Section 6

Wholesale geographic market definition

Introduction

6.1 Having considered in Section 5 the relevant wholesale product market definitions, the wholesale geographic market definition for each of these relevant product markets is now considered in this Section.

Geographic market definition

6.2 As was noted when we defined the relevant retail geographic markets in Section 4, the principles of demand-side and supply-side substitution also apply to the definition of the geographic scope of the relevant economic market. However, rather than considering alternative products, the analysis assesses the effect on demand for the relevant product if there is a relative price change in a narrow geographic area. If products in the relevant product market in other areas are sufficient substitutes, such as to render the price rise unprofitable, then the geographic scope of the relevant market is widened to include these additional areas. Similar principles apply in relation to supply-side substitution. The presence of common pricing constraints across geographic areas is also relevant for the purposes of defining the geographic scope of a market.

6.3 As we have noted previously, also relevant is paragraph 56 of the SMP Guidelines on market analysis and the assessment of market power, which states that in cases where there is a sufficient degree of variety in competitive conditions between geographic areas (what a sufficient level might be is not specified), distinct local markets should be defined:

> "According to established case law, the relevant geographic market comprises an area in which the undertakings concerned are involved in the supply and demand of the relevant products or services, in which area the conditions of competition are similar or sufficiently homogeneous and which can be distinguished from neighbouring areas in which the prevailing conditions of competition are appreciably different. The definition of the geographic market does not require the conditions of competition between traders or providers of services to be perfectly homogeneous. It is sufficient that they are similar or sufficiently homogeneous, and accordingly, only those areas in which the conditions of competition are 'heterogeneous' may not be considered to constitute a uniform market."

6.4 Therefore, different geographic areas are found to be in the same relevant geographic markets to the extent that:

- competitive conditions in different areas are sufficiently homogeneous; and
- the area can be distinguished from neighbouring areas where the competitive conditions are appreciably different.

6.5 Common pricing constraints can also be relevant, for the reasons explained in Section 4.

Overview of demand and supply of wholesale leased lines services

6.6 We provided an overview of demand and supply for leased lines services in Section 4. This explains that there is an inherent geographic element in retail leased lines as they link distinct geographic locations. An important implication of this for the wholesale products which support the retail services is that they have to span multiple distinct geographic areas.

6.7 This means that a service provider competing in the retail market would either have to have its own network at both ends of the leased line (and hence self-provision the wholesale elements) or be able to access wholesale inputs from third-parties at one or both ends (either on commercial or regulated terms). If the retailer did not have its own network at one or both ends and it could not access wholesale inputs then it would not be able to offer the retail service to its end customer.

6.8 On the supply side at the wholesale level, a network operator would be able to supply wholesale elements to third-parties in those geographic locations where it has network, as long as the retail service provider was able to interconnect with the wholesaler. If interconnection were not possible then the operator would have no means of supplying the wholesale elements to the retailer (although the operator would be able to self-supply the wholesale elements to its own downstream arm).

6.9 This discussion of demand and supply for wholesale leased lines services suggests:

- Wholesale elements (be these self-provisioned or bought from third-parties) must be able to support the provision of services in the geographic locations which the retail business connectivity services are provided; and
- The retail provider must either be able to self-provide the wholesale elements or be able to purchase the wholesale inputs from a wholesale supplier in the relevant locations.

6.10 As we discussed in the retail geographic market section, in the 2003/04 LLMR Ofcom concluded that the Hull area was a distinct geographic market from the rest of the UK partly on the basis that KCOM was by some distance the biggest communications provider, with a much wider network reach than other providers throughout the Hull area. Ofcom continues to consider this to be the case and combined with the available pricing evidence in the Hull area where KCOM prices on a geographic ally uniform basis, we continue to consider that the Hull area constitutes a separate geographic market from the rest of the UK for each of the wholesale product markets defined in Section 5. The precise definition of the Hull area is provided in the Notification in Annex 15 below.

Ofcom's analytical framework

6.11 Building on the analytical framework developed for the Disaggregated Markets discussion document, there are three main elements to our consideration of geographic markets at the wholesale level. These are:

- Wholesale service shares;
- The impact of alternative infrastructure; and
- BT's pricing policies.

Wholesale service shares

6.12 An analysis of wholesale service shares can be useful in informing whether there are geographic variations in competitive conditions. To the extent that variations in service share exist on a geographic basis this may indicate that separate local geographic markets exist. However, consistent with the approach in our Disaggregated Markets discussion document, while this can be useful for informing whether separate local markets exist or not, we need to be careful and not to place too much weight on such analysis for defining the precise boundary of the market. To do otherwise would risk circularity in the analysis, with the current market outcome determining the market boundary.

6.13 It should be noted that service shares are not market shares, but the proportion of leased lines services in the relevant product market provided by operators in each postal sector. Once the precise boundary of the relevant geographic market has been defined we can then calculate operators' market shares across the whole market as part of the assessment of market power within the relevant markets.

6.14 The detail of our approach to calculating service shares is set out in Annex 9. We set out the results of the service share analysis when we consider each of the individual product markets below.

The impact of alternative infrastructure

6.15 Competition from operators which have built their own networks has the potential to constrain pricing in those geographic areas where such network build has occurred. However, this raises the question of how such constraints transmit (if at all) to geographic areas where an operator has not built its network. As explained above, leased lines have an inherent geographic element as they are involved with connecting distinct geographic areas. In defining the scope of the market, we need to do this assuming an absence of regulation at the level of the market being considered, otherwise we risk building circularity into our market definitions (see Section 3). Thus we have to assume that there is no wholesale leased line regulation in place.

6.16 In defining the geographic scope of the market it is therefore useful to consider different competition scenarios. Suppose for example that there exists a geographic area where there is alternative network infrastructure and another area, by definition, which does not have any alternative network infrastructure. Absent regulation we could not expect there to be any provision of wholesale elements to third-parties (although that is not to say that such wholesale provision would not occur). In this scenario there would only be self-provision of wholesale elements, used to support the provision of downstream retail supply. Therefore, at the retail level there would be three broad type of circuit available:

- Where the A end and the B end are both outside of the geographic area where there is alternative network infrastructure;
- Where either the A end or the B end is in the geographic area where there is alternative network infrastructure and the other end is not; and
- Where both the A end and the B end are inside the geographic area where there is alternative network infrastructure.

6.17 In the absence of wholesale regulation (or commercial third- party supply) the first and second types of circuit would be monopolised by an operator with a ubiquitous network (in this case BT) as only an operator with a ubiquitous network would be able to provide leased lines services in both geographic areas. The third type of circuit would be potentially competitive depending on the ability of an alternative operator (or group of alternative operators) to supply both ends of the retail circuit. Therefore, whether the third area could be found to be competitive will depend to a large extent on the coverage of individual operators and/ or the ability of alternative operators to interconnect with each other.

6.18 Thus the answer to the question of whether the geographic scope of a wholesale leased lines market is national or local where there is evidence of geographic variations in competitive conditions will depend crucially on two main points:

- First, do there exist barriers to interconnection between operators which mean that operators with limited geographic coverage are unable to provide services in geographic locations in which they do not have a network presence?. Interconnection is important in leased lines due to the inherent geographic element which exists in the product i.e. a leased line provides connectivity between two distinct geographic locations; and

- Even if such barriers to interconnection exist, are there any alternative operators which would be able to cover, to a sufficient extent, a geographic area such that competitive conditions in a geographic area are sufficiently different from neighbouring areas to define a separate local market?.

6.19 On the question of barriers to interconnection, it is useful to first assume the state of the world where interconnection between operators is not possible (for one reason or another). In this extreme example, operators will only be able to provide a service where they have network. As BT is the only operator with a ubiquitous network it would monopolise all circuits which extended beyond the network reach of individual operators. Thus, while there may be individual routes where there are competing operators able to provide a service, this would lead to very narrow markets being defined for a small proportion of the total market. Therefore, most of the market will be in the hands of a monopolist and the market is most likely defined to be national

6.20 Next it is useful if we assume that it is possible for BT to provide interconnection services e.g. PPCs but it is not possible for alternative operators to interconnect with each other. In this state of the world, alternative operators could provide services on their own network in those geographic areas where they are present and on BT's where they are not. Thus, alternative operators are able to compete throughout the whole of the UK, albeit using their own network where they have it and relying on BT's wholesale inputs where they do not. This means that there may be additional competitive constraints in those geographic areas identified as having numerous alternative operators present. However, any individual operator would only be able to provide an additional constraint in the area covered by its own network, relying on BT's products elsewhere.

6.21 In the third state of the world, we assume that interconnection with BT and with alternative operators is possible. This would mean that alternative operators could provide competitive services everywhere where they have network, where they can access other alternative operators' networks or access BT's wholesale inputs. Thus, like the second state of the world, there may be additional competitive constraints in those geographic areas identified as having numerous alternative operators

present. However, this time, in contrast to the second state of the world, the additional competitive constraint would be present in the area where there are alternative network operators present. Operators would no longer be limited to relying either on their own or BT's network to provide a service and could use each others' networks to provide a constraint on BT at the wholesale level.

6.22 The above thought experiment is useful for exposing why barriers to interconnection could affect the market definition outcome. The difference between the second and third state of the world is that in the second state of the world, an individual operator could only exert a constraint in the area where it has network. This means that while a broader geographic area may appear to be sufficiently competitive to completely deregulate due the presence of multiple networks, if there were no individual operators with a significant network reach in that area, then no alternative operator would be able to provide services throughout the whole of that geographic area. Thus, the barriers to interconnection discussion becomes less relevant the greater the network reach of individual operators. Therefore, the analysis of the reach individual operators' networks within apparently more competitive geographic areas is useful to inform the geographic market definition question. We conduct such analysis below.

BT's pricing policies

6.23 As noted above, the existence of common pricing constraints can inform the definition of the geographic boundary, even where there is a lack of demand-side and supply-side substitution. For leased lines in the UK, most operators price on a bespoke basis so it is not possible to observe if a common pricing constraint exists. However, in markets where BT is regulated such that it has to publish its prices, this can provide information on whether a common pricing constraint may exist.

6.24 In the provision of wholesale leased lines, BT has either one or two geographic prices. Where BT prices differentially, it has a lower price within the Central London Zone (CLZ) which is the area of London served by the 020 7 dialling code. Table 10 below summarises the leased lines services at the retail and wholesale level where BT offers geographically differentiated prices.

Table 10: Summary of BT's pricing by product market

Market	BT pricing policy
Low bandwidth traditional interface retail	Some circuits priced at a discount in CLZ[1]
Low bandwidth TISBO	Some circuits priced at a discount in CLZ[1]
High bandwidth TISBO	CLZ discount
Very high bandwidth TISBO	CLZ discount
Low bandwidth AISBO	Single national price
High Bandwidth AISBO	Single national price

1: 2Mbit/s circuits.

6.25 The information in Table 10 might indicate that for some products it might be appropriate to define local geographic markets for those product markets where BT

offers price discounts in the CLZ. Any competitive pressure in one part of the CLZ, to the extent that it is reflected in the price, will be transferred to all other areas of the CLZ. However, there are two caveats to this approach:

- BT is currently under a regulatory obligation to publish its prices. To the extent that there is more intense competitive pressure in a geographic area and that BT wishes to reflect this in its prices then BT has to publish not only the price level but the geographic area in which it applies. It may be the case that BT has chosen the CLZ as this is relatively easy from an administrative perspective, even if the more intense competitive pressure is concentrated in a sub-part of the CLZ;

- Even though the common pricing constraint currently exists, in a world absent regulation (which should be the assumption when considering market definition) it is likely that BT would not publish its prices and that it would offer bespoke prices to its customers. Therefore the evidence of a common pricing constraint is reliant on the presence of regulation at the wholesale level.

6.26 Therefore, while BT's differential prices in the CLZ may indicate that there are differences in competitive constraints in the London area in broad terms, care should be taken if using these prices to conclude that the CLZ is an appropriate boundary for the definition of a separate local market.

6.27 We now set out our analysis for each of the four main elements relevant to our consideration of geographic market definition at the wholesale level for each of the relevant wholesale product markets defined in Section 5.

Low bandwidth TISBO

Wholesale service shares

6.28 We set out below the results of this analysis. However, the information that communications providers have been able to provide us with is such that we have not been able to carry out the analysis that we originally intended (set out in Annex 9). Nevertheless we have been able to conduct a geographic service shares analysis for each of the relevant wholesale product markets. The details of our methodology for calculating wholesale service shares are set out in Annex 9. Figure 36 sets out BT's service share by postal sector in the wholesale low bandwidth TISBO market for the UK as a whole with Figure 37 showing the CLZ and Figure 38 the City of London (with the boundary of each of these areas identified by the black boundary line.

Figure 36: BT's service share in the wholesale low bandwidth TISBO market: UK

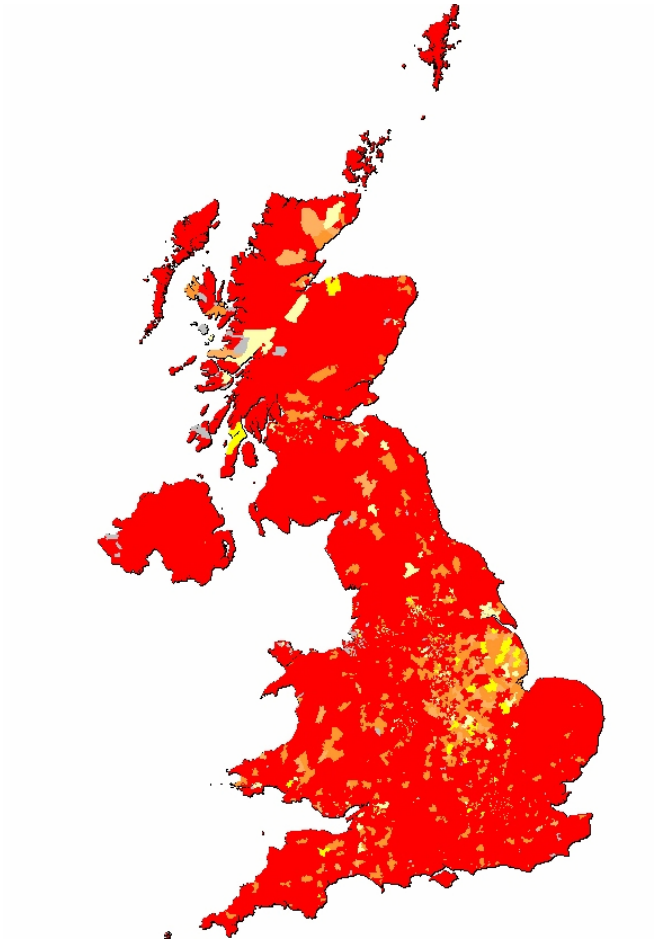


Figure 37: BT's service share in the wholesale low bandwidth TISBO market: CLZ

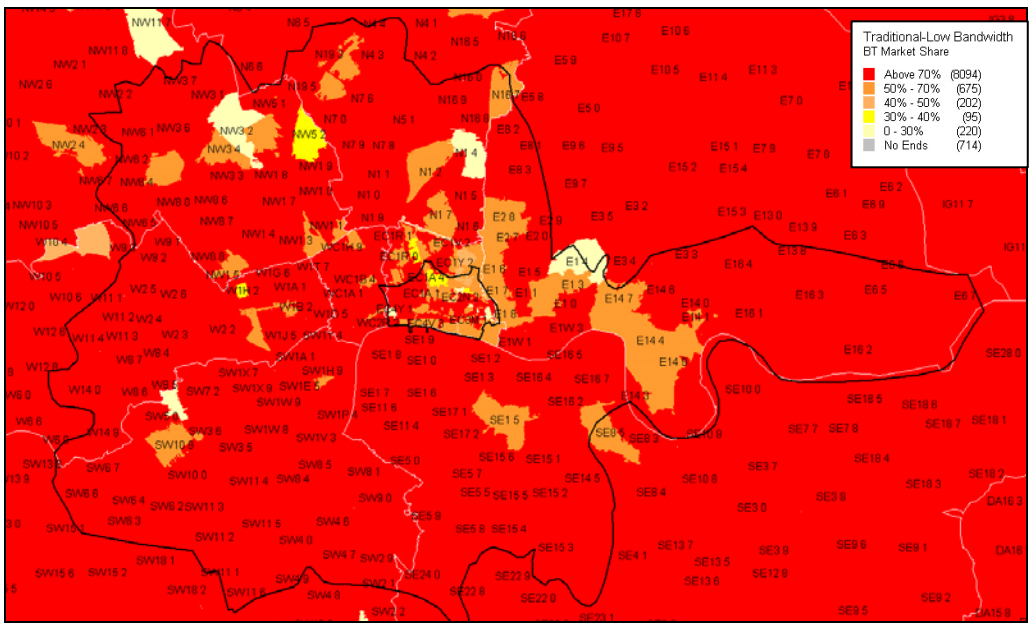
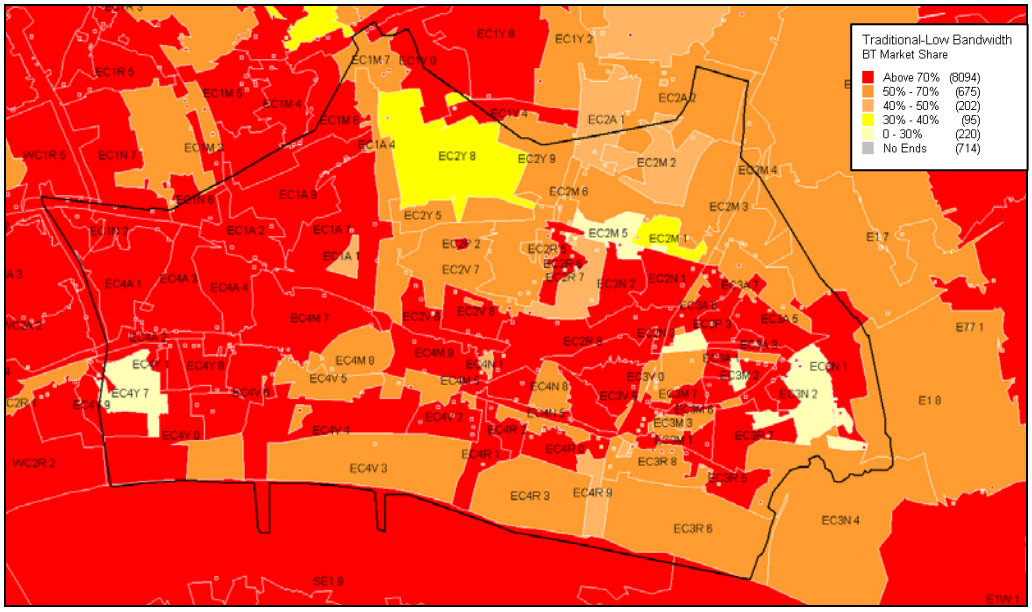


Figure 38: BT's service share in the low wholesale bandwidth TISBO market: City of London



6.29 Figures 36 to Figure 38 above show that there is very little variation in BT's service share in the wholesale low bandwidth TISBO market when assessed on a postal sector basis.

Operators' network reach

6.30 Our network reach analysis seeks to identify the number of operators in a postal sector that is able to potentially supply the representative customer, based on assumptions of the threshold for build distance from the operator's 'flex point' (see below). The result of this analysis is the average number of operators per business location in each postal sector. The network reach analysis is the same for each product market as operators can provide all of the relevant services from each of the flex points and we are unable to distinguish between business sites that may demand particular types of services (although as noted below, the economic build distance is likely to be lower for lower bandwidth circuits, a point reflected in the service share analysis). Therefore the results of our network reach analysis set out below for the wholesale low bandwidth TISBO market are common for all of the markets which we consider.

6.31 A flexibility point is a point on an existing network where new fibre can be added in order to connect it to end-users. Flexibility points may well be buildings where fibre terminates on an Optical Distribution Frame or underground chambers where the fibre can be accessed, where ducts meet at a junction (etc). The fibre in the ground/duct would have to be added to by fibre-splicing and duct dug in order to connect an end-user premise to the fibre optic cabling.

6.32 We have used the Experian Business Database dataset to identify location of large businesses in the UK. This database was used to identify all of the locations of businesses where the number of employees across the business is more than 250 as we consider these business types to be most likely to have demand for leased lines services. There are around 154,000 such sites in the UK. We have then compared this information to the location of the other operators' flex points. It is then possible to calculate the number of operators that are able to offer services to businesses in each postal sector.

6.33 An important assumption that we use in this analysis is the build distance, which is the assumed distance that an operator would build out from their network in order to provide services to end users/customers. The base case build distance assumption that we have used in our analysis is 250m. However, we understand that the build distance is decision is made on a case by case basis and will likely vary by individual contract as a higher margin contract can support a bigger investment. Annex 9 sets out sensitivity analysis around this build distance assumption.

6.34 In practical terms there are a number of different steps of the analysis:

- The flex points for each operator (excluding BT) are plotted on a map;
- The locations of businesses with more than 250 employees across the business are also plotted on the map;
- A buffer area of 250m is drawn around the location of each business; and
- The number of different operators that fall within the 250m buffer area around each location of each business (counting each operator only once) is calculated. This gives the number of operators from which each business location could seek supply, given the 250m build distance assumption. This is illustrated in Table 11 below. In the example below there are 5 business locations in the postal sector each with between 2 and 4 different operators with a flex point within 250m.

Table 11: Example calculation of average number of operators that can serve business sites in a postal sector

	Op1	Op2	Op3	Op4	Op5	Op6	Op7	Op8	Total
Business1	Y	Y	N	N	N	N	Y	Y	4
Business2	Y	N	Y	N	N	N	N	Y	3
Business3	N	N	N	Y	Y	Y	Y	N	4
Business4	N	N	Y	Y	Y	N	N	N	3
Business5	N	N	N	N	N	N	Y	Y	2

6.35 From this information, the average number of operators per business location in each postal sector can be calculated. This is calculated by summing the number of operators for each business location and dividing through by the number of business locations. For the postal sector in the example above this is 3.2 (16/5).

6.36 The results of the analysis for the CLZ and the City of London for a build distance of 250m are shown in Figure 39 and Figure 40 respectively. The results of the analysis on a national basis are shown in Annex 9 as is the results of the sensitivity analysis for different build distance assumptions.

Figure 39: Number of operators in each postal sector, assuming 250m build distance: CLZ

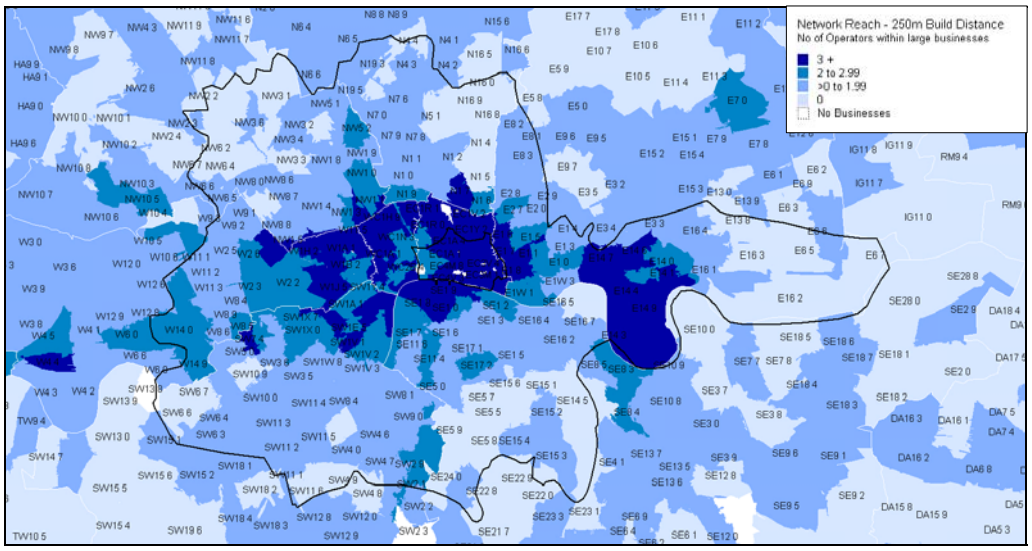
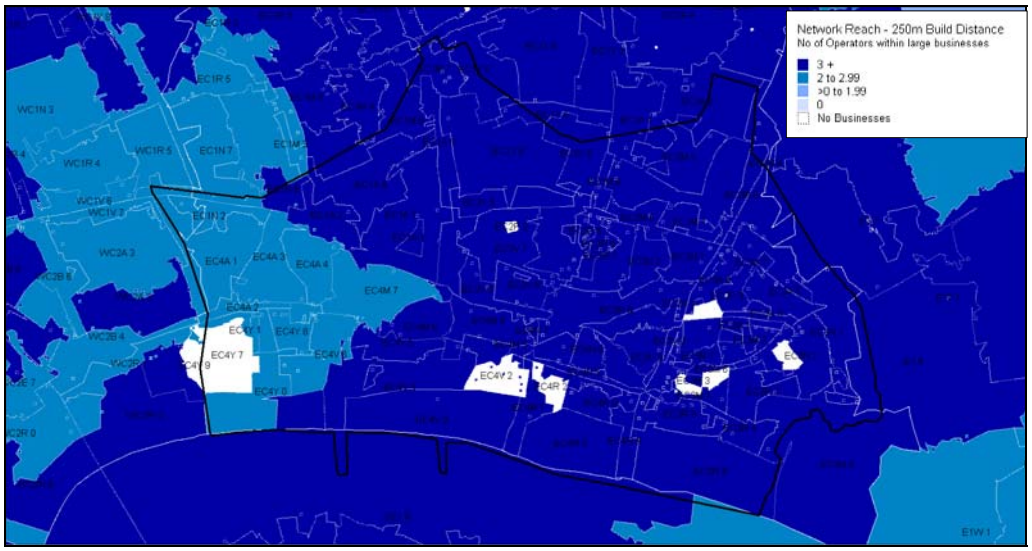


Figure 40: Number of operators in each postal sector, assuming 250m build distance: City of London



6.37 The analysis in the UK as a whole shows that outside of the London area there is a very limited number of postal sectors where there might be different competitive conditions. However, these postal sectors contain a limited number of business sites. As such we consider that at this time it is not proportionate to consider identifying separate local geographic markets in these areas on the basis of this network reach analysis. Therefore, in this market review Ofcom has focussed its analysis of this question in the London area. However, Ofcom will revisit this question in future market reviews and make appropriate decisions at such a time as to whether it should focus this analysis in additional areas of the UK.

6.38 Our network reach analysis shows that in the London area, operators' network build is concentrated in a sub-part of the CLZ, including the City of London on the basis of a 250m build distance. In particular there is a contiguous group of postal sectors which includes central and east London in which the average number of operators that can serve a business site in each postal sector is two (in addition to BT) or

greater. This may be indicative of there being a number of postal sectors where there could be expected to be a greater constraint on pricing, compared to other geographic areas. The service share analysis may then capture the extent to which this has been reflected in actual competition.

BT's pricing policies

6.39 As noted in Table 10 above, in the wholesale low bandwidth market, BT currently prices 2Mbit/s circuits at a discount in the CLZ. As noted in earlier in this Section, this may be indicative of there be different competitive conditions in the CLZ such that defining a separate geographic market is warranted. However, as also noted earlier in this Section, there are reasons to be cautious about concluding that the boundary of such a market would be the CLZ, both related to the current presence of wholesale regulation in this product market.

Conclusion on geographic market definition in the wholesale low bandwidth TISBO market

6.40 The wholesale service share information available to Ofcom does not indicate that there are significant geographic variations in competitive conditions in the low bandwidth TISBO market. BT's service share is broadly uniform across the whole of the UK when assessed on a postal sector basis. While alternative operators have, as would be expected, focussed much of their network roll-out in the geographic areas where business customers are located, in particular in the London area, the analysis of service shares indicates that this infrastructure is not being used to compete in the provision of low bandwidth TISBO circuits. In addition, while BT offers a discount on its 2Mbit/s TISBO circuits in the CLZ, which might be indicative of increased competitive pressure in the London area, this is only a single bandwidth service (although the most significant) in the low bandwidth market, with BT choosing to price the remaining bandwidth circuits on a geographically uniform basis.

6.41 On the basis of the evidence above, Ofcom considers that the geographic scope of the wholesale low bandwidth TISBO market is national (excluding the Hull area) in scope.

High bandwidth TISBO

Wholesale service shares

6.42 We set out below the results of this analysis and have used the same methodology as that for the wholesale low bandwidth TISBO market. As noted in that discussion, the details of our methodology for calculating wholesale service shares are set out in Annex 9. Figure 41 sets out BT's service share by postal sector in the wholesale high bandwidth TISBO market for the UK as a whole with Figure 42 showing the CLZ and Figure 43 the City of London (with the boundary of each of these areas identified by the black boundary line.

Figure 41: BT's service share in the wholesale high bandwidth TISBO market: UK

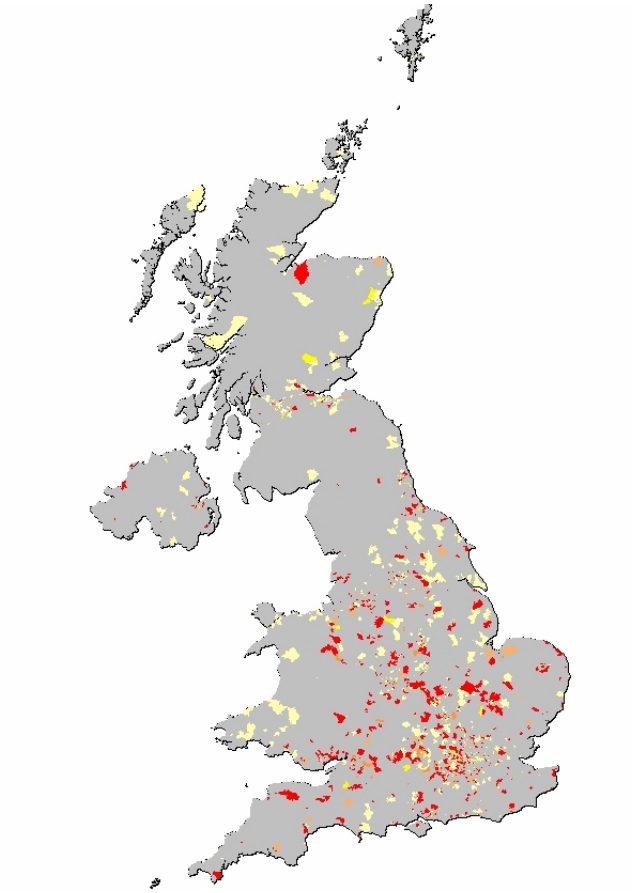


Figure 42: BT's service share in the wholesale high bandwidth TISBO market: CLZ

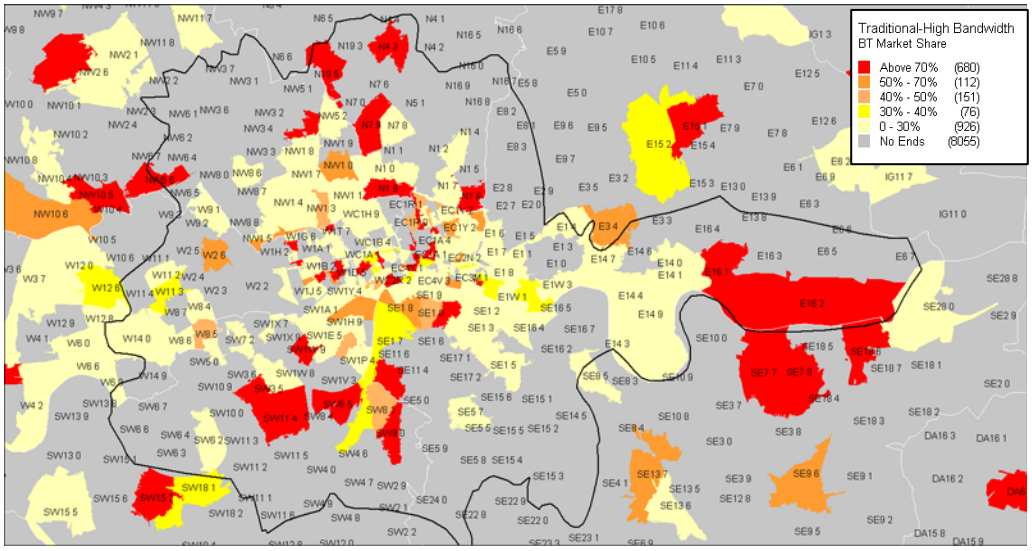
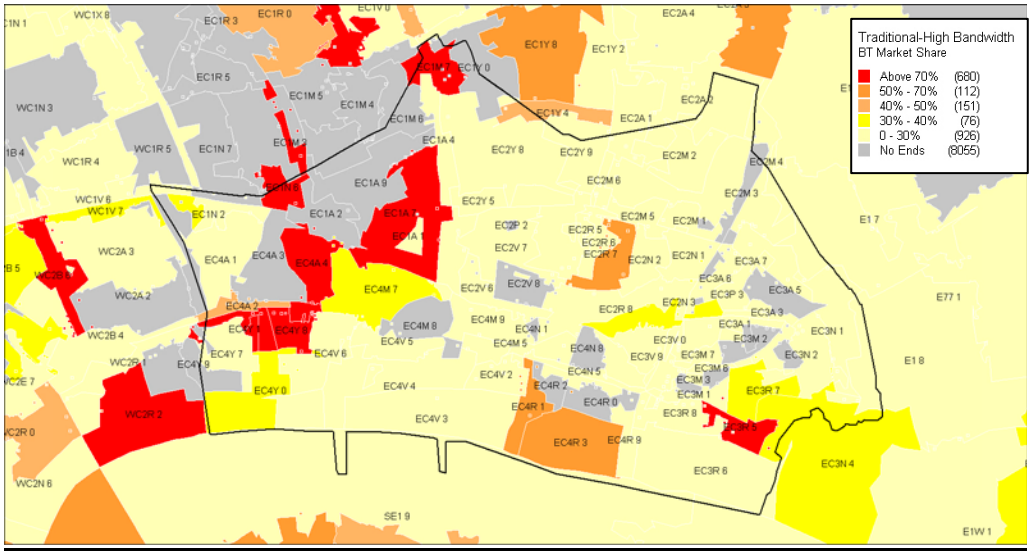


Figure 43: BT's service share in the wholesale high bandwidth TISBO market: City of London



6.43 This service share analysis shows that there is significant variation in BT's service share in the wholesale high bandwidth TISBO market when assessed on a postal sector basis. Many of the postal sectors where BT's service share is low are in the London area, although there are other areas in the UK where this is also the case.

Operators' network reach

6.44 We have already explained our network reach analysis and its conclusions earlier in our discussion of the wholesale low bandwidth TISBO market. As the network reach analysis is not specific to individual markets, it is not necessary to repeat the explanation of the analysis and its conclusions here. However, to recall from Figure 31, there is a contiguous area of central and east London where significant alternative network build exists and that this alternative network can be used to provide wholesale high bandwidth TISBO services. This, together with the service share analysis might indicate that alternative operators are using this network to provide services in this market in competition with BT, such that significantly different such that there exist sufficiently different competitive conditions to warrant the definition of separate geographic markets.

BT's pricing policies

6.45 As noted in Table 10 above, in the wholesale high bandwidth market, BT currently prices all of its circuits at a discount in the CLZ. As noted earlier in this Section, this may be indicative of there be different competitive conditions in the CLZ such that defining a separate geographic market is warranted. However, as also noted earlier in this Section, there are reasons to be cautious about concluding that the boundary of such a market would be the CLZ, both related to the current presence of wholesale regulation in this product market.

Interim conclusion on geographic market definition in the wholesale high bandwidth TISBO market

6.46 The wholesale service share information available to Ofcom indicates that there are significant geographic variations in competitive conditions in the high bandwidth TISBO market. In addition, the network reach analysis which we have conducted

shows that alternative operators have, as would be expected, focussed much of their network roll-out in the geographic areas where business customers are located, in particular in the London area, the analysis of service shares indicates that in this case this infrastructure is being used to compete in the provision of high bandwidth TISBO circuits. In addition, BT offers a discount on all of its high bandwidth TISBO circuits in the CLZ, which is indicative of increased competitive pressure in the London area.

6.47 On the basis of the evidence above, Ofcom considers that for the wholesale high bandwidth TISBO market there exist separate local geographic markets, with a separate market in the London area and in the rest of the UK (excluding the Hull area). However, having concluded that this is the case we now need to determine what the precise geographic boundary of the market is.

Defining the precise geographic market boundary

6.48 Having determined that there exist local (i.e. sub-national) geographic markets in the wholesale high bandwidth TISBO market, we need to define the precise geographic market boundary. In doing this, we consider that it is important to bear in mind that in conducting the geographic market definition that we are seeking to identify areas of sufficiently homogeneous competitive conditions to include them in the same economic market and that market definition is a means to an end, the end of which is to identify whether ex-ante regulation is required or not. We consider that network reach analysis, supplemented by consideration of service shares, provides a solid basis for identifying the precise boundary of the geographic market. This approach builds on the methodology in the Disaggregated Markets discussion document and is consistent with the approach we have taken in our recent consultation on our proposals to define local geographic markets in our review of wholesale broadband access markets.

6.49 The question then arises as to what the appropriate groupings of postal sectors are into a separate market in the London area. In broad terms, the option open to us is to group postal sectors into a market where we consider that there is a greater competitive constraint compared to other postal sectors. From the information that we have obtained from alternative operators, we have identified that there are 16 alternative operators which have some network presence in the CLZ. However, the postal sector with the largest number of operators present (on the basis of our base 250m network build distance) in any of the CLZ postal sectors has 14. On the other hand there also exist in the CLZ postal sectors where BT is the only operator present (on the basis of the same network build assumptions). Therefore, there is clearly a continuum of competitive conditions, even in the postal sectors in the CLZ, from where there is BT only able to provide services and where there are up to 14 alternative operators in addition to BT able to offer services.

6.50 We consider that in the context of the provision of high bandwidth TISBO services it would appear to be the case that where there are postal sectors where BT and one other operator are present (i.e. up to one alternative operator) then it is reasonable/ appropriate to conclude that these postal sectors have different competitive conditions than postal sectors where there are two or more alternative operators (i.e. three operators including BT) able to provide services. However, above this it is difficult to identify further break points in terms of number of operators, at which competitive conditions become materially different again. This is because of the model of competition, which in TISBO markets is based on investment in competing local infrastructure (rather than regulated access to BT local loops as in wholesale broadband access). This affects the cost structure of competing operators (in

particular, the balance between the fixed costs of entry to a local market and the incremental costs of serving additional customers) and means that, for example, an operator's ability to serve a particular customer may be affected by natural obstacles such as rivers. These factors may however be reflected in local service shares, which are therefore taken into account in addition to the number of operators present..

6.51 In practice, the area in which there are two or more operators in addition to BT closely matches the area in which BT's service share is relatively low. Our proposal is therefore to define the boundary of the local geographic market in the London area primarily on the basis of the number of operators able to provide services in a postal sector on the basis of our 250m network build assumption. Postal sectors where 2 or more alternative operators are able to provide a service is defined to be in a separate geographic market from those postal sectors where there is one or less alternative operators able to provide a service.

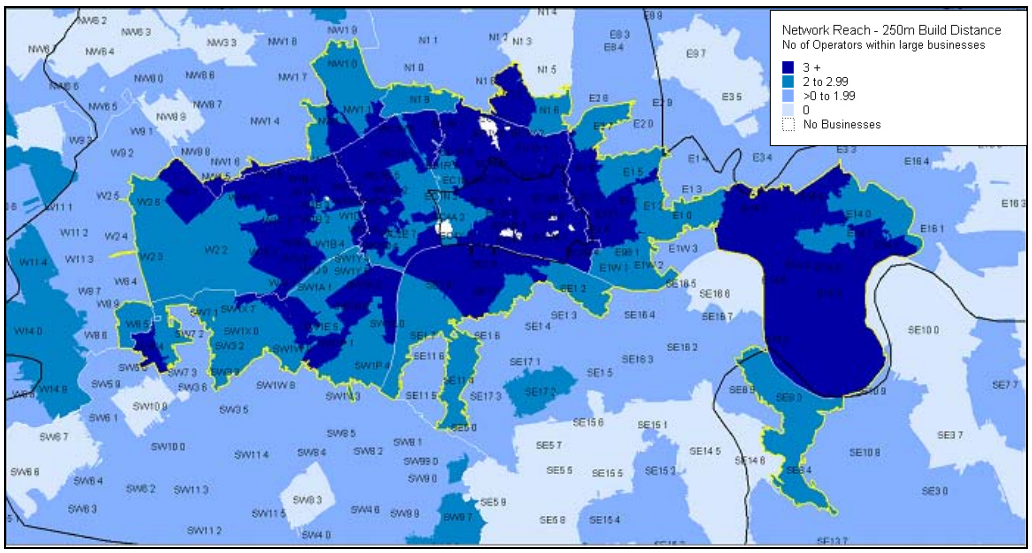
Contiguity

6.52 A further issue which we need to consider when defining the boundary of the local geographic market is whether or not contiguity is important. We consider that in the context of leased lines markets contiguous geographic markets are more important than perhaps in some other telecommunications markets where geographic variations in competitive conditions exist e.g. wholesale broadband access. This is because leased lines networks tend to be built incrementally, which is not necessarily the case in broadband where an LLU operator will enter an individual exchange based primarily on the costs of entering that exchange and its potential customer base from that exchange. Moreover, in leased lines, for an operator to impose a constraint in the high bandwidth TISBO market, it will have to be present (or have access to network) at the customer end all the way to either the boundary of the geographic market, the point of interconnect with an alternative operator, or the other end of the leased line. On this basis we consider that it is necessary for the postal sectors which constitute a separate geographic market in the high bandwidth TISBO product market to be contiguous with other postal sectors in that geographic market.

Ofcom's proposal for geographic market definition in the high bandwidth TISBO market

6.53 On the basis of the framework explained above, we proposed to define a separate local geographic market in the high bandwidth TISBO market in the London area on the basis of our network reach analysis explained above. The boundary of our proposed local geographic market are those contiguous postal sectors where there are two or more alternative network operators able to provide services on the basis of our 250m network build assumption. The boundary of this market is identified by the yellow boundary line in Figure 44 below. A list of the postal sectors which constitute this separate local market are included in Annex 15. This market falls within central and east London and Ofcom refers to this market as the Central and East London Area (CELA) in the remainder of this document. Ofcom considers that the rest of the UK (excluding the Hull area and CELA) constitutes a single separate geographic market.

Figure 44: Ofcom's proposed boundary of the CELA high bandwidth TISBO market



Potential issues which may undermine the finding of local geographic markets in the high bandwidth TISBO market

6.54 There may be reasons, despite there being evidence of sufficiently different geographic variations in competitive conditions to warrant the definition of local geographic markets, to nevertheless conclude that the market is indeed national in scope. This being so we have assessed whether these reasons are present in this case to ensure that we have appropriately defined the boundary of the geographic scope of the market and that this is supported by the evidence available.

6.55 There are two potential issues which may undermine the finding of local geographic markets in the high bandwidth TISBO market. These are:

- If there exist barriers to interconnection; and
- Individual operators' have limited coverage of the proposed local geographic markets.

6.56 We have conducted an analysis of both of these issues to determine whether they do in this case warrant revising our proposed market boundaries set out earlier in this Section. This analysis concludes that revision of our proposed geographic market definitions is not warranted.

Barriers to interconnection

6.57 As set out earlier in this Section, in a world absent regulation at the level of the market being reviewed and where operators do not have a network presence in all geographic areas where there may be demand for their leased line services, the ability of operators to interconnect with each other may be important when considering in which areas competitive constraints exist and which areas they do not. This is because of the geographic dimension which is inherent in leased lines services and which can limit the geographic reach of competitive constraints from alternative network operators. In order for the geographic reach of competitive constraints to extend beyond an individual operator's network, it would have to be able to interconnect with other operators which are present in other geographic areas.

6.58 In considering whether the ability for alternative operators to interconnect is a feasible option, there are a number of relevant factors including:

- The extent to which there exist technical barriers to interconnection;
- The extent to which there exist commercial barriers to interconnection e.g. what incentives are there to interconnect with each other rather than only with BT; and
- The extent to which networks built using wholesale inputs from a number of different operators can provide the same quality of service as one based on wholesale inputs provided by a smaller number of operators i.e. is it usual practice for service providers to limit the number of network operators that input into the provision of a retail business connectivity service.

6.59 We have limited information on the geographic location of where operators may be able to interconnect with each other and what type of interconnection such sites may support. Nevertheless, we do have evidence from the information provided by operators to Ofcom which shows that operators can and do interconnect with each other. For example Table 12 below summarises the position with regard to the high bandwidth TISBO market (noting that the interconnection figures only include those circuits sold by a sub-set of operators that are active in this market).

Table 12: Current interconnection in the high bandwidth market

	National	CLZ (excl CoL)	City of London	CLZ (incl CoL)
Total no. of ends	19,426	5,317	924	6,241
No of ends in which OCP interconnection is provided	2,196	1,377	233	1,611

6.60 This evidence suggests that technical and commercial barriers to interconnection are limited. However, also in terms of commercial barriers to interconnect, we consider that it may be the case for alternative operators with significant coverage of a particular geographic area may have less of an incentive to interconnect with its competitors than an operator with a lower coverage, as in the event that there was no regulated supply available, the larger operator might have less to gain from such a transaction (as any benefit, in a coverage sense would be limited).

6.61 In addition, it may be the case that interconnection of multiple alternative operators at the TISBO level creates transaction costs that make such interconnection less economically justifiable, limiting the incentives for such arrangements to take place on a purely commercial basis. However, as noted above in Table 12, such interconnection does currently take place indicating that such commercial barriers may be limited.

6.62 On the issue of whether a service provided using the networks of multiple operators causes a degradation of service, we do not have any substantial evidence on this point, although we believe that this may be an issue, particularly in terms of effective maintenance and if a fault develops, establishing on whose network the fault lies. We have consistently been told by operators that service degradation does occur, particularly when networks of more than two or three operators are required to provide the service.

6.63 However, on the other hand, the end-user research conducted for the Disaggregated Markets project in 2006 found that larger businesses (which would be those that use leased lines which utilise the wholesale elements in the high bandwidth TISBO market) were less concerned about using networks which utilised wholesale inputs from multiple network operators and would tend to link premises using the lowest cost provider at the time that the connection was required.

6.64 The available evidence suggests that insurmountable barriers to interconnection do not exist, particularly as operators do currently interconnect with each other on a significant scale.

Operators' coverage of the proposed local geographic markets

6.65 Absent the ability of operators to access wholesale services from other operators (either on regulated or unregulated terms) an operator would only be able to provide services within the geographic area covered by its own network. Therefore, an individual operator's coverage of a local geographic market might limit the competitive constraint that it can exercise in that local geographic market. In order to allow us to evaluate whether this might undermine our finding of local geographic markets in the high bandwidth TISBO market we have calculated the coverage of each operator in terms of number of postal sectors and businesses within the proposed CELA geographic market using our assumed network build distance of 250m. The operator coverage of CELA is set out in Table 13.

Table 13: Coverage of each operator by no of business sites and by postal sectors in CELA

Communications provider	Businesses	Postal sectors
Operator 1	99%	100%
Operator 2	97%	100%
Operator 3	55%	76%
Operator 4	20%	39%
Operator 5	17%	28%
Operator 6	17%	29%
Operator 7	9%	21%
Operator 8	7%	17%
Operator 9	7%	14%
Operator 10	4%	9%
Operator 11	4%	10%
Operator 12	4%	9%
Operator 13	3%	6%
Operator 14	2%	4%
Operator 15	1%	1%
Operator 16	0%	0%
Operator 17	0%	0%
Operator 18	0%	0%
Operator 19	0%	1%
Operator 20	0%	0%
Operator 21	0%	0%

6.66 Table 13 shows that for the CELA market, at least two operators would have a very significant coverage of the market and one other would be able to provide services to more than half of businesses, in three quarters of the postal sectors. This analysis implies that there will be operators which will be able to provide services to businesses throughout the CELA market without needing to access wholesale

products from other operators (either BT or other alternative operators). Tthis further supports Ofcom's conclusion that there exist different competitive conditions in the CELA market compared to neighbouring areas. Moreover, the fact that there are operators present with very significant coverage of the CELA market diminishes the importance of any barriers to interconnection which may exist (although we establish earlier in this Section that insurmountable barriers to interconnection do not in any case exist).

Conclusion on geographic market definition in the high bandwidth TISBO market

6.67 Our conclusion, for the reasons set out above, is that there are separate local geographic markets in the UK (excluding the Hull area) for wholesale high bandwidth TISBO services. These separate markets are the CELA and the UK (excluding the Hull area and CELA). A list of the postal sectors which constitute this separate local market are included in Annex 15.

Very high bandwidth TISBO

Wholesale service shares

6.68 We set out below the results of this analysis and have used the same methodology as that for the wholesale low bandwidth TISBO market and the high bandwidth TISBO market. Again, as noted above, the details of our methodology for calculating wholesale service shares are set out in Annex 7. Figure 45 sets out BT's service share by postal sector in the wholesale very high bandwidth TISBO market for the UK as a whole with Figure 46 showing the CLZ and Figure 47 the City of London (with the boundary of each of these areas identified by the black boundary line.

Figure 45: BT's service share in the wholesale very high bandwidth TISBO market: UK

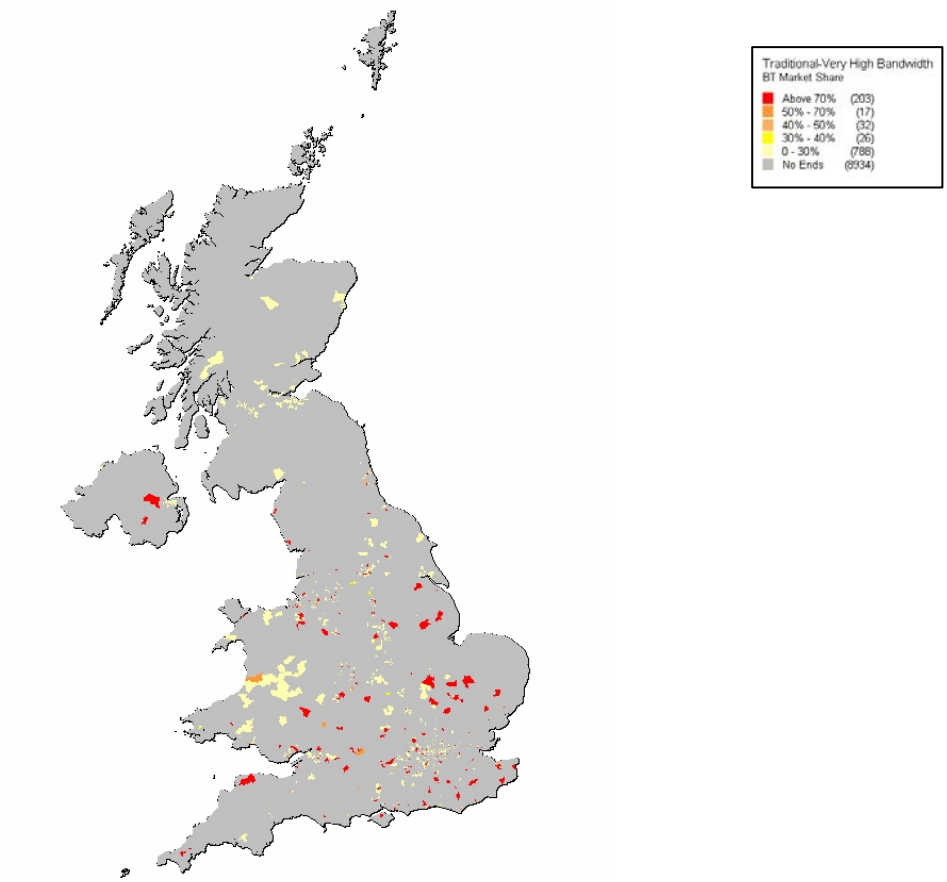


Figure 46: BT's service share in the wholesale very high bandwidth TISBO market: CLZ

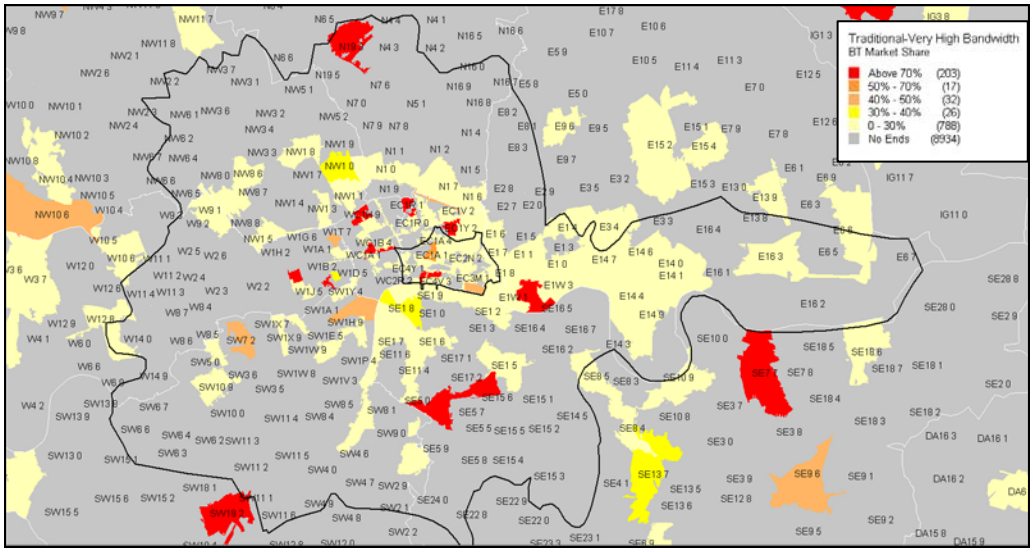
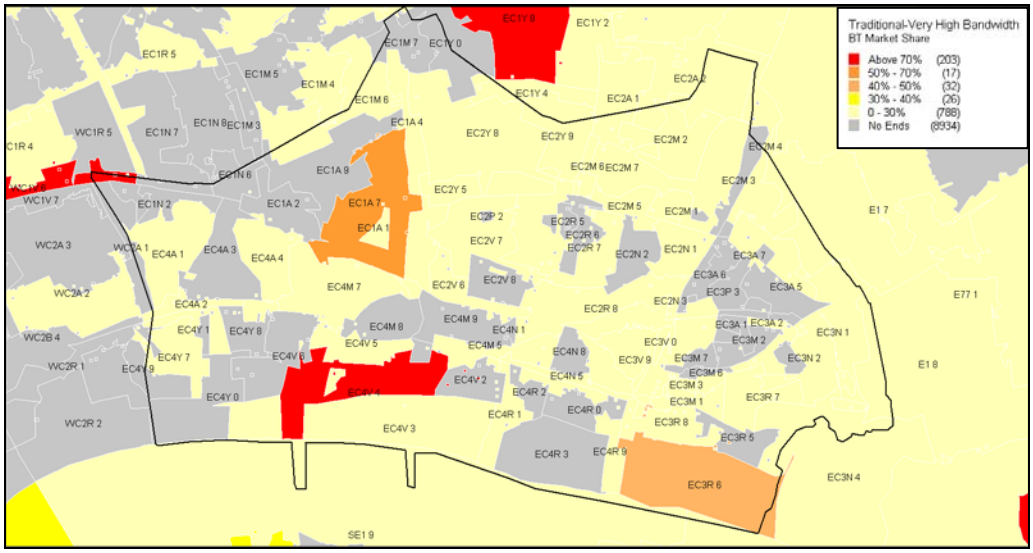


Figure 47: BT's service share in the wholesale very high bandwidth TISBO market: City of London



6.69 The service share analysis shows that there are postal sectors where BT has a relatively high service share and others where it is relatively low. This could suggest that there are geographic variations in competitive conditions in this market. However, unlike the other product markets which we have considered so far, there is currently a much more limited number of wholesale very high bandwidth circuits in the UKL. This means that in any particular postal sector, it only requires a small number of circuits (in absolute terms) to be provided by an operator for there to be significant changes in operators' service shares.

6.70 Moreover, as the value of a circuit is positively correlated with its bandwidth i.e. as the bandwidth increases the value increases, this means that it is much more economical for operators to extend their networks to provide services to business premises which demand circuits which require very high bandwidth TISBO wholesale inputs. This is one reason why we have concluded that there is a break in the product markets between the high bandwidth TISBO market and the very high bandwidth TISBO market (there are different competitive conditions). Therefore, it is reasonable to expect that competitive constraints in the very high TISBO market could extend (possibly quite significantly) beyond the limit of current network infrastructure.

Operators' network reach

6.71 As noted above, we have already explained our network reach analysis and its conclusions in our discussion of the wholesale low bandwidth TISBO market. As the network reach analysis is not specific to individual markets, it is not necessary to repeat the explanation of the analysis and its conclusions here. However, to recall from Figure 44, there is a contiguous area of central and east London where significant alternative network build exists and that this alternative network can be used to provide wholesale very high bandwidth TISBO services. This, together with the service share analysis which could be interpreted as showing that geographic variations in competitive conditions in this product market exist might indicate that alternative operators are using this network to provide services in this market in competition with BT, such that there exist sufficiently different competitive conditions to warrant the definition of separate geographic markets.

6.72 However, as noted above under the discussion of wholesale service shares, we need to take care when interpreting the results of our analysis in this market. This is in particular for two main reasons:

- The number of very high bandwidth circuits in a single postal sector is relatively limited, so small absolute changes in volumes can have significant impacts on postal sector service shares; and
- The higher value of very high bandwidth TISBO circuits means that competitive constraints that exist from current alternative network could extend beyond the current network footprint.

BT's pricing policies

6.73 As noted in Table 10 above, in the wholesale very high bandwidth TISBO market, BT currently prices all of its circuits in this market at a discount in the CLZ. As noted above, this may be indicative of there being different competitive conditions in the CLZ such that defining a separate geographic market is warranted. However, as also noted above there are reasons to be cautious about concluding that the boundary of such a market would be the CLZ, both related to the current presence of wholesale regulation in this product market.

Conclusion on geographic market definition in the very high bandwidth TISBO market

6.74 We consider that while there is some evidence that might suggest that there are some geographic variations in competitive conditions, there is conflicting evidence which suggests that the competitive constraints in the very high bandwidth TISBO market are likely to be quite similar throughout the UK, due to the high value of these services. On this basis, we consider that the geographic scope of the wholesale very high bandwidth TISBO market is national (excluding the Hull area).

Low bandwidth AISBO

Wholesale service shares

6.75 We set out below the results of this analysis and have used the same methodology as that for the various wholesale TISBO markets. Again, as noted above, the details of our methodology for calculating wholesale service shares are set out in Annex 9. Figure 48 sets out BT's service share by postal sector in the wholesale low bandwidth AISBO market for the UK as a whole with Figure 49 showing the CLZ and Figure 50 the City of London (with the boundary of each of these areas identified by the black boundary line).

Figure 48: BT's service share in the wholesale low bandwidth AISBO market: UK

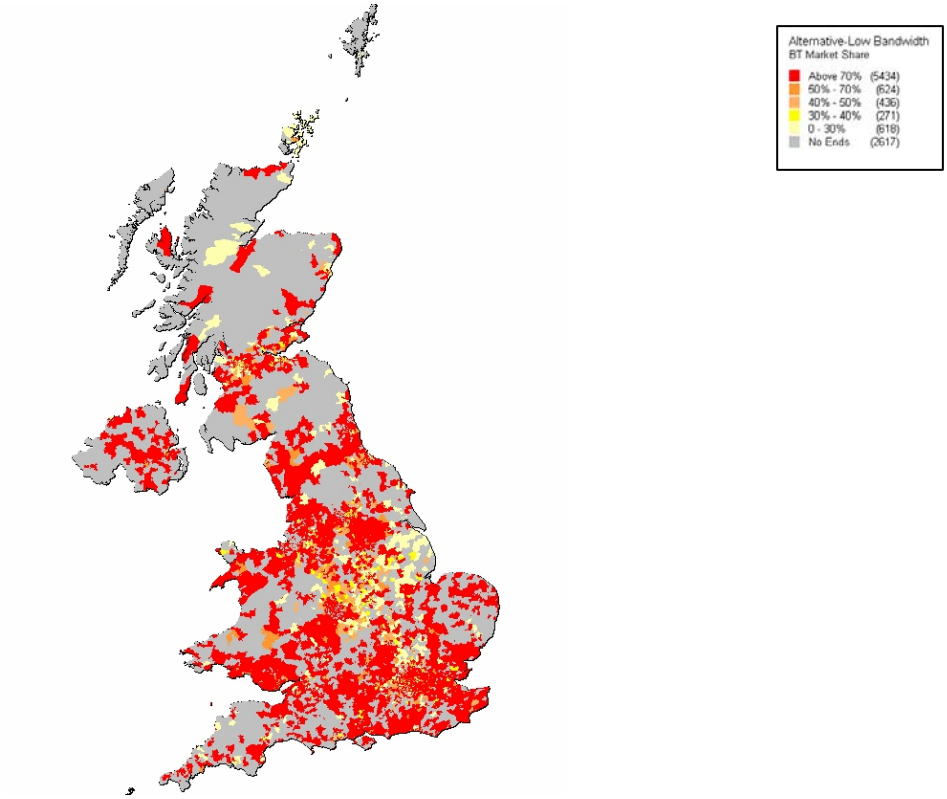


Figure 49: BT's service share in the wholesale low bandwidth AISBO market: CLZ

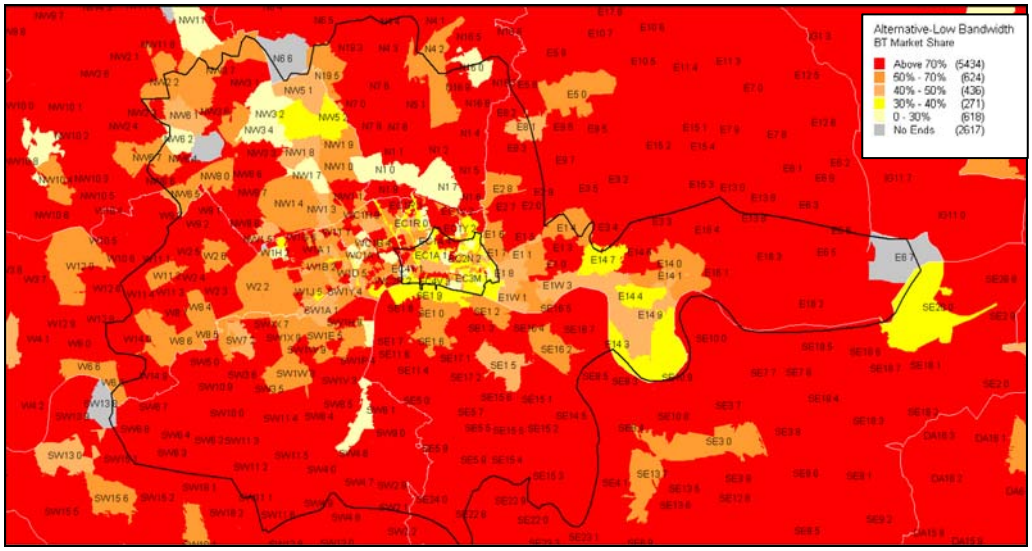
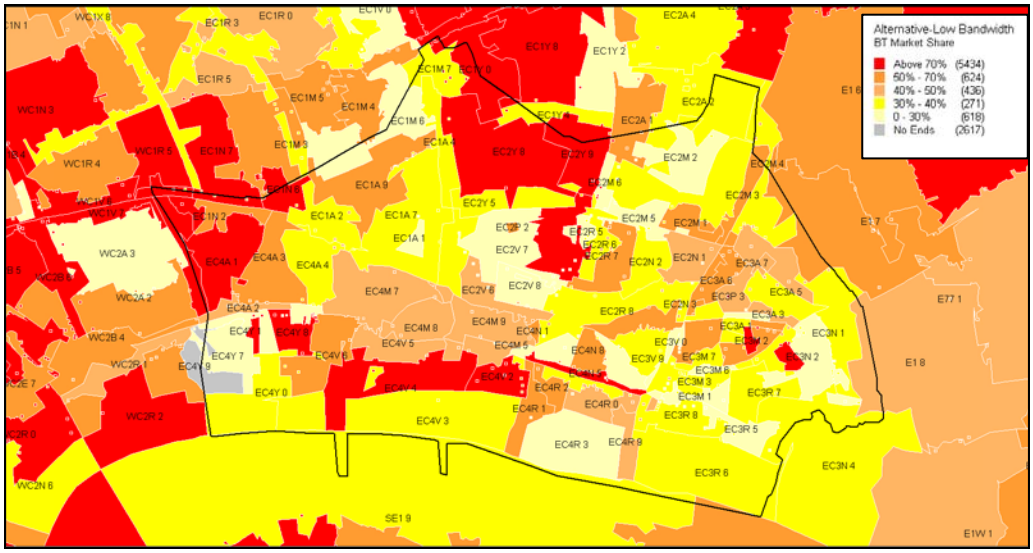


Figure 50: BT's service share in the wholesale low bandwidth AISBO market: City of London



6.76 The Figures above show that there is limited geographic variation in competitive conditions in the low bandwidth AISBO market, with any such variations largely limited to the English Midlands and the London area.

Operators' network reach

6.77 As noted above, we have already explained our network reach analysis and its conclusions in our discussion of the wholesale low bandwidth TISBO market. As the network reach analysis is not specific to individual markets, it is not necessary to repeat the explanation of the analysis and its conclusions here. However, to recall from Figure 44, there is a contiguous area of central and east London where significant alternative network build exists and that this alternative network can be used to provide wholesale low bandwidth AISBO services. This could be interpreted as showing that geographic variations in competitive conditions in this product market exist and might indicate that alternative operators are using this network to provide services in this market in competition with BT, such that there exist sufficiently different competitive conditions to warrant the definition of separate geographic markets.

6.78 However, the service share analysis shows that there is limited geographic variation in competitive conditions in the low bandwidth AISBO market, although an area where there is variation does appear to overlap with the London area where there is alternative infrastructure.

BT's pricing policies

6.79 As noted in Table 10 above, in the wholesale low bandwidth AISBO market, BT currently prices all of its circuits in this market on a nationally averaged basis. This suggests that there is a common pricing constraint throughout the whole of the UK (excluding the Hull area) in this market. This may be indicative of there being sufficiently homogeneous competitive conditions throughout the whole of the UK (excluding the Hull area) such that a national market exists.

Conclusion on geographic market definition in the low bandwidth AISBO market

6.80 We consider that the available evidence suggests that there exist sufficiently homogeneous geographic competitive conditions in the low bandwidth AISBO market to support a conclusion that the geographic market is national in scope. In particular, the presence of a national common pricing constraint supports such a conclusion.

High bandwidth AISBO

Wholesale service shares

6.81 We set out below the results of this analysis and have used the same methodology as that for the various wholesale TISBO markets and the wholesale low bandwidth AISBO market. Again, as noted above, the details of our methodology for calculating wholesale service shares are set out in Annex 7. Figure 51 sets out BT's service share by postal sector in the wholesale high bandwidth AISBO market for the UK as a whole with Figure 52 showing the CLZ and Figure 53 the City of London (with the boundary of each of these areas identified by the black boundary line.

Figure 51: BT's service share in the wholesale high bandwidth AISBO market: UK

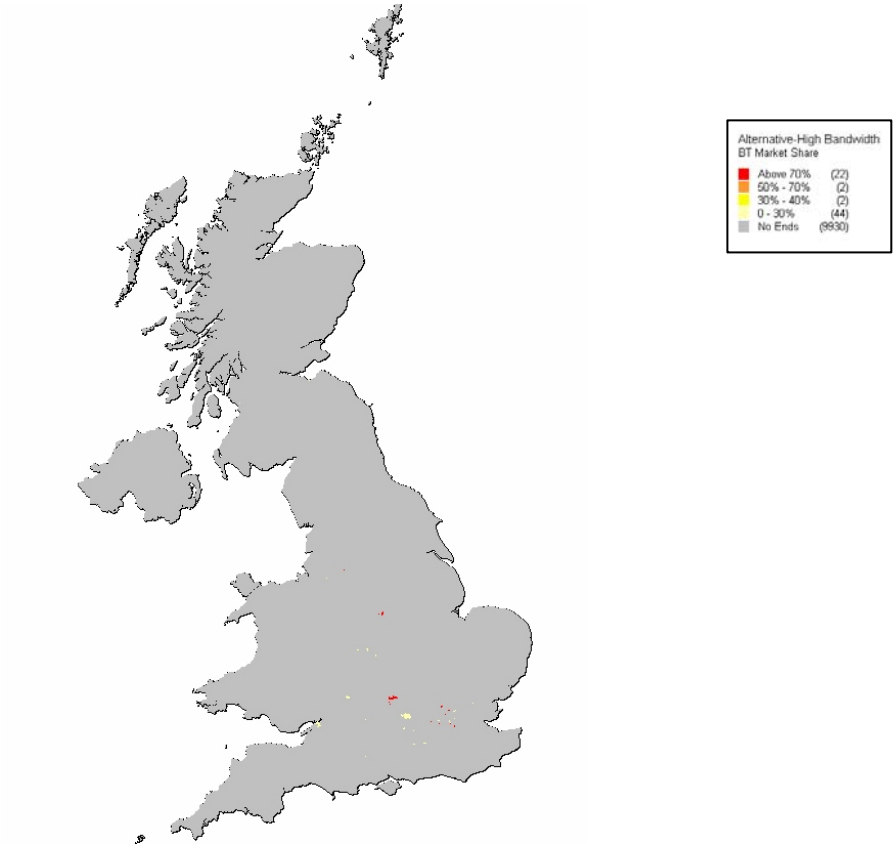


Figure 52: BT's service share in the wholesale high bandwidth AISBO market: CLZ

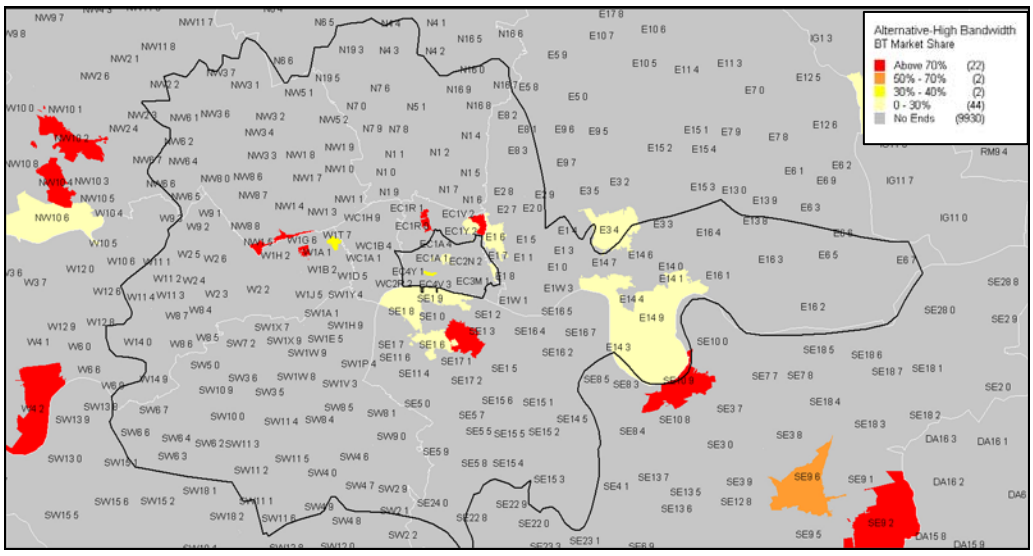
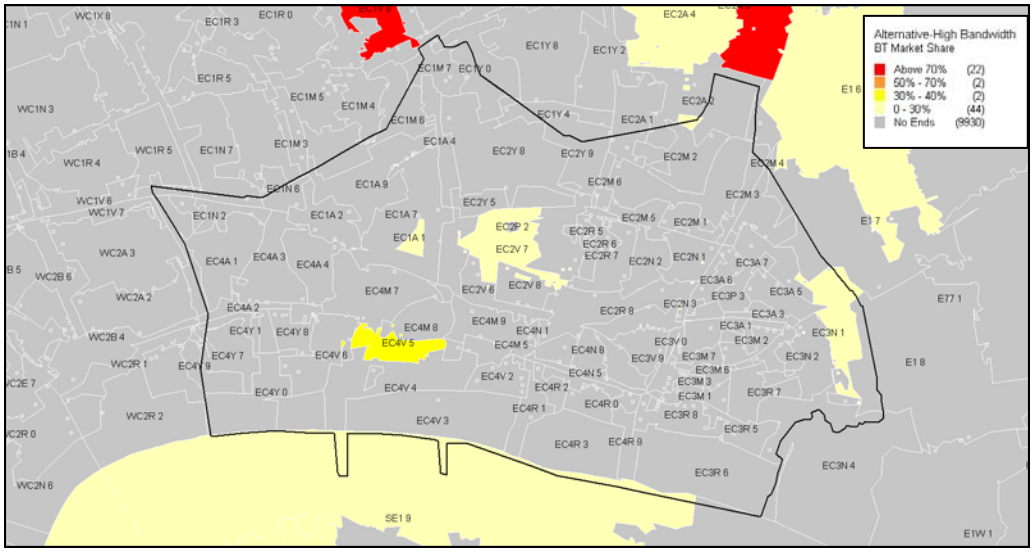


Figure 53: BT's service share in the wholesale high bandwidth AISBO market: CLZ



6.82 The Figures above show that there is currently limited geographic provision of wholesale high bandwidth AISBO circuits in the UK. This reflects the fact that there is limited provision of these circuits, in absolute volume terms.

Operators' network reach

6.83 As noted above, we have already explained our network reach analysis and its conclusions in our discussion of the wholesale low bandwidth TISBO market. As the network reach analysis is not specific to individual markets, it is not necessary to repeat the explanation of the analysis and its conclusions here. However, to recall from Figure 44, there is a contiguous area of central and east London where significant alternative network build exists and that this alternative network can be used to provide wholesale high bandwidth AISBO services. This could be interpreted as showing that geographic variations in competitive conditions in this product market exist and might indicate that alternative operators are using this network to provide services in this market in competition with BT, such that there exist sufficiently different competitive conditions to warrant the definition of separate geographic markets.

BT's pricing policies

6.84 As noted in Table 10 above, in the wholesale high bandwidth AISBO market, BT currently prices all of its circuits in this market on a nationally averaged basis. This suggests that there is a common pricing constraint throughout the whole of the UK (excluding the Hull area) in this market. This may be indicative of there being sufficiently homogeneous competitive conditions throughout the whole of the UK (excluding the Hull area) such that a national market exists.

Conclusion on geographic market definition in the high bandwidth AISBO market

6.85 We consider that the available evidence suggests that there exist sufficiently homogeneous geographic competitive conditions in the high bandwidth AISBO market to support a conclusion that the geographic market is national in scope. In particular, the presence of a national common pricing constraint supports such a conclusion.

Trunk geographic market definition

6.86 As discussed in our product definition, due to the inherent geographic nature of trunk segments, it was appropriate to assess the specific location of aggregation nodes (which inform the break between trunk and symmetric broadband origination markets) within our geographic assessment.

6.87 The first part of our geographic assessment therefore sets out our proposed approach to identify the location of aggregation points. Having identified the specific location of particular trunk routes in the UK, for the purposes of further defining the geographic scope of a trunk market, we apply a similar underlying methodology used in earlier in this sub-section in relation to our geographic assessment of symmetric broadband origination.

6.88 In particular, we assess trunk routes between the aggregation nodes identified below and assess demand and supply-side substitution opportunities and whether it is appropriate to group together circuits on the basis of the homogeneity of competitive conditions.

6.89 We have not had to assess the trunk market for the Hull area as no market for trunk currently exists – or is likely to do so on a forward looking basis - for circuits within the Hull area.

Identifying the geographic location of aggregation points

6.90 As set out above, the first stage of our geographic assessment is to determine an appropriate methodology for identifying the location of key aggregation points which inform the break between trunk and symmetric broadband origination.

6.91 Ofcom has identified two options to define the break between trunk and termination. This will then provide a basis for identifying major trunk routes within the UK. Each option is not completely independent from the others, such that a "hybrid" approach that contains elements could also be considered. We briefly describe below the two options identified, we have identified before discussing their relative merits below.

Option 1: Inter Tier 1 or metro nodes

6.92 Option 1 would entail the least change to the current market definition. This would entail defining traffic as inter-Tier 1 or inter-metro node traffic (taking into account BT's migration to metro nodes within the timeframe of this review)[87]. This option might be preferable where we considered that Tier 1 nodes or metronodes are likely to coincide closely with CP's major points of interconnection.

Option 2: Identification of "aggregation" nodes

6.93 An alternative option, would be to abstract as far as possible from the location of Tier 1 or metro nodes, which are related to BT's build decisions and network hierarchy. Option 2 would instead group together circuits based on variations in

[87] This might include traffic from a Tier 1 node to a metro node given that BT may roll-out services interconnected to metronodes in phases.

competitive conditions. Competitive conditions would therefore be used to allocate routes in specific locations either to trunk or symmetric broadband origination markets. This would seek to capture the fact that bottlenecks are more likely to arise within backhaul links whereas trunk routes are prospectively more competitive.

6.94 Given that CPs remain reliant, in many cases on BT for the provision of SBO services, it might not be appropriate to abstract fully from the location of BT's Tier 1 nodes, as many CPs might choose to locate near to at least one Tier 1 node to pick up any leased lines traffic. This is because many CPs are still reliant on BT (in many cases) for access and backhaul of leased lines traffic.

6.95 The conditions conducive to interconnection at one particular Tier 1 node over another are likely to be highly correlated to proximity of nodes and based on the density of traffic within reach of each particular node. And where Tier 1 nodes in close proximity do not merit interconnection this would be indicative of potential economic bottleneck. We therefore consider below how we might use these two factors to identify where the key aggregation nodes are likely to be located, which would then be used to inform the break between trunk and SBO services.

6.96 A CP seeking to optimise its interconnection decisions (and hence number of Tier 1 nodes it is likely to interconnect with) faces a trade-off between costs and benefits. To illustrate this further, we have referred back to the example we provided in Section 5 on the provision of trunk on the London to Reading route. First, the CP would need to be able to provision its own London to Reading trunk route (plus any additional SBO) cheaper than relying on a backhaul circuit to a potential substitute Tier 1 node that could also serve the London to Reading route. Given these substitution opportunities exist, it can seen that there would be limited limited incentives to build out trunk further or to interconnect at multiple Tier 1 nodes.

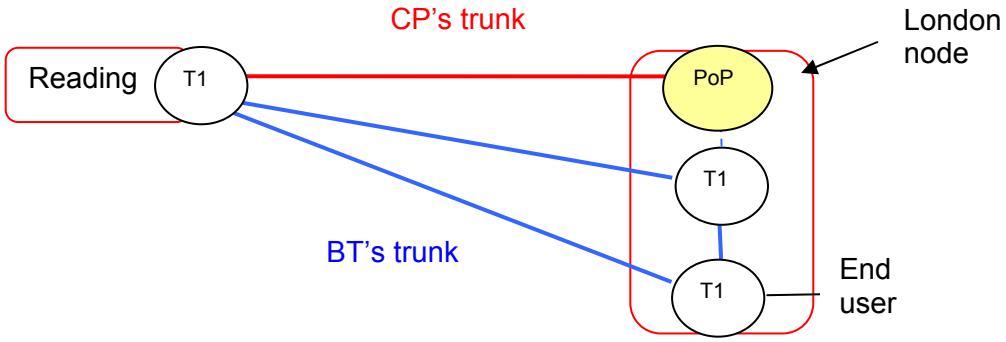
6.97 Further interconnection would entail significant sunk costs. In order to be cheaper than relying on backhaul provisioning (to its existing point of interconnection), it would require sufficient scale opportunities for the CP to aggregate the traffic sooner. For this to be economic would almost certainly require traffic not only from one user with traffic running from London to Reading but also from a number of other users.

6.98 At the same time it would also depend on the distances involved. Because of fixed costs of interconnecting at another node, the average cost per km served would fall as distance increases. The benefits of building out further (i.e. avoiding costs of purchasing backhaul from another CP) would need to be outweigh the distance related costs and other fixed costs of interconnection.

6.99 Hence, if the aggregation opportunities and build distances involved are insufficient this would not justify the CP locating at each and every Tier 1 node. And as aggregation opportunities become fewer it is less likely that a CP will interconnect at a number of points in close proximity.

6.100 Therefore, Option 2 would seek to capture the substitution opportunities between trunk rotues by aggregating together Tier 1 nodes in close proximity. Similarly metro nodes would be mapped together with Tier 1 nodes to identify "aggregation nodes". For the purposes of defining trunk this would be classed as traffic between any Tier 1 or other node falling within the aggregation node to another node located in a separate aggregation node. This is shown in Figure 54 below.

Figure 54: Revised trunk definition



6.101 One implication of this definition is that any traffic that is not between aggregation nodes would be classified as backhaul. For example, using the London to Reading example, the two Tier 1 nodes in the London area would form one aggregation node. In these circumstances, any intra-Tier 1 traffic in the London "aggregation node" would be treated as backhaul, whereas traffic between aggregation nodes (i.e. from the Reading aggregation node and the London aggregation node) would be classed as trunk.

Assessment of options for identifying break-point

Option 1: Inter Tier 1 or Metro node circuits

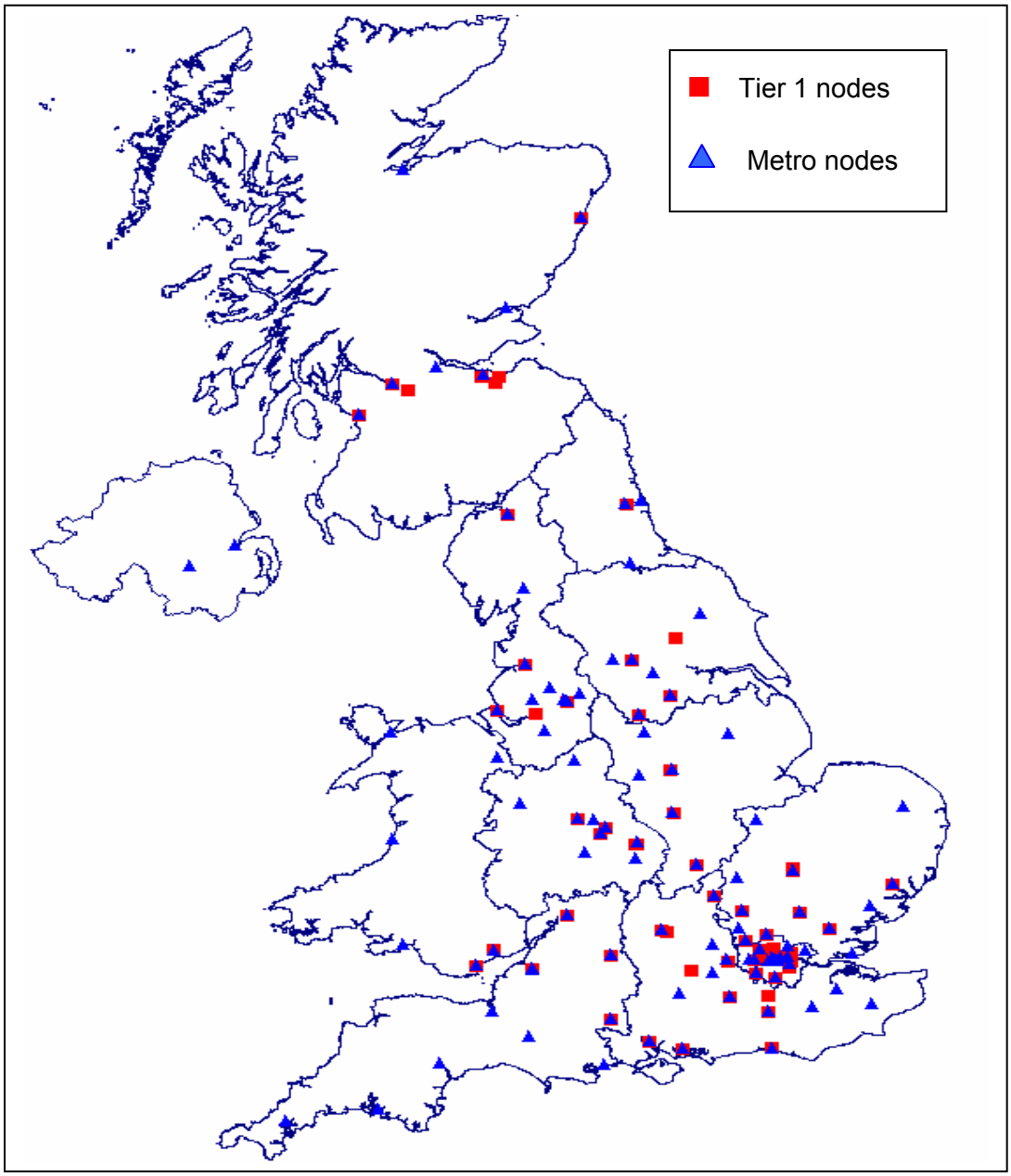
6.102 In the 2003/04 Review, Ofcom relied on the Tier 1 definition as it was considered that it generally captured where the trunk market began. In addition, it was considered that there were unlikely to be fundamental changes to the nature of interconnection within the timeframe of the review (i.e. the Tier 1 node could provide an accurate picture of trunk market on a forward looking basis).

6.103 As discussed under our product definition, the operation of the Tier 1 node approach has not always accurately captured where aggregation points on the trunk network reside and where potential competitive routes exist. In particular, under the Tier 1 definition, this results in a large amount of intra-city traffic being defined as trunk. In other cases, BT has located Tier 1 nodes in locations for its own network management purposes rather than where major business traffic resides. Accordingly, in both of these cases, there is limited prospect that CPs will build out to all of these Tier 1 nodes.

6.104 There is a further issue to resolve due to BT's 21CN migration that was not an issue for the timeframe considered by the 2003/04 Review 2003/04. As noted in Ofcom's consultation on Next Generation Networks, 21CN has strong implications for trunk segments. 21CN will lead to substantial geographic rearrangement of networks. Some of the points of interconnection to which other operators have deployed may no longer be available within 21CN. This is because BT proposes to shift many of the points of interconnection within its trunk network, and withdraw interconnection at local exchange level.

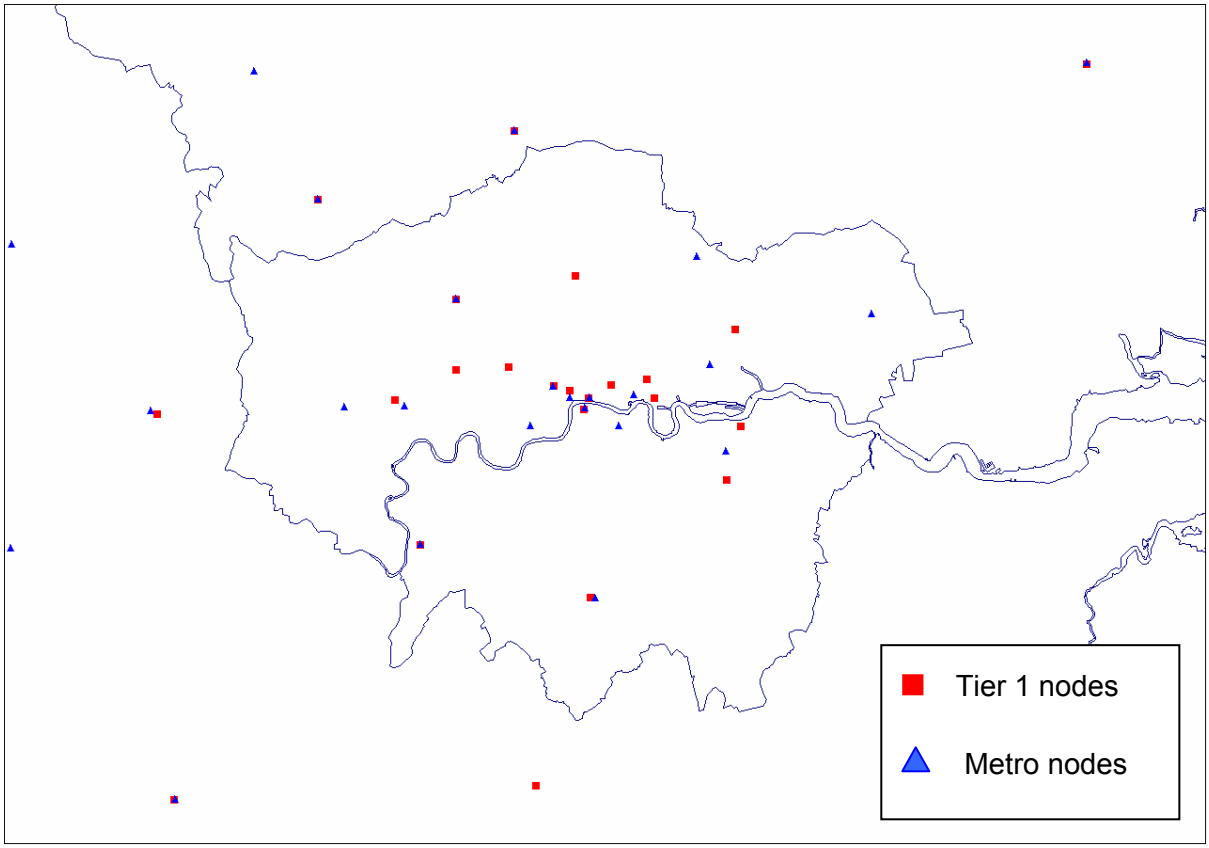
6.105 The question is whether on a forward looking basis, a network definition focussed on BT's network nodes remains appropriate. Figure 55 below shows the potential location of BT's metro nodes versus its SDH Tier 1 nodes.

Figure 55: Location of Metro versus Tier 1 nodes



6.106 For the majority of SDH Tier 1 nodes, the metro nodes will be located at the same or at nearby locations. However, a visual inspection of SDH Tier 1 nodes suggests approximately one quarter of metro nodes would not map very closely to an existing Tier 1 node. Many of these are within the Greater London area as shown in Figure 56.

Figure 56: Location of Metro nodes versus Tier 1 nodes – Greater London



6.107 Given the relationship between metro nodes and SDH highlighted above it might be possible to redefine the 2003/04 Review market definition such that trunk segments are defined as any traffic between any Tier 1 nodes and/or any metro node. As existing Tier 1 nodes often have a metro nodes generally located in the same area, this would potentially not result in large changes in the location of the breakpoint for trunk and terminating segments for the majority of traffic.

6.108 However, there would be issues associated with such an approach to market definition in the context of BT's introduction of metro nodes. First, there would be many more metro nodes introduced on BT's 21CN (circa 106 nodes, which are broadly at the same "level" in the network hierarchy as BT's current 67 Tier 1 nodes).

6.109 BT's planned metro node roll-out will also include locating those 106 metro nodes in more distant locations. As shown in Figure 55 this would occur in particular in the more remote areas such as the South West of England. The implication of this is that the break point between trunk and SBO would be potentially reliant on where BT had decided to locate its metro nodes. Such a definition would also be potentially unstable as BT could add or subtract metro nodes from the list.

6.110 In addition, it would be unlikely that the location of metro nodes would be informative of where the break between trunk and SBO would tend to sit for traditional interface leased line traffic. For example, in the South West of England, it is unlikely that these regions would generate significant traffic flows as there are relatively few leased lines customers.

6.111 Moreover, the roll-out of metro nodes in these areas is a BT network build decision, which among other things will also reflect the demand for broadband and voice

services. Hence, it is unlikely that interconnecting operators could generate sufficient scale to build out their core networks to those metro nodes to deliver leased lines services only. And given this, it would be appear that any wholesale network BT provides to serve customers in those locations should fall under a backhaul rather than trunk definition.

6.112 The impact of this definition is that it could also reclassify terminating segments as trunk. In the South West, currently the nearest (overland) Tier 1 node is located in Bristol. In most cases a CP with existing network might have interconnected at the Bristol node. BT has lower tier SDH nodes within the South West (i.e. Tier 2 and 3) but any transmission from lower Tier nodes is classed as backhaul.

6.113 It can be seen that a change in the definition to include traffic between Tier 1 and/or metro nodes would therefore potentially result in a number of backhaul circuits being re-classified as trunk. This would be incorrect as this is not a result of fundamental changes in aggregration opportunities for example due to growth in enterprise traffic. The introduction of additional metro nodes in the South West would also not be likely to result in additional network build to those nodes on the basis of leased lines traffic.

6.114 The inclusion of metro node/Tier 1 as the basis for defining the break between terminating and trunk segments would still not address the issues of potential substitute routes in close proximity. In particular, it would not take account of the possibility of substitution between trunk segments where CPs are able to connect to different but nearby Tier 1 nodes. Using metro nodes (or continuing to use Tier 1 nodes) as a break would not appear to capture this issue.

6.115 Therefore, while Option 1 would entail the least change in methodology used to derive trunk and terminating segments, it would retain the same problems in relation to intra-City routes currently labelled as Trunk. This definition would also encounter issues in relation to the planned (greater) number of metro nodes. On the other hand, this option might be preferred if Option 2 resulted in greater potential distortions.

Option 2: Identification of “aggregation nodes”

6.116 As part of the market definition exercise, it is desirable to apply a “network-neutral” approach. Option 2 could in principle seek to identify the key breaks in the market by relying solely on variations in competitive conditions and abstracting from BT’s network node locations. As explained above, in the discussion under Option 1, in the case of trunk markets, it would not necessarily be desirable to rely solely on BT’s build historic build decisions for its SDH/PDH network or the location of its metro nodes going forward.

6.117 As discussed earlier, we consider that it would not be logical to completely divorce the analysis of trunk competition from the realities of network build by different CPs and BT’s network. In particular, BT’s decision to locate its Tier 1 nodes in part reflects where it was optimal to locate these nodes for the purposes of aggregating leased lines traffic. Furthermore, given the fact that many CPs are reliant on BT for the provision of wholesale leased lines for access and backhaul, this suggests that their network build will relate closely to the location of BT’s network nodes. For example, OCPs have, in many cases, located their points of presence nearby to at least a subset of Tier 1 nodes.

6.118 Therefore, the proximity of Tier 1 nodes approach provides a useful starting point for determining the natural aggregation points on the network. However, Option 2 has the advantage over Option 1, in than it seeks to abstract from BT's network to a greater degree in particular by capturing the key competition issues discussed above.

6.119 We therefore propose to base our assessment of the appropriate break between trunk and symmetric broadband origination on Option 2. The remainder of this section therefore sets out in greater detail the assumptions we have used in applying under Option 2 in order to identify the "aggregation nodes". Following this, we then undertake an assessment of those trunk routes to assess whether specific geographic markets can be applied.

Identification of "aggregation nodes"

6.120 As discussed above, the key issue is whether particular routes can be grouped together based on particular trunk routes providing a reasonable economic substitute for another trunk route in a similar locality. These substitution opportunities come down to an assessment of the costs of interconnection at the various Tier 1 nodes.

6.121 There is a potential trade-off in the decision where to interconnect. OCPs will generally not seek to interconnect at each and every node, particularly where each node is located very close to each other. In some cases the volumes of traffic served by that node may be insufficient to justify an individual point of interconnection there. Equally, where traffic is highly concentrated this may be sufficient for a CP to wish to locate at nodes nearby to each other.

6.122 On this basis, it is likely that the potential traffic (originating or terminating at a particular node) is likely to be a key determinant as to where aggregation opportunities might occur. Furthermore, the extent of concentration of traffic is likely to affect the likely distances between interconnection points with BT's existing Tier 1 nodes. This is likely to vary significantly by the location and CP.

6.123 There is a question about choosing an appropriate distance assumption that captures the substitution opportunities for between trunk routes. The factors determining the distance between "aggregation nodes" where trunk routes would be sustainable may vary significantly between regions. In particular in more densely populated areas it may be the case that the distances involved between points of interconnect might be shorter.

6.124 Ofcom has not sought to undertake a detailed calculation of an appropriate proximity figure for each of the 67 individual BT Tier 1 nodes. Our judgement is that the density of traffic would be the dominant factor to differentiate CPs interconnection decisions in different localities.

6.125 Therefore, we propose to identify three broad categories (i.e. based on the trunk traffic volume originating or terminating at that node) and have applied different proximity assumptions for each of these categories. As London-based traditional interface leased lines traffic accounts for up to one third of all UK traffic, we have identified this as a separate category. We have applied a similar assumption for Tier 1 nodes associated with high volumes (greater than 1500 circuits). For lower volumes, an assumption of 20 to 25km was used and a range of 15 to 20km for medium volume trunk routes.

Table 14: Proximity assumptions applied to trunk routes

Volume category		Distance ranges considered	
		Low	High
London / Greater London		10 km	15km
Rest of UK	Low volume circuits (≤500 circuits)	20km	25km
	Medium volume circuits (>500 & ≤1500)	15km	20km
	High volume circuits (>1500 circuits)	10 km	15km

Source: Ofcom

6.126 The above distance assumptions reflect data Ofcom requested on the potential costs to an OCP of self-provisioning trunk rather than "backhauling" traffic to an existing Tier 1 node. This analysis indicated that, for the example of 2 Mbit/s PPCs (which formed the majority of the circuits purchased by that CP), in many cases it would not be economic for the CP to build its own trunk link where the nearest node was within 30km of another. However, in other cases, the CP highlighted that this distance might be as short as 10km. Within the CLZ, the CP estimated that it would not be economic to build trunk segments for routes less than 10km apart.

6.127 This is also consistent with analysis we undertook of the number of CPs interconnected (or in close proximity) to BT's 67 Tier 1 nodes (set out in figure 1 of Annex 8).

6.128 It was possible from this analysis to assess the nodes at which CPs were interconnected, the distances between Tier 1 nodes, and the traffic associated with particular nodes. Therefore, based on the proximity assumptions in Table 14, it was possible to assess whether or not this broadly captured CP's network build decisions.

Proposed list of "aggregation nodes"

6.129 Based on the proposed proximity assumptions for different circuit volumes set out in Table 14, we have therefore analysed the Tier 1 nodes that can be grouped together. This is based on an assessment of the proximity of nodes to each other, as shown in Annex 8. From this aggregation process, Ofcom has identified 40 "aggregation nodes" based on the consolidation of Tier 1 nodes as set out in Table 15 below.

Table 15: Aggregation node proposals based on major urban centres

ABERDEEN	CRAWLEY/REDHILL	LIVERPOOL	PRESTON
BELFAST	DONCASTER	LONDON	READING
BIRMINGHAM	EDINBURGH	LUTON	SALISBURY
BISHOPS STORTFORD	GLASGOW/CLYDE	MANCHESTER	SHEFFIELD
BRIGHTON	GLOUCESTER	MILTON KEYNES	SLOUGH
BRISTOL	GUILDFORD	NEWCASTLE	SOUTHAMPTON/COSHAM
CAMBRIDGE	IPSWICH	NEWPORT/CARDIFF	SWINDON
CARLISLE	IRVINE	NORTHAMPTON	WARRINGTON
CHELMSFORD	LEEDS	NOTTINGHAM	WOLVERHAMPTON
COVENTRY	LEICESTER	OXFORD	YORK

Source: Ofcom

6.130 The results of this analysis are shown in more details in Annex 8. In that analysis, Ofcom has also sense-checked the above list of nodes by highlighting the nodes at which OCPs apparently have network build and levels of interconnection to these points.

6.131 For example, the above list groups Newport and Cardiff nodes. It can be seen from the analysis presented in Annex 8[ ] that there is limited interconnection at the Newport node (less than 2 CPs are within 10km). In addition, the relatively close proximity of these nodes (circa 18km) and the relatively limited traffic for the Newport area (0.5% of all trunk circuits) suggests that these areas should be grouped together. This is because CPs are in the main unlikely to interconnect at both nodes given the volume and proximities of the nodes.

6.132 A similar process (i.e. identifying the proximity of nodes and assessing interconnection and traffic volumes) was undertaken for each of the above nodes in order to determine whether our proposed list was consistent with the main interconnection points and location of CPs network within the UK.

6.133 On the basis of our proximity analysis, we consider that the above list provides an appropriately consolidated view of the major aggregation points in the UK. Ofcom therefore proposes that trunk segments are defined as circuits between network nodes where one of the nodes is situated in one of the above urban areas and any node situated in a different urban area in the above table. On this basis any (SDH/PDH) traffic between aggregation nodes on the proposed list would be counted as having a trunk component.

Specific scope and location of aggregation nodes

6.134 The above list of aggregation nodes provides an initial view of the Tier 1 nodes that it would be appropriate to aggregate together. Having identified the proposed trunk aggregation nodes, we considered more precisely how the distinction between trunk and backhaul circuits should be drawn. There are two broad ways in which this could be done:

- *Catchment areas*: the first option would be to define catchment areas around each of the trunk nodes which, taken together, would cover the whole of the geographic market. With this approach, any circuit crossing a boundary between two catchment areas would be considered a trunk circuit.
- *Islands*: the alternative would be to define a zone or island around each aggregation node and to define a trunk circuit as any circuit between two islands.

6.135 The two approaches would lead to some circuits which start and end outside the islands being treated differently. This should not be an issue for longer distance circuits because, for example, circuit from a town outside Manchester to a town outside London is likely to be routed via London and Manchester, in which case it would clearly include a trunk segment. However, there will inevitably be some relatively short circuits which would cross a catchment area boundary but for which the efficient routing is direct, rather than via the corresponding trunk islands. Circuits of this type would be considered trunk circuits in the Catchment Area option but not under the Islands option.

6.136 This issue is important because it will affect the way in which competitive parity is achieved between BT and its competitors. In the existing model for TI circuits, BT is obliged to provide PPCs which run from a customer site to a point of presence (POP) in the purchasing CP's network, but does not provide end-to-end wholesale services between customer sites. In this existing model, a CP wishing to provide a short retail circuit which crosses a catchment area boundary has to purchase terminating segments from each customer site to the respective Tier 1 nodes, and then link the Tier 1 nodes using at least some of their own network.

6.137 In order to provide competitive parity, when BT provides a similar circuit, it is required to charge its retail business as if the circuit had been routed via the same Tier 1 nodes, even if the physical routing was in fact much more direct. This is a key feature of the PPC charging model. It is essentially an Equivalence of Outcome (EOO) approach rather than one based on Equivalence of Inputs (EOI). BT is not actually providing the same services to its own downstream business as to its competitors, but it uses its internal transfer charging framework in an attempt to achieve an equivalent outcome.

6.138 However, we are seeking a trunk definition which will operate effectively in a future environment in which AI technology will have an increasingly important role in trunk network provision. And in the AI market, BT provides wholesale end-to-end services (WEES) which link customer premises. When providing short circuits across potential catchment area boundaries, therefore, competing operators are not obliged to purchase partial circuits linking customer sites to their own POPs; they can purchase end-to-end circuits with a more efficient and direct physical routing. This is an EOI approach which provides competitive parity without the need for what might be termed artificial transfer charging arrangements.

6.139 Having considered the relative merits of the two options, Ofcom is inclined towards an approach based on islands rather than catchment areas. This is partly because, as discussed above, it is more in tune with the future direction of network provision, based on AI technology and EOI regulation. A further benefit is that competitive conditions are likely to be more homogeneous within the trunk market if the market boundary is based on islands rather than catchment areas. This is because routes between major urban centres will tend to be the high volume routes where the potential for competition is likely to be relatively high. With a definition based on catchment areas, on the other hand, the market is likely to include some minor routes across catchment area boundaries, where the scope for competition is much more limited.

6.140 It is also relevant to note that, as our work on replicability has revealed, there are some significant weaknesses in the PPC charging model and the extent to which it yields competitive parity (see Annex 13).

6.141 An additional benefit of the islands model is that it avoids the risk of placing potentially inefficient restrictions on the way in which Openreach plans the development of its backhaul network. One element of the thinking behind the BT Undertakings is that Openreach should provide access and backhaul network services, but not trunk. An implication of this is that, if a catchment area model were to be adopted, Openreach might be prevented from developing its backhaul network in an efficient manner, because of the need to avoid crossing catchment area boundaries. Such an outcome would not be in the interests of citizens and consumers.

6.142 It should be noted that the proposed definition of the trunk market, based on islands around aggregation nodes, would not remove the need for BT to continue to apply the PPC charging model as described above. It would only be appropriate to remove that requirement if BT were to provide PPCs on an EOI basis, and that is not proposed.

Geographic assessment

6.143 Having identified trunk routes as falling between "aggregation nodes" in the UK, for the purposes of defining the geographic scope of a trunk market, we have adopted a similar approach to our geographic assessment of wholesale symmetric broadband origination. This is based on three main steps:

- an assessment of potential demand-side and supply-side substitution on specific trunk routes;
- the presence of common pricing constraints across geographic areas; and
- whether different trunk routes might be found to be in the same relevant geographic markets to the extent that competitive conditions in different areas are sufficiently homogeneous.

6.144 We consider each of these steps in turn below.

Demand-side and supply-side substitution

6.145 The principles of demand-side and supply-side substitution also apply to the definition of the geographic scope of the relevant economic market. However, rather than considering alternative products, the analysis assesses the effect on demand for a particular trunk route if a hypothetical monopolist were able to impose a SSNIP on that route. If routes between products in the relevant product market are sufficient substitutes, such as to render the price rise unprofitable, then the geographic scope of the relevant market is widened to include these additional areas. Similar principles apply in relation to supply-side substitution.

Demand-side substitution

6.146 Ofcom considers that our analysis of aggregation nodes has already in the main modelled the potential substitution opportunities between trunk routes. For example, our proximity analysis grouped together all trunk circuits (such as the two potential circuits from BT's Tier 1 nodes to Reading, and a CP's circuit from its London PoP to Reading) as a single London and Reading route. Hence, any trunk circuit between the London "aggregation node" and Reading node is considered as providing a potential constraint on any other circuit between the same route.

6.147 There is a question whether more "indirect" routing might be possible in relation to SDH-trunk. For example, a hypothetical monopolist of a trunk route from London to Reading might be constrained in raising the price of its trunk segment for example by providers with spare capacity on trunk circuits from London to Oxford and Oxford to Reading.

6.148 The relevant test for market definition purposes, in this specific example, is whether a hypothetical monopolist would be constrained from imposing a SSNIP on the London to Reading trunk route (assuming that trunk route was competitively priced). If the costs of the indirect routing were also priced in a cost reflective manner, it would be unlikely that such "indirect" routing would impose a constraint as the distances involved are far higher.

6.149 However, there are other examples where "indirect" routing could impose a constraint. For example, for a trunk route from London to Manchester there could be an intermediate point between both cities (e.g. Birmingham). Therefore, a CP with capacity on routes from London to Birmingham and Birmingham to Manchester could potentially compete for the London to Manchester Route.

6.150 In the context of assessing geographic markets, this might therefore suggest that it would not be appropriate to identify route specific markets. This is because alternate routings possibilities may open up far greater substitution between routes. Clearly, the significance of this issue will depend on the different combinations of routes between aggregation nodes that could be used as substitutes to each other (and that have not been implicitly captured within the analysis of "aggregation"nodes). There is nevertheless the potential that demand-side substitution arising from alternate routing opportunities would point to wider market for trunk.

Supply-side substitution

6.151 In respect of supply-side substitution, it is unlikely that in response to a SSNIP a trunk provider that did not already have capacity between a particular trunk route would be able to substitute to providing capacity on a new trunk route due to the significant cost and sunk nature of investments. On this basis, supply-side substitution is unlikely to impose a relevant constraint.

6.152 In summary, our assessment of demand-side and supply-side opportunities could potentially result in a narrow geographic market definition which treated each trunk route between aggregation nodes. However, given that multiple alternate routes may potentially exist, this may well point to a wider definition, such that it would be inappropriate to define the trunk markets on a route by route basis. In addition, as discussed in relation to symmetric broadband origination services, it is also relevant to consider similarity of competitive conditions and/or whether a common pricing constraint exists across those circuits.

BT's pricing policies

6.153 In principle, it might be expected if there were intensive competition on specific routes that BT may have attempted to de-average its trunk prices, for example such that more competitive routes were priced lower. However, the available evidence shows that BT has not varied its prices for the provision of wholesale trunk segments on a geographic basis. For example, for each bandwidth, BT has a single

national price. This could suggest that there is a national common pricing constraint present, indicating a wider national market for trunk segments.

Geographic variaitions in competitive conditions

6.154 The above discussion suggests potentially mixed evidence on the demand-side regarding whether sub-national markets might exist for individual (or a group) trunk routes between aggregation nodes. In addition BT has chosen to price its trunk segments on a national basis. This is potentially reflective of the fact that competitive conditions are sufficiently homogenous across each of the potential 780 route combinations such that it does not justify separate pricing.

6.155 We have nevertheless also considered below other potential indicators of competitive conditions on the 40 aggregation nodes, in order to assess whether particular routes or set of routes might constitute separate geographic markets. For instance there may be a group of trunk routes between the largest UK cities which might be viewed as potentially more competitive than other trunk routes.

6.156 The geographic assessment of trunk routes is based on a similar methodology set out above in the geographic definition of the various wholesale SBO product markets. Under the assessment of SBO markets earlier in this Section, we sought to identify geographic locations by grouping together postal sectors within the UK with similar conditions of competition. While reflecting the fundamental differences between trunk and SBO, we have followed a similar underlying process for our assessment of trunk, based on the following steps:

- **Identification of the relevant geographic unit:** in the case of the assessment of trunk the relevant geographic unit is each of the relevant potential 780 route combinations;

- **Assessment of indicators of competitive conditions for each geographic unit:** we then identify relevant indicators of competitive conditions on trunk routes and use these indicators to assess potential competition for each route;

- **Group together units with homogenous competitive conditions:** based on the SMP guidelines, the individual trunk routes would be grouped together where the conditions of competition are similar or sufficiently homogeneous and which can be distinguished from neighbouring areas (i.e. other trunk routes) in which the prevailing conditions of competition are appreciably different.

- **Conclude on relevant geographic markets:** the above approach might result in identification of a sub-set of the trunk routes between 40 aggregation nodes that are potentially competitive compared to other routes that are not. However, in reaching any conclusions on geographic markets, Ofcom still needs to weight the available evidence against other factors, such as the apparent common price constraint on trunk and the materiality of potentially competitive routes.

6.157 In the next section we undertake our geographic assessment of trunk based on these steps.

Geographic assessment

Identification of relevant geographic unit

6.158 The relevant geographic unit is based on trunk routes between the 40 aggregation nodes as set out in Table 15. In some cases however a particular route will not have any trunk sales as there are no circuits sold across that route[88]. Therefore, any routes without circuit sales have not been included within our analysis[89].

6.159 Having identified the relevant geographic unit as trunk routes between aggregation nodes, we discuss the potential indicators of competitive conditions for each route.

Indicators of competitive conditions

6.160 We have identified a number of indicators of competitive conditions. These are split into two broad areas: first indicators to assess potentially competitive routes based on CPs' presence on those routes (i.e. how many CPs have potential network capacity to compete with each other on that route); and a second set indicators based on actual service shares on those routes.

CPs presence

6.161 We have counted the number of CPs that could potentially compete across a route by considering whether the CP has a "presence" at either end of the Trunk route. Ofcom has identified two main approaches:

- **Proximity to aggregation nodes:** based on the "proximity" of OCPs (i.e. within a 10km distance) to at least one Tier 1 node located within an aggregation node and at least one Tier 1 node located in at another aggregation node. The intuition is that if they have a point of presence close to at least one Tier 1 node in each City they could potentially compete for that inter-City route if they have network between those two points.

- **Actual network presence:** clearly those CPs who are present at both ends of a trunk route also need to have network infrastructure on that route to impose a constraint on a particular trunk route. It would not be possible to link together specific trunk segments unless the operators have network capacity. This has been assessed on the basis of analysing the extent to which CPs (including BT) are selling circuits to third parties across trunk circuits between aggregation nodes(on the assumption that they are using their own infrastructure to do so).

[88] This is based both on an assessment of the relevant retail demand, which would generate demand for a trunk circuit over that route and any BT or OCP wholesale sales over that route.

[89] We have identified relevant circuits sales across individual trunk routes based on mapping the circuits originating or terminating to a particular post code an assigning each end to the relevant parented Tier 1 node. Where each end is mapped to Tier 1 node that falls within the same aggregation node, this circuit would not be counted as having a trunk component. However, specifically for Belfast, it was not been possible to assess directly traffic to the Belfast aggregation node using this methodology, as it does not currently have a Tier 1 node. However, traffic to Belfast is included within our analysis, as it is mapped to the nearest Tier 1 node which is located within the Irvine aggregation node.

Service shares

6.162 Even if there is greater network presence from other CPs, this may not impose a sufficient competitive constraint across those routes. Therefore, in addition to assessing the scope for CPs to compete for each other based on their network presence, it is also necessary to consider the strength of competition on particular routes. This assessment has been calculated on the basis of the service shares of CPs on each route.

6.163 For trunk routes, where CPs are selling retail circuits that require a trunk segment, this can be supplied by purchasing relevant inputs from third parties or by self-supply. The implied level of self-supply has been calculated by netting from CPs overall trunk requirements the amounts they have purchased from third parties. On this basis it has been possible to calculate BT's service shares on particular routes.

6.164 In addition to the analysis of overall service shares, we also calculate BT's share of sales of trunk circuits to third parties. Although this information alone does not provide an overall picture of service shares on particular routes, this information is informative of the extent to which BT's overall market share tends to be dominated by the supply of circuits to its downstream retail arm.

Identification of routes with homogenous competitive conditions

6.165 The full outputs of CP presence and service share analysis is included in Annex 9. This includes the assessment for trunk routes of CP presence using different distance assumptions; assessment of the relative size of routes based on circuit counts; and the relevant service shares.

6.166 We have applied the following thresholds for identifying potentially competitive routes, before considering actual competition as indicated by service shares:

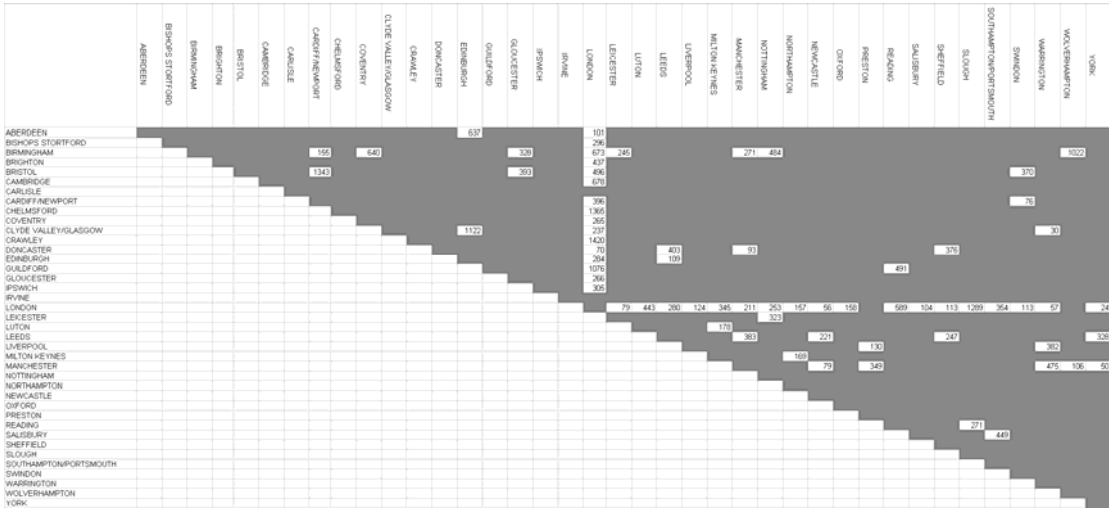
- "2 or more" OCPs with proximity to aggregation nodes (by definition BT will already have presence at Tier 1 nodes);
- "3 or more" CPs (including BT) are selling circuits to third parties on that route; and
- Materiality threshold (for routes with fewer than 10 circuits)

6.167 The above approach assumes that at least 3 CPs are required to be present for a particular route to be potentially competitive. This assumption is consistent with our assessment of the competitive threshold used in our assessment of SBO markets above.

6.168 We set out below the combined results of this analysis. The Figure below shows the number of routes that might be identified as potentially more competitive based on CPs presence on those routes. The grey boxes show the routes that do not pass the above competition thresholds. Routes that meet the conditions in the above bullets (i.e. the routes that have been identified as potentially competitive) are shown based on the relevant size (in terms of weighted circuit counts)[90] for that route. This is to highlight the potential materiality of those routes.

[90] Ofcom has applied the same central assumption for its bandwidth weightings as discussed under our SMP analysis. This is intended to reflect that higher bandwidth circuits are higher value.

Figure 57: Identification of potentially competitive routes

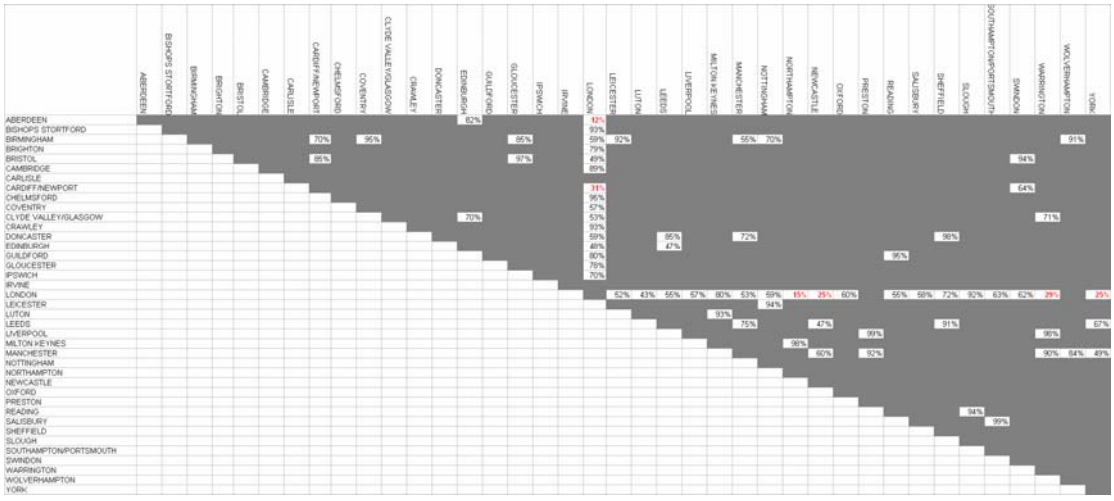


Source: Ofcom

6.169 The above results suggest that based on the above criteria less than 10% of routes are potentially competitive (although this represents nearly 60% of total circuit counts). Therefore, the materiality of the "potentially competitive" trunk routes is relatively high in circuit count terms. This in part reflects the fact that many of these routes appear to either originate or terminate at the London aggregation node.

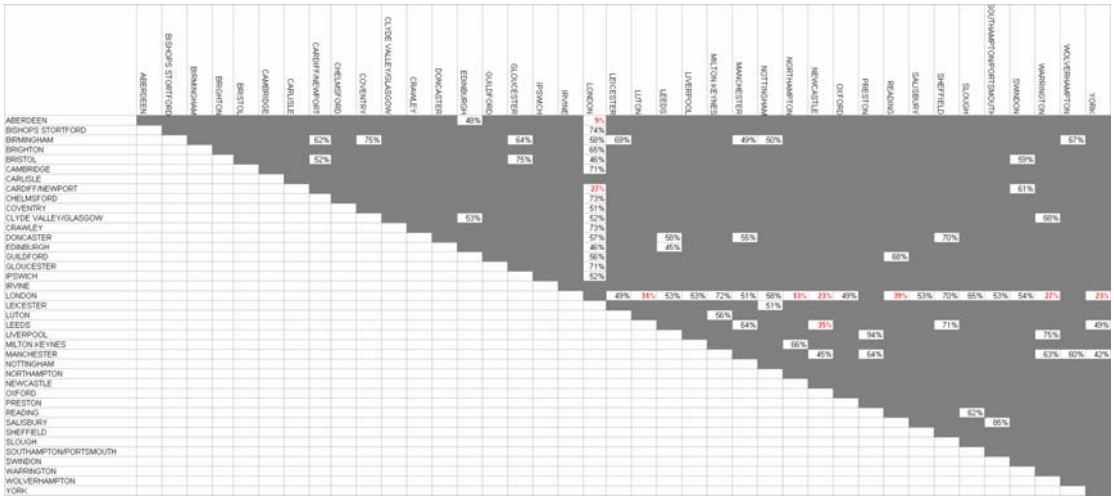
6.170 The above analysis has only identified so far the potentially competitive trunk routes based on potential CP presence on those routes. It does not however provide a complete picture of competitive conditions, which is the key aspect of our geographic analysis. The figures below therefore combine the initial set of routes identified above with our service share analysis for each route.

Figure 58: BT wholesale service shares for routes with potential competition



Source: Ofcom

Figure 59: BT share of third party sales on potentially competitive routes



Source: Ofcom

6.171 The above service share analysis shows BT's service shares on particular routes (based on self-supply and sales to OCPs). We have also considered in Figure 59 BT's share of of third party sales. In both figures, service shares of below 40% are shown in red, whereas service shares above 40% are shown in black.

6.172 In either case, with few exceptions, BT's service shares for individual routes exceed 40%. This is consistent with the aggregate picture for the UK, where BT's service share is well above 40%. Only in the case of 6 trunk routes is BT's service share below 40%, which could be indicative of some variation in competitive conditions on those routes. However, in terms of the materiality of the routes where BT has service share below 40%, they only account for less than 4% of total trunk circuits (weighted by bandwidth).

6.173 It is worth recalling that the assessment of trunk routes for the purpose of our geographic market definition is intended to capture variations in competitive conditions such that it may be appropriate to apply different regulatory remedies (depending on our SMP assessment for those markets). The above analysis has considered whether there are specific routes which it is appropriate to group together on the basis on similarities in competitive conditions on those routes (and that are sufficiently distinct in terms of competitive conditions to other trunk routes in the UK). As shown in the analysis above, there was a subset of routes that have been identified as potentially competitive. But when additional competitive indicators are taken into account, such as BT's service shares, it appears to suggest that for the majority of routes, BT's high service share on most routes does not provide evidence of a sub-national market.

6.174 Indeed, this result is supported more generally by other evidence considered within our geographic assessment. In particular in the case of BT's pricing of trunk, it still applies a national price. Therefore, it appears that even on the routes where potential competitors to BT exist, this have not imposed a sufficient constraint on BT's trunk sales to warrant it de-averaging its pricing. Ofcom therefore considers that it is appropriate to define a national market for trunk segments.

Conclusion on relevant geographic markets for trunk

6.175 Ofcom's proposed conclusion from the above geographic analysis is that there do not appear to be significant variations in competitive conditions to justify identification of a separate market for individual trunk routes.

6.176 There are a number of routes that appear to be subject to a potential competitive pressure from other CPs. However, on those routes, the available evidence suggests that this CP presence is insufficient to exert a significant competitive pressure on BT. In particular, there are a very small number of routes where BT has service shares below 40%. These routes only account for around 4% of the total number of trunk circuits (based on a weighted circuit count for trunk).

6.177 In addition, to the above analysis, a national common price constraint appears to exist for trunk. This shows that BT has chosen not to de-average its prices for the provision of wholesale trunk segments on a geographic basis. This provides further evidence that BT is not subject to significant variations in competitive constraints on particular routes.

6.178 On this basis, Ofcom has concluded that there is a national market for trunk based on the presence of a national common pricing constraint present and the limited number of routes that are potentially more competitive.

Summary of conclusions of wholesale geographic market definitions in each of the relevant wholesale product markets

6.179 From the analysis above we conclude the following wholesale leased lines markets exist in the UK:

- low bandwidth traditional interface symmetric broadband origination up to and including 8Mbit/s in the UK (excluding the Hull area);
- low bandwidth traditional interface symmetric broadband origination up to and including 8Mbit/s in the Hull area;
- high bandwidth traditional interface symmetric broadband origination above 8Mbit/s up to and including 45Mbit/s in the UK (excluding CELA and the Hull area);
- high bandwidth traditional interface symmetric broadband origination above 8Mbit/s up to and including 45Mbit/s in the CELA;
- high bandwidth traditional interface symmetric broadband origination above 8Mbit/s up to and including 45Mbit/s in the Hull area;
- very high bandwidth traditional interface symmetric broadband origination over 45 Mbit/s in the UK (excluding the Hull area);
- very high bandwidth traditional interface symmetric broadband origination over 45 Mbit/s in the Hull area;

- low bandwidth alternative interface symmetric broadband origination up to and including 1Gbit/s in the UK (excluding the Hull area);
- low bandwidth alternative interface symmetric broadband origination up to and including 1Gbit/s in the Hull area;
- high bandwidth alternative interface symmetric broadband origination over 1Gbit/s in the UK (excluding the Hull area); and
- high bandwidth alternative interface symmetric broadband origination over 1Gbit/s in the Hull area; and
- trunk segments in the UK..
- The next section now assesses whether any operator has SMP in any of these relevant markets.

6.180 The next section assesses whether any operator has SMP in any of these relevant markets.

Question 6: Do stakeholders agree with our proposed wholesale geographic market definitions? In particular, do you agree with Ofcom that a separate market now exists in the UK for high bandwidth TISBOs in the Central and East London Area (CELA)?