin rule that needed to be investigated further. This subsequent investigation concluded that margins were too small and that BT should widen them (Ofcom, 2004c: 3). In August 2004 BT did act to restore the margin by raising its IPStream prices, only for the ISPs that use these products to complain (ADSLGuide, 2004). Since then a stalemate has developed, with BT arguing that it was obligated to raise prices and ISPs complaining these increases undermine their ability to compete.

6.6 Discussion and conclusion

The regulatory initiatives outlined above are underpinned by the desire to make the broadband market more attractive to service providers other than BT. The initiatives have sought to improve the terms on which service providers gain access to BT's network as well as reduce the costs of such access. As improved terms and reduced costs make the broadband provision more attractive and service providers enter the market, the competition that emerges will lead to consumer benefits such as better and cheaper products.

If we take the notion of consumer benefits as our starting point, it can be argued that the end consumer has benefited from the regulatory initiatives that Ofcom has taken. By taking the same set of residential service providers identified by Ofcom in its 2004 review of telecommunications, we can compare prices and speeds for broadband products between June 2004 and January 2006. Drawing on Table 6-7 (over), three observations can be made. Firstly, there is a tendency across all six operators to reduce prices. It is, however, worth noting that in some cases these price reductions are relatively small and that four operators – BT, AOL, Wanadoo and Telewest – offer time limited discounts as well. That operators are willing to offer such discounts suggests that competition is increasingly based on price and not other product characteristics. Moreover, price competition could be taken as indicating that market growth is slowing.

Table 6-7
Residential broadband prices, June 2004 and January 2006

June 2004			January 2006		
Service name	Advertised speed, kbits/s	Cost	Service name	Advertised speed, kbits/s	Cost
BT Broadband basic	512	£19.99	Option 1	Up to 2024	£14.99 for 3 months, then £17.99
BT broadband	512	£24.99	Option 2	Up to 2024	£20.99 for 3 months, then £22.99
BT Yahoo	512	£26.99	Option 3	Up to 2024	--
BT Yahoo	1024	£29.99	Option 4	Up to 2024	£28.99 for 3 months, then £29.99
AOL Silver	256	£19.99	AOL Silver	512	1 month free, then £17.99
AOL Gold	512	£24.99	AOL Gold	1024	1 month free, then £24.99
AOL Platinum	1024	£29.99	AOL Platinum	2024	1 month free, then £29.99
Wanadoo Broadband 512 with a 2GB download limit	512	£17.99	Standard, with 2GB download limit	Up to 8192	£14.99 for 3 months, then £17.99
Wanadoo Broadband 512+ with a 15GB download limit	512	£27.99	Active, with 6GB download limit	Up to 8192	£22.99
Wanadoo Broadband 1MB with a 30GB download limit	1024	£34.99	Heavy, with 30GB download limit	Up to 8192	£27.99
Telewest Broadband 256K	256	£17.99	N/A	N/A	N/A
Telewest Broadband 750K	750	£25.00	N/A	N/A	N/A
Telewest Broadband 1.5MB	1500	£35.00	N/A	N/A	N/A
Telewest Broadband 3MB	3000	£50.00	N/A	N/A	N/A
			Broadband	512	£14.99
			Complete	1024	£19.99 for first 3 months
			Elite	10240	£35
NTL 150k	150	17.99	N/A	N/A	N/A
NTL 600k	600	24.99	N/A	N/A	N/A
NTL 1MB	1024	37.99	1MB	1024	£17.99
			2MB	2048	£24.99
			10MB	10420	£37.99, 75GB download limit
Tiscali Broadband x 10 Anytime	512	24.99	N/A	N/A	N/A
Tiscali Broadband x10 (50hr)	512	19.99	N/A	N/A	N/A
Tiscali Broadband x5	256	17.99	N/A	N/A	N/A
Tiscali Broadband x3	150	15.99	N/A	N/A	N/A
			Broadband & Phone	2048	£19.99
			2MB	2048	£17.99
			1MB	1024	£14.99

Note: N/A = this product is no longer available. Source: Ofcom (2004d: 42); operator websites

Secondly, several operators have introduced download limits. However, these seem very generous at 2GB plus. It is likely that only the most dedicated of gamers, music fans or

downloaders would breach such generous limits. Thirdly, there has been an increase in the speed of broadband products offered. The speed of broadband products in January 2006 varies more than it did in June 2004; some operators are now offering 10MB broadband whilst others offer 512 kbits/s. Moreover, two operators – BT and Wanadoo – offer the same speed bundled with other products and/or higher download limits.

There are, of course, other broadband service providers that target the residential market. Determining how their prices have changed over the last 18 months is more difficult than for the aforementioned service providers as no one appears to track them in the same way that the larger companies are covered by analysts, consumer groups etc. Even so, industry websites do suggest that prices are falling among the smaller, less well known, broadband service providers.

Table 6-8 compares the price of broadband products in August 2004 and January 2006 for Plus.net. Like the larger broadband service providers, prices have declined. Two developments are of interest. Firstly, a August 2004 announcement narrowed the price differential between the three products offered quite considerably through the difference between the metered and un-metered products remained quite large. Secondly, by January 2006 Plus.net had simplified its pricing structure by removing the distinction between metered and un-metered broadband access. Whilst all three broadband products are the same in terms of access speed, the primary distinction is in terms of download limit. At its most basic, the higher the price the more can be downloaded.

Table 6-8
Details of price charges, August 2004 and January 2006

Speed	Pre-August 2004	August 2004		January 2006		
	Old Lite price	New Lite price (metered)	Premier (un-metered)	PAYG, 1GB download limit	Broadband Plus, 5GB download limit	Premier
512KBS	£14.99	£14.99	£21.99			
1MB	£23.99	£14.99	£29.99			
2MB	£31.99	£19.99	£39.99			
2MB*				£14.99	£14.99	£21.99

Note: *up to 8MB though guaranteed basic speed of 2MB.
Source: Saffron (2004); operator data, available from www.plus.net

The aforementioned price reductions and speed improvements suggest that residential consumers are beginning to benefit from the regulatory initiatives taken by Ofcom. However, this does not mean that cause and effect relationships can be identified that link specific regulatory initiatives with particular end consumer benefits. Whilst it is arguably the case that reductions in wholesale charges have contributed to the growth in broadband, their contribution would have been less if the terms of the relationship between BT and other service providers had not been addressed as well. Regulatory changes have sought to stop BT from forestalling competition through, for instance, not providing wholesale products in a timely fashion, by engaging in cost-price squeeze or by providing products that cannot be industrialised. In other words, end consumers were only able to enjoy the benefits because both wholesale prices were reduced and terms improved.

The desire of Ofcom to improve the relationship between BT and other service providers is exemplified in the notion of equality of access. At its most basic, equality of access means that other service providers should have access to the same wholesale products on the same terms as BT retail. Given the widespread feeling among other service providers that past attempts at installing ‘Chinese Walls’ within BT had been less than satisfactory, it was perhaps inevitable that Openreach was created. Openreach is significant for three reasons. Firstly, it is operationally separate from the rest of BT although it remains part of the BT Group. In other words, the creation of Openreach formalises ‘Chinese Walls’ within BT. Secondly, Openreach removes from BT the possibility, at least theoretically, of using its vertical integration to competitively further its position in the market, as this new company should treat all service providers the same.

The third reason why Openreach is significant is that it lays the foundation for the creation of a fully independent local loop company at some point in the future *if* BT fails to meet its obligations. When BT agreed to establish Openreach, this was in lieu of a reference under the terms of the Enterprise Act 2002. Ofcom, however, reserved the right to make a reference under the Enterprise Act 2002 if BT failed to live up to its obligations. It is, therefore, possible to view Openreach as a last chance for BT to preserve its vertical integration, at least in terms of ownership if not operation. If a reference under the Enterprise Act were to be triggered at some point in the future, it would be easier to disentangle Openreach from the rest of BT than would otherwise be the case, as it is already operationally independent.

Having said this, from BT's perspective there are undoubted advantages associated with retaining ownership of Openreach. As long as these advantages remain, Ofcom should be able to extract concessions from BT for fear of a reference being triggered. It is for this reason that BT is likely to comply with the obligations imposed on it, at least in the short term though as the balance between advantages and disadvantages becomes more aligned the compliant nature of BT may change. This is, however, speculative as Openreach only began operating as an independent company in early January 2006. Although too early to say whether BT will comply with its obligations, many of its competitors felt that vigilance on the part of Ofcom would be required to ensure that its obligations are met.

If we return to the notion that regulation in the UK has gone through three phases, with the most recent being service competition, where do Openreach and equality of access fit? Openreach and equality of access contribute to the development of service competition through improving the terms on which other operators access BT's network. The contribution of Openreach and equality of access to service competition is reinforced when the geographical scope of the various competing infrastructures is taken into account. Notwithstanding the development of cable networks and the limited investment by some alternative operators, the only fixed infrastructure operator with national coverage is BT.

Having said this, it was reported at the time of the strategic review concluding that Ofcom was expecting operators other than BT to invest in infrastructure and thus develop competing networks. To date only a handful of infrastructure investments have been announced, though this may be partially due to the short timescale since the review was concluded. The limited announcements that have been made highlight a tendency for alternative operators to focus their investments on urban markets. Not only do such investments exacerbate the differences in infrastructure availability between, say urban and rural areas, but they also underline the importance of access to BT's network as well. Thus, it is perhaps more accurate to say that the UK telecommunications market will combine infrastructure with service based competition. Infrastructure based competition will occur in urban markets, and although service based competition will also be found in these markets, it will be the sole form of competition in small urban and rural markets.

A final observation that can be made is that the consultative process lends itself to 'gaming' by participants. Service providers such as BT, NTL and Cable & Wireless have timed their announcements to skew the consultative process in their favour, a phenomenon that is clearly

illustrated by the announcements made in the four or so months leading up to the wholesale local access consultation reporting in December 2004. Both Cable & Wireless and NTL announced substantial investments in LLU (Budden and Kirchgaessner, 2004; Cable & Wireless, 2004), and just two days before the review was published Wanadoo announced its entry into the LLU market (Saffron, 2004). In contrast, Energis said it would not be investing in LLU nationally as satisfactory returns were unlikely in the near future (Richardson, 2004). Sir Christopher Bland, the chairman of BT, stated that reduced LLU charges would inevitably lead to BT questioning whether investments were necessary and undermine the ability of the company to compete at the retail level (Budden, 2004b: 22). Through these announcements, Cable & Wireless and NTL sought to support Ofcom whereas Energis hoped to encourage further charge reductions and BT limit the extent to which LLU charges would be reduced.

In summary: the strategic review marks a milestone in the regulation of the UK telecommunications market. From the review emerged the notion of ‘equality of access’ and the establishment of Openreach as a independent division within BT. When combined with the creation of OTA, a mini-regulatory’ focused on LLU processes, Ofcom has sought to realign the often fraught relationship between BT and other service providers. It is hoped that these changes will lead to a more efficient and effective relationship between wholesale and retail markets, and ultimately that end consumers will benefit through increased competition. It is, however, too soon to state whether this new regulatory framework will function as expected. If the regulatory regime does not function as anticipated, Ofcom may have no choice but to refer BT under the Enterprise Act 2002 §.

6.7 References

- ADSLGuide (2004). ISP industry speaks out against BT broadband price rise, 11 August, ADSL Guide, available at www.adslguide.org.uk.
- Analysys (2004). UK broadband status report, July, Analysys, Cambridge, England.
- Bourne, T. (2005). BT cashes in to Government money, 1 December, available at digital-lifestyles.info.
- BT (2004a). Press release – BT confirms timetable for broadband roll out, June 30, available www.bt.com/broadband.
- BT (2004b). Press release – BT to usher in new era of broadband investment, 13 May, available at www.bt.com.
- BT (2004c). Press release – BT confirms lower local loop unbundling prices to encourage infrastructure investment and competition. New director of LLU also appointed, 22 September, available at www.bt.com.

- Budden, R. (2004a). Watchdog delays telecommunications blueprint, *Financial Times*, 13 October: 6.
- Budden, R. (2004b). Broadband imbalances threaten BT investment, *Financial Times*, 4 November: 22.
- Budden, R. and S. Kirchgaessner (2004). NTL to spend up to £65m on 'local loop unbundling,' *Financial Times*, 21 September: 23.
- Cable & Wireless (2004). Press release – Cable and Wireless plc presentation on local loop unbundling, 16 September, available at www.cwplc.com.
- Curwen, P. (2004). Markets vs. regulators and the battle to determine market structure: evidence from the UK cable industry, *Info*, Vol.6(1): 24-36.
- Guerrera, F. and R. Budden (2004). PCCW delays UK broadband roll-out, *Financial Times*, 25 November: 29.
- IT Week (2006). Broadband lines near 10 million, 5 January, available at www.itweek.co.uk.
- Littlechild, S. (2004). Why BT needs to be carved up, *Financial Times*, 5 October: 19.
- Odell, M. (2005a). New unit emerges from the shake-up, *Financial Times*, 24 June: 23.
- Odell, M. (2005b). Rivals applaud as Ofcom moves to end the party for a dominant BT, *Financial Times*, 24 June: 23.
- Odell, M. (2005c). BT's reach under scrutiny as it climbs into competition, *Financial Times*, 23 September: 23.
- Ofcom (2004a). Strategic review of telecommunications – phase 1 consultation document, 28 April, Ofcom: London.
- Ofcom (2004b). Press release – Ofcom's broadband framework, 13 May, available at www.ofcom.gov.uk.
- Ofcom (2004c). Consultation on a draft direction setting the margin between IPStream and ATM interconnection prices, 27 May, Ofcom, London.
- Ofcom (2004d). The communications market 2004 – telecommunications, 11 August, Ofcom, London.
- Ofcom (2004e). Strategic review of telecommunications – phase 2 consultation document, 18 November, Ofcom, London.
- Ofcom (2004f). Ofcom publishes final local loop unbundling charges, 15th December, Ofcom, London.
- Ofcom (2004g). Review of the wholesale local access market, 16 December, Ofcom, London.
- Ofcom (2005a). A statement on setting quality of service parameters, 27 January, Ofcom, London.
- Ofcom (2005b). Telecommunications statement, 23 June, Ofcom, London.
- Ofcom (2005c) The communications market – August 2005 Quarterly Update, August, Ofcom, London.
- Ofcom (2005d). Valuing copper access, 18 August, Ofcom, London.
- Ofcom (2005e). Ofcom accepts undertakings from Board of BT Group plc on operational separation. BT access services business – Openreach – formally established today, 22 September, Ofcom, London.
- Ofcom (2005f). Final statement on the strategic review of telecommunications, and undertakings in lieu of a reference under the Enterprise Act 2002. Statement, 22 September, Ofcom, London.
- Ofcom (2005g). Final statement on the strategic review of telecommunications, and undertakings in lieu of a reference under the Enterprise Act 2002. Statement, 22 September, Ofcom, London.

- Ofcom (2005h). Local loop unbundling: setting the fully unbundled rental charge ceiling and minor amendment to SMP conditions FA6 & FB6, 30 November, Ofcom, London.
- OTA (2004a). Progress update on telecommunications adjudication scheme, 23 September, OTA, London.
- OTA (2004b). Guidelines, 14 October, OTA, London.
- OTA (2005a). Telecommunications adjudicator – update for November 2005, 9 December, OTA, London.
- OTA (2005b). Telecommunications adjudicator – update for December 2005, 13 January 2006, OTA, London.
- Public Technology (2006). Broadband now available to every community in Scotland, 6 January, available at www.publictechnology.net.
- Richardson, T. (2004). LLU is ‘uneconomic’, says Energis, The Register, 8 November, available at www.theregister.co.uk.
- Saffron (2004). Wanadoo has placed orders for LLU service, ADSLGuide, 14 December, available at www.adslguide.org.uk.
- Scottish Executive (2005). News release – broadband for all, April 25, available at www.scotland.gov.uk.
- Telewest (2003). Annual report, Telewest, London.
- Telewest (2005a). Earnings release – Telewest 2004 and Q4 results show excellent operational and financial performance, 22 March, Telewest, London.
- Telewest (2005b). Earnings release – Q3 results, 10 November, Telewest, London.
- Trade and Industry Committee (2000). Local loop unbundling, sixth report, session 2000–2001, minutes of evidence, 14 November.
- Turner, C. (2003). Issues in the mass market deployment of broadband, Info, Vol.5(2): 3-7.
- UK Broadband (2005). NOW wireless expands into London, 26 August, available at www.ukbroadband.co.uk, site visited 12 January 2006.
- Wales Assembly Government (2005). Broadband Wales programme strategy 2005–2007, Cardiff, Wales.
- Wilsdon, J. and D. S. Jones (2002). The politics of bandwidth. Network innovation and regulation in broadband Britain, Demos, London.

7 From static efficiency to innovation focus: The turnaround of U.S. unbundling policy¹⁵⁰

Johannes M. Bauer, Michigan State University, USA

7.1 Introduction

After a decade of flux, U.S. unbundling policy seems to have arrived at a sustainable set of rules. Building on earlier policies crafted during the 1980s, such as Open Network Architecture (ONA), the Telecommunications Act of 1996 (Act) had introduced detailed unbundling requirements for incumbent local exchange carriers (ILECs).¹⁵¹ The first set of specific regulations, adopted shortly after the passage of the new law, preceded unbundling policies in other nations by several years. In narrowband voice markets, the U.S. rules turned out to be more stringent and detailed than those to be promulgated by other countries. Given the intrusive nature of some unbundling obligations, the initial rules and subsequent modifications were quickly challenged in the courts. In the U.S. legal system, the courts' power of judicial review extends beyond procedural aspects of a case to the substance of regulatory decisions. Using these powers, the courts repeatedly instructed the FCC to reconsider specific regulations or overturned rules altogether. These judicial findings contributed to significant alterations and eventually a near-reversal of the initial unbundling rules. In December 2004, again responding to court directions, the FCC adopted an Order which substantially redefined the unbundling obligations of ILECs in the narrowband markets and confirmed earlier changes in broadband markets.¹⁵² It marks the preliminary end point of the prolonged struggle to translate the unbundling provisions of the Act into sustainable regulatory rules.

Compared to the initial rules adopted by the FCC in August 1996 and subsequent proceedings, the unbundling obligations of ILECs were drastically curtailed. The ILECs have gained freedom to price now unregulated network elements in narrowband markets, constrained only by antitrust oversight. Competitive local exchange carriers (CLECs) will be able to buy un-

¹⁵⁰ Parts of this chapter draw on an earlier paper published in *Communications & Strategies* (Bauer 2005). Permission by the editor is gratefully acknowledged.

¹⁵¹ Telecommunications Act of 1996, Pub. L. No. 104–104, 110 Stat. 56. The 1996 Act amended the Communications Act of 1934, 47 U.S.C. § 151 et seq. Sections cited in this article refer to the amended legal text.

¹⁵² The full text of the Order was released on February 4, 2005 and became effective March 11, 2005 (FCC 2005c). Regulatory and court decisions are referenced by issuing institution and year. Throughout the chapter, detailed case numbers are provided in the reference section at the end of the article.

bundled network elements (UNEs) other than those that continue to be regulated but they will have to pay commercially determined prices. Broadband unbundling rules had been limited and gradually phased out since 2003, creating the environment “unfettered by regulation” envisioned by the Telecommunications Act for the Internet and advanced networks. Although the present rules cannot be regarded as an entirely new “unbundling philosophy,” they represent a significant shift from a short-term orientation emphasizing swift competitive entry to a longer-term view stressing investment and innovation. Thus, they signify a shift from a static view of competition and efficiency to a dynamic approach. The new framework is also shaped by a confluence of other forces. These include (1) the need to find a pragmatic response to repeated defeats of earlier rules in the courts, (2) a critical assessment of the experience with previous unbundling rules, (3) a response to the changing technological basis of the industry, and (4) a new vision regarding the role of digital applications such as Voice over Internet Protocol (VoIP) as competition to traditional services. The new rules also seem to reflect a shift in political influence from CLECs to ILECs. At the heart of the FCC’s approach continues to be trust in facilities-based competition with (light-handed) regulation limited to cases where competitors would be impaired without access to unbundled network elements. However, based on a dynamic analysis, the situations in which such impairment exists are narrowly defined. With regard to narrowband communications, the new rules align the U.S. framework with unbundling policies in other countries. With regard to broadband, the new rules create a less regulated environment than elsewhere. This chapter reviews the main stages of the evolution of the unbundling rules in the narrowband and broadband markets. After a short review of the conceptual foundations of unbundling, it proceeds with a critical assessment of the reasons for the policy changes. To keep the discussion manageable, emphasis is placed on federal rules, which have determined the overall course and substance of unbundling, with only occasional reference to developments at the state level.¹⁵³

7.2 Conceptual foundations of unbundling

Unbundling intends to ease competitors’ access to an incumbent service provider’s network. Such a measure requires clear justification, which is typically rooted in some form of essential facilities argument: access to a network element/functionality is deemed necessary to com-

¹⁵³ The most relevant role of the state Public Utility Commissions (PUCs) is to determine prices for unbundled network elements within the framework defined by federal rules.

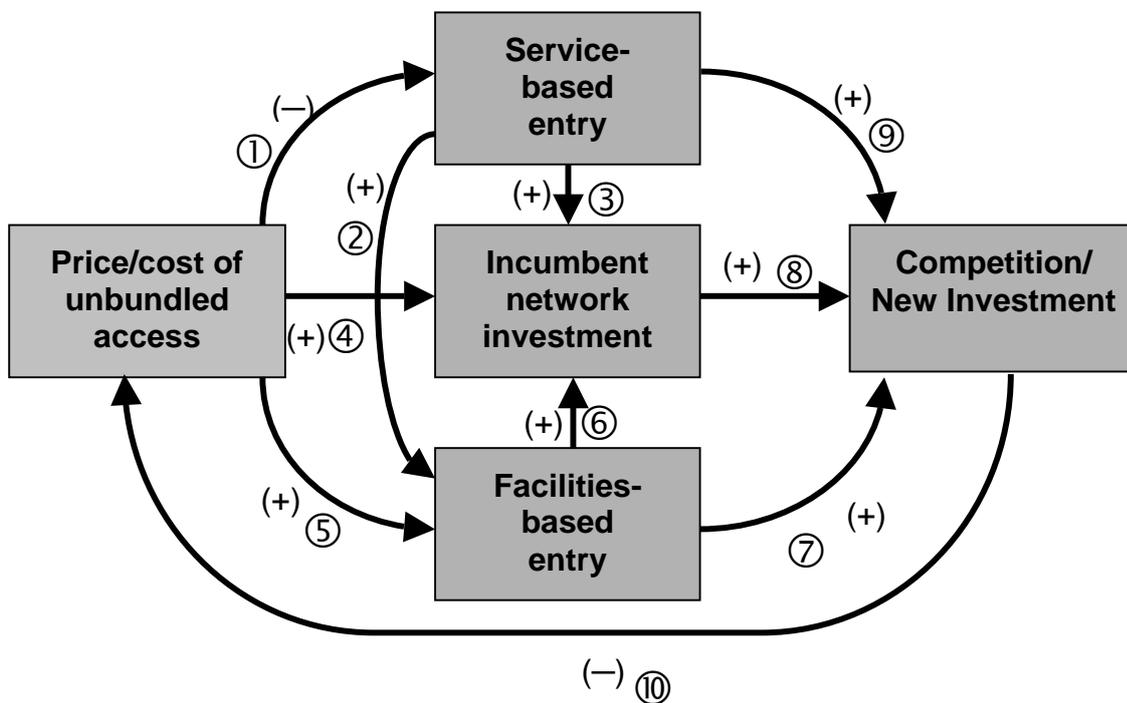
pete, but the specific technological and economic conditions render duplication uneconomic and welfare-reducing. Noam (2001, chapter 6) mentions that interconnection and unbundling are closely related policies. The term “unbundling” had previously been used in discussions of subsidy-free pricing. However, “unbundling as a conceptual issue emerged in force in the context of ‘open network’ architecture” (Noam 2001, p. 174; see also Mansell 1994). In the early 1990s, two incumbent local exchange carriers had attempted to get regulatory and anti-trust relief by voluntarily proposing far-reaching unbundling models. Although the plan was never realised, Ameritech, a Baby Bell, offered many of the features that would later be required in the Act voluntarily in its Consumers First Plan (Harris, Rosston, and Teece 1995). Before that, Rochester Telephone had unbundled its local network platform from the provision of services. However, these remained isolated examples until the Telecommunications Act of 1996 established relatively stringent asymmetric unbundling requirements for all ILECs, and even more stringent rules for the Regional Bell Operating Companies (RBOCs).

Unbundling raises many intricate issues, including (1) how detailed unbundling requirements should be, (2) how unbundled network elements should be priced, and (3) whether these issues should be resolved by private negotiation, regulation, or hybrid approaches. It has complex, often contradictory effects on the incentives of the different stakeholders. Furthermore, unbundling creates multiple trade-offs, for example, between short-term effects on the competitive structure of a market segment and long-term effects on investment and innovation behaviour. These incentives materialise in direct and indirect ways and cannot easily be associated with incumbents and new entrants. Because of these feedbacks it is probably impossible to define a single optimal unbundling policy. Rather, the most appropriate unbundling regime will be contingent upon the specific policy objectives and the market context. It is also important to note that the goals of unbundling have changed over time. Initially designed as a policy to stimulate local competition, it is more recently advocated as a tool to promote broadband development (OECD 2003, p. 4).

When the most recent unbundling measures were introduced in 1996, these multi-faceted effects of unbundling were only poorly understood. Within a relatively short period of time, research has attempted to close the gap and a more solid knowledge base is now available. While this research has not established a consensus on best-practice unbundling, it has started to illuminate the relevant trade-offs and specified the conditions under which they apply. Figure 7-1 illustrates in a stylised way the direct and indirect effects of unbundling. A (+) sign

next to an arrow linking two boxes signifies that the two variables move in the same direction. For example, link ⑤ indicates that a higher (lower) price/cost ratio of unbundled access will — other things equal — increase (decrease) facilities-based entry. A (−) sign signifies that the two variables move in opposite directions. Therefore, link ① indicates that a higher (lower) price/cost ratio of unbundled access implies — other things equal — lower (higher) service-based entry.

Figure 7-1
Direct and indirect effects of unbundling



The overall effect of unbundling depends on the severity of the intervention (e.g., the mandated deviation of prices from the cost of providing unbundled access or the scope of unbundling requirements), the relative strength of the positive and negative effects linking the variables, and the time lags at which these effects unfold. More stringent unbundling rules (i.e., a lower price cost ratio) will stimulate service-based entry (links ① and ⑨). In turn, service-based entry will stimulate intra- as well as inter-platform facilities-based investment (link ②). Both service-based entry and facilities-based entry will indirectly spur investment by the incumbent (links ③ and ⑥). However, stringent unbundling will also have a direct negative effect on facilities-based investment by the incumbent and new entrants (links ④ and ⑤). To the contrary, less stringent unbundling rules will likely create stronger incentives for long-

term investment but reduce short-term market entry opportunities. The overall net effect on competition and new investment will depend on the interaction of these forces (links ⑦, ⑧ and ⑨). Lastly, there is also a feedback loop from the resulting state of competition and investment back to the market for access to unbundled network elements (link ⑩).

Space constraints do not allow a full review of the literature that has attempted to substantiate the strengths and time patterns of these links both empirically and theoretically. A recent survey is provided by Baranes and Bourreau (2005). However, a few main points that help to understand the changes in U.S. unbundling policy deserve mentioning. The appropriate design of unbundling rules depends, first, on whether they are intended to ease access to an already existing network or access to a new network that has yet to be deployed. In the first case, the concerns about the long-run effects on new investment and innovation are probably less important and easier access conditions seem conducive to the overall policy goal. In the case of new infrastructures or innovations that require significant upgrades to existing networks, however, the long-term effects are of primary concern and more stringent unbundling policies could have an overall negative effect. Several empirical studies have produced tentative evidence in support of these differential impacts on short-term and long-term goals (see Baranes and Bourreau 2005 for more details).

This evidence does not necessarily imply that unbundling is a poor policy option but it points to the importance of applying the correct price setting method. The TELRIC standard proposed by the FCC (and similar long-run incremental costs standards used by PUCs) aim at mimicking the competitive long run equilibrium price of an efficient supplier. However, these models do not take into account that real-world telecommunication markets are characterised by sunk costs and uncertainty. As has already been pointed out at a general level by Joseph Schumpeter in the 1950s, the conditions for static efficiency need to be violated to achieve dynamic efficiency. More recent contributions to the research literature take dynamic effects of unbundling rules into account (for example, see Cave and Vogelsang 2003, Mandy and Sharkey 2003, Valletti 2003, Pindyck 2004, 2005, and Bourreau and Doğan 2005). Hausman (1999) and Pindyck (2004, 2005) argue that under conditions of uncertainty unbundled access creates an option value to a new entrant. As this option value is not reflected in the TELRIC prices, it distorts investment decisions by both incumbents and new entrants. Noam (2001) cautions that in industries with first-mover advantages these insights from real options theory will need to be modified. His concerns point to the importance of taking the competitive situa-

tion into account. If intra-modal competition is the only relevant option, more stringent unbundling will probably have stronger and more desirable effects than if there is strong inter-modal competition. Lastly, the effect of unbundling will depend on the overall condition of the industry. If the environment is risky, easier unbundled access will, all other things equal, render service-based a more attractive option than facilities-based competition. In any case, the important lesson is that the stringency of unbundling has important effects on the dynamic incentives of incumbents and new entrants that need to be considered explicitly.

7.3 Searching for a sustainable approach

The rationale and substance of the most recent FCC initiatives can only be understood in the context from which it emerged. Space constraints do not permit a detailed discussion but this section offers a synopsis of the major milestones of this process.¹⁵⁴ The Telecommunications Act of 1996 codified many regulatory practices that had been adopted before its passage. Rules governing access to network facilities and services for enhanced service providers preceded the Act's unbundling provisions. These had, in turn, evolved from earlier policies dating back to the Computer Inquiries, a series of proceedings beginning in 1966 to delineate rights and obligations of basic and enhanced service providers. From these deliberations, in the late 1980s the concept of Open Network Architecture (ONA) had emerged, specifying rules under which enhanced service providers could get access to essential network functions provided by carriers that also had a presence in enhanced service markets. Whereas ONA was never fully implemented, unbundling became a cornerstone of the Act's objective to expand the reach of competition to local voice markets.

7.3.1 The early unbundling regime

The drafters of the Act envisioned three forms competition to emerge in local markets: facilities-based competition, service-based competition (resale), and competition via unbundled network elements (UNEs), a hybrid form in which carriers could combine network components purchased from incumbent service providers with their own facilities. Resale, and to some degree UNEs, were seen as transitory stages on the road to facilities-based competition. Incidentally, the U.S. debate did not use the notion of a ladder-of-investment that had been

¹⁵⁴ More detailed legal histories of the unbundling rules can be found in the relevant FCC Orders, most recently FCC (2003, 2005c). See also the discussion in Nuechterlein and Weiser (2005, especially chapters 3 and 5).

proposed by Cave and has influenced European policy. For resellers, ILECs were required to make their retail services available wholesale at retail price minus avoided costs (e.g., marketing, invoicing, and billing costs). With regard to unbundling, section 251(c)(3) of the Act proscribed that ILECs must provide requesting telecommunications carriers “non-discriminatory access to network elements on an unbundled basis at any technically feasible point on rates, terms, and conditions that are just, reasonable, and non-discriminatory in accordance with ... the requirements of this section and section 252.” It further stated that incumbent local exchange carriers had to provide “unbundled network elements in a manner that allows requesting carriers to combine such elements in order to provide such telecommunications service.” This obligation to re-bundle UNEs for new entrants became one of the most hotly contested areas of the rules.

The FCC was instructed to use a dual standard, modelled on essential facilities principles, in determining which network elements had to be unbundled (section 251(d)(2)). Specifically, the Act stated that “in determining what network elements should be made available for purposes of subsection (c)(3) of this section, the Commission shall consider, *at a minimum*, whether (A) access to such network elements as are proprietary in nature is *necessary*; and (B) the failure to provide access to such network elements would *impair* the ability of the telecommunications carrier seeking access to provide the services that it seeks to offer” (emphasis added). It is the test used to establish “impairment” that was at the heart of court challenges and eventually led to an elimination of many of the earlier unbundling rules. Section 252(d)(1) further required that such network elements must be made available at cost-based rates, “... however determined without reference to a rate-of-return or other rate-based proceeding.” This last provision is often interpreted as requiring the use of price caps to set rates for unbundled network elements.

Implementing these provisions, the FCC, in its Local Competition Order in August 1996 (FCC 1996), specified seven unbundled network elements: (1) local loops, (2) network interface devices, (3) local and tandem switching, (4) interoffice transmission facilities, (5) signaling networks and call-related databases, (6) operations support systems, and (7) operator services and directory assistance (FCC 1996). To price these unbundled network elements and combinations, the FCC developed the TELRIC (Total Element Long Run Incremental Cost) standard, a forward-looking methodology to generate a benchmark based on the assumption that an efficient, modern network (rather than the legacy network) is in place. Even though the

state PUCs challenged the FCC's costing guidelines and price benchmarks, most of them followed some form of long run incremental cost (LRIC) standard and, in fact, set prices that were in the range originally proposed by the FCC.

From this Order, two principal unbundling models emerged, with differentiated rules for the mass market (residential users and small businesses) and the enterprise market. New entrants could lease unbundled network elements in conjunction with their own switching and transportation facilities. Most importantly, they could lease local loops, a model given the acronym "UNE-L." They could also lease re-bundled UNEs from the ILECs. In the mass market, an unbundled network platform, consisting of local loop, switching and transportation (short "UNE-P") emerged as an attractive entry model. This allowed CLECs to enter the market with only minimal complementary facilities investment. In the enterprise market, CLECs were able to request enhanced extended loops (EELs), combining a local loop, interoffice transportation, and cross-connect or multiplexing, if necessary. EEL enables CLECs to serve business customers without having to collocate in every local exchange by routing traffic to those central offices which contained their own switching equipment. ILECs claimed that UNE-P was a resale service in disguise at a price much lower than would have resulted from applying the retail price minus avoided cost formula. Conversely, new competitors and state PUCs argued that UNE-P was an important step in opening the local market to competitors.

Several of the provisions of the Local Competition Order were challenged on procedural and substantive grounds by industry and state regulators. *Inter alia*, the FCC's authority to promulgate nation-wide rules, its standard to assess impairment (essentially: higher costs for new entrants), and its guidelines for unbundled network element pricing were contested. Between 1996 and 2004, the FCC issued several major Orders in response to appellate court and U.S. Supreme Court decisions.¹⁵⁵ The UNE Remand Order of 1999 responded to the directions of the highest court by narrowing the list of UNEs (FCC 1999b). However, in a separate Order in the same year, the list was expanded by adding dark fibre, subloops, and the high frequency portion of the copper loop used to provide DSL as unbundled network elements (FCC 1999a). Claiming that the FCC had not gone far enough to redefine the impairment standard, the UNE Remand Order was again challenged by incumbent service providers, coordinated by the United States Telecom Association (USTA). Earlier, in 2001, the FCC had initiated a pro-

¹⁵⁵ For a more detailed chronology of the U.S. unbundling rules see Bauer (2005).

ceeding to seek comment on whether the unbundling regime should be further modified to reflect changing technological and market conditions (FCC 2001). When the appeals court decision was handed down in the challenge of the UNE Remand Order in 2002 (USTA I), the pending Triennial Review Notice of Proposed Rulemaking (NPRM) was amended to incorporate the court's mandates.

7.3.2 Changing course: The Triennial Review Order

The Triennial Review Order (TRO), adopted in February 2003 and released in August 2003, proposed a new impairment standard and narrowed the unbundling obligations in several areas. According to the refined standard, impairment existed “when lack of access to an incumbent LEC network poses a barrier or barriers to entry ... that are likely to make entry uneconomic” (FCC 2003, pp. 58-64). Relevant structural barriers to be considered in the impairment analysis were “(1) economies of scale; (2) sunk costs; (3) first-mover advantages; (4) absolute cost advantages; and (5) barriers within the control of the incumbent” (FCC 2005c, p. 8). In a political compromise, the two Democratic Commissioners and Republican Commissioner Martin agreed to keep the narrowband unbundling framework (UNE-L, UNE-P) in place but to free ILECs from unbundling rules in the broadband markets.¹⁵⁶ Against the votes of Chairman Powell and Commissioner Abernathy — who had apparently considered keeping line sharing for copper lines in place to provide additional incentives for ILECs to invest in fibre-based networks but were opposed to UNE-P — the Order required that line sharing be phased out over a three-year period. Furthermore, new (“greenfield”) fibre deployment was fully exempted from the unbundling rules. For overlays to existing copper networks and hybrid copper-fibre networks (“brownfield” projects), the Order established that only a narrowband channel needed to be unbundled. The Order delegated the task of promulgating the granular rules required by the court decision for switching, high-capacity loops and dedicated transport to the state PUCs and set a strict time-table. Various parties, including the United States Telecom Association (USTA) representing the ILECs, appealed several parts of the Order, including the finding that the narrowband mass market switching and the enterprise markets were impaired and that the state PUCs should promulgate the more granular rules.

¹⁵⁶ In separate statements, the democratic Commissioners Copps and Adelstein expressed their unease over dropping the line sharing rules to achieve compromise on the narrowband provisions of the Order.

In March 2004, the D.C. District Court of Appeals decided *United States Telecom Association v. FCC* (USTA II), in which several rules were expressly upheld, one was vacated, and others were vacated and remanded to the agency (D.C. Circuit Court 2004). Among the Commission's findings in the Triennial Review Order that were expressly upheld are the three-year phase-out of line sharing, the decision not to require unbundling of new fibre networks, provisions governing hybrid copper-fibre loops, the elimination of enterprise switching, and the pricing and combination requirement. However, the court vacated the agency's sub-delegation of authority to the states to develop granular unbundling rules. Moreover, it vacated and remanded the FCC's finding of nationwide impairment with respect to mass market switching (and thus indirectly of UNE-P) and dedicated transport. In the switching market, the court argued, that in its assessment of impairment the FCC had only relied on one particular method (the "hot cut" process) for transferring lines from an incumbent's to a competitor's switch but had failed to consider alternative procedures. Finally, the court called into question certain aspects of the overall unbundling framework, including the efficiency level of competitors used when determining impairment, the FCC's lack of reliance on information from comparable markets, and the failure to consider alternatives to unbundling.

With Commissioner Martin changing his initial stance in support of UNE-P, neither the FCC nor the government appealed the decision to the U.S. Supreme Court. A petition by several parties, including state regulators and CLECs, to the Supreme Court was not granted *certiorari* (i.e., was not accepted for review). In August 2004, the FCC issued an interim Order to avoid disruption of the telecommunications markets and to gain time to develop a more detailed policy (FCC 2004a). The December 2004 Order (Triennial Review Remand Order), released on February 4, 2005, is the response to USTA II and addresses the concerns raised in that decision (FCC 2005c).

7.4 The present unbundling policy

The latest Orders together with provisions that had survived the multiple earlier court reviews, make up the present unbundling framework.¹⁵⁷ The Triennial Review Remand Order modified

¹⁵⁷ Court challenges continue, however, as several provisions of the Triennial Review Remand Order, in particular rules concerning high-capacity loops and dark fibre, were challenged at the time of writing.

the rules governing unbundling in the narrowband mass market and in the enterprise market. Rules in broadband markets remained in force from earlier Orders.

7.4.1 The overall unbundling framework

The latest rules refine the framework developed in the Triennial Review Order with regard to impairment. The appeals court had criticised that the FCC did not specify the level of efficiency of competitors for whom lack of access to a network element poses a barrier or barriers to entry. In response, the FCC clarified that impairment needs to be determined with reference to a hypothetical “reasonably efficient” competitor (FCC 2005c, pp. 15-17). Thus, an entrant could not claim impairment if the business model is only workable contingent upon unbundled network elements. The Commission clarified that impairment can persist with regard to any telecommunications services (and not just in cases of core services offered in direct competition with the incumbent as had previously been the case). Following the direction of the court in USTA II, the Commission decided, however, to prohibit the use of unbundling for exclusive service to competitive markets, specifically mobile wireless services and long distance services (FCC 2005c, pp.17-25). The agency stated that Congress had not introduced the unbundling framework to increase profits in competitive market segments. In these market segments, it was reasoned that competitors were able to develop working business models without access to unbundled network elements and thus could not be considered impaired.

Given the direction of the USTA II court, the FCC had to come up with its own finding of market segments in which impairment existed. To facilitate such determination, the Order abandoned national unbundling rules in favour of a more differentiated approach. As will be discussed in more detail in the next subsections, “similar” markets were distinguished based on the expected revenue opportunities and/or the likely presence of competitive fibre facilities. The likelihood that “reasonably efficient” competitors would be impaired in these segments was then evaluated. Lastly, the FCC began to take alternative offerings, such as tariffed special access arrangements whose prices are not regulated, into account when assessing impairment. However, the Commission refused to accept the availability of special access as a general indicator that new entrants were not impaired. Such a generic rule, as was proposed by major ILECs, would have raised several concerns, among them the ability of the ILECs to manipulate competition via these special access tariffs. Thus, availability of tariffed services was not considered a sufficient condition for non-impairment.

7.4.2 Mass market unbundling

In the mass market, comprising residential and small business customers, after a transition period, only local loops (UNE-L) will be available on an unbundled basis. Using the directions provided by the USTA II court, the FCC eliminated its earlier finding of impairment in the (residential and small business) mass market for local circuit switching. As a consequence, the widely used UNE-P platform is no longer available since March 2006, when the 12 month transition period ended. In the future, carriers will either have to deploy their own facilities, lease network elements such as switching from other CLECs, or lease them from ILECs but at non-regulated market prices. In justifying this new finding, the FCC pointed to recent developments in the mass market. First, it was argued that CLECs had deployed soft switches and packet switches in a growing number of exchanges. Between 1999 and 2003, 500 new switches had been installed. This expansion brought the total to 1,200, which served more than 3 million competitive access lines (FCC 2005c, pp. 112-115). The Bell Operating Companies (BOCs) submitted evidence showing that in 137 of the top 150 Metropolitan Statistical Areas competitive switches had been deployed. Many of these new switches could be shared with other CLECs, reducing their dependence on ILEC switching services. Even though competitive switches were not deployed ubiquitously, they could reach a wide territory as dedicated transport arrangements could facilitate the aggregation of traffic for switching in distant wire centres. Weighing all evidence, the FCC argued that the incremental costs of competitive switching did not impair reasonably efficient competitors. According to the Commission, this was demonstrated by the fact that several CLECs, including McLeodUSA, FDN Communications, and Cavalier Telephone, used competitive switching in combination with UNE-L. Second, the FCC, analyzing alternatives to the “hot cut” process used to transfer lines from an ILEC to a CLEC switch, found that other methods, such as batch cuts, were available so that CLECs were no longer impaired.¹⁵⁸

Since March 11, 2005, ILECs are therefore under no obligation to offer unbundled mass market local circuit switching (and thus UNE-P). For existing unbundled switching customers, the FCC adopted a 12-month transition plan, which ended in March of 2006. During this period, competitive carriers were not allowed to add new switching UNEs. Furthermore, incumbents received permission to increase UNE-P prices. The FCC declared that, “during the transition

¹⁵⁸ The CLECs had argued that hot cuts cost up to \$50 upfront that could not be recovered due to high churn rates and low margins.

period, competitive carriers will retain access to the UNE platform (*i.e.*, the combination of an unbundled loop, unbundled local circuit switching, and shared transport) at a rate equal to the higher of (1) the rate at which the requesting carrier leased that combination of elements on June 15, 2004, plus one dollar, or (2) the rate the state public utility commission establishes, if any, between June 16, 2004, and the effective date of this Order, for this combination of elements, plus one dollar” (FCC 2005c). The Commission did not release details to substantiate the magnitude of the price increases other than that it would ease the transition by avoiding a rate shock while protecting the interests of the ILECs where unbundling will be eliminated.

7.4.3 Dedicated interoffice transport market unbundling

Unbundled dedicated interoffice transportation is used by carriers to aggregate end-user traffic both in the mass market and the enterprise market. In its new rules, the FCC differentiated DS1 (24 voice grade circuits), DS3 (28 DS1 lines) and dark fibre transport. To make the required granular assessment of impairment in these markets, the FCC first defined three tiers of markets reflecting the state of competition and the revenue potential of a service. To capture these features, the agency uses the number of fibre-based collocators and the number of business lines served in a market as proxies. In the Commission’s classification, Tier 1 wire centres are characterised by the presence of four or more fibre-based collocators or more than 38,000 business lines. At the time the Order was drafted, about two thirds of these wire centres had more than 4 fibre-based collocators, signifying the existence of substantial revenue opportunities. According to the Commission’s analysis, in this situation it was likely that a CLEC may either be able to deploy facilities itself or acquire services in the wholesale market.¹⁵⁹ Approximately 5.4 percent of all 10,796 BOC wire centres fell into this category. Tier 2 wire centres were defined as having three or more fibre-based collocators or more than 24,000 business lines. About two thirds of these wire centres had three or more fibre-based collocators at the time the Order was written. Approximately 3.2 percent of all BOC wire centres, serving 12.6 percent of all BOC business lines, fell into the Tier 2 category (FCC 2005c, p. 69). Tier 3 wire centres are defined as all remaining centres.

¹⁵⁹ Stakeholders proposed widely different thresholds for business line counts: the RBOCs Bell South, Verizon and SBC proposed 5,000 lines and several CLECs more than the 38,000 proposed by the FCC (FCC 2005c, p. 68).

Using these thresholds, the FCC found that requesting carriers are impaired without access to DS1 capacity “on all routes except those connecting two Tier 1 wire centres” (FCC 2005c, p. 72). In other words, on routes involving Tier 2 or Tier 3 wire centres, DS1 transport circuits have to be made available by ILECs on an unbundled basis. To maintain consistency with its DS3 unbundling rules, the FCC limited the number of unbundled DS1 transport circuits that one carrier may request to 10 (FCC 2005c, p. 73). DS3 loops have to be unbundled for all routes involving at least one Tier 3 wire centre; no carrier may request more than 12 DS3 transport circuits (FCC 2005c, pp. 74-75). Likewise, dark fibre only needs to be offered on an unbundled basis on routes involving at least one Tier 3 wire centre (FCC 2005c, pp. 75-77). Lastly, based on market evidence, the FCC determined that lack of access to entrance facilities (the facilities connecting a CLEC network to an ILEC network) did not constitute impairment (FCC 2005c, pp. 77-80). As in the case of mass market circuit switching, a 12-month transition plan was adopted for competing carriers to transition away from the use of DS1- and DS3-capacity dedicated transport where they are not impaired. For dark fibre, an 18-month plan was put into place (ending in September 2006). According to the FCC, “these transition plans apply only to the embedded customer base, and do not permit competitive LECs to add new dedicated transport UNEs in the absence of impairment. During the transition periods, competitive carriers will retain access to unbundled dedicated transport at a rate equal to the higher of (1) 115% of the rate the requesting carrier paid for the transport element on June 15, 2004, or (2) 115% of the rate the state commission has established or establishes, if any, between June 16, 2004 and the effective date of this Order” (FCC 2005c, pp. 4-5). As in the case of mass market switching, the FCC did not release any specific data to justify the range of allowable price increases.

7.4.4 High-capacity loops

High capacity loops are primarily used to serve business customers. Based on the directions provided by the USTA II court, the FCC examined whether such loops could be procured from third parties or self-provided. Based on the Commission’s analysis, it determined that DS3 loops needed to be unbundled to locations within a wire centre serving fewer than 38,000 business lines or in which fewer than four fibre-based collocators were present (FCC 2005c, p 98-100). For DS1 loops, the FCC recognised that stand-alone provision was rarely economically viable. Thus, it assumed that DS1 loops were only available on a competitive basis where sufficient DS3 capacity was present that could be leased at the DS1 level. For that

reason, it ruled that DS1 loops would need to be unbundled in wire centres containing fewer than 60,000 business lines or fewer than four fibre-based collocators. Thus, in both cases, unlike in the case of dedicated transport, the failure to meet one of the two indicators triggers an obligation to unbundle. The agency found that CLECs were not impaired without access to fibre loops in any instance.

As in the case of dedicated transportation, the FCC adopted “a 12-month plan for competing carriers to transition away from use of DS1- and DS3-capacity loops where they are not impaired, and an 18-month plan to govern transitions away from dark fibre loops” (FCC 2005c, p. 108-109). Transition measures only applied to the embedded customer base “and did not permit competitive LECs to add new high-capacity loop UNEs in the absence of impairment. During the transition periods, competitive carriers retained access to unbundled facilities at a rate equal to the higher of (1) 115% of the rate the requesting carrier paid for the transport element on June 15, 2004, or (2) 115% of the rate the state commission has established or establishes, if any, between June 16, 2004 and the effective date of this Order” (FCC 2005c, p. 108-109). Beginning in March and September 2006, respectively, prices for high-capacity loops will be determined by commercial transactions.

7.4.5 Next-generation networks

Unbundling provisions in broadband markets were not directly affected by the Triennial Review Remand Order as they had already been vacated by the USTA I decision in 2002 or phased out by the Triennial Review Order of 2003. As discussed earlier, line sharing had been introduced as a separate network element in 1999. In USTA I the D.C. Court of Appeals vacated the line sharing rules with the argument that the FCC had not considered the market leadership of cable and the potential disincentives for ILECs and CLECs to innovate. In response, the Triennial Review Order had established a three-year time table to phase out line sharing. Thus, between 2003 and 2006, ILECs had to allow line sharing, but were allowed to charge higher prices than in the past. According to the Order, prices could increase to 25% of the full copper loop price in year 1, 50% in year 2, and 75% in year 3. Under the transition plan, new customers could only be added during year 1. However, ILECs will have to allow line splitting, a scenario in which a CLEC acquires a local loop for use of the high-frequency circuit while leasing the voice channel to another CLEC.

The Triennial Review Order also had eliminated unbundling requirements for fibre deployment to the premises (FTTP) in new developments to stimulate investment in these next-generation platforms. Responding to a request for reconsideration by Bell South and other ILECs, in October 2004 the Commission clarified that this exemption would also apply to fibre-to-the-curb (FTTC) projects, in which fibre extends to within 500 feet of all the customers served by that loop (FCC 2004b). If an ILEC overbuilds copper loops, it will either have to keep the copper loop in service or make a narrowband channel available on an unbundled basis if the copper loop is retired. More specifically, ILECs must provide access to a voice grade channel via time division multiplexing (TDM) technology or, if no TDM is available, make a 64kbps channel available. In the Triennial Review Order, the FCC had also eliminated the broadband sharing requirement for hybrid loops. In hybrid networks fibre is deployed to points that do not qualify as FTTP or FTTC. In such cases, CLECs may deploy their own networks to the fibre termination point of the ILEC (“remote terminal”) and then lease the remaining copper loop (called “subloop”). Overall, interpreting the instruction in the Telecommunications Act to facilitate the deployment of advanced communications infrastructure and services, unbundling obligations in next-generation network markets have been essentially eliminated.

7.5 Drivers of the new unbundling rules

The new unbundling regime has to be seen in the light of several developments. One is the sequence of legal battles driving its repeated overhaul for the past nine years. Another is the shift in attention from existing to emerging next-generation networks, which changed the focus of regulatory decisions from short-term efficiency considerations to longer-term investment and innovation considerations. At the same time, it is a response to the experience with earlier approaches to unbundling and a new assessment of the future of competition in the narrowband and broadband markets. While the rules may have been changing, the FCC’s mandate remained (and remains) to ascertain the public interest. Thus, each set of rules can be seen as a specific expression of the agency’s view as to which institutional arrangements best served the public interest given the specific technological and economic context. This was not always a decision based purely on theoretical reflections and factual evidence. It was also influenced by political feasibility constraints and forward-looking views as to the nature of the problem and of adequate solutions.

7.5.1 From a static to a dynamic approach

First, reacting to several court defeats, the FCC had to define “impairment” in ways that would survive possible future legal challenges. The conceptual literature on interconnection and access is well developed under static conditions (see, for example, Laffont and Tirole 2000 and Armstrong 2002). Early unbundling policies at the federal and state levels were clearly inspired by a static view of unbundling and competition. In contrast, the new definition of “impairment” is influenced by a pragmatic dynamic notion of competition in which new entrants with access to new technology compete against an incumbent with a legacy network. Coaxed by several court defeats, the FCC has gradually expanded the weight attributed to the dynamic incentives for ILEC and CLEC investment created by its unbundling rules. This view is particularly relevant in the broadband markets, where substantial new investment is required.

Initial FCC regulations had tested whether a competitor’s lack of access to an unbundled network element would increase the cost of the entrant. The U.S. Supreme Court argued convincingly that this was inappropriate as entrants in any industry initially face higher costs than the incumbents. Thus, impairment had to be defined more narrowly with regard to wasteful duplication of investment and natural monopoly features. Consequently, the FCC proposed to include factors such as sunk costs, economies of scale, first-mover advantages, and other barriers within the control of an ILEC in assessing impairment (FCC 2003). The most recent standard evaluates impairment with regard to the capabilities of a “reasonably efficient” competitor. The new standard emphasises that impairment is not constituted solely by the existence of sunk costs or of higher cost incurred by competing service providers. Rather, impairment exists if a reasonably efficient competitor would not be able to exert an effective check on the incumbent’s market power. Following the instructions of the appeals court, the FCC now explicitly considers the existence of substitutes to unbundled network elements, which includes tariffed — but not price-regulated — forms of access, such as special access. Furthermore, the FCC weighs the potential costs of unbundling, especially in the form of reduced investment and innovation incentives. With its emphasis on “reasonably efficient competitors” and inter-modal competition, the new standard improves — but does not necessarily fully clarify — the “impairment” threshold.

7.5.2 Inter-modal competition

A second development contributing to the new approach was the perception that increased competitive pressure was exerted by inter-modal platforms. Additional new technologies that would further intensify competition were expected to be on the verge of commercial deployment. In the narrowband voice markets, wireless services had developed into closer substitutes to fixed service; cable television companies had gradually expanded their share of the market and, as more systems were upgrading to digital cable, further growth was expected.¹⁶⁰ In the broadband markets, in addition to the players just mentioned, the gradual migration toward 3G services and other wireless broadband platforms (e.g., WiFi (802.11), WiMax (802.16) or Mobile-Fi (802.20), both licensed and unlicensed), satellite-based services, and powerline communications promised additional competition. During the past few years, the FCC had adopted policies to facilitate the growth of these alternative platforms. For example, it had made more electromagnetic spectrum available for licensed advanced mobile services and expanded unlicensed bands, not least in support of Wireless Internet Service Providers (WISPs), and it had taken action to promote powerline communications. Moreover, it seems that by the end of 2004 the majority of Commissioners envisioned VoIP as the future of voice. The services offered by the new service providers were considered as superior to those supplied by many CLECs. From that vantage point, narrowband unbundling appeared less important in the future. However, it might have been justified to retain line sharing somewhat longer until more robust platform competition had materialised. This apparently was the position of the majority of the Commissioners, but in a somewhat odd act of political logrolling it was abandoned to facilitate the political compromise underlying the Triennial Review Order. Ironically, that Order retained a broad range of narrowband unbundling provisions, which were later overturned by the appeals court, but eliminated line sharing and other broadband unbundling obligations. The FCC apparently did not find a way to re-insert line sharing into the latest Order, as had then been predicted by some experts.

¹⁶⁰ At the end of June 2005, cable provided about 50% of the facilities-based CLEC loops. This figure corresponded to about 13% of all CLEC access lines and about 3% of the total number of access lines. See Federal Communications Commission, *Local Telephone Competition, Status as of June 30, 2005*, available at http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-264742A1.pdf.

7.5.3 The experience with narrowband unbundling

In contrast to earlier decisions, when the rule revisions were undertaken a growing empirical record of outcomes under the previous unbundling rules was available, which undoubtedly influenced the direction of the changes. The intent of Congress in the Act was to stimulate facilities-based competition. The implementation of the Act at the federal and state levels spawned rules that had several unintended consequences. The TELRIC standard for the pricing of unbundled network elements resulted in charges based on a hypothetical, efficient greenfield technology. The Regional Bell Operating Companies (RBOCs — Bell South, Qwest, Verizon, and SBC) claimed that these prices were not cost-covering and implied a discount of up to 50-60% off the retail rate (compared to a mandated discount of about 17-25% for wholesale services sold to resellers). In addition to the TELRIC standard, ILECs had to recombine individual network elements and sell them at TELRIC prices as platforms (UNE-P). This changed the incentives for new competitors in favour of service-based entry by offering them a lower-risk alternative to facilities-based entry.

The empirical record reveals that UNE-P indeed became the preferred entry strategy after the collapse of the information and communication technology stocks in 2000. Overall, new market entrants were able to expand their share in fixed local access lines from about 3.2% in 1997 to 17.8% in 2004, a substantial increase. However, the envisioned influx of facilities-based competitors was much lower than expected. Although the number of customers served via CLECs' own facilities increased from 4 to 7.4 million, UNE-P based lines increased even faster from 4.8 million in 2001 to 17.1 million in 2004. As a result, the share of CLEC facilities-based lines in total competitive lines declined from 31% in 2000 to 23% in 2004. During the same period, pure resale declined from 45% to 10% and UNE-L from 24% to 13% of all competitive lines. However, service-based UNE-P lines increased from very low levels (there is no detailed data available for the early years) to 53%. Overall, while the record does not speak very favourably for UNE-P, the evidence is mixed. On the one hand, there are cases of CLECs that offered innovative services over UNE-P platforms and later transitioned to facilities-based solutions. On the other hand, even though the investment disincentive argument is not very convincing with respect to traditional copper loops (which are already sunk) the empirical data does not seem to support a strong claim that UNE-P was a first step toward facilities-based competition in the aggregate.

7.5.4 The experience with broadband unbundling

The dynamic incentives of unbundling rules are much more critical in the area of broadband communications, where substantial facilities upgrades and new investment are required. During the past few years, policy-makers and some industry leaders were increasingly concerned that the U.S. was losing ground in broadband vis-à-vis South Korea, Canada, and other leading nations.¹⁶¹ There was a remarkable difference in the ranking with regard to cable modem and DSL availability: whereas in 2003 the U.S. ranked number two in terms of households passed by cable modem-ready systems, it only ranked number eighteen in DSL (OECD, 2003). Bittlingmayer and Hazlett (2002) have attributed this gap to the difference in the legal treatment of cable (free from unbundling obligations) and telephone companies although there are other factors at play as well. At the FCC and in the court rooms, this perception has probably further boosted the case against the asymmetric unbundling regime. FCC Commissioners had indicated several times that the agency intended to eliminate the asymmetries between telephone and cable companies. Many contributions in this policy debate pointed out that low UNE prices had lessened investment incentives of the ILECs — and especially the RBOCs, due to their stricter regulatory mandates — weakening one major investor in advanced networks. Several studies, some financed by the ILECs, argued that UNE-P and TELRIC had created a disincentive for ILECs to invest in advanced infrastructure (e.g., Pindyck 2004). While these rules may have advanced the short-term goal of attracting new entrants, they were in conflict with other goals of the Act, most importantly to accelerate broadband deployment. These short and long-term effects of unbundling on advanced service deployment are not fully investigated. As discussed above, the net effect of unbundling rules depends on the outcome of contrary forces: the acceleration of market entry and its repercussions on the incumbent and the disincentive to invest for the incumbent (and possibly new entrants who would have otherwise invested more in their own facilities). There is also contrary evidence indicating that unbundling has contributed to an acceleration of deployment of advanced technology at the level of wire centres (Gabel and Huang 2003). However, even studies that indicate the overall positive effect of unbundling typically find that lower prices for UNEs constitute a disincentive for investment (Gabel and Huang 2003).

¹⁶¹ For example, as of June 2004, the OECD (2005) ranked the U.S. number 11 in broadband penetration. For a more detailed analysis of U.S. broadband policy see Bauer (2006).

A chance to put telephone and cable companies on an equal footing came after the U.S. Supreme Court decided *NCTA v. Brand X* in 2005 (U.S. Supreme Court 2005). In 2002 the FCC had issued a declaratory ruling, affirming that cable modem service was to be treated as information service. This meant that common carrier rules such as unbundling or non-discrimination conditions would not apply to cable. That same year, the Commission also initiated a proceeding to review the rules governing broadband access in general. The declaratory ruling was challenged but in *Brand X* the U.S. Supreme Court affirmed the Commission's authority to classify broadband services. Having been affirmed, the FCC proceeded to declare DSL service as information service as well, eliminating the asymmetries between cable and telephone companies (FCC 2005a). To address potential concerns that the new rules, which eliminated non-discrimination requirements and unbundling for telephone companies in broadband markets, would lead to a closure of the openness of the Internet, the Commission simultaneously issued a — legally non-binding — policy statement in favour of the preservation of such open access (FCC 2005b). Since then, the FCC had to act in only a few cases to prevent a LEC from disadvantaging competing service providers but the concerns have fuelled an intense debate on net neutrality and led to the introduction of several draft bills in Congress that are aimed at addressing these issues. These issues are beyond the scope of this paper.

7.6 Assessment and outlook

Given the short observation period and the conflicting forces at work, it is difficult to assess the effects of the new unbundling rules empirically. Although early analyses anticipated short-run price increases for inputs sold to competitors, this was not an inevitable conclusion. Bourreau and Doğan (2005) showed that incumbents may have an incentive to keep lease prices low to delay facilities-based entry of competitors with cheaper technology. The FCC adopted transition periods to avoid destabilisation of the market position and business plans of CLECs and to facilitate a migration to other solutions. In the areas affected by the Triennial Review Remand Order, price increases during the transition were limited to 15% or \$1.00 as stated. The early evidence indicates fairly stable prices for UNEs and, in the aggregate, ILECs do not seem to have taken advantage of the additional pricing flexibility provided by the FCC (Gregg 2006). Where they are not considered impaired, since March 11, 2006, competitive carriers have to buy unbundled network elements under negotiated agreements or tariffed

special access prices (or move away from the unbundling model toward resale or facilities-based competition). During past years, these unregulated special access prices typically exceeded the regulated UNE prices considerably.¹⁶² It is too early to assess whether prices for inputs will increase toward that level. Similar considerations apply to the effect of the changes on costs of CLECs and broadband ISPs. A few carriers, for example Verizon and Covad, have announced private agreements but it is far from certain that smaller competitors will be able to negotiate such arrangements. However, as in the voice case, it is not straightforward to assume that prices in wholesale markets will necessarily increase, not least because emerging technologies, such as very scaleable switches, may ease potential cost increases in the medium and long run. The granular analysis of the FCC did not rely on a detailed analysis of the costs of competitors in the market tiers and is thus a rough proxy. It remains to be seen whether in smaller and medium-sized markets the remaining unbundled elements will suffice to avoid serious cost disadvantages for new competitors.

The evidence after the Telecommunications Act of 1996 indicates that unbundling — at least under the specific rules adopted by the FCC in 1996 — did not turn out to be the anticipated transition policy to facilities-based competition. Hazlett and Bazelon (2005) examined the empirical record and concluded that unbundling has not provided such a stepping stone. However, their approach does not capture the indirect effects of unbundling and further research to clarify these issues would be desirable. A cautious interpretation of the most recent empirical data suggests a more differentiated picture. The growth rate of total CLEC lines had been declining and the growth rate of facilities-based lines had been increasing for several years prior to the latest policy revisions. Whereas the total number of CLEC lines had increased by 24.7% between June 2002 and June 2003 and by 18.7% during the next year, it slowed to 6.5% between 2004 and 2005 (FCC 2006, table 1). In contrast, the increase in the number of CLEC owned lines accelerated from 2.1% between 2002 and 2003, to 17.5% (2003–2004), to 21.2% (2004–2005). These changes may have happened in anticipation of the new policies or they could indicate, alternatively, that UNE-P had some, if less than expected, positive effect on facilities-based competition.

¹⁶² In a study for CompTel/ASCENT, a business association of competitive local exchange carriers, Bryant and Pelcovits (2004) found that the cost impact of a transition from DS1 UNEs to special access DS1 would raise the respective costs of CLECs by 100%, and in some cases up to 10-fold. Trade press information often suggests that special access is priced up to 300–500% above UNEs.

In the broadband access markets, both DSL and cable modem growth rates initially increased after the Triennial Review Order but started a slight but continuing decline after a peak in December 2003. The DSL growth rate declined from 23.9% in December 2003 (over the preceding half year) to 17.1% in June 2005. The cable modem growth rate declined from 20.2% in December 2003 to 12.1% in June 2005. The growth rates for DSL were slightly higher than those for cable modem service, although starting from a lower level. Accelerated growth is visible in fibre access networks and wireless broadband after the Triennial Review Order but both platforms had shown similar growth rates in 2000-2001. The available evidence is compatible with the claim that the new unbundling rules have accelerated investment in advanced platforms. The accelerated growth rates are probably also driven by more robust inter-modal competition, which in turn has been strengthened by the symmetric regulatory framework. Nonetheless, the data is still insufficient to establish a causal link and a fuller statistical analysis will have to await a longer observation record.

Overall, in the U.S. the view has prevailed that the potential negative effects on short-term market entry of weaker unbundling rules pale compared to the benefits from stronger investment incentives, the long-term benefits of more robust facilities-based competition, and more symmetric regulation. Compared to other countries, the U.S. narrowband unbundling framework had been very tedious and intrusive. The past ten years also illustrate that in an environment with increasing competition such detailed regulatory rules are not sustainable. The present framework brings the U.S. more in line with the narrowband unbundling rules of other nations. In broadband markets, the U.S. has introduced a framework free of specific unbundling regulations, trusting that it would stimulate investment and innovation. However, the elimination of unbundling rules in the broadband access markets has raised new concerns. In August 2005, the FCC emphasised its commitment to keep the Internet open. In its wake an intense debate on network neutrality has ensued. As in the early unbundling debate, the complicated interactions between different regimes governing the access of content providers to network platforms on the overall innovation dynamics of the sector are poorly understood. Nevertheless, at the time of writing, several bills intended to address these issues are pending in Congress. A new round of unbundling debates may be in the making.

7.7 References

- Baranes, E. and Bourreau, M. (2005). An economist's guide to local loop unbundling, *Communications & Strategies*, 57: 13-31.
- Bauer, J. M. (2005). Unbundling policy in the United States: players, outcomes and effects, *Communications & Strategies*, 57: 59-82.
- Bauer, J. M. (2006). Broadband in the United States, in: M. Fransman (ed.) *Global Broadband Battles: Why the U.S. and Europe Lag While Asia Leads*, pp. 133-163, Stanford, CA: Stanford University Press.
- Bittlingmayer, G. and Hazlett, T. W. (2002). "Open access": the ideal and the real, *Telecommunications Policy*, 26: 295-310.
- Bourreau, M. and Doğan, P. (2005). Unbundling the local loop, *European Economic Review* 49: 173-199.
- Bryant, M. T. and Pelcovits, M. D (2004). The economic impact of the elimination of DS-1 loops and transport as unbundled network elements, Washington, D.C.: Microeconomic Consulting & Research Associates Inc.
- Cave, M. and Vogelsang, I. (2003). How access pricing and entry interact, *Telecommunications Policy*, 27: 717-727.
- D.C. Circuit Court (2002). *United States Telecom Association v. FCC*, 290 F.3d 415 (D.C. Cir. 2002) (USTA I).
- D.C. Circuit Court (2004). *United States Telecom Association v. FCC*, 359 F.3d 554 (D.C. Cir. 2004) (USTA II).
- Eighth Circuit Court (1997). *Iowa Utilities Board v. FCC*, 120 F.3d 753 (8th Cir. 1997).
- FCC (1996). In the Matter of Implementation of the Local Competition Provisions in the Telecommunications Act of 1996; Interconnection between Local Exchange Carriers and Commercial Mobile Radio Service Providers, CC Docket Nos. 96-98, 95-185, First Report and Order, 11 FCC Rcd 15499, 15616-775 (Local Competition Order).
- FCC (1999a). In the Matter of Deployment of Wireline Services Offering Advanced Telecommunications Capability and Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, CC Docket Nos. 98-147, 96-98, Third Report and Order in CC Docket No. 98-147 and Fourth Report and Order in CC Docket No. 96-98, 14 FCC Rcd 20912 (Line Sharing Order).
- FCC (1999b). In the Matter of Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, CC Docket No. 96-98, Third Report and Order and Fourth Further Notice of Proposed Rulemaking, 15 FCC Rcd 3696, 3699 (UNE Remand Order).
- FCC (2001). In the Matter of Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, Implementation of the Local Competition Provisions of the Telecommunications Act of 1996, Deployment of Wireline Services Offering Advanced Telecommunications Capability, CC Docket Nos. 01-338, 96-98, 98-147, Notice of Proposed Rulemaking, 16 FCC Rcd 22781 (Triennial Review NPRM).

- FCC (2003). In the Matter of Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers; Implementation of the Local Competition Provisions of the Telecommunications Act of 1996; Deployment of Wireline Services Offering Advanced Telecommunications Capability, CC Dockets Nos. 01-338, 96-98, 98-14, Report and Order and Order on Remand and Further Notice of Proposed Rulemaking, Federal Communications Commission, February 20, 2003 (Triennial Review Order).
- FCC (2004a). In the Matter of Unbundled Access to Network Elements, Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, WC Docket No. 04-313 and CC Docket No. 01-338, Federal Communications Commission, July 21, 2004.
- FCC (2004b). In the Matter of Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, Order on Reconsideration, CC Docket No. 01-338, October 18, 2004.
- FCC (2005a). In the Matters of Appropriate Framework for Broadband Access to the Internet over Wireline Facilities, Universal Service Obligations of Broadband Providers, Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services, Computer III Further Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer III and ONA Safeguards and Requirements; Conditional Petition of the Verizon Telephone Companies for Forbearance Under 47 U.S.C. § 160(c) with Regard to Broadband Services Provided Via Fiber to the Premises; Petition of the Verizon Telephone Companies for Declaratory Ruling or, Alternatively, for Interim Waiver with Regard to Broadband Services Provided Via Fiber to the Premises, Consumer Protection in the Broadband Era, CC Dockets No. 02-33, 01-337, 95-20, 98-10, WC Dockets No. 04-242, 05-271, Federal Communications Commission, September 23, 2005.
- FCC (2005b). In the Matter of Appropriate Framework for Broadband Access to the Internet over Wireline Facilities; Review of Regulatory Requirements for Incumbent LEC Broadband Telecommunications Services; Computer III Further Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Regulatory Review – Review of Computer III and ONA Safeguards and Requirements; Inquiry Concerning High-Speed Access to the Internet Over Cable and Other Facilities; Internet Over Cable Declaratory Ruling; Appropriate Regulatory Treatment for Broadband Access to the Internet Over Cable Facilities, CC Dockets No. 02-33, 01-337, 95-20, 98-10, GN Docket No. 00-185 and CS Docket No. 02-52, Federal Communications Commission, September 23, 2005.
- FCC (2005c). In the Matter of Unbundled Access to Network Elements; Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, WC Docket No. 04-313 and CC Docket No. 01-338, February 4, 2005 (Triennial Review Remand Order).
- FCC (2006). High-Speed Services for Internet Access: Status as of June 30, 2005, Industry Analysis and Technology Division, Wireline Competition Bureau, Washington, DC: Federal communications Commission.
- Gabel, D. and Huang, G. (2003). Promoting Innovation: Impact of Local Competition and Regulation on Deployment of Advanced Telecommunications Services for Businesses, paper presented at the conference of the American Federation of Evolutionary Economics (AFEE). Washington, D.C. January 2003, available at http://itc.mit.edu/itel/docs/2003/promo_innov.pdf.
- Gregg, B. J. (2006). A Survey of Unbundled Network Element Prices in the United States (Updated March 2006), available at <http://www.nrri.ohio-state.edu/Telecom/a-survey-of-unbundled-network-element-prices-in-the-united-states-updated-march-2006>.
- Harris, R. G., Rosston, L. G. and D. J. Teece (1995). Competition in local telecommunications: implications of unbundling for antitrust policy, in: G. W. Brock (ed.) *Toward a Competitive Telecommunication Industry. Selected Papers from the 1994 Telecommunications Policy Research Conference*, pp. 67-94, Mahwah, NJ: Lawrence Erlbaum.

- Hazlett, T. W. and Bazelon, C. (2005). Regulated unbundling of telecommunications networks: a stepping stone to facilities-based competition? Paper presented at the 33rd Research Conference on Communications, Information, and Internet Policy, Alexandria, VA, September 23-25, 2005, available at <http://www.tprc.org>.
- Laffont, J.-J. and Tirole, J. (2000). *Competition in Telecommunications*, Cambridge: MIT Press.
- Mandy, D. M. and Sharkey, W. W. (2003). *Dynamic pricing and investment from static proxy models*, OSP Working Paper No. 40, Washington, D.C.: Federal Communications Commis
- Mansell, Robin (1994). Strategic Issues in Telecommunications: unbundling the information infrastructure, *Telecommunications Policy*, 18(8): 588-600.
- Noam, E. M. (2001). *Interconnecting the Network of Networks*, Cambridge: MIT Press.
- Nuechterlein, J. E. and P. J. Weiser (2005). *Digital crossroads: American telecommunications policy in the Internet age*, Cambridge: MIT Press.
- OECD (2003). *Developments in Local Loop Unbundling*, DSTI/ICCP/TISP(2002)5/FINAL, Paris: Organisation for Economic Co-operation and Development.
- OECD (2005). *Communications Outlook 2005*, Paris: Organisation for Economic Co-operation and Development.
- Pindyck, R. S. (2004). *Mandatory unbundling and irreversible investment in telecom networks*, NBER Working Paper 10287, available at <http://ssrn.com/abstract=502982>.
- Pindyck, R. S. (2005). *Pricing capital under mandatory unbundling and facilities sharing*, NBER Working Paper 11225, available at <http://ssrn.com/abstract=693086>.
- U.S. Supreme Court (1999), *AT&T et.al. v. Iowa Utilities Board et.al.*, 525 U.S. 366 (1999).
- U.S. Supreme Court (2002). *Verizon Communications Inc. et.al. v. Federal Communications Commission et.al.*, 535 U.S. 467.
- U.S. Supreme Court (2005). *National Cable & Telecommunications Ass'n v. Brand X Internet Services*, 125 S. Ct. 2688.
- Valletti, T. M. (2003). The theory of access pricing and its linkage with investment incentives, *Telecommunications Policy* 27: 659-675.