Local loop unbundling: backhaul services

A consultation document and draft Direction issued by the Director General of Telecommunications

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Summary

S.1 In this document, Oftel sets out its view on wholesale backhaul and related retail markets for broadband services and its proposals to require BT to provide cost orientated backhaul services. Local loop unbundling (LLU) backhaul is a wholesale service which provides capacity between an LLU operator’s equipment at a BT local exchange and an operator’s point of interconnection with BT’s network. Backhaul is a component of a wholesale DSL service. It is similar to a partial private circuit (PPC), however with a connection to a co-location site rather than a customer’s premises. Oftel is therefore issuing this document at the same time as Phase I of the PPC draft direction.

S.2 Oftel has identified markets for backhaul links, which provide capacity from a local exchange to BT’s trunk network, and backhaul trunk, which provides capacity across BT’s trunk network. Backhaul links form two separate markets: links provided by leased lines (LL) and those provided by Local Area Network extension services (LES). Oftel considers that the markets for LL backhaul links and LES backhaul links are not effectively competitive; whereas the backhaul trunk market is prospectively competitive.

S.3 Oftel considers that BT has an obligation under both the Interconnection Directive (ICD) and under the EC LLU Regulation (2887/20) to provide backhaul to operators.

S.4 Oftel has considered the state of competition in the relevant retail and wholesale markets and concluded that:

- LLU will not be fully effective unless BT provides backhaul at cost orientated prices; and
- fully effective LLU should make a significant contribution towards making broadband Internet access markets competitive.

S.5 For LL and LES backhaul links which are not effectively competitive, Oftel considers that cost orientated prices should be interpreted as long run incremental cost (LRIC) plus mark-up. Additionally both prices for LL backhaul links and backhaul trunk should be set on a consistent basis as PPC prices. Oftel has attached a draft direction to this document, which requires BT to provide link and trunk backhaul at cost orientated prices within eight weeks of the publication of the final direction. Oftel requires BT to offer a service level agreement (SLA) that guarantees that backhaul services will be provided on reasonable terms including terms for provisioning and repair.

S.6 While the requirement for backhaul is based on the market analysis for broadband Internet access markets, Oftel considers that BT has an obligation to provide backhaul at cost orientated prices for all services that are being provided by LLU operators.
S.6 External Tie Circuits are required to connect a distant co-location site to BT's main distribution frame (MDF) at a local exchange. In the market analysis, Oftel has considered the competitiveness of the market for external tie circuits and has concluded that BT has market power in the provision of external tie circuits. Accordingly, Oftel has attached a draft direction to this document, requiring BT to reduce the mark-up on the cost of providing external tie circuits to no more than the level it currently charges for external tie circuit pull through.
Chapter 1

Introduction

1.1 Oftel’s strategy is to achieve the best deal for the consumer primarily through effective competition. A key part of Oftel’s strategy is ensuring that the level of regulation is appropriate to the state of competition.

1.2 Demand for broadband Internet access and other interactive services is increasing. Oftel’s approach is designed to encourage competition and consumer choice in the provision of these services. To achieve this result, in August 2000, Oftel mandated full unbundling of BT’s local loop. Local Loop Unbundling (LLU) enables telecoms operators (operators) to rent space in an incumbent’s exchanges, lease local access lines (the local loop) and upgrade them with Digital Subscriber Lines (DSL) technology to provide a range of higher bandwidth services to service providers and end customers. In addition to this obligation, BT is required to provide its wholesale ADSL services to other operators (OLOs) and service providers on non-discriminatory terms.

1.3 Subsequently, the EC Regulation of the European Parliament and the Council on unbundled access to the local loop (‘the Regulation’) has been adopted (EC 2887/2000). This Regulation imposes a number of obligations on Notified Operators that have been designated by their national regulatory authority as having significant market power in the fixed public telephone network supply market under the relevant Community provisions. In the UK, these obligations fall on both BT and Kingston Communications (Hull) Plc (Kingston).

1.4 An operator supplying broadband services via unbundled loops needs a backhaul connection between its equipment such as DSLAMs (DSL equipment) in a co-location facility at or nearby a BT local exchange and its own network. LL (leased lines) backhaul links and trunk backhaul share similar network components to a PPC, the key difference between backhaul and PPCs is the inclusion of a local end in the PPC. As a result there a number of close links between PPCs (part leased lines) and LLU backhaul.

1.5 In March 2001 Oftel issued a Direction requiring BT to offer PPCs on cost-oriented terms and setting a deadline for negotiations between BT and operators. This Direction also set out Oftel’s view that PPCs are covered by Article 4(1) of the EC Interconnection Directive (ICD). Under the ICD operators as defined in Schedule 2 of the Interconnection Regulations (‘Schedule 2 Operators’) have rights and obligations to negotiate interconnection with each other for the provision of PPCs services. On 1 August 2001, PPCs were launched. A number of issues were referred to Oftel to resolve. Simultaneously with this document Oftel is publishing a draft Determination covering the first phase of these issues.
1.6 This explanatory document sets out Oftel’s view of the legal framework for determining BT’s obligations to provide backhaul under both the LLU Regulation and the ICD. The explanatory document also sets out a description of backhaul services, an economic analysis of the relevant markets and an assessment of BT’s market power in the retail and wholesale markets related to backhaul.

1.7 Oftel’s Statement and draft Direction on BT’s charges for Local Loop Unbundling distant and physical co-location published on 18 October 2001 (www.ofTEL.gov.uk/publications/broadband/llu/colo1001) noted the read across from BT provision of external tie circuits to LLU backhaul. The market analysis in chapter 3 defines the relevant market for external tie cables, assesses BT’s market power and considers the implications of these conclusions.
Chapter 2

Backhaul products

2.1 Backhaul provides a capacity that conveys telecommunications services delivered by means of a Metallic Path Facility (MPF), from a serving Main Distribution Frame (MDF) at an LLU operator’s co-location site to an operator’s point of connection with BT’s network. There are likely to be a variety of types of backhaul depending on the location of the operator’s equipment at a co-location site, and the type and location of the point of interconnection with BT’s network. One form of LLU backhaul is similar to a PPC, but without the local loop connecting to the customer’s premises. In that case, backhaul may use BT’s Synchronous Digital Hierarchy (SDH) network, which is described in more detail in Annex 1. This is illustrated in Figure 2.1. Some operators may prefer to use alternative technology to BT’s SDH network such as LAN (local area network) extension services (LES). Operators may choose to self-provide backhaul or purchase backhaul from another Annex II operator. However as explained in the market analysis, Oftel considers that operators will require BT to provide backhaul in most cases.

2.2 Operators will need a specified and dedicated capacity, similar to a leased line for backhaul purposes. Oftel expects that operators will also need backhaul for narrowband PSTN services provided over unbundled local loops, as LLU deployment has focused on broadband services, this document is accordingly focused on broadband services.

2.3 A backhaul link does not need to be a separate physical connection and like a leased line it can be formed by allocating some dedicated capacity within a shared physical link. In this arrangement the backhaul link can be considered to be a leased line without any local end connecting to the customer. Oftel understands that operators currently purchase retail leased lines or LES from BT to backhaul their LLU traffic.

2.4 Figure 2.1 provides an illustration of backhaul between a co-location facility at an MDF and an operator’s core network. The diagram shows two backhaul products. LL Backhaul links, which connect an MDF site with a point of interconnection up to or at the first Tier 1 of BT’s SDH network. LES backhaul links could also provide backhaul over this part of the network. Backhaul trunk provides capacity beyond the first Tier 1 in BT’s SDH network. Very high bandwidth backhaul (at 155 Mbit/s and above) may be carried over BT’s Marconi Synchronous Hierarchy (MSH) network. As discussed in Annex A, BT’s MSH network has 120 MSH A nodes and over 700 MSH B nodes. Oftel considers that the trunk network lies on MSH A nodes which are co-sited with Tier 1 SDH nodes. LAN extension circuits do not have a capacity to be multiplexed into a trunk network and hence can only used for backhaul links and not backhaul trunk. As
discussed in chapter 3, the market analysis may differ between the two elements of backhaul.

2.5 LAN Extension Services (LES) can be used for backhaul instead of an SDH based transmission medium for distances of less than 25 km. This service transmits ethernet over fibre. There is no use of SDH as the underlying transmission medium. Oftel has specified a range of backhaul products in Annex A. If operators require alternative products, Oftel expects BT to develop these products provided it is technically feasible and there is reasonable demand.

Figure 2.1: Schematic of a network configuration for an LLU operator

2.6 Figure 2.1 also shows a distant co-location facility, a backhaul link could be provided to connect the LLU operator’s equipment at a distant co-location facility to a point of interconnection with an operator.

2.7 An operator will need to connect the distant co-location site to the MDF at the BT local exchange via an external tie circuit. An operator can choose to connect its remote site to the MDF in the BT exchange using two different services:

   a) BT provides an external tie circuit to connect the MDF to remotely located LLUO equipment; or
   
   b) LLUOs provide their own external tie circuit. BT pulls it through into the exchange and connects it to the MDF.
Questions

Q2.1 Should backhaul services be based on leased lines with the terminating end at a co-location site? Should wholesale LAN extension service (LES) be provided in addition to leased lines backhaul? Should other backhaul services be provided, if so please describe these services?

Q2.2 Should BT provide points of interconnection with operators at Tiers 1,1.5, 2 and 3 of the SDH network and any tier of the MSH network?

Q2.3 What bandwidth of backhaul would operators be interested in purchasing, do operators require backhaul at or below 2 Mbit/s or is backhaul only required at bandwidths of 34 Mbit/s and above?
Chapter 3

Summary of the market analysis

3.1 This chapter sets out Oftel’s definition of the retail and wholesale markets relating to LLU backhaul and an assessment of BT’s market power. A full discussion of the analysis is included in Annex B.

Market definitions

Retail markets

3.2 The key retail markets are those for supplying connectivity to the Internet. The functionality within these markets includes dispatch and receipt of e-mails, browsing and downloading information from websites and uploading information to websites. Asymmetric services will be suitable for many users but symmetric services, where the bandwidth available in each direction is the same, may be required by those who need to upload large volumes of data frequently.

3.3 Retail markets will be defined first, and then wholesale markets will be considered in relation to downstream retail markets. This approach is followed as the definition of a retail market is likely to affect the assessment of whether market power in a related wholesale market exists. For example, the breadth of a retail market may determine whether a provider of wholesale services has market power in the wholesale market.

3.4 Oftel considers that broadband and narrowband Internet access will not be in the same market, as the availability of competitive narrowband Internet access will not constrain the price of broadband Internet access to competitive levels. This is because of the differences in speed, content available and convenience of always-on compared with dial-up PSTN and ISDN services. Oftel currently considers that broadband Internet access to be always-on Internet access at over 128Kbit/s and this therefore includes access over DSL and cable networks. However, the exact level of bandwidth may change depending on customer reaction to availability of products at or around this bandwidth.

3.5 Oftel considers that there are four broadband Internet access markets: symmetric business, asymmetric business, symmetric residential and asymmetric residential broadband Internet access. On the demand side the availability of any of one of these services would not constrain a hypothetical monopolist in another of these services, as these users have distinct demand characteristics. Supply-side substitution into any of these potential disaggregated markets will require access to wholesale broadband services. The purpose of this market analysis is to determine the impact that market power in wholesale broadband services will have on the retail markets for services provided using these inputs. Whether or not business and residential (or symmetric and asymmetric) Internet access are in the
same or separate retail markets would not affect the exercise of market power in the related wholesale (input) market – given that it is generally the same input that is required for each of the potential markets.

3.6 Oftel considers that uncontended Symmetric DSL (SDSL) will provide similar capacity as low bandwidth leased and therefore will be part of a broader market for low bandwidth retail leased lines, although SDSL leased lines may have a lower cost structure and will be limited to DSL-enabled parts of the UK. The implications of these differences will be considered in the assessment of market power.

3.7 Oftel has not reached a view on whether video-on-demand (VOD) is likely to be sufficiently distinct from other video services such as pay TV, pay-per-view and video/DVD rental to create a separate market. However such a distinction is not necessary for drawing a conclusion on BT’s market power in backhaul.

**Market power**

3.8 BT’s ability to exercise market power in the retail markets for broadband Internet access will depend on whether the related markets for wholesale services are effectively competitive. If LLU is not fully effective in the absence of the provision by BT of cost orientated backhaul, then LLU will not constrain BT’s market power in broadband Internet access markets.

3.9 In the provision of low bandwidth leased lines, it is unclear what the implications of any BT market power in wholesale broadband markets may have for the provision of SDSL leased lines. While from the perspective of the customer, SDSL and other types of leased lines may provide the same service, it is currently unclear as to whether SDSL leased lines have a significantly lower cost structure than other types of leased lines. If SDSL leased lines were lower cost than other leased lines, then BT’s market power in backhaul may raise issues for the provision of SDSL leased lines. As LLU may constrain BT’s market power in SDSL and backhaul is necessary for LLU to be fully effective. If LLU was not fully effective in the absence of cost orientated backhaul, BT may not provide SDSL leased lines or raise prices of SDSL leased lines above competitive levels, if PPCs were a higher cost technology than SDSL leased lines. However, if PPC/leased lines have a similar cost structure as SDSL leased lines, there should be no issue of market power given the availability of cost orientated PPCs.

**Wholesale markets**

3.10 Oftel considers that there are separate wholesale markets for:

- access;
- symmetric enabled access and asymmetric enabled access;
- LL backhaul links/PPC terminating segments and LES backhaul links;
- backhaul trunk/trunk leased lines;
• external tie circuits; and
• co-location space

Figure 3.1: Wholesale and retail markets

3.11 Oftel considers that backhaul trunk, LL and LES backhaul links to the DSLAM, co-location space and access (including the local loop) are all part of separate markets as these products complement rather than provide substitutes to each other in the provision of broadband services. In order to provide wholesale DSL services, an LLU operator will require loops, equipped co-location space, backhaul links, trunk and possibly an ATM/IP network. A wholesale DSL provider may utilise ATM or IP technology on their core network, however ATM/IP technology is not required for backhaul. An operator is likely to incur significant costs in extending its network each stage towards the customer from the trunk section to access. The key markets for this analysis are the access, backhaul link and trunk markets. The market or markets for co-location space have been addressed in Oftel’s investigation of BT’s non-participation in the Bow Wave Process, Local loop unbundling: BT’s non-participation in the Bow Wave Process (the ‘non-discrimination complaint’).

3.12 Oftel considers that access will be a separate market from other components such as backhaul links due to the high sunk costs facing an operator to extend their network beyond the backhaul link. This suggests that supply side substitution from backhaul into access is unlikely, even where a hypothetical monopolist of access raised prices above a competitive level. Demand side substitution will be
very limited as an operator requires access to provide broadband services. Oftel considers that access enabled for broadband services is a separate market from access. Enabling access requires an operator to sink significant sunk costs at each local exchange or concentrator to provide the capacity to provide enabled (broadband) access. On the demand side, narrowband access will not be a substitute for broadband access. On the supply side, the sunk costs of enabling access is likely to deter supply side substitution. Enabled access includes products such as cable modem and DSL access. Oftel considers that there are likely to be separate markets for asymmetric and symmetric enabled access related to the separate retail markets for symmetric and asymmetric broadband Internet access. On the demand side asymmetric access will not provide a reasonable substitute for symmetric access. On the supply side, it is unclear whether there would be significant cost barriers to switching from asymmetric to symmetric access or vice versa. Oftel understands that currently there may be significant investment in automatic testing equipment required to switch from asymmetric to symmetric access. On this basis, Oftel defines separate markets in asymmetric and symmetric access. There are no related separate business and residential markets for enabled access, as there are no relevant distinctions between business and residential enabled access.

3.13 Oftel considers that trunk and link backhaul are likely to be part of separate markets as trunk and link backhaul are not substitutes, but complements ie to provide a wholesale DSL service an operator requires both trunk and link backhaul. As the sunk costs of providing backhaul links are quite large (see discussion in Annex B), it is unlikely that an operator providing trunk backhaul could easily switch to providing links. Therefore Oftel considers that backhaul trunk and links are separate markets. Oftel has defined two markets for backhaul links, LES backhaul links and LL backhaul links. There are significant cost and technical differences between these two products, which suggests that the availability of one link product will not constrain the prices of the other product to competitive levels.

3.14 Enabled access and backhaul links together can be used to provide broadband origination. Broadband origination provides broadband capacity from an end customer to an operator’s point of connection.

3.15 Backhaul trunk is a similar product to the trunk segment of leased lines, as both provide dedicated capacity over the trunk section of BT’s network. Similarly, LL backhaul links are like the terminating segment of a PPC, except that a terminating segment also includes the local end from the MDF site to the customer. Oftel considers that backhaul trunk is likely to be in the same market as trunk segments of PPCs, as the trunk PPCs are likely to be reasonable substitutes for trunk backhaul for a customer and suppliers of trunk PPCs are likely to be able to easily enter a market for trunk backhaul. Similarly, LL backhaul links and terminating segments of PPCs are likely to be in the same market, as an operator providing PPCs should also be able to supply LL backhaul, although from a customer perspective, a PPC cannot be used to provide backhaul as it originates
at a customer site rather than a BT exchange. LES backhaul links will be in a separate market from PPC terminating segments and LL backhaul links.

**Bandwidth**

3.16 Oftel considers that there are separate LL backhaul link/PPC terminating segment markets for low bandwidth (2Mb and below) and high bandwidth backhaul (above 2 Mb). This is because of the lack of demand side substitutability between 2 Mb and the next bandwidth commonly available – 34Mb. Furthermore, there is little evidence of supply side substitution from 34 Mb into the 2 Mbit/s market. In practice, backhaul operators are unlikely to require capacity of 2 Mb, hence it is the high bandwidth backhaul market which will be of interest. For the purpose of further discussion backhaul link is high bandwidth backhaul link, although much of the analysis will also apply to low bandwidth links. LES backhaul links will form one market at all bandwidth as they are only available at high bandwidths.

**Geographic**

3.17 Oftel considers that there is a national market for backhaul LL backhaul links/PPC terminating segments. While there is some evidence from the leased lines review that different competitive conditions are developing in central London and possibly other metropolitan areas, it is not obvious that separate markets exist between central London and the rest of the UK. Central London is usually considered as the area covered by 020 7 telephone numbers, which is priced by BT as the Central London Zone (CLZ) for leased lines. It is not clear to what extent access network competition exists in central London, and while a number of operators have built out access networks in central London, these networks do not appear to provide competitive constraint across all of the CLZ. Early indications from LLU operators (LLUOs) are that sites in the central London are not subject to more competitive backhaul conditions than other parts of the country. Therefore, while Oftel does not rule out the emergence of different markets in different parts of the country over time, it does not appear that there is sufficient evidence at present to justify defining separate markets inside and outside central London or other metropolitan areas.

3.18 BT prices LES backhaul links on a geographically averaged basis. This pricing structure would suggest that competitive conditions are similar across the UK. Although, Oftel acknowledges that different competitive conditions may emerge in London or metropolitan areas as discussed above for LL backhaul links, at this stage, Oftel considers that there is a national market for LES backhaul links.

**External tie circuits**

3.19 External tie circuits provide a connection between the MDF at BT’s exchange and an operator’s distant co-location site. A hypothetical monopolist of external tie cables is likely to be able to raise prices above competitive levels. An operator
would be unable to use a distant co-location site without an external tie cable. There are no supply side alternatives to the provision of external tie cable at distant co-location site. On the demand side, it may be possible for a LLUO in some cases to switch to physical co-location and the use of an internal tie cable in response to an increase in price of external tie cables. However, at this stage of the development of LLU, it not clear whether physical co-location will be a substitute for distant co-location. Distant co-location may be required due to a shortage of space at a physical co-location site or an operator may prefer distant co-location as they have control of over costs associated with the provision of the co-location facility. Furthermore, Oftel considers it desirable that LLUO have the option of distant co-location, even where in cases where physical co-location is viable. On the basis, that external tie circuits are necessary for distant co-location and that physical co-location is not always a substitute for distant co-location, Oftel considers that external tie circuits are a separate market.

**Market power**

**Backhaul links**

3.20 Oftel assessed BT’s market power on the basis of evidence relating to barriers to entry, market shares, price trends, entry into the market and profitability. As Oftel considers that LL backhaul links are part of the same market as PPC terminating segment, the market analysis is based on information from the leased lines market. Leased line market information is used as no information is available on wholesale leased lines as PPCs were only launched on 1 August 2001. Prior to that date, OLOs purchased retail leased lines to provide end to end leased lines to their retail customers. Therefore retail leased line market data provides a useful indication of the wholesale leased lines markets. A full discussion of BT’s market power is in Annex B.

3.21 Oftel considers that BT has market power in the provision of LL backhaul link/terminating segments on the basis of the following factors:

- barriers to entry arising from significant sunk costs to rolling out terminating segments/backhaul link;
- BT’s 38% market share in high bandwidth leased lines;
- BT’s high and rising profitability of high bandwidth leased lines (37% ROCE (return on capital employed) on leased lines at 2 Mbit/s and above); and
- recent trends in pricing leased lines, real prices have remained stable, while Oftel understands that cost per circuit are likely to have fallen.

3.22 Oftel considers that BT has market power in LES backhaul links as the same barriers to entry are likely to apply to LES backhaul links as apply to PPC backhaul links because both involve high sunk costs in network rollout. Oftel does not have profitability data for LES services themselves, however Oftel has estimated the profitability of short haul data services. Oftel understands that LES services are a type of short haul data services. BT’s rate of return on shorthaul data was 104% in
1999/00. Furthermore Oftel understands that BT is currently the only provider of LES backhaul services. Therefore on the basis of the high sunk costs of providing LES links and the lack of competitive constraint on BT’s LES backhaul services, Oftel considers that BT has market power in LES backhaul links.

**Backhaul trunk**

3.23 The leased lines market review concluded that trunk segments of leased lines were not effectively competitive, but that this market is prospectively competitive. The market is prospectively competitive due to the entry of number of operators such as Cable & Wireless and Energis at a national level and the roll out of networks by other players such as Worldcom, COLT, ntl, Norweb, Torch and Thus. Furthermore a number of these entrants were offering wholesale trunk facilities to other carriers suggesting that they were not going to exploit their networks on an exclusive basis. As backhaul trunk is part of the trunk segment market, Oftel considers that backhaul trunk is prospectively competitive.

**Access, symmetric and asymmetric enabled access**

3.24 Oftel considers that BT has market power in both access, symmetric and asymmetric enabled access. Given BT’s continuing high market share in access lines, coupled with the substantial entry barriers facing new entrants seeking to gain a significant share of the local access market, Oftel concludes that BT possesses market power within the access market such that it has ability to raise prices above the competitive level in the relevant market for a non-transitory period. In terms of symmetric and asymmetric enabled access, Oftel considers that the relative position of cable and BT’s share of addressable broadband end-users means that BT has market power.

**External tie circuits**

3.25 Oftel considers that BT has market power in the market for external tie circuit, as OLOs are likely to face similar difficulties in self providing external tie circuits as they face in providing terminating segments to customers where they have not rolled out an access network. If OLOs are faced with digging new duct to self-provide new tie circuits, while BT can utilise its existing network for all or part of the distance, then BT will have market power. The key difference between terminating segments and external tie circuits may be the level of duct building required by both BT and other operators. While in the case of terminating segments and leased lines, BT is able to utilise a ubiquitous network to reach customers, in the case of distant co-location sites, BT may also have to build some amount of new duct. This is because distant co-location sites may be at locations which do not already receive telecom services, such as newly constructed street cabinets, or have access duct to the BT network and be located short distance from the MDF site. On the basis that is likely to be able to utilise its access network to supply external tie circuits, Oftel considers BT to have market power in the supply of external tie circuits and that the market is not effectively competitive.
Implications of BT’s market power in backhaul link for broadband Internet access/data transfer

3.26 In order to consider the impact that BT’s market power in LLU backhaul could have on the broadband Internet access markets, it is necessary to consider the importance of LLU backhaul in the overall cost of providing broadband Internet access. Oftel does not have detailed costing information on the provision of broadband Internet access. However it possible to estimate the significance of backhaul in comparison to other LLU costs such as LLU line rental.

Table 3.1: Rental cost of a retail leased line to provide backhaul per 500 Kbit/s and 2 Mbit/s of capacity in terms of pounds (£) per year

<table>
<thead>
<tr>
<th>Contention ratio</th>
<th>2:1</th>
<th>20:1</th>
<th>50:1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of main link (km)</td>
<td>10</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>Per 500 Kbit/s</td>
<td>£530</td>
<td>583</td>
<td>742</td>
</tr>
<tr>
<td>34 Mb</td>
<td>£328</td>
<td>361</td>
<td>462</td>
</tr>
<tr>
<td>155 Mb</td>
<td>£2120</td>
<td>2332</td>
<td>2967</td>
</tr>
<tr>
<td>Per 2 Mbit/s</td>
<td>£1321</td>
<td>1446</td>
<td>1846</td>
</tr>
<tr>
<td>34 Mb</td>
<td>£2120</td>
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</tr>
<tr>
<td>155 Mb</td>
<td>£1321</td>
<td>1446</td>
<td>1846</td>
</tr>
</tbody>
</table>

3.27 Table 3.1 shows the cost of backhaul based on an operator purchasing retail leased lines to carry 500 kbit/s or 2 Mbit/s from their points of presence to the Concentrator Unit across a range of bandwidths, contention levels and lengths of main links. 500Kbit/s is at the lower end of bandwidth required for providing broadband DSL services, while 2 Mbit/s is in line with bandwidth required for SDSL services. LLU line rental charges have been determined by Oftel to be £122 per annum (see Determination under Condition 83.16 of the Licence of British Telecommunications plc relating to the charges for the provision of metallic path facilities and associated internal tie circuits, December 2000). Retail leased lines are an appropriate product as the definition of PPC does not include backhaul (as discussed in Chapter 2). Therefore operators are likely to require retail leased lines to backhaul LLU traffic from DSLAM to their networks, in the absence of network build out. Table 3.1 shows that in most scenarios, backhaul will be a significant cost of providing broadband DSL services, although at high contention levels and at high levels of aggregation, the cost of backhaul becomes relatively modest. These estimates may understate the cost of backhaul to operators, as operators may have some level of contention in reserve to allow for future sales ie the purchase of backhaul is likely to provide a lumpy increase in capacity.
3.28 Oftel has received confidential cost information from an operator considering providing wholesale DSL services. This information shows that backhaul is a significant cost component of providing wholesale DSL services.

3.29 On the basis of the above information, Oftel concludes that backhaul costs are likely to be a significant component of providing broadband Internet services and data services via an unbundled loop.

3.30 Oftel’s view is that the appropriate interpretation of the requirement for prices to be cost orientated cannot be considered in isolation from the extent of competition for the service in question. For example, if the provision of the service in question was effectively competitive or moving towards a competitive market structure then Oftel is likely to interpret the requirement for cost orientation as meaning any price between the long run incremental cost (LRIC) floor and stand alone cost (SAC) ceiling, subject to any relevant combinatorial and non discrimination tests also being satisfied. However, if by contrast the relevant economic market was not competitive (i.e. not effectively or prospectively competitive) then Oftel will be inclined to interpret the cost orientation requirement to mean that prices should be set on a LRIC basis with some allowance for common cost recovery. On the other hand, if it appears that market power is not likely to persist, such that effective competition is in prospect, Oftel would generally consider lighter regulation, for example regulation based on the principles of non-discrimination, to be more appropriate.

**Market power**

3.31 Oftel has carried out the assessment leading to this consultation document in accordance with the current legal framework, using the powers described above in Chapter four. However, in doing so, Oftel has also considered the potential position under the set of Directives setting out a new legislative framework for telecommunications, proposed by the European Commission and currently before the European Parliament and the Council of Ministers. Oftel believes that the proposals made in this consultation and draft direction are consistent with the current European proposals. In particular Oftel expects that, if it were called on to apply the requirements in Chapter III of the draft Access and Interconnection Directive and in Chapter IV of the draft Framework Directive to this situation, on current facts and on the aforementioned European Commission proposals it would reach a view consistent with the proposals put forward in this document.

**Conclusion**

3.32 In this chapter, Oftel has defined four retail markets for broadband Internet access: business asymmetric, business symmetric, residential symmetric and residential asymmetric. SDSL leased lines are part of a broader market for low bandwidth leased lines. Oftel has not reached a view on whether or not VOD is likely to form a separate market. Oftel has defined three separate wholesale markets for backhaul: trunk backhaul, LL backhaul links and LES backhaul links.
3.33 The markets for access, symmetric and asymmetric enabled access, LL and LES backhaul links are not effectively competitive, while the backhaul trunk market is prospectively competitive. The availability of LLU allows entry into access and symmetric and asymmetric enabled access markets. However, BT’s market power in LL and LES backhaul links and backhaul trunk markets means that LLU will not be effective in enabling the development of a competitive broadband Internet access. In the absence of cost orientated backhaul, LLUOs will not be able to compete effectively with BT in the broadband Internet access markets. Therefore in order to ensure that LLU is fully effective in promoting competition in broadband Internet access, Oftel proposes that BT should be obliged to provide cost orientated backhaul ie trunk backhaul, LL backhaul links and LES backhaul links. Based on the Oftel interpretation of cost orientation set out above, this implies that LL backhaul links and LES backhaul links prices should be set on a LRIC plus basis, while trunk backhaul prices would be required to be non-discriminatory and between LRIC and SAC.

3.34 In terms of SDSL leased lines, BT’s market power in backhaul services may raise issues of market power in the provision of SDSL leased lines, if SDSL leased lines have a significantly lower cost structure than other leased lines. However, as BT will be obliged to provide cost orientated backhaul to enable competition in the broadband Internet access markets, it is not necessary for Oftel to reach a view on whether backhaul is required for the purpose of providing SDSL leased lines alone. LLUOs providing leased lines will be able to obtain cost orientated backhaul, as backhaul will be provided on a non-discriminatory basis and therefore Oftel has not needed to reach a view on whether backhaul is required for providing leased lines.

3.35 For VOD services, it is not clear that separate retail markets exist and therefore it is unclear whether BT would leverage its market power from backhaul services into the relevant retail markets. However, Condition 57 of BT’s Licence prohibits it from unduly preferring its own business, or unduly discriminating, as respects interconnection of any description which it provides pursuant to Part C of its Licence (ie Conditions 44-50A). This means that BT cannot unduly discriminate in the provision of LLU backhaul services on the basis of the service that an operator provides.

Questions

3.1 Oftel is interested in the views of respondents on all aspects of the market analysis. In particular Oftel is interested in whether respondents consider the retail and wholesale market definitions are appropriate.

3.2 Do respondents agree that the backhaul link is not effectively competitive?

3.3 Do respondents agree that the backhaul core market is prospectively competitive?
3.4 Do respondents agree that the market for external ties circuits is not effectively competitive? If possible, please provide evidence on the level of new duct build required for operators to self provide external tie circuits and on the level of new duct build necessary for BT to provide external tie circuits?
Chapter 4

Legal framework and conclusions

4.1 The Director General considers that backhaul falls within the scope of EC Regulation 2887/2000 on unbundled access to the local loop (the EC Regulation) as a related facility within the meaning of Article 2 of the EC Regulation. He also considers that it falls within Directive 97/33/EC of the European Parliament and Council on interconnection in Telecommunications with regard to ensuring universal service and interoperability through the application of the principles of Open Network Provision (ICD).

4.2 The EC Regulation defines a 'related facility' as

“...the facilities associated with the provision of unbundled access to the local loop [...] access to which is necessary for a beneficiary to provide services on a competitive and fair basis.”

4.3 The Director General considers that backhaul is necessary for a beneficiary to provide services over unbundled loops and will be a related facility under Article 2 of the LLU Regulation (2887/2000), for as long as the market for backhaul is not effectively competitive and backhaul is a material cost element for providing broadband Internet access over an unbundled loop. As set out in chapter 3, the Director General considers that the market for LL and LES backhaul links are not effectively competitive at all bandwidths and backhaul trunk is not effectively competitive, although backhaul trunk is prospectively competitive. The cost analysis in chapter 3 finds that backhaul will be a material cost element in the provision of broadband Internet and data services. Where backhaul is a related facility, Article 3.3 of the Regulation requires BT to charge prices set on the basis of cost orientation.

4.4 The Director General takes the view that the ICD also applies.

4.5 The ICD defines interconnect as “the physical and logical linking of telecommunications networks used by the same or a different organisation in order to allow the users of one organisation to communicate with users of the same or another organisation, or to access services provided by another organisation. Services may be provided by the parties involved or other parties who have access to the network”. A telecommunications network is defined as: "transmission systems and, where applicable, switching equipment and other resources which permit the conveyance of signals between defined termination points by wire, by radio, by optical or by other electronic means."

4.6 Trunk, LL and LES backhaul are interconnection because they are the physical and logical linking of transmission systems which permit the conveyance of signals between defined termination points. The provision of a circuit that
conveys telecommunications services delivered by means of a Metallic Path Facility (MPF), from a serving Main Distribution Frame (MDF) at an LLU operator’s co-location site to an operator’s point of connection with BT’s network also falls within the definition of a leased line in Annex 1 of the ICD:

“Leased lines means telecommunications facilities which provide for transparent transmission capacity between network termination points and which do not include on-demand switching (switching functions which the user can control as part of the leased line provision). They may include systems which allow flexible use of the leased line bandwidth, including certain routing and management capabilities.”

4.7 BT has been designated as having Significant Market Power (SMP) in the market for leased lines for the purpose of the ICD. This SMP designation implies an obligation on BT to provide leased lines at cost-oriented prices in response to a reasonable request.

4.8 Where BT is asked to provide a backhaul circuit in connection with a request under the EC Regulation for unbundled access to the local loop, such a request is likely to be reasonable, provided that it relates to the provision of a circuit between the operator’s (beneficiary’s) equipment and the nearest point of connection to an operator’s backbone system.

4.9 Since the obligation under the ICD is substantially the same as that under the EC Regulation where backhaul is a related facility, in practice the Director's powers to require BT to provide backhaul circuits in response to reasonable demand are the same, whether or not that provision is 'necessary' within the meaning of Article 2 of the EC Regulation.

4.10 The Director General has recently consulted on the future of the regulatory framework for the provision of leased lines (at www.ofTEL.gov.uk/publications/licensing/2001/ppcs0301.htm). The Director General expects the principles set out in the statement which resulted from that consultation to apply to the provision of backhaul circuits. Although not directly relevant to the provision of backhaul circuits, some of the principles in the Director General’s PPC direction – in particular as regards pricing – will also be relevant to the treatment by the Director General of any disputes relating to the provision of backhaul in the context of local loop unbundling.

4.11 Accordingly, although the Director has powers to make any determination in relation to backhaul under both under the EC Regulation and the ICD, in the interests of legal certainty he considers it more appropriate, in order to ensure the provision of LLU Backhaul throughout the UK, to use his powers pursuant to the Regulations implementing the ICD (ie the Telecommunications (Interconnection) Regulations 1997).
4.12 Under Regulation 6(3) of these Regulations (which implements Article 9(3) of the ICD) the Director may, in pursuit of the aims stated in Regulation 6(1), intervene at any time in order to make a direction specifying issues which must be covered in an interconnection agreement, and to specify conditions that must be observed by one or more parties to such an agreement.

4.13 The aims listed in Regulation 6(1) include the need to stimulate a competitive market and the principles of non-discrimination (including equal access) and proportionality. LLU backhaul is needed to allow unbundling of the local loop to be fully effective in enabling competition in broadband services. Effective LLU will help stimulate a competitive market in broadband Internet access. LLU backhaul is also required to ensure that BT is unable to discriminate in the provision of backhaul to itself and other wholesale DSL providers.

4.14 Interconnection for leased lines under Regulation 6(3) is provided by BT pursuant to Condition 45.1 and as such is a Standard Service (as defined in BT’s Licence). Under Condition 57, BT is prohibited from unduly discriminating or unduly preferring its own business in respect of interconnection. In respect of such services BT is required to ensure that its charges are cost-orientated (Condition 69.1 of BT’s Licence).

4.15 The Director General’s view is that the appropriate interpretation of the requirement for prices to be cost-orientated cannot be considered in isolation from the extent of competition for the service in question. For example, if the provision of the service in question was effectively competitive or moving towards a competitive market structure then Oftel is likely to interpret the requirement for cost orientation as meaning any price between the long run incremental cost (LRIC) floor and stand alone cost (SAC) ceiling, subject to any relevant combinatorial and non discrimination tests also being satisfied. However, if by contrast the relevant economic market was not competitive (ie not effectively or prospectively competitive) then Oftel will be inclined to interpret the cost orientation requirement to mean that prices should be set on a LRIC basis with some allowance for common cost recovery. On the other hand, if it appears that market power is not likely to persist, such that effective competition is in prospect, Oftel would generally consider lighter regulation, for example regulation based on the principles of non-discrimination, to be more appropriate.

4.16 The Director General believes that its view on cost-orientation is consistent with the approach taken by the ICD, Recital 10 of which states that:

“...whereas the level of [interconnection] charges should promote productivity and encourage efficient and sustainable market entry, and should not be below a limit calculated by the use of long-run incremental cost and cost allocation and attribution methods based on actual cost causation, nor above a limit set by the stand-alone cost of providing the interconnection in question.”
4.17 The Director General expects BT to set prices in consultation with interested operators within this framework and expects that the price for backhaul link and trunk should be priced on the same basis as PPC terminating segments.

4.18 The interaction of Conditions 45 and 69 of BT’s licence requires that charges for Standard Services are reasonably derived from the cost of providing the service based on a forward looking incremental cost approach (except to the extent that the Director considers it appropriate to apply another cost standard). In the event of a dispute, the Director will consider the appropriate cost standard in considering what would be a cost-orientated price.

**Service level agreements**

4.18 It is important, in order to stimulate a competitive market that operators can effectively compete with BT. In order to do this they must have guarantees that LLU backhaul will be provided on reasonable terms, including terms for provisioning and repair.

4.19 The ICD requires BT to adhere to the principle of non-discrimination with regard to interconnection offered to others. BT must apply similar conditions in similar circumstances to interconnecting organisations providing similar services. In addition BT must provide interconnection facilities 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. BT must, therefore, ensure that the service level agreement (SLA) relating to the supply of LLU backhaul must not in any way put an operator at an unfair competitive disadvantage as regards BT or another operator.

4.20 It is, therefore, appropriate that the SLA relating to the supply of LLU backhaul includes provision for the payment of reasonable liquidated damages, to be payable by BT where its failure to fulfil its obligations under the SLA causes an operator loss. This will ensure that BT has an economic incentive not to discriminate in the level of service it provides to itself and to an operator.

**External tie circuits**

4.21 Condition 83 of the BT Licence obliges BT to make available access to its local lines to consumers, space in its exchanges, use of certain circuits and reasonably necessary ancillary services, including the provision of co-location, so that other licensed operators having interconnection rights under the ICD can provide telecommunications services (including ADSL services) over those lines.

4.22 Paragraph 17 of Condition 83 provides that BT shall provide access network facilities at a charge or charges to be agreed between the parties or, in default of agreement, to be determined by the Director. In addition paragraph 19 of the Condition requires BT to secure that the offer of an agreement to provide any of
the access network facilities under the Condition contains only terms and conditions which are reasonable.

4.23 Article 3(1) of the European Parliament and the Council Regulation on unbundled access to the local loop (EC 2887/2000) requires notified operators (as defined in the EC Regulation and of which BT is one) to publish, from 31 December 2000, and keep updated, a reference offer for unbundled access to their local loops and related facilities, on terms set out in the EC Regulation. The reference offer for unbundled access to local loops run by BT is known as the Access Network Facilities Agreement which, for the purposes of the Direction, includes the relevant parts of BT’s price list.

4.24 Article 4(1) of the EC Regulation requires the Director to ensure that charging for unbundled access to the local loop fosters fair and sustainable competition. Article 4(2) of the EC Regulation gives the Director the power where justified to impose changes on the reference offer for unbundled access to the local loop and related facilities. Article 4(3) of the Regulation permits the Director to intervene on his own initiative where justified in order to ensure non-discrimination, fair competition, economic efficiency and maximum benefit for users.

4.25 Cost orientated prices on BT provided external tie circuits are required to ensure competitive prices for external tie circuits, as operator self provide is unlikely to constrain BT’s prices to competitive levels. Cost orientated external tie circuits will stimulate competitive wholesale DSL services, as external tie circuits are required for operators who utilise distant co-location to provide wholesale DSL services.

4.26 Article 3(3) of the EC Regulation requires BT to make charges for related facilities to unbundled access to the local loop (including space at its exchanges) set on the basis of cost-orientation.

**Conclusion**

4.27 The Director considers that BT has an obligation under both the ICD and LLU regulation to provide LL and LES backhaul link and trunk at cost orientated prices to operators and that backhaul prices should be set on a consistent basis with PPCs. BT has an obligation under the LLU regulation to provide external tie circuits at cost orientated prices.
Chapter 5

Arrangements for making and viewing representations

5.1 This draft Direction has been prepared on the Director General’s own initiative. The Director General’s proposed decision is being made available to interested parties, together with the Director General’s reasons, so that they may have a reasonable opportunity to make representations. Having considered any such representations, the Director General will, if appropriate, make the Direction and will notify interested parties of that Direction and his reasons for making it. The closing date for submitting representations is 16 January 2002.

5.2 Where possible, comments should be made in writing and sent by e-mail to david.black@oftel.gov.uk. However, copies may also be posted or faxed to the address below. If any stakeholders are unable to respond in one of these ways, they should discuss alternatives with:

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Further copies of this document

5.3 This document can be viewed in the Publications section of Oftel’s website (www.oftel.gov.uk), under the classification Broadband. Paper copies and more accessible formats such as large print, Braille, disc and audio cassette can be made available on request. Please contact Oftel’s Research and Information Unit by phoning 020 7634 8761 or by sending an e-mail to infocent@oftel.gov.uk.

Publication of representations made by stakeholders

5.4 On this occasion, Oftel is not inviting stakeholders to comment on the representations made by others. However, in the interests of transparency, all representations will be published, except where respondents indicate that a response, or part of it, is confidential. Respondents are therefore asked to separate out any confidential material into a confidential annex which is clearly identified as containing confidential material. Oftel will take steps to protect the confidentiality of all such material from the moment that it is received at Oftel’s offices. However, in the interests of transparency, respondents should avoid applying confidential markings wherever possible.
5.5 Non confidential representations can be viewed on Oftel’s website in the *Publications* section under *Responses to Oftel consultations*. They can also be viewed at Oftel’s Research and Information Unit. Appointments must be made in advance by phoning 020 7634 8761 or sending an e-mail to infocent@oftel.gov.uk.
Glossary

Asymmetric digital subscriber line (ADSL): a technology that allows the use of a metallic line to send a large quantity of data (e.g., a television picture) in one direction and a small quantity (e.g., a control channel and a telephone call) in the other.

ATM service: data services using Asynchronous Transfer Mode technology, such as BT’s Cellstream service or Energis’s Cellconnect.

Bandwidth: the physical characteristic of a telecommunications system that indicates the speed at which information can be transferred. In analogue systems, it is measured in cycles per second (Hertz) and in digital systems in binary bits per second (bit/s).

Copper or metallic line: the main transmission medium used in telephony networks to connect a telephone or other apparatus to the local exchange. Copper lines have relatively narrow bandwidth and so have limited ability to carry broadband services such as video unless combined with an enabling technology such as ADSL.

De-averaging: the move from a single averaged tariff or charge to separate ones based on differing geographical areas or types of service.

Digital subscriber line (DSL): A family of technologies generically referred to as DSL, or xDSL, capable of transforming ordinary phone lines (also known as “twisted copper pairs”) into high-speed digital lines, capable of supporting advanced services such as fast Internet access and video-on-demand. ADSL (Asymmetric Digital Subscriber Line), HDSL (High data rate digital subscriber line), SDSL (symmetric digital subscriber line), and VDSL (Very high data rate digital subscriber line) are all variants of xDSL.

Digital subscriber line access multiplexer (DSLAM): it is located in the co-location space of an operator at an exchange site. It is composed of a multiplexer and the DSL modems necessary to operate DSL services over the loops served by the operator from the exchange.

Digital Cross Connection node: A node in BT’s Private Circuit network where circuits at 64kbit/s and below can be cross-connected between differing 2Mbit/s tributaries.

Digital Junction Switching Unit (DJSU): a tandem switch used to connect between DLEs in the London area.

DLE (Digital Local Exchange): the telephone exchange to which customers are connected, usually via a concentrator.
**DMSU (Digital Main Switching Unit):** connects calls between DLEs and also other DMSUs and form the backbone of the trunk network.

**Geographically averaged prices:** prices established by averaging the costs of network elements across the country so that customers in different areas of the country do not pay different rates.

**Incremental costs:** the capital and operating costs that arise as a result of the provision of the ‘increment’. In contrast to fully allocated costs, the incremental costs include only those costs that are caused by the provision of the increment.

**Internet:** a global network of networks, mainly narrowband, accessed by users with a computer and a modem via a service provider.

**Internet Protocol (IP):** A set of instructions describing how to address and transfer information across a network. The Internet is a public network consisting of many interconnected IP networks.

**Leased line:** A permanently connected communications link between two premises dedicated to the customers’ exclusive use. Also known as a **private circuit**.

**Local loop:** the access network connection between the customer’s premises and the local PSTN exchange, usually a loop comprised by two copper wires.

**Long-run incremental cost (LRIC):** the cost avoided through no longer providing the output of a defined increment. For example, the cost of call conveyance is the cost which would be saved in the long-run if this service was no longer provided.

**Mbit/s:** Mega (million) bits per second. A measure of speed of transfer of digital information.

**PPC:** A generic term used to describe a category of private circuits that terminate at a point of connection between two operators’ networks. It is therefore the provision of transparent transmission capacity between a customer’s premises and a point of connection between the two operators’ networks. It may also be termed a part leased line. It includes terminating segments.

**Plesiochronous Digital Hierarchy (PDH):** an older method of digital transmission used before SDH which requires each stream to be multiplexed or demultiplexed at each network layer and does not allow for the addition or removal of individual streams from larger assemblies.

**Public Switched Telephone Network (PSTN):** the complete network of interconnections between telephone subscribers.
RCU (Remote Concentrator Unit): The lowest level of BT’s PSTN hierarchy. Customer lines, which are generally copper wires, are concentrated/multiplexed and routed to a DLE.

Synchronous Digital Hierarchy (SDH): a method of digital transmission where transmission streams are packed in such a way to allow simple multiplexing and demultiplexing and the addition or removal of individual streams from larger assemblies.

Symmetric Digital Subscriber Line (SDSL): a technology that allows the use of a metallic line to send a large quantity of data in both direction.

Terminating segment: A terminating segment is capacity between a customer’s premises and an operator’s point of connection at Tier 1 of BT’s SDH network.

Video-on-demand: a programme or film sent independently to a customer in response to his individual request. This contrasts with broadcast television, which is sent simultaneously to all customers able to receive it.
Annex A: Service Definitions

Description of BT’s network

A.1 BT’s SDH network is arranged in three main tiers. The tier structure relates to the capacity of the nodes and interconnecting transmission paths. The network comprises a top layer mesh of around 60 Tier 1 nodes, situated in trunk buildings which usually also accommodate a BT trunk tandem switch (DMSU, DJSU or WAT). Sub-ordinate to the Tier 1 mesh are Tier 2 rings. Tier 2 nodes (around 600 in number) are situated in buildings in towns and cities that usually have either a trunk tandem switch or a DLE. Subordinate to Tier 2 rings are Tier 3 rings. Tier 3 nodes (around 1000 in number) are mainly situated in buildings housing local concentrators. Other serving exchanges for private circuits connect to Tier 3 nodes using Plesiochronous Digital Hierarchy (PDH) transmission.

A.2 However, many Tier 2 rings are physically remote from the Tier 1 mesh, so an intermediate set of rings, known as ‘supersets’, connect the remote Tier 2 rings to the Tier 1 mesh. The Tier 2 nodes that are situated on the supersets are sometimes referred to as Tier 1.5 and these can be considered as an intermediate layer in the hierarchy, where they exist. There are around 100 such nodes.

A.3 BT has an extra tier-less overlay network called the Marconi Synchronous Hierarchy (MSH) network. This is a broadband SDH network that BT uses to switch at 622 Mbit/s. This network carries circuits at 622 Mbit/s to 2.4 Gbit/s. BT has around 120 MSH A nodes and around 700 MSH B nodes. Products F and G, which relate to the higher bandwidth backhaul (622Mbit/s to 2.4Gbit/s) which connect across BT’s MSH network.

A.4 Customers may be connected to any of the tiers. For example customers could be connected to Tier 2, 1.5 or Tier 1 nodes for the provision of circuits at 2 Mbit/s and above.

A.5 Oftel recognises that LAN extension services (LES) can be used for backhaul instead of an SDH based transmission medium. This service transmits ethernet over fibre. There is no use of SDH as the underlying transmission medium. A customer sited handover is proposed for LES as an In Span Interconnection (ISI) is not considered to be practical at this stage. This is because an ISI handover of LES would involve the Licensee providing a portion of the LES circuit handing over In-Span via a fibre splice. Many LES circuits have end-to-end network management and, thus, it would not be possible to provide suitably managed LES via ISI. There could also be problems with the splicing of different types of fibre. Oftel will consider interconnection issues associated with provision of LES circuits in the forthcoming determination on LES circuits as part of the Phase II PPC determination. LES backhaul links will be limited to a radial distance of less than 25 km due to the nature of the technology.
A.6 Backhaul Circuits in respect of which BT is required by the direction to offer to enter into an agreement are set out below.

a) The provision of transparent transmission capacity by the Licensee, at all bandwidths between 2 Mbit/s and 155 Mbit/s (inclusive) between a Local Loop Unbundling operator’s (LLUO) equipment at a Licensee’s MDF site and a point of connection with an operator’s Applicable System connected to the nearest appropriate Licensee Synchronous Digital Hierarchy (SDH) node to the customer. Such node could be a tier 3, tier 2, tier 1.5 or tier 1 node.

b) The provision of transparent transmission capacity by the Licensee, at all bandwidths between 2 Mbit/s and 155 Mbit/s (inclusive) between a LLUO’s equipment at a Licensee’s MDF site and a Point of Connection with an operator’s Applicable System connected to the nearest appropriate Licensee SDH node to the customer which is superior in the hierarchy to the node defined in (A) above, where such node exists. Such node could be a tier 2, tier 1.5 or tier 1 node.

c) The provision of transparent transmission capacity by the Licensee, at all bandwidths between 2 Mbit/s and 155 Mbit/s (inclusive) between a LLUO’s equipment at a Licensee’s MDF site and a Point of Connection with an operator’s Applicable System connected to the nearest appropriate Licensee SDH node to the customer which is superior in the hierarchy to the node defined in (B) above, where such node exists, and which could be a tier 1.5 or tier 1 node.

d) The provision of transparent transmission capacity by the Licensee, at all bandwidths between 2 Mbit/s and 155 Mbit/s (inclusive) between a LLUO’s equipment at a Licensee’s MDF site and a Point of Connection with an operator’s Applicable System connected to the nearest appropriate Licensee SDH node to the customer which is superior in the hierarchy to the node defined in (C) above, where such node exists, and which is a tier 1 node.

e) The provision of transparent transmission capacity by the Licensee, at all bandwidths between 2 Mbit/s and 155 Mbit/s (inclusive) between a LLUO’s equipment at a Licensee’s MDF site and a Point of Connection with an operator’s Applicable System connected to any Licensee SDH tier 1 node.

f) The provision of transparent transmission capacity by the Licensee, at all bandwidths from 622 Mbit/s to 2.4 Gbit/s (inclusive) between a LLUO’s equipment at a Licensee’s MDF site and a Point of Connection with an operator’s Applicable System connected to the nearest appropriate Licensee Marconi Synchronous Hierarchy (MSH) node to the customer.

g) The provision of transparent transmission capacity by the Licensee, at all bandwidths from 622 Mbit/s to 2.4 Gbit/s (inclusive) between a LLUO’s equipment at a Licensee’s MDF site and a Point of Connection with an
operator’s Applicable System connected to any appropriate Licensee MSH node.

h) The provision of dedicated ethernet presented transmission capacity by the Licensee, at all bandwidths from 10 to 1000 Mbit/s (inclusive) between a LLUO’s equipment at a Licensee’s MDF site and a site within an operator’s Applicable System connected to an appropriate Licensee node within a distance of 25 radial km.

A.7 The diagram below illustrates the different types of SDH backhaul circuits.
Annex B

Market analysis

B.1 This annex presents a detailed discussion of Oftel’s understanding of the retail and wholesale markets relating to LLU backhaul and an assessment of BT's market power in these markets.

Market definitions

B.2 There are two dimensions to the definition of a relevant market: the relevant products to be included in the same market and the geographic extent of the market(s). Oftel’s approach to market definition follows that used by UK competition authorities (1) and is in line with those used by European and US competition authorities. Market boundaries are determined by identifying constraints on the price-setting behaviour of firms. There are two main competitive constraints to consider: how far it is possible for customers to substitute other services for those in question (demand-side substitution); and how far suppliers could switch, or increase, production to supply the relevant products or services (supply-side substitution) following a price increase.

B.3 The concept of the 'hypothetical monopolist test' is a useful tool to identify close demand-side and supply-side substitutes. A product is considered to constitute a separate market if a hypothetical monopoly supplier could impose a small but significant, non-transitory price increase without losing sales to such a degree as to make this unprofitable. If such a price rise would be unprofitable, because consumers would switch to other products, or because suppliers of other products would begin to compete with the monopolist, then the market definition should be expanded to include the substitute products. However, the relevant market is not necessarily the smallest which it is possible to define using the hypothetical monopolist test. It may be appropriate to include in the relevant market, a number of products (or areas), in the supply of which competitive conditions are homogeneous.

B.4 Firstly retail markets will be defined and then wholesale markets will be considered in relation to downstream retail markets. This approach is followed as the definition of a retail market is likely to affect the assessment of whether market power in a related wholesale market exists. For example, the breadth of a retail market may determine whether a provider of wholesale services has market power in the wholesale market.

B.5 The relevant wholesale market will generally be as broad as the relevant retail market. For example, there are two different retail services, one of which is
provided using wholesale input and the other using wholesale input B, perhaps using entirely different technologies. If the two retail services are sufficiently close substitutes to compete in the same retail market the relevant wholesale market will usually include both A and B. So, even if there was a sole supplier of A, say, this might not be sufficient to establish that upstream power existed.

B.6 A complexity is that the same wholesale input might be used in the supply of a range of retail services, which compete in different retail markets. Some of the retail services might compete in markets which only included other retail services provided using similar wholesale services. In such cases, the appropriate wholesale market definition would be relatively narrow.

B.7 Oftel acknowledges that the industry is changing rapidly and accepts that market definition might also change overtime. Whenever possible, likely future developments of the industry are considered in order to assess the magnitude of some of the changes that may occur.

Retail markets

B.8 Oftel considers that the key products available over unbundled local loops are broadband Internet access, leased lines and video on demand (VOD). Internet access, leased lines and VOD are different products with different features and may form part of separate markets ie VOD is not likely to be a substitute for Internet access or vice versa. Hence the market definitions will begin from the premise that these products are part of separate markets. Firstly, broadband Internet access will be considered and then, leased lines and VOD.

Broadband Internet access

Market definition

B.9 Internet access via DSL enabled copper fibre has three distinguishing features which are not available in practice on PSTN and ISDN Internet access. It is fast (because of higher bandwidth), it is always on (ie no dial up required) and it allows content (eg music clips, video clips) which are not practically available with narrowband access. DSL Internet access differs from leased line or fixed link Internet access in that it is asymmetric and it usually has contended backhaul. For a discussion of the definition of the narrowband Internet access market, see Oftel's 2000/01 effective competition review of dial-up Internet access, July 2001.

B.10 Oftel research suggests that 84% of residential users of the Internet use dial-up narrowband access (August 2001) (2), while research on SMEs suggest that 73% used dial-up narrowband access (August 2001) (3). When the research information on the SMEs is broken down between small and medium businesses, 74% of small businesses and 34% of medium businesses used dial-up narrowband. The next most popular means of accessing the Internet was ISDN, 54% of medium businesses, 26% of small businesses and only 9% of residential
users used ISDN to access the Internet. Leased lines were used to access the Internet by only 14% of medium business, and only 1% of small business. Broadband (DSL) Internet access is used by 5% of small businesses and 6% of medium businesses. This data sums to greater than 100%, as business customers use more than one means of accessing the Internet. The Oftel research suggests that dial-up narrowband access is currently the most important means of accessing the Internet for residential users and small businesses and an important means of access for medium size businesses.

Substitution between high- and low-speed

B.11 A first issue arises when making a distinction between narrowband and broadband products: can they be seen as being part of the same market, or as being separate markets?. For the purpose of the market analysis, Oftel defines broadband as always-on Internet access above 128 Kbit/s and narrowband as Internet access at up to and including 128 Kbit/s. The substantial price differential between narrowband and broadband access would tend to suggest that the two products are in separate markets. The price of flat rate PSTN dial up narrowband Internet access is about £12-15 per month, whereas the cheapest DSL broadband Internet access is around £40 to £50 per month and the cheapest cable modem broadband Internet services are available for £25 to £35 per month.

B.12 The definition of the market or markets for Internet access may be dependent on whether the starting point is narrow or broadband access (4). It is possible that broadband access may constrain the prices of narrowband access, but narrowband access may not constrain the price of broadband access. Technological development often results in the introduction of higher quality technologically more sophisticated products in technology intensive industries. In such situations, it is reasonable to believe that the price of the lower quality product is increasingly constrained by movements in the price of the higher quality product. This is on the basis that it is likely that sufficient customers will have a willingness to pay for higher quality that is greater than the cost differential. A monopoly supplier of narrowband access may find it unprofitable to raise its prices significantly as consumers would be increasingly encouraged to switch to the high quality high speed product. However, the opposite might not be true as sufficient broadband users are likely to attach a relatively high value to the higher quality product which relates to the specific functionalities that the product has and that cannot be provided by the narrowband product. Hence, from the viewpoint of broadband access, broad and narrowband access may form separate markets.

B.13 It might also be the case that there exist two distinct groups of customers, those with a high willingness to pay for the functionality offered by high-speed Internet access and those with a relatively low willingness to pay. In these circumstances it might be that neither high- nor low-speed products would provide a competitive constraint on the pricing of the other for these groups of customers. High- and low-speed Internet access products could thus form separate economic markets when considering either set of products.
B.14 Consumers' valuations of high-speed products may change over time, as the more widespread availability and the lower prices of high-speed access translates into the supply of new products which could not be offered otherwise. The change in valuation implies that if broad and narrowband were part of the same market at present, this may well change. It is likely that in the future consumers’ valuation of high-speed products will be increasingly greater, as awareness and expectations adjust to the more widespread availability of high-quality products. A monopolist who provides high-speed products would then be in an increasingly better position to retain its customers following a non-transitory price increase, since the valuation consumers would attach to high-speed products is likely to exceed the cost differential plus the price increase. In other words, they would become so used to the quality/services that they would need a much larger price differential in order to be induced to switch to low-speed access. This would imply that, when considering high-speed products, the markets for low- and high-speed Internet access will be separate, provided supply-side substitution does not constrain the hypothetical monopolist of high speed access. Supply side substitution is considered further below.

B.15 A further difference between ISDN and PSTN Internet access and broadband technologies, such as DSL and cable modem, is that ISDN and PSTN are dial-up technologies. Dial-up access is less convenient than always on access in that it requires the user to dial-up whenever access is required. Consumers may therefore be prepared to pay more for always-on services. In this case, the availability of competitive dial-up access may not constrain the prices of always-on access to competitive levels.

B.16 In light of the differences in speed, expected future developments in broadband content and the convenience of always-on connections compared with dial-up access, Oftel considers that the availability of competitive PSTN and ISDN Internet access will not constrain the price of broadband Internet access such as DSL to competitive levels.

B.17 There are a variety of technologies for providing always-on broadband Internet access: DSL, cable modem, leased lines and fixed link access. Fixed links and leased lines provide a dedicated capacity between a customer and an ISP, however fixed links differ from leased lines in that they may be switched and need not provide a capacity when not in use. These differences are likely to result in fixed link having a lower cost compared with an equivalent leased line. Moreover, there are significant differences between DSL and cable modem Internet access and leased line and fixed link Internet access. Leased lines and fixed link Internet access provide symmetric access ie the same capacity upstream as downstream and they also provide uncontended backhaul services ie users do not share backhaul capacity. It is possible to provide symmetric and uncontended Internet access using SDSL (although such a product is not currently available), however leased lines and fixed links cannot be provided as contended and asymmetric access. As set out in the market analysis in chapter 3, the level of contention in the backhaul element has a significant impact on cost. There may also be significant
differences between the cost of the DSL enabled local loop and the cost of leased lines local ends.

B.18 These differences suggest that leased lines and fixed link Internet access will have a significantly higher cost than contended and asymmetric DSL and cable modem Internet access. Therefore the availability of competitive leased line or fixed links access is unlikely to constrain pricing of DSL and cable modem services to competitive levels. The ability of an SDSL provider to provide broadband Internet access market depends on wholesale access to DSL technology. Therefore the potential for substitution from SDSL symmetric access into broadband Internet access will not increase the competitive constraints on a supplier of wholesale DSL services by broadening the retail market for Internet access. These differences between DSL and leased lines/fixed links suggest that there may be more than one broadband Internet access market.

Other broadband Internet access markets

B.19 The analysis has so far proceeded on the basis that there is one broadband Internet access market. However, Oftel considers that a number of broadband Internet access markets can be distinguished: business symmetric, business asymmetric, residential symmetric and residential asymmetric broadband Internet access. The needs and willingness to pay for high bandwidth services of residential and business consumers is likely to be quite different. Business users are likely to have greater need for broadband services and lower contention requirements, some businesses are likely to have a greater need for upstream capacity. This suggests that not only may there be separate business and residential markets for broadband access. There may also be a separate market for symmetric and asymmetric Internet access.

B.20 Residential users are likely to tolerate higher contention ratios and have lower bandwidth demands than business users. Oftel research suggests that SMEs have a significantly higher willingness to pay for broadband services than residential users. In an Oftel survey, small businesses indicated they would be willing to pay £66 per month, while medium businesses indicated they would be willing to pay £108 per month (5). This compares with the figure of only £21-27 for residential users. Some residential and business users will require higher upload or more symmetric capacity than other residential or business customers. This is because some business customers are likely to make available information and provide customer services on web sites, while some residential customers may require upload capacity for Internet based video games. Business customers are likely to require more bandwidth and lower contention levels than residential customers, as businesses are likely to have a number of users sharing their Internet access and have a lower tolerance of delays than residential customers. Business users are also likely to require a more tailored level of customer support and a higher level of network reliability. These differences suggest that on the demand side, a hypothetical monopolist of business Internet access may profitably sustain prices above competitive levels for business Internet access. This is
because business users would not switch to residential Internet access due to its lower speed and quality of service, even if the price of business Internet access were raised above competitive levels.

B.21 It is also likely that a hypothetical monopolist may be able to sustain the price of symmetric broadband Internet access above competitive levels, even where asymmetric broadband Internet access is competitively provided. This is because customers with high upload requirements would not switch from symmetric to asymmetric access, if the price of symmetric access were raised above competitive levels. Equally, the competitive provision of symmetric broadband Internet access may not constrain a hypothetical monopolist of asymmetric broadband Internet access to pricing at a competitive level due to the higher costs of providing symmetric broadband Internet access.

B.22 A chain of substitution may link the business symmetric market to the residential symmetric Internet access and in turn to the asymmetric business market, which could then be linked to the residential asymmetric market. However it is unclear to what extent these products are currently available and how they will constrain each other prices. Therefore, from the perspective of the demand side, Oftel considers that there are four markets for broadband Internet access.

B.23 On the supply side, there is a question as to whether supply side substitution would constrain the ability of a hypothetical monopolist in these markets to raise prices above competitive levels. At a retail level, there are likely to be barriers for a retail provider of residential Internet access moving into the business market. The different level of service required may make it difficult for a supplier of broadband Internet access to residential customers to substitute rapidly into a market for business users. On the other hand, most ISPs appear to supply both business and residential customers, although a few ISPs appear to focus on one group of customers. Three of the top four ISPs for residential customers were among the top four ISPs for small businesses and two were among the top four ISPs for medium businesses (6). While this evidence may suggest that the differences between business and residential customers are not sufficient to make it difficult for an ISP to serve both groups of customers, it could also mean that most ISPs participate in both markets.

B.24 In any case, supply side substitution from one of these markets into any other of these markets will require access to the wholesale broadband services. However the purpose of this market analysis is to determine whether the breath of the retail market will constrain an operator with market power in the provision of wholesale broadband services. The conclusion is that whether or not symmetric business and residential Internet access, asymmetric business Internet access or residential asymmetric Internet access are in the same or separate markets would not limit the exercise of market power in the related wholesale market.
**Conclusion on broadband Internet access**

B.25 Oftel has defined four broadband Internet access markets: asymmetric business and residential access and symmetric business and residential broadband Internet access.

**Leased lines**

B.26 DSL can provide both Internet access and local ends of leased lines. Oftel expects that SDSL (Symmetric DSL) will be used to provide leased lines at bandwidths of up to approximately 2Mb. However SDSL products are not yet widely available in the retail market.

B.27 Oftel considers that uncontended SDSL and leased lines of equivalent bandwidth provide the same service and therefore should be considered to be in the same market. Oftel considers that it is likely in certain circumstances that SDSL will cost less than leased lines provided by other technologies, although there is insufficient evidence to reach a definitive conclusion. If SDSL is a significantly lower cost technology than other means of providing local ends for leased lines, then this may raise issues for the assessment of market power.

**Video-on-demand**

B.28 It is possible that this retail product is constrained by the presence of pay TV, pay-per-view, digital TV and video/DVD rentals, usage of video recorder or a combination of these products. For example, a customer may consider video rentals together with video recording of pay TV programmes to be a potential substitute for video-on-demand products. What is less clear is whether these possible substitutes are sufficient to constrain the prices for video-on-demand to the competitive level.

B.29 Unfortunately, empirical data on the extent to which consumers view these products as substitutes is not currently available, as video-on-demand products have been launched very recently. Whilst the extensive libraries and the watch-when-you-want facilities (amongst others) available via video-on-demand retail products are to some extent distinct from the potential substitutes, it is not clear whether they are sufficiently distinct to create a separate economic market. It is thus not possible to conclude whether BT possesses retail market power in the provision of VOD services. As a corollary of this, it cannot be concluded at this stage whether or not BT’s wholesale market power in the provision of backhaul will raise potential issues of leverage into VOD.

**Retail market power**

B.30 BT’s ability to exercise market power in the retail markets for broadband Internet access will depend whether the related markets for wholesale services are effectively competitive. BT will not be able to exercise market power in VOD if this
product is part of broader markets with alternative wholesale supply. In the provision of low bandwidth leased lines, it is unclear what the implications of any market power BT has in the wholesale DSL markets may have for the provision of SDSL leased lines. While from the perspective of the customer, SDSL and other types of leased lines may provide the same service, it is difficult to draw definitive conclusions as to whether SDSL leased lines have a significantly lower cost structure than other types of leased lines. If SDSL leased lines were lower cost than other leased lines, then market power in wholesale DSL services may raise issues for the provision of SDSL leased lines. If LLU was not fully effective in the absence of cost orientated backhaul, BT may not provide SDSL leased lines or raise prices of SDSL leased lines above competitive levels, if PPCs were a higher cost technology than SDSL leased lines. However, if PPC/leased lines have a similar cost structure as SDSL leased lines, there will be no issue of market power given the availability of cost orientated PPCs.

**Wholesale markets**

B.31 The wholesale market analysis will define the relevant wholesale markets and consider the extent of BT’s market power in these markets.

**Market definition**

B.32 This section considers wholesale market definitions in light of the conclusions on retail market definitions.

B.33 Oftel considers that there are separate wholesale markets for:

- access,
- symmetric enabled access and asymmetric enabled access;
- LL backhaul/PPC terminating segments and LES backhaul links;
- backhaul trunk/trunk leased lines;
- external tie circuits; and
- co-location space
B.34 The wholesale services required to provide broadband Internet access are:
access (including the local loop), backhaul including both trunk and link, and
co-location space. A wholesale DSL provider may also utilise ATM or IP technology
on the core network. However ATM/IP technology is not required for backhaul.
BT’s wholesale DSL service provides all of these services as a combined
wholesale DSL service to operators and service providers. As noted above, this
product provides a competitive constraint on BT’s ability to exercise market power
in the retail market for broadband Internet services. Co-location space is not
considered in this paper as it has been separately addressed as part of the LLU
process (see OfTEL’s investigation of BT’s non-participation in the Bow Wave

**Trunk and link backhaul**

B.35 OfTEL considers that backhaul can be split into two distinct markets, one
market for trunk backhaul (beyond the first tier 1 in terms of the SDH network,
broadly equivalent in PSTN terms to intertandem transmission) and one market for
link backhaul (from MPF up to the trunk network). This market analysis has strong
parallels with the market definitions of wholesale leased lines, where separate
markets for trunk and segmenting segments have been defined. A detailed
discussion of the separate markets for trunk and terminating segments is set out in
the effective competition review of leased lines (August 2000) and the Phase I
PPC draft determination. In brief, trunk and link backhaul link are complements
rather than substitutes, therefore a hypothetical monopolist of backhaul links will
be able to raise prices above competitive levels without demand side switching to backhaul trunk. Supply side substitution from backhaul trunk to backhaul link is also unlikely due to the high sunk costs of building backhaul links. Similarly, Oftel believes that trunk backhaul is part of a separate market as trunk backhaul is not a substitute for backhaul link or access.

B.36 In the leased lines review, Oftel considered that the trunk market was between SDH tier 1 nodes. In terms of the MSH network (see Annex A, for a description of the MSH network), the trunk segment will lie within the 120 MSH A nodes. Oftel understands that the MSH A nodes are the nodes which receive high traffic volumes and that MSH A nodes are also ATM nodes. It seems unlikely that OLOs will find it economic to build out to all MSH A nodes, as OLO build out currently is limited to not more than 30 to 40 nodes. Oftel considers that the trunk network will be consistent across both MSH and SDH networks, as OLOs will utilise POCs for both MSH and SDH backhaul traffic. Therefore, Oftel has defined the trunk network for the MSH network parallel with the definition of the trunk for those SDH network. The definition of trunk for the SDH network is atTier 1, therefore only MSH nodes which are located coincident to Tier 1 SDH nodes are defined as trunk nodes.

**Trunk backhaul and PPC trunk segments**

B.37 Oftel considers that backhaul trunk is likely to be in the same market as PPC trunk segments, as customers are likely to consider PPC trunk segments to be reasonable substitutes for trunk backhaul and suppliers of PPC trunk segments are likely to be able to easily enter the market for trunk backhaul. This is because both backhaul trunk and PPC trunk segments involve the provision of dedicated capacity within Tier 1 of BT’s SDH network. On the demand and supply side, PPC trunk segments and backhaul trunk are substitutes for each other. Therefore, a hypothetical monopolist of trunk backhaul is unlikely to be able to sustain a price increase above competitive levels, as customers would switch to PPC trunk segments and suppliers of PPC trunk segments would switch into the provision of trunk backhaul.

**Access and backhaul links**

B.38 A wholesale leased line terminating segment equates to access and link backhaul. Backhaul link and access are likely to form separate markets for the same reason as backhaul link and trunk form separate markets. The products are demand side complements rather than substitutes. On the supply side, an operator who had built out to the concentrator unit (CU) is likely to face significant costs in extending their network to the customer. Therefore a hypothetical monopolist of access would be able to sustain prices above competitive levels, even if backhaul links were competitively provided.

B.39 Oftel considers that access enabled for broadband services is a separate market from access. Enabling access requires an operator to sink significant sunk
costs at each local exchange or concentrator to provide the capacity to provide broadband access. On the demand side, narrowband access will not be a substitute for broadband access, as narrowband access does not have a broadband capacity. On the supply side, the sunk costs of enabling access is likely to deter supply side substitution from narrowband access. Enabled access includes products such as cable modem and DSL access. Oftel considers that there are likely to be separate markets for asymmetric and symmetric enabled access related to the retail markets for asymmetric and symmetric Internet access. On the demand asymmetric access will not provide a reasonable substitute for symmetric access. On the supply side, it is unclear whether there would be significant cost barriers to switching from asymmetric to symmetric access or vice versa. On this basis, Oftel defines separate markets in asymmetric and symmetric access. There are no related business and residential markets for enabled access, as there are no relevant distinctions between business and residential enabled access.

**LL and LES backhaul**

B.40 There are two backhaul link products: leased lines (LL) backhaul links and LES backhaul links. LL backhaul links are a link provided using leased line type circuits on BT’s SDH or MSH network. Note that these circuits are not PPCs as they do not originate/terminate at a customer site, however they do use the same type of network. LES backhaul links are links provided using LES (LAN (Local Area Network) extension services) circuits to connect an OLO’s telecommunication equipment at a co-location site with a point of connection. Oftel considers that LES backhaul links and LL backhaul links are likely to be in separate markets, as a hypothetical monopolist of LL backhaul circuits would be able to raise LL backhaul circuits above competitive levels, even where LES backhaul links were competitively supplied. From a customer perspective, LES and LL links may not be good substitutes, as LES links are limited to distances of less than 25 km and a likely to be significantly lower cost than LL backhaul links. It is unclear whether suppliers of LL links would switch into the provision of LES links in the case of a price increase above competitive levels by a hypothetical monopolist of LES links, due to the differences in the technologies. Even were supply side substitution to occur, in practice this is unlikely to provide a competitive constraint on BT, as they are the only operator with the ubiquitous network who could potentially supply LES links across the UK. Therefore, Oftel considers LES backhaul links to be a separate market.

B.41 LL backhaul links and PPC terminating segments both involve the provision of dedicated capacity using the same technology from Tier 1 to an MDF site or a end user. From the perspective of a customer, a PPC includes the local end from the MDF site and therefore may not be used to provide capacity from the MDF site to a point of connection. However, a supplier of PPC terminating segments should be able to enter the market for backhaul link, provided it can obtain access into the relevant BT’s exchange sites. Oftel understands that BT is providing a backhaul egress product that will provide fibre capacity between the OLOs DSLAM and
footway box outside the exchange. This should enable an operator who provides PPC terminating segments to switch into providing LL backhaul link. Therefore a hypothetical monopolist of LL backhaul links would not be able to sustain prices above competitive levels, due to the ability of a supplier of PPC terminating segments to enter the market.

Wholesale DSL

B.42 A bundled wholesale end-to-end DSL service is not a substitute for any of the individual components discussed above, as purchasing the DSL service necessarily involves buying all the components of this service. Therefore wholesale DSL will form part of a separate wholesale market.

Low and high bandwidth backhaul

B.43 PPC terminating segments are available at a range of bandwidths, from 64 Kbit/s to 2.4 Gbit/s. In theory LL backhaul links could be purchased at all bandwidths, however in practice LLUOs will only require services at 34 Mbit/s and above. However, it is important to identify the appropriate markets before assessing market power. In the Leased Lines Review (August 2000), Oftel had previously concluded that there is a one market for terminating segments at all bandwidth. However, as part of the PPC determination, Oftel has looked again at whether there is only one market for terminating segments at all bandwidth, or whether there are two separate markets for high and low bandwidth segments. Low bandwidth terminating segments are defined as up to and including 2Mbit/s and high bandwidth segments all those above 2Mbit/s. LES backhaul links are only available at high bandwidths and therefore a distinction between low and high bandwidths is not required.

B.44 The application of the hypothetical monopolist test to segments above 2Mbit/s shows that, in response to a small but significant increase in their price, it is unlikely that either supply side substitution from or demand side substitution into low bandwidth segments would take place. On the demand side, low bandwidth terminating segments are not likely to constrain the price charged by a hypothetical monopolist of high bandwidth terminating segments, because of the difference in price, speed and quality between an aggregate of low bandwidth leased lines and a high bandwidth leased line. High bandwidth segments are currently available (7) at bandwidth ranging from 34Mbit/s up to 622Mbit/s. For a customer using a 34Mbit/s segment, a multiple of 2Mbit/s segments is not a cost effective substitute, as, the retail rental price of 34Mbit/s leased line is approximately 600% greater than a 2Mbit/s leased line. Therefore, the availability of low bandwidth circuits would not constrain a hypothetical high bandwidth monopolist to maintain competitive prices. This comparison is based on BT’s current prices. These prices may be above the level that would prevail in a competitive market, but Oftel considers that this does not affect the conclusions derived from the comparison because Oftel understands that the costs underlying the provision of terminating segments also reflect significant cost differences.
B.45 Above 2Mbit/s, Oftel considers that there is likely to be a chain of substitution between bandwidths: 34Mbit/s terminals are likely to be substitutes for 45Mbit/s circuits, both in terms of capacity, quality and price. 45 Mbit/s are likely to be substitutes for 140Mbit/s or 155Mbit/s, and so on for higher bandwidths. Hence it can be argued that there is a chain of substitution that links high bandwidth terminating segments, but that this chain is broken between 2Mbit/s and 34Mbit/s terminating segments, as described above.

B.46 On the supply side, it is necessary to distinguish two cases. The first is when an OLO is already supplying circuits to the premises and the second is when an OLO has to roll out duct and fibre to extend its network to the premises of the customer. In the former case the necessary network is already in place, hence the sunk costs that would have to be incurred in switching provision from low to high bandwidth circuits are low and supply substitution is likely to take place. However, this may be limited to OLOs providing 1 and 2 Mbit/s terminals, since the technology used for lower bandwidths is different and, hence, the cost of switching into high bandwidth services are higher. In the latter case, a supplier of low bandwidth terminating segments may enter the market for high bandwidth terminating segments in response to a significant price increase as the sunk costs it would have to incur are likely to be low compared with likely revenues, as the operator has an access network for low bandwidth services. Nevertheless, even though possible, supply side substitution from low to high bandwidth is unlikely to actually happen since there are few OLOs who provide low bandwidth segments and no suppliers of exclusively low bandwidth segments. Therefore, it can be concluded that from the point of view of high bandwidth terminating segments, low and high bandwidth circuits form separate markets. It is also true that separate markets exist from the perspective of customers and suppliers of low bandwidth terminating segments. This analysis is not set out in this annex, as backhaul is only likely to be demanded at high bandwidths. This analysis is set in the market analysis annex of the Phase I PPC determination.

B.47 This analysis is consistent with the evidence available from the leased line market, although no information has been collected on the wholesale market, nor is the information broken down into local ends, link and trunk/core. However, all leased line operators have entered the high bandwidth retail leased lines market, while there has been little entry below the 2 Mb level. No operator has entered the low bandwidth market alone.

B.48 Oftel concludes that there is a market for high bandwidth terminating segments and LL backhaul links. As LL backhaul links are likely to be only demanded at high bandwidths, the LL backhaul links will be defined only including high bandwidth backhaul links.
Geographic market

B.49 Oftel also examined the issue of the appropriate geographic boundaries of the market, as there is evidence of a higher level of entry in central London. However, it concluded that there was not sufficient evidence to justify a geographic segmentation of the market.

B.50 In the leased line review, Oftel concluded that the main factor which determines whether entry will occur in the market for the provision of terminating segments is the existing and expected level of traffic density in the area. Oftel still considers that traffic density is the main factor that drives entry. It therefore believes that competition in the provision of terminating segments is likely to vary between geographic areas of different density and that entry is more likely in areas where traffic volumes are sufficiently high to justify the sunk costs of entry.

B.51 In the leased lines review Oftel singled out the central London zone (‘CLZ’) (defined as the 020 7 area) as a potential geographic market. Oftel has considered again this issue, it appears that some entry in the supply of PPC terminating segments above 2Mbit/s has occurred and that this is mainly concentrated in the CLZ and a few other metropolitan areas. Entry, however, appears to be confined only to limited parts of these metropolitan areas and, from evidence on the supply of backhaul to LLU providers, Oftel understands that there are parts of central London which still lack alternative suppliers for terminating segments.

B.52 This evidence may suggest a geographic segmentation of the market for high bandwidth terminating segments into metropolitan and non-metropolitan. However, it would be very difficult to define the boundaries of these two geographic markets. As discussed above, even within metropolitan areas there are zones with more competition and zones with much less competition. Hence, boundaries between more and less competitive areas are rather blurred and are likely to shift over time. Hence, Oftel considers that at present it would not be appropriate to define separate geographic markets and proposes to define a single national market for high bandwidth terminating segments/ LL backhaul links. Nevertheless, as discussed above, this market is characterised by varying degrees of competitive pressure and any analysis or policy intervention should take this into account.

Market power

B.53 For the purposes of this direction, Oftel interprets market power to mean the ability to raise prices above the competitive level in the relevant market for a non-transitory period without losing sales to such a degree as to make this unprofitable. Oftel has assessed BT’s market power on the basis of evidence relating to barriers to entry, market shares, price trends, entry into the market and profitability.
Access

B.54 Oftel considered that BT had market power in access when it mandated the unbundling of the local loop in 1999. Oftel still considers that BT has market power in the provision of wholesale access via the local loop. This market includes not just the provision of access by means of a copper exchange lines but also cable and satellite and fixed wireless technologies.

Market share

B.55 While the provision of access by means of satellite and fixed wireless may constitute a viable alternative to access over the local loop at some point in the future as such services are not yet provided commercially and so do not and will not, in the short to medium terms, provide a competitive constraint on BT's behaviour in the provision of access. It is further the case that cable access does not provide a sufficiently significant competitive constraint on BT's position in the provision of access to make the market either competitive or prospectively competitive. BT's share of total exchange lines remains very high at 82% (March 2001). Whilst this figure has been eroded in recent years, it was 85% in June 1999, this decline in share is very gradual.

B.56 BT's local network is ubiquitous and BT is likely to remain the primary supplier of local access in the near future – the UK appears to have already witnessed the bulk of cable access rollout that is seen as economic by such operators

Access entry barriers

B.57 There are considerable entry barriers to achieving a significant share of the local access market. BT and some OLOs have already incurred sunk costs associated with entering the access market. Therefore, whatever the pre-entry price set by these operators, what matters for the profitability of new entry is the price that would arise from competition between firms post-entry. If the expected post-entry price is such that the entrants' post-entry profits fail to recover the sunk costs of entry and if the entrant foresees this, then entry will not take place. Accordingly, the threat that BT (and others) would reduce prices post-entry may deter OLOs from entering the access market.

B.58 This strategic entry barrier is reinforced for any particular OLO by the fact that other firms may be preparing to enter at the same time. This creates an increased risk of excess capacity post-entry and so a low post-entry price thus further deterring entry.

B.59 In addition BT's economies of scale and scope which are not available to the entrant, may reinforce its strategic advantage. The economies of scale and scope are, in part, due to the ubiquity of BT's network and legacy effects derived from its
former monopoly status. The effect of these is to lower the marginal costs faced by BT. From the point of view of a potential entrant, it is less profitable to compete with an incumbent firm who has a lower rather than higher marginal cost level, because the incumbent is likely to compete more aggressively the lower its marginal costs. Thus, the economies of scale and scope mean that the risk of not recovering sunk costs of entry is greater and the strategic entry barrier is more effective.

Conclusion

B.60 Given BT’s continuing high market share in access lines, coupled with the substantial entry barriers facing new entrants seeking to gain a significant share of the local access market, Oftel concludes that BT possesses persistent market power within the wholesale access market such that it has ability to raise prices above the competitive level in the relevant market.

Enabled (broadband) access

B.61 BT’s market power in access may in part be addressed by LLU, which provides the opportunity for LLUOs to rent access lines from BT and enable the lines by installing DSL technology at an exchange. However, it could be argued that if BT does not have market power in enabled access then fully effective LLU will not be necessary to contribute towards competition in the broadband Internet access markets. This section considers the evidence of BT’s market power in enabled access.

Market share

B.62 BT’s DSL rollout has to date involved approximately 1000 DSLAMs which have the potential to DSL enable 60% of BT’s access lines: 16.8m lines. Cable modem rollout has thus far enabled 8.8m lines (Telewest: 4.5m; ntl: 4.3m) with the potential to provide broadband cable availability – this figure is due to rise to 11.1m by the end of next year due to continued ntl rollout. It is therefore the case that BT currently possesses in excess of 65% of the UK’s broadband enabled addressable access lines. This coupled with the ubiquity and size of their access network provides BT with the potential to possess increasingly large shares of the achieved (actual subscribers) asymmetric enabled access markets. These data does not distinguish between asymmetric and symmetric enabled access. However, Oftel understands that both BT and cable operators only offer asymmetric access, therefore Oftel considers this data relates only to the asymmetric enabled access market.

B.63 Figure B.1 sets out the number of actual broadband subscribers to whom cable’s and BT’s enabled access is being used as a current input (either directly or via re-sale). The latest published November 2001 figures (for both cable and DSL) show that cable operators have 59% (35% ntl, 24% Telewest) and Kingston 3% of
the 287,000 broadband subscribers, BT have 38%. BT’s share has declined from 53% in December 2000.

Figure B.1: BT’s market share

![BT Market Share](image)

B.64 Oftel considers that placing too much reliance on these current subscriber figures is not appropriate at this relatively early stage in the development of broadband services. The market share figures are in their infancy and the number of subscribers is changing rapidly, they are therefore not yet a very reliable indicator of market power.

B.65 It is also the case that BT’s DSL enabled products are currently significantly (£10-20) more expensive than those offered by the cable companies. Should the pricing differentials between these innovative products narrow, so it is likely that BT’s share of actual broadband subscribers and therefore asymmetric enabled access would rise substantially. It is also true that in terms of a revenue market shares, BT’s share of the current asymmetric enabled access market would be greater than their current subscriber share.

B.66 BT’s share of actual subscribers to date has also suffered as a result of operational difficulties that BT has experienced in its wholesale DSL business. These difficulties are likely to have restricted BT’s actual number of broadband subscribers and may have suppressed BT’s share of this market.
Entry barriers: access and technology

B.67 Apart from DSL enabled access, the only substantial alternative technological method of currently supplying broadband enabled access is via cable, coupled with cable modems. Both BT and the cable operators are both sinking considerable costs to enable their networks to provide broadband enabled access. The resulting rollouts to date were discussed earlier.

B.68 Given today’s technologies, it is necessary to have access to either a copper or cable network to provide wide-scale broadband origination (enabled access and backhaul), there are considerable barriers to building such a network. It appears to be the case that the UK appears to have already witnessed the bulk of cable access rollout that is currently seen as economic by such operators.

B.69 Other access provision technologies such as broadband wireless access may offer competitive alternatives to copper and cable broadband access in the future. However, this and other new technology based broadband constraints, such as Digital TV, are longer-term prospects that will not have a significant effect in the short to medium term. It is further the case that none of these DSL competing delivery routes will (individually or collectively) provide scope for near-ubiquitous access in the near future. For example, cable networks at present pass only around 52% of UK homes. For the next few years, BT’s copper loops will therefore be the primary route for the delivery of higher bandwidth services to the mass-market. Demand from such consumers will not generally be able to be met by other routes.

B.70 In terms of symmetric access, if both BT and the cable operators had equal capacity to offer symmetric enabled access, then on the basis of the current information outlined above, Oftel considers that BT would have market power. However, Oftel understand that the cable operators’ deployment of symmetric enabled access may be limited to low volumes of symmetric access, if deployed at all. Therefore, BT may face less competitive constraint from cable modem for symmetric enabled access. Low bandwidth PPCs may also constrain BT’s market power in symmetric enabled access. However it is unclear whether low bandwidth PPCs have sufficiently low cost to constrain DSL access to competitive prices.

B.71 Oftel concludes that in the absence of fully effective LLU and the relative position of cable, BT possesses market power in both symmetric and asymmetric enabled access such that it has ability to raise prices above the competitive level in this market for a non-transitory period without losing sales to such a degree as to make this unprofitable.

LL and LES backhaul links

B.72 As Oftel considers that LL backhaul links are part of the same market as PPC terminating segment, the market analysis for LL backhaul links is based on information from the leased lines market. Retail leased line market information is
used as no information is available on wholesale leased lines as PPCs were only launched on 1 August 2001. Prior to that date, OLOs purchased retail leased lines to provide end to end leased lines to their retail customers. Therefore retail leased line market data provides a useful indication of the wholesale markets for PPC terminating segments and in access.

**Entry barriers**

B.73 A key factor in assessing BT’s market power in the backhaul market is the extent of strategic entry barriers. Strategic entry barriers arise in LLU backhaul due to the existence of sunk costs and the asymmetry in timing of the network build out between the incumbent and the operators. Strategic entry barriers were also considered to be a key factor by Oftel in BT’s dominance of the market of terminating segments.

B.74 If operators decide to build LL and LES backhaul links, they incur high sunk costs. Sunk costs include costs of digging and ducting fibre from a concentrator site (or a customer’s premises in the case of leased lines) to the operator’s trunk network. There are approximately 5600 concentrator sites in the UK. Costs are ‘sunk’ because they are unrecoverable if the operator were to exit the market. Operators are deterred from entering the market because they face a significant risk in not being able to recover their fixed costs of entry. This is primarily because of the strategic advantages enjoyed by BT but these are also reinforced by the behaviour of other operators and BT’s economies of scale and scope.

B.75 BT has already incurred the sunk costs of entering the market. Therefore, whatever the pre-entry price set by BT, what matters for the profitability of the entrant is the price that would arise from competition between firms post-entry. If the expected post-entry price is such that the entrants’ post-entry profits fail to recover the fixed costs of entry and if the entrant foresees this, then entry will not take place. Accordingly, the threat that BT would reduce prices post-entry deters operators from entering the market for terminating segments.

B.76 This strategic barrier is reinforced for any particular operator by the fact that other firms may be preparing to enter at the same time. This creates an increased risk of excess capacity post-entry and so a low post-entry price thus further deterring entry.

B.77 In addition BT’s economies of scale and scope, which are not available to the entrant, may reinforce its strategic advantage. The economies of scale and scope are, in part, due to the ubiquity of BT’s network and legacy effects derived from its former monopoly status. The effect of these is to lower the marginal costs faced by BT. From the point of view of a potential entrant, it is less profitable to compete with an incumbent firm who has a lower rather than higher marginal cost level, because the incumbent is likely to compete more aggressively the lower its marginal costs. Thus, the economies of scale and scope mean that the risk of not
recovering fixed costs of entry is greater and the strategic entry barrier is more effective.

**Market share**

B.78 BT’s market share in the retail leased lines market provide an indication of its likely share of the market for LL backhaul links/PPC terminating segments, in the absence of further regulation, although the retail leased lines include trunk segments and local access which are not part of backhaul links. Table 1 and 2 set out BT’s market share in the low and high bandwidth leased line markets.

**Table 1: Estimated revenue market shares for high and low bandwidth end to end leased lines**

<table>
<thead>
<tr>
<th>Operator</th>
<th>March 99/00 Low Bandwidth (up to 2Mbit/s)</th>
<th>March 99/00 High Bandwidth (above 2Mbit/s)</th>
<th>June 00/01 Low Bandwidth</th>
<th>June 00/01 High Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>83%</td>
<td>42%</td>
<td>80%</td>
<td>38%</td>
</tr>
<tr>
<td>C&amp;W</td>
<td>8%</td>
<td>29%</td>
<td>11%</td>
<td>35%</td>
</tr>
<tr>
<td>Kingston</td>
<td>0%</td>
<td>1%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>Cable</td>
<td>3%</td>
<td>10%</td>
<td>4%</td>
<td>5%</td>
</tr>
<tr>
<td>Others</td>
<td>6%</td>
<td>18%</td>
<td>4%</td>
<td>21%</td>
</tr>
</tbody>
</table>

*Sources: Oftel Market Information and data from operators*
### Table 2: Estimated volume market shares for high and low bandwidth end to end leased lines

<table>
<thead>
<tr>
<th>Operator</th>
<th>March 99/00 Low Bandwidth (up to 2Mbit/s)</th>
<th>March 99/00 High Bandwidth (above 2Mbit/s)</th>
<th>June 00/01 Low Bandwidth</th>
<th>June 00/01 High Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT</td>
<td>82%</td>
<td>30%</td>
<td>85%</td>
<td>39%</td>
</tr>
<tr>
<td>C&amp;W</td>
<td>6%</td>
<td>34%</td>
<td>6%</td>
<td>20%</td>
</tr>
<tr>
<td>Kingston</td>
<td>1%</td>
<td>3%</td>
<td>1%</td>
<td>6%</td>
</tr>
<tr>
<td>Cable</td>
<td>4%</td>
<td>7%</td>
<td>4%</td>
<td>5%</td>
</tr>
<tr>
<td>Others</td>
<td>7%</td>
<td>26%</td>
<td>4%</td>
<td>30%</td>
</tr>
</tbody>
</table>

B.79 In the August 2000 consultation document, Oftel estimated that BT’s share of the wholesale terminating segment to be in excess of the retail market share. This is because, prior to the availability of PPCs, OLOs purchased retail leased lines from BT to provide links to customer sites. This would suggest that BT’s share of the UK wholesale terminating segment market is greater than 38% at above 2Mb for Quarter 1, 2000/01.

B.80 Oftel understands that much of the competitive entry into the high bandwidth leased lines market is in metropolitan areas and that there is limited or no competition to BT in parts of the UK. Operators potentially require backhaul from any of BT’s 5600 MDF sites. It seems likely that there is little or no competitive constraint on BT at some of these sites. If BT prices were geographically averaged, it may be argued that limited competition in some areas would not matter, as competition in other parts of the country might keep prices down. However, BT’s leased lines are geographically de-averaged to some extent, which suggests that competitive pressure in metropolitan areas will not constrain prices in others parts of the UK. Therefore, Oftel considers that BT’s significant market share in the terminating segment market and the geographic limited nature of competition suggests that BT have market power.

B.81 Oftel does not have market share data for LES backhaul or for retail LES services. Oftel understands that BT is currently the only supplier of LES backhaul, although the market is still at an early stage of development.
Profitability

B.82 As part of the leased lines review, Oftel considered the profitability of BT’s leased lines business.

Table 3: Oftel estimates of BT’s ROCE for different leased line services 1998/99 and 1999/00 (8)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Analogue</td>
<td>18%</td>
<td>19%</td>
</tr>
<tr>
<td>Kilostream and N*64</td>
<td>41%</td>
<td>41%</td>
</tr>
<tr>
<td>(Under 2 Mbit/s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Megastream (2+Mbit/s)</td>
<td>32%</td>
<td>37%</td>
</tr>
<tr>
<td>Overall</td>
<td>31%</td>
<td>34%</td>
</tr>
</tbody>
</table>

B.83 The rate of return for Megastream leased lines presented in Table 3 above is well in excess of Oftel estimate of BT’s cost of capital of 13.5% and well above the rate of return on its whole systems business of 22% (1998/99). Profitability data is not yet available for 2000/01, as BT’s regulatory statements have not yet been finalised. Oftel does not have corresponding profitability information for LES services, however Oftel’s estimate of the rate of return on BT’s shorthaul data services is 100% in 1998/99 and 104% in 1999/00. Oftel understands that retail LES services are part of the product group of shorthaul data services.

B.84 These estimates are based on Current Cost Accounting Fully Allocated Costs (FAC). In the leased lines review Oftel expressed some concerns that FAC profitability measures may be dependent on the methodology chosen to allocate common costs. However, in the case of leased lines, some of the costs of leased lines are common with PSTN services and BT’s PSTN wholesale and retail services are subject to price cap regulation. Where a consistent data set is used to derive leased line and PSTN FAC profitability figures then there is a stronger case for relying on the leased lines FAC profitability figures as evidence of whether or not returns on leased lines are excessive. BT’s flexibility in allocating costs between PSTN and leased lines is restricted by PSTN price regulation. In this case, it could not be argued that a higher returns from leased lines is required in order to make up for a lower recovery of common costs on PSTN services. While, it is possible to investigate further the issue of excessive pricing of leased lines via combinatorial tests, such a study requires detailed information on common costs between leased lines and all other part of BT’s regulatory business and includes the profitability of other parts of BT which share costs with leased lines. Earlier Oftel work on this issue for the August 2000 statement indicated that there are considerable uncertainties in making this calculation for retail leased lines. Therefore, Oftel considers that the very high rates of return on BT’s retail leased
lines on an FAC basis provides some evidence to suggest in the case of leased
lines, that BT is earning excessive returns. Oftel considers that the profitability of
wholesale terminating segments is likely to be higher than retail leased lines, as
BT sells terminating segments at retail prices, but BT incurs lower costs

Pricing

B.85 Price movements over time and comparisons of prices between suppliers
are an indicator of the degree of independence from its competitors that a firm
enjoys when setting its price.

B.86 Oftel has compared BT’s prices for retail leased lines by comparing revenue
per circuit from BT and OLO market data and by comparing BT and C&W price
lists. This revenue per circuit data suggests that BT and the OLOs have similar
prices for 34 and 45 Mbit/s circuits and that BT may have significantly higher
prices for higher bandwidth circuits than some operators. The price lists suggest
that BT and C&W may have similar prices, however C&W may offer non-published
discounts on the listed prices. Some caution needs to be exercised in drawing
conclusions from this information, as it is based on averages derived from revenue
and volumes of circuits. Therefore the estimate of price differences does not take
into account differences due to the lengths of the circuit or the particular quality of
service offered by BT or operators.

International comparison

B.87 As part of the PPC market analysis, Oftel has updated the benchmarking of
prices for leased lines that it included in the leased lines review. This exercise
compares price trends for individual circuits over the last five years. The prices
used refer to the UK, the EU average price and the price for the third cheapest EU
operator (9). Oftel does not have international benchmarking comparisons for LES
services.

B.88 In 1996 the UK price for a 30km 64k circuit was below average and close to
the price for the third cheapest operator, but by 2001 the UK’s relatively strong
position had been eroded with the UK moving from below average to above
average. The same proved true for a 30km analogue circuit. As for a 30km 2Mbit/s
circuit, the UK position moved from being well below to being just below average,
although it has maintained its position as the third cheapest country.

B.89 Due to a lack of price information, it is impossible to perform a comparison of
price trends for high bandwidth circuits over five years. Hence the comparison is
limited to 34 Mbit/s and 155 Mbit/s and to the last 18 months. The overall
conclusion that has been derived from this benchmarking exercise is that UK
prices for these two types of circuits appear to have increased relative to those of
the third cheapest country. For example UK prices for 2km 34 Mbit/s circuits are
now 153% higher than those of the third cheapest country, while they were only
59% higher in 1999. In general the UK’s position has declined relative to third cheapest over the last eighteen months.

B.90 These results suggests that UK customers are not getting the best deal when compared to other European countries, especially for high bandwidth circuits.

**Price trends**

B.91 As part of its assessment of whether BT has market power, Oftel has examined BT’s prices (excluding discounts) for high bandwidth circuits between 1997 and 2001. Oftel has not examined price trend information for LES services.

**Figure B.2: BT’s prices in real terms for retail leased lines by bandwidth, 2000 prices**

Note: Prices include rental and connection charges and assume that the length of the link required is 30km. Prices exclude discounts and CLZ prices.

Source: Oftel

Figure B.2 represents the price trend in real terms, ie allowing for inflation, for circuits from 8 Mbit/s up to 155 Mbit/s. It shows that, overall, BT’s annual price trends have remained relatively flat.

B.93 There was a substantial reduction in price for circuits at 34Mbit/s, 45 Mbit/s and 155Mbit/s at the end of 1998. Prices in real terms fell by 25%, 25% and 33% respectively in that year. This is largely accounted for by reduction in installation...
prices. Prices for circuits at 140 Mbit/s instead increased due to a rise in the yearly rental. However, provision of services at these bandwidths is very recent. Therefore some adjustment of prices may be expected at this early stage whilst the market settles at an appropriate price. What the figure shows clearly is that in the last year there have been no price changes at any of the bandwidths shown.

B.94 Oftel has considered whether the stability of prices in real terms for all digital circuits reflects a lack of competitive pressure. In order to make such an assessment it is necessary to understand what has happened to costs over the time period. Oftel’s investigation into costs suggests that the cost volume relationship (CVR) for leased lines is relatively low. This implies that for any given increase in volumes, total costs rise by a smaller proportion and so average costs fall. Given that the volume of BT’s digital leased lines has increased significantly over the past few years, the low CVR suggests that, in a competitive market, prices of digital leased lines should have fallen significantly.

B.95 In Oftel’s view, the failure of BT’s prices to fall in line with what might have been expected by the evidence on CVRs and volumes is evidence of the limited scope of competition.

B.96 On balance, Oftel considers that the evidence on profitability, market share and pricing are consistent with BT having persistent market power in the provision of both LL backhaul links. While, less evidence is available to reach a conclusion on LES backhaul links, Oftel considers that similar barriers of entry are likely to exist for providing LES and LL backhaul links. The profitability of short haul data services suggests that BT is facing little competitive constraint in providing these services. Therefore, Oftel considers that BT will have market power in the provision of LES backhaul links.

Conclusion

B.97 Oftel considers that BT has market power in the provision of LL and LES backhaul links in the UK on the basis of the significant barriers to entry into these markets. Oftel considers that the backhaul trunk market is likely to be potentially competitive on the basis of lower barriers to entry and the evidence of entry into the trunk market for leased lines. Oftel considers that BT has market power in access and asymmetric and symmetric enabled access. LLU has the potential to provide some competitive constraint on BT’s market power in asymmetric and symmetric enabled access. However, LLU will not be effective without the provision of LL and LES backhaul links at competitive prices. Therefore, if cost orientated backhaul is not provided by BT, then BT’s market power in the markets for broadband Internet access will not be constrained to any extent by LLU.

B.98 In terms of SDSL leased lines, BT’s market power in backhaul services may raise issues of market power in the provision of SDSL leased lines, if SDSL leased lines have a significantly lower cost structure than other leased lines. However, as BT will be obliged to provide cost orientated backhaul to enable competition in the
broadband Internet access markets, it is not necessary for Ofte to reach a view on whether backhaul is required for the purpose of providing SDSL leased lines alone. LLUs providing leased lines will be able to obtain cost orientated backhaul, as backhaul will be provided on a non-discriminatory basis and therefore Ofte has not needed to reach a view on whether backhaul is required for providing leased lines.

B.99 For VOD services, it is not clear that separate retail markets exist and therefore it is unclear whether BT would leverage its market power from backhaul services into the relevant retail markets. However, Condition 57 of BT’s Licence prohibits it from unduly preferring its own business, or unduly discriminating, as respects interconnection of any description which it provides pursuant to Part C of its Licence (ie Conditions 44-50A). This means that BT cannot unduly discriminate in the provision of LLU backhaul services on the basis of the service that an operator provides.

B.100 The market analysis for backhaul is consistent with the market analysis in the price control review, and the FRIACO determination which found that the DMSU to customer segment of these services is not effectively competitive.

Notes


2 Ofte market research, Consumers’ use of Internet Ofte residential survey, August 2001.

3 Ofte market research, Business use of the Internet, August 2001

4 For more information on asymmetric substitutability, please refer to the OFT’s Guideline, Market Definition, OFT 403, March 1999.

5 Ofte market research, Use of Fixed Line Services Among Small and Medium Enterprises (SMEs), September 2000.

6 Ofte market research, Internet use among small and medium enterprises, August 2000 and Consumers’ use of the Internet, August 2000.

7 In the past it also was possible to buy 8 Mbit/s circuits from BT. Currently no new circuits are provided at this bandwidth. Ofte considers that the existing 8Mbit/s circuits should be included in the high bandwidth market.

8 These estimates are based on information supplied to Ofte by BT. The full methods of attribution, accounting and valuation to calculate these ROCE figures have not been disclosed to Ofte. These figures are end to end, that is they have based on the addition of figures extracted from BT’s Network and Retail System Business that when added together form an end to end view of leased lines.

9 Prices are presented using the Euro exchange rate expressed in terms of Purchasing Power Parities.
Annex C

Draft Direction and Annex relating to the provisions of a Local Loop Unbundling backhaul product

Draft Direction by the Director General of Telecommunications under Regulation 6(3) of the Telecommunications (Interconnection) Regulations 1997

WHEREAS

Introduction

1. The Secretary of the State granted to British Telecommunications on 22 June 1984 a licence (the ‘BT Licence’) under section 7 of the Telecommunications Act 1984 (the ‘Act’) for the running of the telecommunication systems specified in Annex A to that licence;

2. By virtue of Section 109 of and paragraph 20 of Schedule 5 to the Act, the BT Licence has effect as if granted to British Telecommunications plc (‘BT’);


4. Condition 45.5 of the Licence requires BT to comply with the requirements of any directions given pursuant to Regulation 6(3) of the Regulations;

5. Regulation 6(3) of the Regulations allows the Director, in pursuit of the aims stated in Regulation 6(1), to intervene at any time in order to make a direction specifying issues which must be covered in an interconnection agreement, and to specify conditions that must be observed by one or more parties to such an agreement;

6. The aims listed in Regulation 6(1) include the need to stimulate a competitive market and the principles of non-discrimination (including equal access) and proportionality;

Interconnection product

7. Local Loop Unbundling (‘LLU’) backhaul is required to connect traffic originating on unbundled loops to a point on or in an operator’s core network for subsequent conveyance to a service provider. Operators will require backhaul connection from an operator’s co-location facility to a point of interconnection with BT’s network in
order to provide a wholesale or retail Digital Subscriber Line ('DSL') services across the UK;

8. LLU backhaul is needed to enable effective unbundling of the local loop. Effective LLU will stimulate competitive markets in broadband Internet access;

9. LLU backhaul is also required to ensure that BT is unable to discriminate in the provision of backhaul to itself and other wholesale DSL providers;

10. For the reasons set out in Chapter 3 and Annex B of the Explanatory Document to this Direction, the Director considers BT to have market power in the markets for backhaul links and trunk;

11. The Directive defines interconnect as “the physical and logical linking of telecommunications networks used by the same or a different organisation in order to allow the users of one organisation to communicate with users of the same or another organisation, or to access services provided by another organisation. Services may be provided by the parties involved or other parties who have access to the network”;

12. The Directive defines a telecommunications network as: "transmission systems and, where applicable, switching equipment and other resources which permit the conveyance of signals between defined termination points by wire, by radio, by optical or by other electronic means";

13. LLU backhaul is an interconnection service because it is the physical and logical linking of transmission systems which permit the conveyance of signals between defined termination points;

14. As stated in Chapter 4 of the Explanatory Document attached to this Direction, the Director has powers to make a determination in relation to backhaul under both under the EC Regulation and the ICD;

15. In the interests of legal certainty the Director considers it more appropriate, in order to ensure the provision of LLU backhaul throughout the United Kingdom to use his powers pursuant to the Regulations;

16. Annex I, Part 2, of the Directive defines a leased line as “telecommunications facilities which provide for transparent transmission capacity between network termination points and which do not include on-demand switching (switching functions which the user can control as part of the leased line provision). They may include systems which allow flexible use of the leased line bandwidth, including certain routing and management capabilities”;

17. LLU backhaul falls within this definition because it is transparent transmission capacity between a Digital Subscriber Loop Multiplex ('DSLAM'), at a Main Distribution Frame ('MDF') site, and a Point of Connection with an operator’s
Applicable System, both of which are network termination points, and it does not include on-demand switching;

Cost-orientation

18. Condition 69.1 of BT’s Licence states that the “Licensee shall secure, and shall be able to demonstrate to the satisfaction of the Director, that the charges offered, payable or proposed to be offered or payable by an operator to the Licensee for each Standard Service provided pursuant to an agreement entered into pursuant to Condition 45 of this Licence are reasonably derived from the costs of providing the Service based on a forward looking incremental cost approach...”;

19. Recital 10 of the Directive states that: “...whereas the level of [interconnection] charges should promote productivity and encourage efficient and sustainable market entry, and should not be below a limit calculated by the use of long-run incremental cost and cost allocation and attribution methods based on actual cost causation, nor above a limit set by the stand-alone cost of providing the interconnection in question”;

20. The Director considers that the appropriate interpretation of the requirement for prices to be cost-orientated cannot be considered in isolation from the extent of competition for the service in question;

21. If an interconnection service was provided in an effectively competitive market or a market moving towards a competitive market structure, the requirement for cost-orientation as set out by the Directive is any price between the Long Run Incremental Cost (‘LRIC’) floor and Stand Alone Cost (‘SAC’) ceiling, subject to any relevant combinatorial and non-discrimination tests also being satisfied;

22. If by contrast the relevant economic market was not effectively competitive then the Director, without fettering his discretion, and subject to the facts of the particular case, would be minded to interpret the cost-orientation requirement to mean that prices should be set on a LRIC basis with some allowance for common cost recovery;

Service Level Agreements

23. It is important, in order to stimulate a competitive market that operators can effectively compete with BT, in order to do this they must have guarantees that LLU backhaul will be provided on reasonable terms, including terms for provisioning and repair;

24. Paragraph 1 of Part I of Schedule 3 of the Regulation requires BT to adhere to the principle of non-discrimination with regard to interconnection offered to others. BT must apply similar conditions in similar circumstances to interconnecting organisations providing similar services. In addition BT must provide interconnection facilities 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;

25. Pursuant to Condition 57 of its Licence BT must not (whether in respect of the charges or other terms or conditions applied or otherwise) show undue preference to, or exercise undue discrimination against, particular persons or persons of any class or description (in any markets) as respects interconnection of any description provided pursuant to Condition 45 and this Direction;

26. BT must, therefore, ensure that the Service Level Agreement (SLA) relating to the supply of LLU backhaul must not in any way put an operator at an unfair competitive disadvantage as regards BT or another operator;

27. It is, therefore, appropriate that the SLA relating to the supply of LLU backhaul includes provision for the payment of reasonable liquidated damages to be payable by BT where its failure to fulfil its obligations under the SLA causes an operator loss. This will ensure that BT has an economic incentive not to discriminate in the level of service it provides to itself and to an operator; and

Draft Direction and consultation

28. For the reasons given in these recitals and set out in more detail in the Explanatory Document accompanying this Direction, and having considered the representations made in response to the draft of this Direction published on […] December 2001, and the matters set out in Regulation 6(1) of the Regulations, the Director believes that it is appropriate to make this Direction.

THEREFORE

Pursuant to Regulation 6(3) of the Regulations the Director General of Telecommunications makes the following Direction:

1. BT (the ‘Licensee’) shall within eight weeks of the date of publication of this Direction, offer to provide to any Operator, within a reasonable period of the Operator’s written request, one or more of the products defined in the Annex to this Direction (‘LLU Backhaul’).

2. The Licensee shall supply LLU Backhaul to operators at cost-orientated prices.

3. The Licensee shall not (whether in respect of the charges or other terms or conditions applied or otherwise) show undue preference to, or exercise undue discrimination against, particular persons or persons of any class or description (in any market) as respects the supply of LLU Backhaul. The Licensee may be deemed to have shown such undue preference or to have exercised such undue discrimination if it unfairly favours to a material extent a business carried on by it in
relation to the provision of LLU Backhaul and, in particular, the Service Level Agreement (‘SLA’) relating to the supply of LLU Backhaul.

4. The Licensee shall ensure that its charges for LLU Backhaul are consistent with its charges for those elements which are common with LLU Backhaul and partial private circuits.

5. The SLA relating to the supply of LLU Backhaul shall include provision for the reasonable payment of fixed compensation by the Licensee to an Operator in cases where loss is suffered as a direct result of the Licensee’s failure to fulfil its obligations under the SLA relating to the supply of LLU Backhaul.

6. Except as otherwise defined in this Direction:

6.1 paragraph 4 of the BT Licence shall, with the necessary changes, apply to this Direction as it applies to the BT Licence; and

6.2 terms defined in the BT Licence or in the recitals hereto shall have the same meanings for the purposes of this Direction.

7. Unless otherwise stated, this Direction shall enter into force on the date of its publication.

David Albert Edmonds
Director General of Telecommunications
Annex

Product definition

The Licensee shall within eight weeks of the date of publication of this Direction, offer to provide to any Operator, within a reasonable period of the Operator’s written request, one or more of the following products:

(A) The provision of transparent transmission capacity by the Licensee, at all bandwidths between 2 Mbit/s and 155 Mbit/s (inclusive) between a Local Loop Unbundling Operator’s “LLUO’s” equipment at a Licensee’s MDF site and a Point of Connection with an Operator’s Applicable System connected to the nearest appropriate Licensee Synchronous Digital Hierarchy (‘SDH’) node to the customer. Such node could be a tier 3, tier 2, tier 1.5 or tier 1 node.

(B) The provision of transparent transmission capacity by the Licensee, at all bandwidths between 2 Mbit/s and 155 Mbit/s (inclusive) between a LLUO’s equipment at a Licensee’s MDF site and a Point of Connection with an Operator’s Applicable System connected to the nearest appropriate Licensee SDH node to the customer which is superior in the hierarchy to the node defined in (A) above, where such node exists. Such node could be a tier 2, tier 1.5 or tier 1 node.

(C) The provision of transparent transmission capacity by the Licensee, at all bandwidths between 2 Mbit/s and 155 Mbit/s (inclusive) between a LLUO’s equipment at a Licensee’s MDF site and a Point of Connection with an Operator’s Applicable System connected to the nearest appropriate Licensee SDH node to the customer which is superior in the hierarchy to the node defined in (B) above, where such node exists, and which could be a tier 1.5 or tier 1 node.

(D) The provision of transparent transmission capacity by the Licensee, at all bandwidths between 2 Mbit/s and 155 Mbit/s (inclusive) between a LLUO’s equipment at a Licensee’s MDF site and a Point of Connection with an Operator’s Applicable System connected to the nearest appropriate Licensee SDH node to the customer which is superior in the hierarchy to the node defined in (C) above, where such node exists, and which is a tier 1 node.

(E) The provision of transparent transmission capacity by the Licensee, at all bandwidths between 2 Mbit/s and 155 Mbit/s (inclusive) between a LLUO’s equipment at a Licensee’s MDF site and a Point of Connection with an Operator’s Applicable System connected to any Licensee SDH tier 1 node.

(F) The provision of transparent transmission capacity by the Licensee, at all bandwidths from 622 Mbit/s to 2.4 Gbit/s (inclusive) between a LLUO’s equipment at a Licensee’s MDF site and a Point of Connection with an Operator’s Applicable System connected to the nearest appropriate Licensee Marconi Synchronous Hierarchy (MSH) node to the customer.
(G) The provision of transparent transmission capacity by the Licensee, at all bandwidths from 622 Mbit/s to 2.4 Gbit/s (inclusive) between a LLUO’s equipment at a Licensee’s MDF site and a Point of Connection with an Operator’s Applicable System connected to any appropriate Licensee MSH node.

(H) The provision of dedicated ethernet presented transmission capacity by the Licensee, at all bandwidths from 10 to 1000 Mbit/s (inclusive) between a LLUO’s equipment at a Licensee’s MDF site and a site within an Operator’s Applicable System connected to an appropriate Licensee node within a distance of 25 radial km.
Annex D

Draft Direction

DRAFT

Co-location services pricing

Direction made under Article 4(2)(a) and Article 4(3) of Regulation (EC) 2887/2000 on unbundled access to the local loop and under Condition 83 paragraphs 17 and 19 of the public telecommunications licence granted to British Telecommunications plc pursuant to section 7 of the Telecommunications Act 1984

WHEREAS

1. The Secretary of State granted to British Telecommunications on 22 June 1984 a licence (the "BT Licence") under Section 7 of the Telecommunications Act 1984 (the "Act") for the running of the telecommunication systems specified in the BT Licence;

2. By virtue of Section 109 of and paragraph 20 of Schedule 5 to the Act, the BT Licence has effect as if granted to British Telecommunication plc ("BT");

3. Condition 83 (the "Condition") of the BT Licence obliges BT to make available access to its local lines to consumers, space in its exchanges, use of certain circuits and reasonably necessary ancillary services (together "Access Network Facilities"), including the provision of Co-location, so that other licensed operators having interconnection rights under EC Directive 97/33 and the regulations made under it ("OLOs" or "Operators") can provide telecommunications services (including ADSL services) over those lines. The process is known as local loop unbundling;

4. Paragraph 17 of the Condition provides that BT shall provide access Network Facilities at a charge or charges to be agreed between the parties or, in default of agreement, to be determined by the Director General of Telecommunications (the "Director");

5. Paragraph 19 of the Condition requires BT to secure that the offer of an agreement to provide any of the Access Network Facilities under the Condition contains only terms and conditions which are reasonable;

6. On 18 December 2000 the European Parliament and the Council adopted a Regulation on unbundled access to the local loop (EC 2887/2000) (the "EC Regulation");
7. Article 3(1) of the EC Regulation requires notified operators (as defined in the EC Regulation and of which BT is one) to publish, from 31 December 2000, and keep updated, a reference offer for unbundled access to their local loops and related facilities, on terms set out in the EC Regulation. The reference offer for unbundled access to local loops run by BT is known as the Access Network Facilities Agreement (“ANF Agreement”) which, for the purposes of this Direction, includes the relevant parts of BT’s Price List;

8. Article 4(1) of the EC Regulation requires national regulatory authorities in each member State (which in the United Kingdom is the Director) to ensure that charging for unbundled access to the local loop fosters fair and sustainable competition;

9. Article 4(2) of the EC Regulation gives the national regulatory authority the power where justified to impose changes on the reference offer for unbundled access to the local loop and related facilities. Article 4(3) of the Regulation permits the national regulatory authority to intervene on his own initiative where justified in order to ensure non-discrimination, fair competition, economic efficiency and maximum benefit for users;

10. Article 3(3) of the EC Regulation requires BT to make charges for related facilities to unbundled access to the local loop (including space at its exchanges) set on the basis of cost-orientation;

11. The Director published, on 18 October 2001, a statement and draft direction concerning BT’s charges for Local Loop Unbundling distant and physical co-location;

12. It is appropriate that this Direction be based on the Director’s powers under both the EC Regulation and the Condition; and

13. For the reasons given in these recitals and set out in more detail in the Explanatory Document accompanying this Direction, and having considered the representations made in response to the draft of this Direction published on [...] December 2001, the Director believes that it is necessary to make this Direction.

THEREFORE

Pursuant to Article 4(2)(a) and Article 4(3) of Regulation EC 2887/2000 and Condition 83 paragraphs 17 and 19 of the licence granted to British Telecommunications plc under section 7 of the Telecommunications Act 1984, the Director General of Telecommunications makes the following Direction:

1. BT shall reduce the mark-up on the cost of providing External Tie Circuits to no more than the level it charges, as at the date of this direction, for External Tie Circuits pull through, or as otherwise directed from time to time by the Director.
2. For the purposes of this Direction:

2.1 paragraph 4 of the BT licence shall, with the necessary changes, apply to this Direction as it applies to the BT Licence; and

2.2 terms defined in the EC Regulation and in the BT Licence shall have the same meaning for the purpose of this Direction.

3. This Direction shall apply to all offers for the provision of External Tie Circuits made by the Licensee after 17 January 2001.

[.....]

Director of […]

[date]

A person duly authorised by the Director General pursuant to paragraph 8 of Schedule 1 to the Telecommunications act 1984