Regulating prices of unbundled access to the local loop: a German case study

Markus Fredebeul-Krein

The paper reviews the performance of the German regulatory framework as regards unbundled access to local loop (ULL). The argumentation is based on the assumption that the goal of regulatory interference into telecom markets is to promote sustainable competition in order to maximise social welfare. For Germany, it is demonstrated that – due to a comprehensive regulatory framework – a considerable degree of competition has evolved since the local telecom market has been opened in 1998. Thereby it also becomes evident that pricing is the most controversial issue to be resolved when regulating ULL access.

competition, local telecom markets, network access, local loop unbundling, pricing

Introduction

From an economic perspective, the primary objective of regulating network access is to support the development of efficient and sustainable competition by enabling both the efficient entry of new companies into the telecom market as well as costminimising production. Consequently, it was one of the primary goals of the legal framework created by the Telecommunications Act of 1996 (TKG) to ensure competitors' access to Deutsche Telekom's network, including unbundled access to the local loop. The question arises whether the regulatory approach chosen is appropriate to promote competition by new carriers entering the market.

The paper is organised as follows. Based on the assumption that certain regulatory rules on network access have to be adopted in order to provide safeguards for market access to be effective, it is argued in the first section that a regulatory framework for telecom markets should seek to promote both, service based competition and network competition. In the second section, the German regulatory framework as regards unbundled access to the local loop is analysed. Starting with an examination of the legal and regulatory provisions, the implementation of local loop unbundling in Germany is examined. The third section considers the aspect of pricing local loop services in more detail. The final section briefly summarises the results of the analysis.

The economic rationale for regulating local loop unbundling

Regulatory principles for an efficient ULL regime

According to the concept of contestable markets, governments should only intervene into markets where barriers to entry exist[①]. Such entry barriers can arise from additional costs which must be borne by entrants but not by firms already in the market. One reason for additional costs is control

[①] *For a further discussion of the concept of contestable markets [2].*

over essential facilities[①], which might allow a firm to maintain prices above the competitive level without inducing entry. The refusal to supply an essential facility would increase the rival's costs. Therefore, those markets which are not contestable should be regulated, because firms can distort or deter the developments of markets. On contestable markets, however, potential competition guarantees the efficient allocation of resources. Thus regulation is only desirable if there is clear evidence that a market failure exists and that the development of competition will be harmed without intervention.

In telecommunication markets, certain network services might have the characteristic of an essential facility. Since new telecommunications providers do not own a universal network, they depend to some degree upon the network of the incumbent[②]. The incumbent, on the other hand, could have less incentives to offer access to its network to competitors. Mandatory network access of all public networks is a way to deal with such entry barriers. In addition, in telecom networks substantial investment is „sunk". This is because significant costs are involved in the provision of infrastructure and these costs are lost if companies exit the market. Also, the nature of the supply of telecommunication networks is characterised by economies of scale (stemming from large fixed costs) and economies of scope (giving rise to common costs). The significant economies of scale and scope together with sunk costs in the provision of telecommunications networks, enable the incumbent to deter the market entry of new providers. Yet, not all network elements do have the characteristics of anessential facility. Large parts of a telecom network are contestable and do not require any regulation [5]. This is not the case for local cable based network which is a monopolistic bottleneck.

Service competition versus network competition

To rule out anti-competitive behaviour of incumbents and discrimination of potential competitors, governments need to establish regulatory rules for the provision and use of network services. Yet, the shape of these regulatory rules is highly controversial. One reason is, that this depends on whether regulators focus on network competition or access-based competition: while network competition fosters competition on telecom markets through encouraging the construction of alternative networks, access-based competition requires dominant operators to provide access to other operators to their networks and facilities.

One could argue, that sustainable competition in telecom markets will only emerge if regulatory rules encourage infrastructure competition. Once there is an alternative infrastructure, there are less barriers to entry for service providers by giving them a choice of network operators. A dominant network operator then cannot control essential facilities and therefore abuse its market power, for instance by charging prohibitive network access rates from its competitors. It is therefore necessary to set the right signals which encourage the development of network competition through incentives for efficient investment in alternative infrastructures.

On the other hand, service competition creates faster and more intensive competitive pressure and may reduce the waste of resources. Mandating local loop unbundling is necessary to avoid the duplication of sunk costs involved with infrastructure competition [4]. If competitors of the incumbent were refused to access the unbundled loop, they would unnecessarily duplicate facilities, thereby causing inefficiencies.

① *An essential facility is a monopoly-supplied facility, function, process or service, which competitors require as an input in order to provide telecommunication services and which competitors cannot economically or technically duplicate.*

② *Due to the existence of network externalities in the provision of telecommunications services, competitors would otherwise not reach the necessary number of participants for the service they offer [6].*

Yet, one could also argue that such a behaviour by an individual company is unlikely, since it would not invest in new local infrastructure, if there is no need for more network capacity due to raising demand. This is because a competitive firm would not build a local network if it did not generate sufficient revenues to cover its costs. Rather it would not enter the market. Only if available returns are due to high demand commercially attractive (e.g. access to key sites in central business districts), investment in local networks would take place. Such investment would be efficient in the economic sense. Therefore, the danger of over-investment by duplication of facilities does not necessarily exist. Only if the regulator would set wrong incentives to invest in local infrastructure, inefficient duplication of local networks would take place[①].

However, there are more arguments in favour of regulating unbundled access to the local loop: regulatory rules are necessary in order to:

– overcome barriers for market entry (local network is a bottleneck facility which cannot be replicated by reasonable means),
– allow competitors to built up their own broadband access,
– give new competitors a free choice as to the provision of services (product diversity),
– enable competitors the introduction of innovative technologies.

For all these reasons it seems to be justified to establish a minimum set of regulatory rules for ULL access which enable at least to some extent the development of access-based competition at the retail level.

The regulation of local loop unbundling in Germany

While the previous section has shown that the objective of realising sustainable competition in the long term requires the regulator to aim for both, access-based competition and network competition, we now turn to the regulation of local loop unbundling in Germany.

Legal provisions

The German telecommunications market was fully liberalised on 1st January 1998. Under a comprehensive legal and regulatory framework that provides for safeguards against unfair competition and market power, Deutsche Telekom is obliged to supply a broad portfolio of access services and network capabilities, including unbundled access to the local loop. While the Federal Telecommunication Law (TKG) lays down the general framework for regulating the German telecom market various ordinances set out more detailed regulatory provisions. Two of these ordinances, the Rates Ordinance and the Network Access Ordinance (NVZ) are central to the regulation of ULL access.

Under §§ 33 and 35 TKG in conjunction with § 2 of the Network Access Ordinance, dominant operators are obliged to provide unbundled access to all parts of their telecommunication network including subscriber access lines. According to § 33 of the TKG, network access has to be provided on a non-discriminatory basis, and ... upon the same conditions ..., unless the establishment of less favourable conditions ... is objectively justified. Access to the local loop is considered to be a form of special network access (§ 35 TKG).

① *For instance, such a wrong incentive would be set if a regulator would only allow new entrants to provide broadband services over their infrastructure, but not the incumbent.*

Rates for network services supplied by a dominant provider are subject to prior approval by the regulator (§ 39 TKG). According to § 24 of the Federal Telecommunications Act they shall be based on the costs of efficient service provision. In particular, the tariffs shall:

– include no surcharges sustainable only as a result of dominant position,
– not cover discounts which prejudice competitive opportunities of other companies in a telecommunications market,
– not discriminate between individual users of identical or similar telecommunications services,

unless there is evidence of an objectively justifiable reason therefore.

The Rates Ordinance requires that the costs of efficient services shall be calculated on the basis of long-run additional (incremental) costs of providing the service (LRICS) plus an appropriate mark-up for volume neutral common costs, both inclusive of an appropriate rate of return on capital employed.

In addition, the network access ordinance (§ 3 NVZ) determines rules for co-location: In principle the operator is required to offer physical co-location. In case the operator provides evidence that this is not or no longer objectively justified he is obligated to enable virtual co-location.

Implementing ULL access in Germany

The German regulator has ruled that local loop unbundling means rental of raw copper loops. Only if raw copper is not available Deutsche Telekom must provide bitstream access at the local exchange. Depending on the access equipment in use on a particular customers' premises and the current usage of this equipment, 17 different products are available ranging from the basic copper-pair for usage up to 160 kbit/s up to digital lines facilitated on fibre infrastructure (ISIS/OPAL). Basically, one can distinguish between two groups of products:

– fully unbundled local loops i.e. the provision of „raw" copper or dark fibre, and
– bundled products, so-called „Carrier customer access" i.e. the provision of transmission channels with dedicated analogue frequency range or digital transmission rate.

All network operators (licensees class 3 and 4) are entitled to unbundled local loop access. They may also offer services provided on the local loop to a reseller. Access must be granted at the MDF (main distribution frame) level with co-location being possible at 8000 sites at individually regulated prices. The following graph shows how ULL access is technically implemented in Germany (Fig. 1).

As a result of the comprehensive regulatory provisions on ULL access competition on local telecom markets has been far more rapid in Germany than in any other European country (Fig. 2). By the end of 2000 Deutsche Telekom had already concluded 97 agreements on ULL access. At the same time more than 300.000 lines have been rented by operators from Deutsche Telekom. As demonstrated in the graph below, all other EU member state had only about 25.000 ULLs in service – less than 10% of the number in Germany. Moreover, in most of Germany's large cities, consumers have had a choice between Deutsche Telekom and one – in some cities, several – other provider(s), not withstanding the various new access technologies which are exploited by new entrants (18 operators with frequencies for WLL access, 4 mobile operators, 3 cable TV operators with CATV networks). Thus, as of today, Germany is European wide by far the most advanced market with regard to ULL.

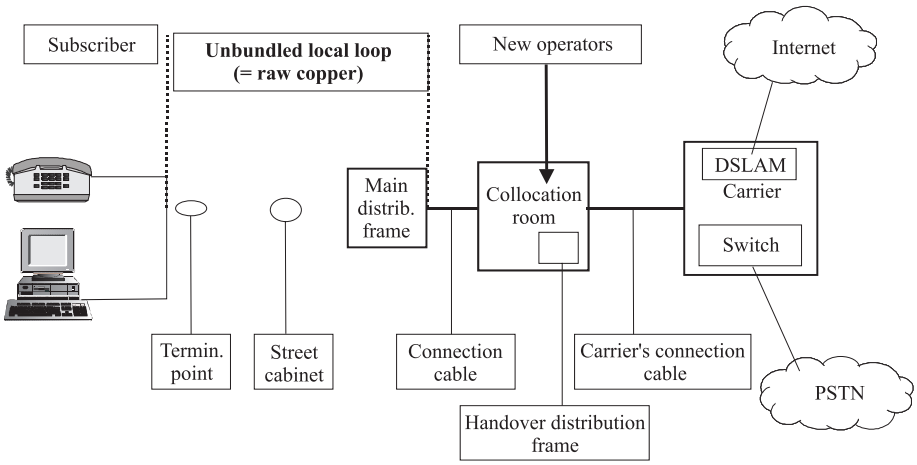

Fig. 1. *Technical implementation of ULL access in Germany*

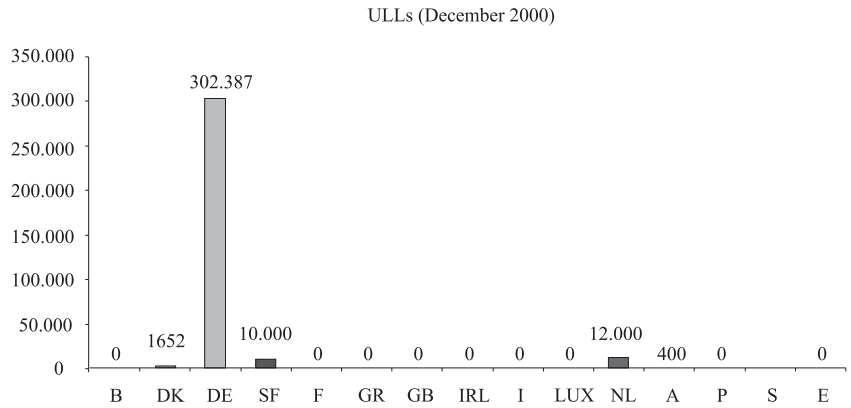

Fig. 2. *Provision of ULL access in EU member states by the end of 2000*

Pricing unbundled access to the local loop

General considerations on ULL-pricing

Fair ULL prices lie at the heart of effective telecommunications competition in local telecom markets. If ULL charges are set too high, competitors would be unable to achieve realistic retail margins. If they are artificially low, there would be little network competition because operators would find it cheaper simply to buy services from the incumbent rather than build their own networks. Yet, setting the right prices for ULL access proves difficult in practice. It can be argued that due to information asymmetries

a regulator can never discern competitive price levels more accurately than the market[①] [3]. While even in theory the determination of economically efficient access prices is a difficult task (there are various theoretical models on optimal access pricing), it becomes even more complicated when one considers the practical problems surrounding the determination of efficient access prices. Depending on the method for allocating the costs of network access, prices are likely to be either below or above the economic costs of network access[②]. While most economists suggest to calculate network access prices according to forward looking long-run incremental costs, it is clear that „costs" are generally not an easy thing to define and identify.

Problems which arise when identifying the efficient costs of ULL access include: estimating the future demand, choosing an appropriate calculation model, determining the investment volume (including the costs of capital and the operating costs) and, at least as important the development of a common understanding on essential technical and economic input parameters. Depending on the assumptions made on these parameters the costs of network elements differ to a great extent. It is therefore nearly impossible for regulators to set a price which is equivalent to the price that would prevail if competition were already in place. Rather, it is likely that regulators set inefficient network access prices resulting in productive and efficiency losses [7].

Determining ULL prices in Germany with the WIK-model

As has been mentioned above, regulatory provisions in Germany require the costs of local loop access to be calculated on the basis of long-run incremental costs. In order to do so the German regulator adapted a national analytical cost model (WIK-model) which was first applied in early 1999 to fix prices for the basic raw copper pair (CuDa2Dr). Based on this model the regulatory authority established a price of 25.40 DM per month[③], although Deutsche Telekom has calculated with its own cost model a price of 37.3 DM for the twisted pair. Two years later, in March 2001 new prices were fixed by applying a revised version of the same cost model.

Thus, since 1st April 2001 new tariffs for ULL are effective (monthly fee of 24.40 DM for rental of an unbundled copper pair)[④]. For most products the new tariffs brought a significant reduction of ULL prices relative to the previous level (between 5% and 30%; see also the Table 1).

The WIK-model used by the German regulator for determining ULL prices calculates per line for each local network the costs of a symmetric copper wire from the MDF to the distribution point (Fig. 3). Thereby only those costs are taken into consideration which an efficient network operator would run today (given the network topology but using modern technology). It is a scorched-node model because of three reasons: the MDF-location sites are given, it uses cluster and shortest path algorithm for determining the efficient length of main cables (minimal spanning tree between MDF and termination point), and it optimises the location sites for street cabinets (positioned at the building closest to the main distribution frame in the particular cluster).

① *For this reason regulatory interference in markets is always a „second best solution".*

② *See the controversial discussion about the network rates of Deutsche Telecom AG which has been led between [1] and [8].*

③ *In addition entrants had to pay a one off set up fee of 196.55 DM for connection and a take-over fee of 191.64 DM.*

④ *The line rental fee will remain fixed for two years. Installation and disconnection fees will be reviewed after one year. Prices were also approved for air conditioning and ventilation, fault repair, after-hours work to provision lines and fulfilment of information requests.*

Table 1. German ULL-prices [euro] for basic product CuDa2Dr (copper pair, up to 160 kbit/s)

ULL (CuDA 2Dr)	Work at street cab.	Work at subscriber	Previous tariffs	Telekom proposal	RegTP order 30.03.01	Difference [%]	
						to previous tariffs	to Telekom proposal
Monthly	–	–	12.99	17.40	12.48	-3.94	-28.30
One-off installation (take over)	–	without	97.98	127.04	92.59	-5.51	-27.12
One-off installation (take over)	–	with	123.38	145.88	117.14	-5.06	-19.70
One-off installation (take over)	without	without	100.49	119.51	86.51	-13.92	-27.61
One-off installation (new line)	with	without	123.12	136.89	107.84	-12.41	-21.22
One-off installation (new line)	without	with	149.76	164.00	135.87	-9.28	-17.16
One-off installation (new line)	with	with	172.39	182.29	157.65	-8.55	-13.52
Disconnection fee (take over)	–	without	55.07	104.41	38.07	-30.87	-63.54
Disconnection fee (new line)	with	without	55.07	104.41	59.24	7.59	-43.26

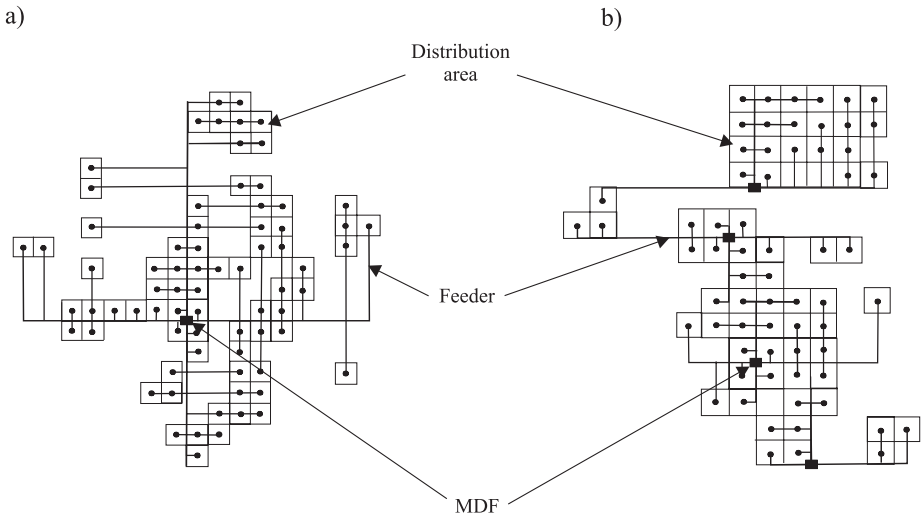

Fig. 3. *Calculation of ULL-costs with WIK-model: a) existing network (no clustering); b) optimised network (minimal spanning tree)*

When calculating the ULL costs with the WIK-model, the German regulator applies the following method: in a first step the investment costs per individual access areas are calculated by determining both structural parameters (number of ducts, economic spare capacity factor, shared installation factor etc.) and investment prices of fixed assets (cable, ducts, planning and authorisation, digging costs, restore of surface etc.). The investment costs are then annualised by applying a rate for the expected return on investment and a depreciation rate. In a third step mark ups for operational costs, product and supply costs, and common costs are added. Finally the monthly rental fee is derived from the weighted average of the costs for individual access areas divided by twelve.

When assessing the appropriateness of the WIK-model as an analytical cost model for fixing ULL prices one has to confess that it is certainly suited for modelling forward-looking (long run) costs. It offers a rather detailed view of (hypothetical efficient) cost structures and there is no dependency on the cost calculation system of the company subject to regulation. Yet, a closer look at the model also reveals some significant shortcomings: it calculates only one local loop product and it does not allow a service specific cost calculation. Moreover, there is no objective method to determine essential input parameters. Sensitivity analyses demonstrate that depending on the data for structural parameters, prices may vary significantly.

Finally, ULL-prices determined with the WIK-model reflect to a large extent the costs of a new hypothetical access network. Such tariffs imply that there is no opportunity for competitors to produce the same product at lower prices because the idea behind such a concept is to produce at the lowest cost possible at that time. No market participant is able to strike these costs. Therefore, all competitors would have to rely on the network which has been build by the incumbent. In the long term the effect of this policy would be an ongoing need for regulation. Yet, there are different views about the efficiency of a network. In particular, there are strong arguments in favour of taking into account path dependency. This would require the regulator to calculate the costs of network services on the basis of the existing network of the incumbent.

Conclusion

On the basis of the experience gained in Germany, it has become evident that the requirement to provide unbundled access to the local loop increases competition on local telecom markets: the comprehensive German regulatory framework on ULL has allowed new entrants to rent a substantial number of subscriber lines within a short period of time after liberalizing the German telecom market.

Yet, when a country considers to regulate the local access market it is vital to balance the objective of promoting competitive entry with the equally important goal of getting the investment incentives right, for both incumbents and new entrants. Thereby, pricing of ULL is – besides co-location – the most complicated and controversial issue: while cost data are of significant relevance for defining the price of ULL, costs are generally not an easy thing to define and identify. There is a particular danger that prices are set arbitrary. To minimise this risk, regulators should therefore countercheck the results of their cost model with alternative cost models. Also, international comparisons may be useful to get an idea about the correct prices of local loop unbundling.

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Markus Fredebeul-Krein

Between 1996 and 1999, Dr. Markus Fredebeul-Krein was a research associate at the Institute for Economic Policy in Cologne. His main subject of research was the regulation of telecoms markets. He received a Ph.D. in December 1999. From May 1999 until April 2001 Dr. Fredebeul-Krein was Assistant Director in the department for „Government Relations, Competition Policy, Regulatory Affairs" at Deutsche Telekom. In this position, he was responsible for the regulation management of carrier services and networks. Since May 2001 he works as a Consultant for Detecon, a telecommunications consulting company, providing management and technology consulting services.
e-mail: Markus.Fredebeul-Krein@detecon.com