

Gabelmann, Anne

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## Regulating European telecommunications markets: Unbundled access to the local loop outside urban areas

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# **Regulating European Telecommunications Markets: Unbundled Access to the Local Loop Outside Urban Areas**

by

**Anne Gabelmann**

**81**

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**Critical comments to the author are welcome!**

**Anne Gabelmann**

**Institut für Verkehrswissenschaft und Regionalpolitik**

**Universität Freiburg**

**Platz der Alten Synagoge, 79085 Freiburg i. Br.**

**Phone: (+49) - (0)761 - 203 - 2369**

**Fax: (+49) - (0)761 - 203 - 2372**

**e-mail: [gabelman@vwl.uni-freiburg.de](mailto:gabelman@vwl.uni-freiburg.de)**

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## **Regulating European Telecommunications Markets: Unbundled Access to the Local Loop Outside Urban Areas**

***Abstract:** This paper examines the topic of unbundled access to the local loop in areas which show characteristics of non-contestable natural monopolies outside the large cities. Under the heading 'local loop unbundling' three variants are discussed, full unbundling, line sharing, and bitstream access. An obligation to provide competitors access to local networks on an unbundled basis is a strong intervention into the property rights of the regulated firm. In this light the following points particularly come into question: Who should be granted the right to access local loops on an unbundled basis? Which form(s) of local loop unbundling should be enforced?*

**Keywords:**

*Fixed Line Communications; Network Access; Local Loop Unbundling*

### **1. Introduction**

As soon as the telecommunications markets in most of the member states of the European Union had been fully liberalized in January 1998, intense competition developed in the field of long distance communications, which led to the construction of alternative long distance networks and an immense decrease in prices for national long distance calls as well as international calls. In contrast, competition has just started to emerge in the area of local networks. In many countries the construction of alternative local infrastructures has so far been limited to the densely populated areas of large cities. Usually the lion's share of access networks is owned by an incumbent carrier. Because there are economies of scale in combination with sunk costs, access networks outside urban areas constitute monopolistic bottlenecks, which are an insurmountable barrier for would-be competitors. An extensive network duplication is neither compatible with the incentives of a new market player nor efficient from a social point of view. This requires regulatory action.

This paper focusses on access to local networks in peripheral and rural regions. The concept of unbundled access to the local loop is an instrument for disciplining market power, which can serve to foster the development of comprehensive competition in markets which are vertically related to the monopolistic infrastructure. The background for the following considerations is the conviction that regulatory action should be limited to what is absolutely necessary.

The following section presents the concept of local loop unbundling as a special case of network interconnection. The different forms of local loop unbundling - 'full unbundling', 'line sharing', and 'bitstream access' - are depicted and briefly discussed. Section 3 presents a normative framework for regulating access to local telecommunications networks. This is the 'disaggregated regulatory approach' in conjunction with the 'essential facilities doctrine'. Section 4 considers the necessity for unbundled access to local loops, differentiating between long distance carriers and suppliers of local services. In section 5 the qualitative effects of the three forms of unbundling on competition and on the ownership rights of the regulated firm are discussed and a possible design for an unbundling obligation is provided. In section 6 the closely related aspect of local loop pricing is touched upon. Finally, section 7 provides a summary of the main findings.

## **2. The concept of local loop unbundling**

### **2.1. Unbundled access to the local loop as a special case of network interconnection**

Local loops cover the distance between the network termination point at the customer's house and the subscriber main distribution frame (see figure 1). On their way to the switch the local loops of different customers are combined to form one single cable. At the switch the individual loops are separated again and connected to the subscriber main distribution frame.<sup>1</sup>

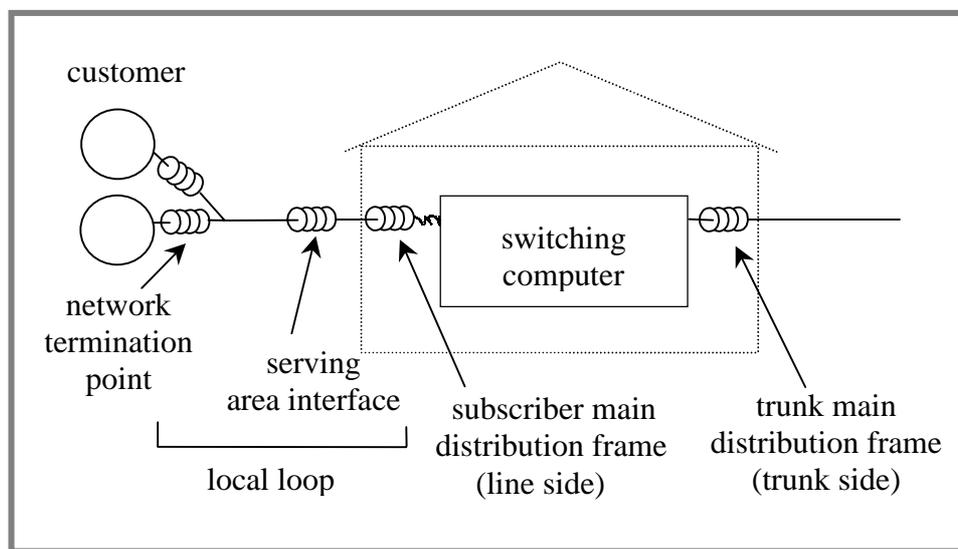
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<sup>1</sup> For a detailed description of the structure of an access network see MITCHELL, VOGELSANG (1994), 13, and WIK (1998), 25ff.

‘Interconnection’ comprises the physical as well as the logical connection of telecommunications networks. The precondition for the physical connection is the existence of adequate technical interfaces securing the compatibility of the different infrastructures. There are different locations which can be used as points of interconnection with access networks.

First, access is possible at the trunk side of the local switching facility, which enables the network operator demanding access to make use of all of the functions (conveyance, switching, and network management) of the established carrier’s network.

Second, access can take place at the line side of the incumbent’s local switch, i.e. at the subscriber main distribution frame,<sup>2</sup> the serving area interface or the network termination point.<sup>3</sup> In these cases the ‘package’ of transmission and switching services is forced open and the entrant is enabled to get unbundled access solely to the local transmission function of the incumbent carrier’s network.



*Fig. 1: Access network and points of interconnection*

<sup>2</sup> In Europe only about 20 % of the copper local loops terminate directly at a switch site. Most customers are connected indirectly with the local switch via a so-called remote concentrator unit (see Lewin, Matthews (1998), 65). In this case the subscriber main distribution frame is located at the remote concentrator unit which is connected with a specific local switch by fibre.

<sup>3</sup> If access is granted at the serving area interface or at the network termination point, this is called ‘subloop unbundling’.

In addition to physical interconnection, telecommunications networks need to be logically interconnected so that the logical resources of one network can provide control and information services accessible to the other network. This is important for technical reasons, e.g. in the course of call routing. Moreover, logical interconnection makes it possible to access databases storing e.g. transmission data or content necessary for offering value added services (see Mitchell, Vogelsang (1994), 19-21). Logical interconnection is realized by means of software interfaces.

The main difference between unbundled access and ‘usual’ local network interconnection is that the newcomer demands physical interconnection only. So the logical interconnection is not realized by the incumbent but by the entrant himself. Of course this difference affects the pricing of network access. Instead of a usage dependent interconnection charge the competitor pays a fixed amount of money to the incumbent monthly for using the local loop.

Another difference is in the intensity of intervention by the regulator in the property rights of the established firm. While with usual interconnection the incumbent keeps full control over his local network, this is not true for all forms of local loop unbundling. E.g. in the case that the access line is separated from his network and fitted into the entrant’s network the technology which is to be employed on the local loop is typically chosen by the competitor, not by the incumbent.

## **2.2. The different versions of local loop unbundling<sup>4</sup>**

### ***Full unbundling***

With this version of unbundling the selected local loops are taken over by the market entrant completely.<sup>5</sup> Figure 2 shows this form of network access for the

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<sup>4</sup> In its recent regulation on unbundled access the European Parliament and the Council oblige operators with significant market power in the provision of fixed public telephone networks and services to offer fully unbundled as well as shared access to their copper local loops. See European Parliament, Council of the European Union (2000).

<sup>5</sup> Although restricted in making use of his property rights, the regulated firm is still the owner of the local loop in a legal sense.

case that access takes place at a subscriber main distribution frame located at the local switch.<sup>6</sup>

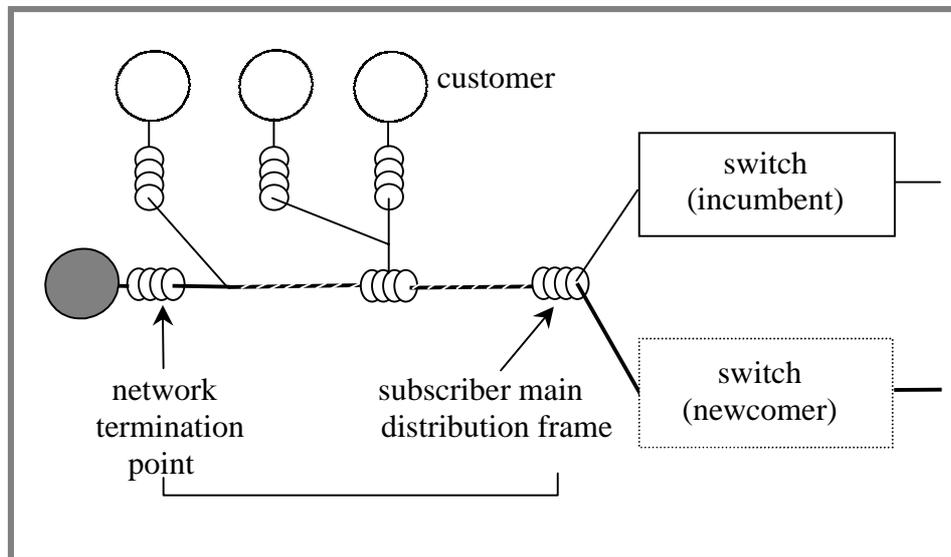


Fig. 2: Full unbundling of the local loop

At the switch the local loops of different customers are separated and connected to the subscriber main distribution frame, the interface at which the competitors can access each individual local loop without using the switching facilities of the incumbent. That means that the entrant is able to supplement his own local facilities with the transmission capacities of the incumbent in a very flexible way at low risk, being generally free to decide which transmission technology should be employed.<sup>7</sup>

The incumbent is not able to offer his services to his former customers any more, because the full frequency spectrum of the local loops in question is used by

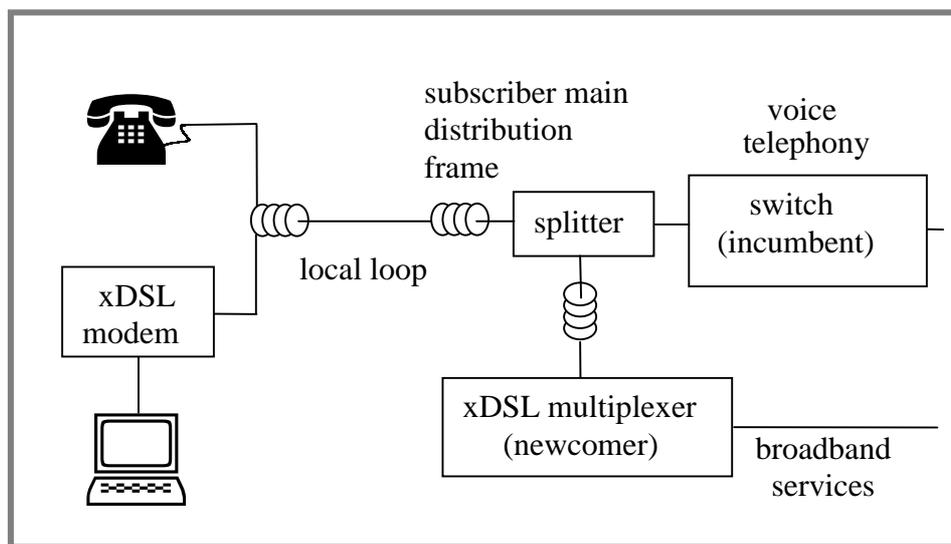
<sup>6</sup> Although there are situations imaginable in which access takes place at other interfaces in the local network (see footnote 3), no distinction is made between these different situations, because this is no central point for the purpose of this paper.

<sup>7</sup> The entrant can use the full frequency spectrum on the copper line which enables the usage not only of ADSL (*asymmetric digital subscriber line*) but also of advanced DSL technologies like VDSL (*very high bitrate ADSL*). But it has to be kept in mind that VDSL only operates over short distances. Only with local loops shorter than 300 metres the maximum speed of more than 50 Mbit/s can be achieved (see Lewin, Matthews (1998), 33). See also section 5.1.

the entrant. Further, what was before a local call within the same switching area may have the character (and the price) of a long distance call now (see Engel, Knieps (1998), 28).<sup>8</sup>

### *Line sharing*

When line sharing is realized, one and the same local loop is used both by the incumbent and the entrant (see figure 3).



*Fig. 3: Line sharing (see EUROPEAN COMMISSION (2000a), 13)*

The incumbent continues offering voice telephony to his customers, whereas the newcomer offers broadband services like fast internet access using his own xDSL-modems.<sup>9</sup>

<sup>8</sup> Consider two end-users, A and B, which were both customers of the incumbent carrier initially. Assume that B decides to become a customer of the entrant. When he calls A now, the call doesn't reach the incumbent's switching computer any more, unless the local networks are interconnected logically at the trunk side of the incumbent's switch. This resembles an interconnection between a local and a long distance network.

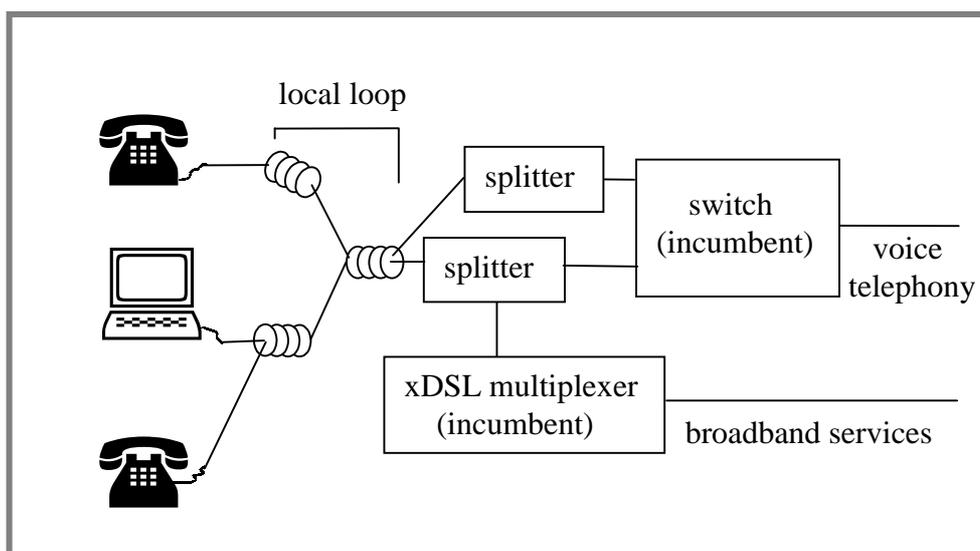
<sup>9</sup> The entrant might offer local voice telephony to his customers, too, by reselling the services of the incumbent or by using the higher frequency spectrum of the hired loop for both broadband and voice services.

Voice telephony and data are separated by means of an xDSL-filter (the so-called ‘splitter’) before reaching the incumbent’s switching computer (see European Commission (2000a), 12-15). Whilst telephone calls are transmitted to the switch of the incumbent, data traffic is branched off and handed over into the newcomer’s network directly. In contrast to full unbundling the local loop remains integrated in the incumbent’s network.

### *High speed bitstream access*

With this form of unbundled access the incumbent carries out the upgrading of his copper loop himself (or maybe the substitution of certain parts of it by fibre) and creates a broadband connection between the end-user and the local exchange (see figure 4). The newcomer is granted access to a specified bandwidth for the provision of broadband services (see European Commission (2000a), 15f.).

As with line sharing, voice and data traffic are separated from each other by a splitter. With bitstream access, the entrant has neither physical access to the copper pairs nor influence on the functionality of the access service. As depicted in figure 4, with high speed bitstream access the incumbent is still able to serve his customers with voice telephony.



*Fig. 4: High speed bitstream access (see EUROPEAN COMMISSION (2000a), 16*

### 3. A normative framework for regulating network access

#### 3.1. The ‘essential facilities doctrine’

The appropriate framework for the assessment whether an incumbent carrier should be forced to grant competitors access to his local infrastructure is the essential facilities doctrine, which has its roots in the tradition of American anti-trust law. It may be used to enforce access to a facility which is ‘essential’.

For a facility to be ‘essential’ several conditions have to be fulfilled simultaneously (see Glasl (1994), 308).<sup>10</sup> The facility in question must be owned by a monopolist who refuses access to potential downstream competitors although this would be feasible. Further the facility has to be not reasonably duplicable by potential entrants with the consequence that they cannot enter the downstream market without being granted access to precisely this facility - in short, if there exist neither active nor potential (perfect or imperfect) substitutes.

Areeda stresses that the doctrine should be applied restrictively - not anything “one has that another wants” should be called an essential facility (see Areeda (1990), 844). But at least for the moment with respect to local loops outside the large cities<sup>11</sup> these conditions seem to be fulfilled as a rule.<sup>12</sup> Access to essential facilities should be granted, if this is “likely substantially to improve competition in the marketplace by reducing price or by increasing output or innovation” (Areeda (1990), 852).

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<sup>10</sup> The leading U.S. essential facilities case in the telecommunications sector is *MCI Communications Corp. v. AT&T*. In the course of this case the criteria mentioned have been established.

<sup>11</sup> In metropolitan areas where network oligopolies have already developed, competitors have obviously managed to enter the market on the basis of their own facilities without dependence upon those of the incumbent. This demonstrates in itself that the local loops of the incumbent are not ‘essential’ for would-be competitors (see Kahn (1998), para. 9). A similar argument holds for large business customers, irrespective of whether they are located in large cities or in rural areas, because for them selective by-pass would be viable (e.g. using fibre).

<sup>12</sup> The author refers especially to the situation in Germany, where end-users outside the large cities normally don’t have the choice between several local carriers. Alternative access technologies using cable TV networks or power line networks are not yet ready for widespread use. This is the case in most member states of the European Union. An exception is the United Kingdom where the local infrastructure of alternative carriers (among others cable TV networks) plays a significant role (see European Commission (1999), 241).

The essential facilities doctrine does not only apply in the context of competition law, but can also be integrated into a framework of sector-specific regulation.

### 3.2. The disaggregated regulatory approach

With the aim of avoiding unnecessary interventions and therefore keeping regulation as light as possible, the disaggregated approach offers principles for sector-specific regulation in network industries, based on clear-cut criteria for the assessment of market power (see Knieps (2000), 95-100). Market power prevails if a natural monopoly exists in conjunction with sunk costs ('monopolistic bottleneck').<sup>13</sup> These explicit economic criteria put the definition of an essential facility in concrete form.

Regulatory measures should be carefully directed only to those parts of the market where a market power problem exists. An extension of the regulatory basis in the sense of a 'global regulation' is rejected, because from a constitutional economic point of view unnecessary interventions into the market mechanism cannot be justified. Besides, the cost of regulation has to be considered.<sup>14</sup>

A related issue is the intensity of interventions. If regulatory action is necessary, it should be measured out in such a dose as to ensure that market power is neutralized without restricting the regulated firm unnecessarily. This implies that the price regulation should be restricted to the price *level* and leave the design of price *structures* as far as possible to the regulated firm, as it is the case with price-cap regulation.<sup>15</sup> Consequently, if a regulation which was necessary in the

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<sup>13</sup> The disaggregated regulatory approach is based on the theory of 'contestable markets', in which sunk costs are identified as the reason for non-contestability of a natural monopoly. See Baumol et al (1982).

<sup>14</sup> Besides the direct costs there are indirect costs of regulation. An example for the latter could be the distortion of the market outcome caused by a restrictive price regulation hampering social welfare.

<sup>15</sup> Because well-directed regulation of monopolistic bottlenecks gives incentives for leveraging market power into vertically related unregulated markets, access regulation and price-cap regulation have to be accompanied by two further measures. First, the regulated firm must be committed to setting non-discriminatory access charges. Otherwise a local profit constraint could be avoided by setting prohibitively high access charges for third parties and low access charges for one's own downstream

past has become superfluous in the meantime, it should be abolished as soon as possible.

#### **4. The relevance of unbundled access to the local loop for competition in downstream markets**

##### **4.1. Unbundled access for long distance carriers?**

The adoption of the regulatory approach presented in the previous section to the problem of local loop unbundling requires a differentiation between long distance carriers and suppliers of local services.

Long distance carriers are dependent on getting access to the incumbent's local network. Otherwise there would be no sense in operating a long distance network, because it would be impossible to reach customers as senders or receivers of messages. Unbundled access to the local loops enables them to transport long distance calls to and from the customers themselves, but in their function as long distance carriers the crucial thing is to get access to the customers *generally* (see Engel, Knieps (1998), 24, 27). For that, interconnection at the trunk side of the local switch (see figure 1) is sufficient.

This makes clear that an unbundling obligation which favours long distance carriers is unnecessary from the perspective of a disaggregated regulatory approach as well as questionable from a legal perspective. Such an obligation might be in conflict with the principle of proportionality,<sup>16</sup> as there exists a weaker instrument for disciplining market power in the form of usual interconnection regulation.

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departments. Second, the regulated firm must be obliged to keep separate books for the regulated and non-regulated parts of the business to prevent internal shifts of costs or revenues. These points are discussed in Brunekreeft (1997), 6-8.

<sup>16</sup> According to this principle an intervention into property rights - which are protected by constitutional law - is only justified if the following three conditions are met: The intervention has to be suitable, the least burdensome solution, and narrowly tailored to the ends (see Stern, Dietlein (1999), 8).

## 4.2. Unbundled access for suppliers of local services?

The term ‘local services’ includes narrowband as well as broadband services. Narrowband voice telephony consists of a package of local transmission and switching services.<sup>17</sup> Local broadband services like fast internet access deal with the transmission of large quantities of data towards the customer as well as away from the customer, usually the latter to a minor extent only.

At present new competitors can enter local service markets outside densely populated areas only by two means, either on the basis of unbundled local loops or by reselling the incumbent’s services.

With resale the entrant buys local telecommunications services offered by the incumbent at wholesale rates and then sells those services on his own behalf and on his own account, thereby passing on a portion of the wholesale discount to his customers. The reseller’s scope for competitive action is confined to the enrichment of existing services by new features and to marketing efforts, e.g. the improvement of the quality of service and the design of new tariff structures. Because the reseller has to make use of loopholes in the established firm’s retail price structure (arbitrage), his possibilities to create innovative tariff structures are limited.

The entrant cannot influence the technical features of the retail services. That is why the reseller’s possibility of standing in contrast to the incumbent and the range of feasible new services are restricted. Given price regulation upstream, tariff arbitrage will lead to lower prices in the field of existing services like local voice telephony. But there is no scope for competition as to the deployment of innovative transmission technologies which might be the source of many new services.

With unbundled access to the incumbent’s local loops new market players are capable of carrying out the local transmission of messages or data on their own. By renting transmission capacities complementary to their own switching devices they are able to offer an alternative connection to the public telecommunications network also to those customers for whom selective bypass wouldn’t be

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<sup>17</sup> This package may be extended by an additional value (‘value added service’), e.g. access to a database from which information on local events can be collected.

profitable. In the case of full unbundling (see figure 2) and line sharing (see figure 3) the newcomer gains certain degrees of freedom as to the choice of transmission technology. It is to be expected that the pressure of competition will foster the spread of innovative technologies like xDSL (see European Commission (2000a), 5), which will lead to a larger variety of services being offered to the customer.

It is apparent that resale is no close substitute for local loop unbundling. An obligation on the part of the incumbent carrier to sell his local services to downstream competitors on the wholesale market cannot overcome the monopolistic bottleneck completely. It follows that but for an unbundling obligation some of the competition potential in local markets would remain unused. From this point of view resale regulation and unbundling regulation are complements rather than substitutes.<sup>18</sup>

In the long run ‘sustainable’ competition, i.e. competition that needn’t be kept alive by permanent market power regulation, is only possible if efficient network competition is evolving gradually. In this context unbundled access may serve as a first stage for new market players.<sup>19</sup> By means of hired local loops entrants can gather information on the demand and cost conditions on local markets without having to run the risk of enormous sunk investments initially. Instead, new infrastructure can be set up step by step when the number of customers is going up. Seen from this perspective, the concept of local loop unbundling might support the development of competition based on an efficient variety of local networks.<sup>20</sup>

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<sup>18</sup> Resale regulation is only sufficient for promoting competition with regard to such services for which innovation at the upstream level plays no central role (e.g. plain voice telephony).

<sup>19</sup> FCC (1999), para. 5: “Moreover, in some areas, we believe that the greatest benefits may be achieved through facilities-based competition, and that the availability of requesting carriers to use unbundled network elements,..., is a necessary precondition to the subsequent deployment of self-provisioned network facilities.” See also Lewin, Matthews (1998), 66.

<sup>20</sup> Hard empirical evidence to back up this argument doesn’t exist as far as the author knows. Lewin and Matthews provide some evidence on the market impact of local loop rental which supports the argument (see Lewin, Matthews (1998), 63/64). For an overview of the structure of the local access markets within the European Union see European Commission (1999), annex 4.7 and (2000b), annex 1.4 and annex 3.

## 5. The design of an unbundling obligation

### 5.1. Effects on competition and property rights

#### *Full unbundling*

This form of unbundling reveals theoretically the largest scope for competition, because the competitors take over the local loops completely and may choose from the whole range of the xDSL family, opening the way for competition in transmission technologies which may yield a multitude of innovative services not yet offered by the incumbent.

But in reality the freedom to choose the transmission technology is restricted by technical boundaries, because not all lines are qualified for all types of xDSL.<sup>21</sup> Additionally, assume that different entrants employ different xDSL-technologies on loops which belong to the same cable. These different technologies are likely to interfere with each other and with existing digital connections of the incumbent carrier (see Ovum (1998), 34-36, 67), which might at worst cause the breakdown of the whole transmission system.

The main shortcoming of full unbundling is that the incumbent cannot use his property for his own purposes any more, because he is uncoupled from his former customers. The essential facilities doctrine cannot be used to justify such a drastic measure.

#### *Line Sharing*

With line sharing both the incumbent and the competitor have access to the customer. The competitor can choose from a range of transmission technologies operating on the higher frequency spectrum of the local loops, e.g. ADSL (*asymmetric digital subscriber line*) or UDSL (*universal DSL*), and offers broadband services to his customers. If the customer decides to change the supplier of broadband services, the incumbent can continue offering voice service using the low frequency spectrum - his property rights are infringed upon

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<sup>21</sup> This is among other things a question of the loop length (see Ovum (1998), 33).

only to the extent which is necessary to enable competition in the field of broadband services.

On the other side with this form of unbundling high-powered technologies like SDSL (*symmetric DSL*), HDSL (*high speed DSL*) and VDSL (*very high bitrate ADSL*) cannot be employed, because this would require the usage of the full frequency spectrum of the local loop (see European Commission (2000a), annex I). This limits the potential for innovation, but reduces the coordination problem mentioned above. Besides, line sharing poses special difficulties as to the pricing of network access (see section 6).

### ***Bitstream access***

With bitstream access the incumbent keeps full control of his network. He is obliged to offer access to a specified bandwidth on his local loop, being free to decide which technology is used.<sup>22</sup> Therefore, the coordination problem as to the use of different technologies in one and the same cable (or the substitution of copper by fibre) is internalized in the course of the incumbent's network optimization. Bitstream access is the least burdensome solution for the incumbent.

The other side of the coin is that the competition effects of this form of unbundling are limited. The entrant is enabled to compete in the area of broadband services, but has no influence on the transmission technology. Innovation can therefore only take place at the service level. The incumbent has the power to decide which local loops should be upgraded first and thus which consumers can be served with broadband services, whether by himself or by the newcomer (see European Commission (2000a), 16). For these reasons requiring bitstream access is too weak an instrument for substantially improving competition in local telecommunications markets.

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<sup>22</sup> “‘High speed bit stream access’ refers to the situation where the incumbent installs a high speed access link to the customers’ premises (e.g. by installing its preferred ADSL equipment and configuration in its local access network) ...” (European Commission (2000a), 15). Or, as Ovum (1998, 68) puts it, with bitstream access „... the incumbent would then be free to modify its access network in whatever way it wished, as long as it delivered the required bit stream services.“ There is no technical regulatory intervention in the sense of the prescription of a special transmission technology.

## 5.2. Suggestions for the design of an unbundling obligation

The different forms of unbundled access to the local loop can be seen as complements or as substitutes. If seen as complements, ‘the market’ can decide which form of access best meets user needs (see European Commission (2000a), 6). In unregulated markets this argument is indisputable, but it is too vague in the context of a sector-specific regulation which intervenes into the market mechanism.

Local loop unbundling goes along with an intrinsic trade-off - the more comprehensive the scope for competition a form of unbundling reveals, the stronger the property rights of the incumbent carrier are infringed upon.

A ‘regulatory menu’ which consists of different forms of unbundling from which entrants may choose à la carte goes too far from the perspective of the disaggregated regulatory approach. It overstrains the essential facilities doctrine and is likely to destroy the incumbent’s incentives to invest in its local networks. The more comprehensive the duty to share its local loops (at cost-based prices), the less is the incentive of the incumbent firm to invest in new, risky technologies: The regulated firm has to bear the whole risk of failure, but has to share the fruits of the investment if it turned out to be successful (see Kahn et al. (1999), 346f).

Based on the previous considerations, line sharing seems to be suitable to enable competition in local markets. An obligation to provide shared access could be seen as a minimum requirement the incumbent has to meet. An entrant preferring fully unbundled access might get it, if the incumbent decided to offer this form of access voluntarily. On the other side, bitstream access could be the result of private negotiation, if the entrant voluntarily waives his right to get unbundled access in the form of line sharing.

The regulatory instrument of local loop unbundling does not have to provide competitors with a *perfect* substitute for a local network of their own, but to enable competition in vertically related markets.

It should be only a temporal substitute, because the development of (efficient) network competition in the long run is the precondition for the elimination of

market power and the phasing-out of sector-specific regulation. In this context, the pricing of unbundled access to the local loop plays a central role.

## 6. The pricing of unbundled local loops

The pricing of unbundled local loops is crucial for the entrants' investment decisions. If the regulator sets the price of the local loops 'too low', investment incentives are destroyed. If the price is set 'too high', inefficient network competition might occur in the long term.<sup>23</sup> Prices of local loops should reflect their long run incremental costs (LRIC) plus a mark-up to ensure that costs which are common to the line and other services of the incumbent carrier can be recovered.<sup>24</sup>

The problem of common cost allocation gains further importance when a local loop is used by two parties, because there are costs which are incremental to the local loop as a whole and not to its higher frequency or lower frequency portion.<sup>25</sup> These costs need to be split and allocated between the voice and non-voice portion of the local loop. In this context different approaches are under consideration (see Oftel (2000), 9-12).

One of them is based on ad hoc rules. Assume that there are one voice service and one data service operating on the local loop in question. Criteria for cost allocation might be the number of services, which would lead to a split of 50:50, or the amount of bandwidth which is used by the services, i.e. roughly a split of 5:95 (see Oftel (2000), 11). Alternatively, the whole of the common costs could be allocated to the voice telephony portion of the line.<sup>26</sup>

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<sup>23</sup> A detailed discussion of the problems related to the pricing of unbundled network elements would be far beyond the scope of this paper.

<sup>24</sup> E.g. the costs for the duct used by several lines between the serving area interface and the main distribution frame (see figure 1).

<sup>25</sup> E.g. the costs for the copper line and the portion of the duct between the network termination point at the customer's home and the serving area interface at which the lines of several customers are concentrated (see figure 1).

<sup>26</sup> The latter is favoured by OFTEL in its Consultation Document on shared access to the local loop, not least for pragmatic reasons (see OFTEL (2000), 11/12). Besides the danger of allocative distortions an additional problem might occur: With line sharing the subscriber could decide to receive both data and voice services on the higher fre-

Another approach deals with mark-ups which are proportionate to the incremental cost of the services provided on it. Under the assumption that the broadband service goes along with higher incremental costs than the voice service (e.g. because xDSL-splitters have to be installed), a higher portion of common costs would be ascribed to the supplier of the broadband service.

Finally, the allocation of common costs can be related to the price elasticity of demand for the services run on the local loop. This is the allocative mechanism to be preferred from an economic point of view. The higher the price elasticity, the smaller the mark-up allocated to the service in question. This approach ensures the recovery of common costs while minimizing allocative distortions which are likely to occur in the context of the two above mentioned approaches, but it requires a very flexible price regulation.

Because the efforts and the costs of creating and enforcing an elaborate regulatory scheme which takes explicitly account of price elasticities are high, it should be discussed whether to include the prices for unbundled network elements into a price-cap mechanism together with other bottleneck elements.

## 7. Summary

In this paper an approach is adopted which postulates that regulatory measures should be restricted to what is absolutely necessary. Seen against this background the following conclusions can be drawn with regard to local loop unbundling.

A general unbundling obligation of incumbent carriers is questionable. Long distance carriers are not dependent upon unbundled access to the incumbent's local loops. Bundled access in the form of usual interconnection is sufficient to assure their participation in the competition process. The unbundling obligation

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quency portion of the local loop. This leads to a dilemma for the incumbent carrier: On the one side he needs to recover the common costs which were allocated to the low frequency portion of the local loop initially, so he has to charge his remaining subscribers a higher line rental. On the other side this might create incentives for them to cease their voice telephony contract, too. OFTEL proposes as a way out to treat such a line just like a fully unbundled one for which the sharing operator offering also voice telephony has to pay the full price (see OFTEL (2000), 12).

of the incumbent should focus on alternative suppliers of local broadband services.

What has to be emphasized is that in the light of a restrictive application of the essential facilities doctrine the different forms of unbundling should not be seen as complements.

In order to open up local telecommunications markets for competition comprehensively, unbundled access in the form of line sharing seems to be a suitable instrument. Suppliers of local services like fast internet access can influence the transmission technology employed on the hired local loops to a certain degree, thereby strengthening competition in this area. This is the main advantage of line sharing compared with bitstream access. Further, the property rights of the regulated firm are infringed upon no more than is necessary, because the connection to its customers is maintained. This is the main advantage of line sharing compared with full unbundling.

An obligation of the incumbent carrier to provide line sharing should be embedded in a flexible framework for price regulation which takes account of the price elasticity of demand.

Because of the prospect of network competition in the long run, the need for an unbundling regulation has to be reviewed from time to time. But maybe less profitable customers like small enterprises and residential customers outside urban areas will not gain from upcoming network competition in the same way as customers in large cities. If this happens there may be a necessity for an unbundling obligation focusing on these customers not only now but also in the years to come.

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