

# Business Connectivity Market Review

Review of the retail leased lines, wholesale symmetric broadband origination and wholesale trunk segments markets

> > **Draft Statement**

Notified to the European Commission: 21 February 2013

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# Annex 1

# List of respondents to our consultations

- A1.1 On 18 June 2012 we published the BCMR Consultation, setting out our proposals for our market review of business connectivity services.<sup>1</sup>
- A1.2 On 5 July 2012 we published the LLCC Consultation, setting out our proposals for charge controls for certain business connectivity markets.<sup>2</sup>
- A1.3 The following stakeholders provided written responses to the BCMR Consultation and the LLCC Consultation:
  - BT;
  - Cable and Wireless Worldwide;
  - Colt;
  - Everything Everywhere;
  - Exponential-e;
  - Geo Networks;
  - KCOM Group;
  - Level 3;
  - National Education Network;
  - Sky;
  - SSE;
  - TalkTalk;
  - Telefónica;
  - Telephony Services Limited;
  - UK Competitive Telecommunications Association (UKCTA);
  - Verizon;
  - Virgin Media;
  - Vodafone;
  - Vtesse;

<sup>&</sup>lt;sup>1</sup> <u>http://stakeholders.ofcom.org.uk/consultations/business-connectivity-mr/</u>

<sup>&</sup>lt;sup>2</sup> <u>http://stakeholders.ofcom.org.uk/consultations/llcc-2012/?a=0</u>

- Zen Internet; and
- One other communications provider who asked us not to publish its name.
- A1.4 We have published non-confidential versions of the responses from all the companies named above. These can be found on our website.<sup>3</sup>
- A1.5 On 15 November 2012 we published the November BCMR Consultation setting out further proposals in connection with our review of business connectivity markets. The following stakeholders provided responses to the consultation:
  - BT;
  - Cable and Wireless Worldwide;
  - Easynet;
  - Everything Everywhere;
  - Level 3;
  - Sky;
  - TalkTalk;
  - Verizon; and
  - Virgin Media.
- A1.6 We have published non-confidential versions of the responses the consultation from all the companies listed above. These can be found on our website.<sup>4</sup>

<sup>&</sup>lt;sup>3</sup> <u>http://stakeholders.ofcom.org.uk/consultations/business-connectivity-</u> mr/?showResponses=true&pageNum=1#responses

http://stakeholders.ofcom.org.uk/consultations/llcc-2012/?showResponses=true&pageNum=1#responses

<sup>&</sup>lt;sup>4</sup> <u>http://stakeholders.ofcom.org.uk/consultations/bcmr-reconsultation/?showResponses=true</u>

Annex 2

# **Regulatory Framework**

# Introduction

- A2.1 This Annex provides an overview of the market review process, to give some additional context and understanding of the matters discussed in the main body of this document and the legal instruments (statutory notifications) published at Annex 7 and Annex 8.
- A2.2 Market review regulation is technical and complex, including the legislation and the recommendations and guidelines that we need to consider as part of the process. There may be many relevant documents depending on the market and/or issues in question. This overview does not purport to give a full and exhaustive account of all such materials that we have considered in reaching our preliminary views on this market. Some of the key aspects of materials relevant to this market review are, however, discussed in this Annex. Additionally, Annex 15 lists the main sources of evidence we have relied upon, including further relevant legislation, recommendations and guidance.

# Market review concept

- A2.3 The concept of a market review refers to procedures under which we at regular intervals identify relevant markets appropriate to national circumstances, carry out analyses of these markets to determine whether they are effectively competitive and then decide on appropriate remedies (known as Significant Market Power (SMP) obligations or conditions). We explain the concept of SMP below.
- A2.4 In carrying out this work, we act in our capacity as the sector-specific regulator for the UK communications industries, particularly relating to our role as the regulator for telecommunications. Our functions in this regard are to be found in Part 2 of the Communications Act 2003 (the Act)<sup>5</sup>. We exercise those functions within the framework harmonised across the European Union for the regulation of electronic communications by the Member States (known as the Common Regulatory Framework or the 'CRF'), as transposed by the Act. The applicable rules<sup>6</sup> are contained in a package of five EC Directives, of which two Directives are immediately relevant for these purposes, namely:
  - Directive 2002/21/EC on a common regulatory framework for electronic communications networks and services (the Framework Directive); and
  - Directive 2002/19/EC on access to, and interconnection of, electronic communications networks and associated facilities (the Access Directive).
- A2.5 The Directives require that NRAs (such as Ofcom) carry out reviews of competition in communications markets to ensure that SMP regulation remains appropriate and proportionate in the light of changing market conditions.

<sup>&</sup>lt;sup>5</sup> <u>http://www.legislation.gov.uk/ukpga/2003/21/contents</u>

<sup>&</sup>lt;sup>6</sup> The Directives have recently been reviewed and amendments were adopted on 19 December 2009. The amendments have been transposed into the national legislation and applied with effect from 26 May 2011.

- A2.6 Each market review normally has three stages, namely:
  - the procedure for the identification and definition of the relevant markets (the market definition procedure);
  - the procedure for the assessment of competition in each market, in particular whether the relevant market is effectively competitive (the market analysis procedure); and
  - the procedure for the assessment of appropriate regulatory obligations (the remedies procedure).
- A2.7 These stages are normally carried out together.

# Market definition procedure

- A2.8 The Act provides that, before making a market power determination<sup>7</sup>, we must identify the market, which is, in our opinion, the one which, in the circumstances of the UK, is the market in relation to which it is appropriate to consider making such a determination and to analyse that market.
- A2.9 The Framework Directive requires that NRAs shall, taking the utmost account of the EC's Recommendation<sup>8</sup> and SMP Guidelines<sup>9</sup> published by the European Commission, define the relevant markets appropriate to national circumstances, in particular relevant geographic markets within their territory, in accordance with the principles of competition law.
- A2.10 The EC's Recommendation identifies a set of product and service markets within the electronic communications sector in which *ex ante* regulation may be warranted. Its purpose is twofold. First, seeking to achieve harmonisation across the single market by ensuring that the same markets will be subject to a market analysis in all Member States. Secondly, providing legal certainty by making market players aware in advance of the markets to be analysed. However, NRAs are able to regulate markets that differ from those identified in the EC's Recommendation where this is justified by national circumstances taking account of the three cumulative criteria referred to in the EC's Recommendation<sup>10</sup> (the "three-criteria test") and where the European Commission does not raise any objections.
- A2.11 The fact that an NRA identifies the product and service markets listed in the 2007 Commission Recommendation or identifies other product and service markets that meet the three-criteria test does not mean that regulation is warranted. Market

<sup>&</sup>lt;sup>7</sup> The market power determination concept is used in the Act to refer to a determination that a person has SMP in an identified services market.

<sup>&</sup>lt;sup>8</sup> Commission Recommendation of 17 December 2007 on relevant product and service markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communication networks and services.

<sup>&</sup>lt;sup>9</sup> http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2002:165:0006:0031:EN:PDF

<sup>&</sup>lt;sup>10</sup> The Recommendation states that, "[w]hen identifying markets other than those set out in the Annex, national regulatory authorities should ensure that the following three criteria are cumulatively met: (a) the presence of high and non-transitory barriers to entry. These may be of a structural, legal or regulatory nature; (b) a market structure which does not tend towards effective competition within the relevant time horizon. The application of this criterion involves examining the state of competition behind the barriers to entry; (c) the insufficiency of competition law alone to adequately address the market failure(s) concerned."

definition is not an end in itself but is a means of assessing effective competition. The three-criteria test is also different from the SMP assessment because the test's focus is on the general structure and market characteristics.

- A2.12 The relationship between the market definitions identified in this review and those listed in the 2007 Commission Recommendation is discussed in Section 7 of this consultation document<sup>11</sup>.
- A2.13 The SMP Guidelines make clear that market definition is not a mechanical or abstract process. It requires an analysis of any available evidence of past market behaviour and an overall understanding of the mechanics of a given sector. As market analyses have to be forward-looking, the Guidelines state that NRAs should determine whether the market is prospectively competitive, and thus whether any lack of effective competition is durable, by taking into account expected or foreseeable market developments over the course of a reasonable period. They clarify that NRAs enjoy discretionary powers that reflect the complexity of all the relevant factors that must be assessed (economic, factual and legal) when identifying the relevant market, and assessing whether an undertaking has SMP.
- A2.14 The SMP Guidelines also describe how competition law methodologies may be used by NRAs in their analyses. In particular, there are two dimensions to the definition of a relevant market: the relevant products to be included in the same market and the geographic extent of the market. Ofcom's approach to market definition follows that used by the UK competition authorities, which is in line with the approaches adopted by the European Commission.
- A2.15 While such methodologies are being used in identifying the *ex ante* markets, they will not necessarily be identical to markets defined in individual competition law cases. This may be the case, especially as the former is based on an overall forward-looking assessment of the structure and the functioning of the market under examination. Accordingly, the economic analysis carried out for the purpose of this review, including the identified markets, is without prejudice to any analysis that may be carried out in relation to any investigation pursuant to the Competition Act 1998<sup>12</sup> (relating to the application of the Chapter I or II prohibitions or Article 101 or 102 of the EC Treaty<sup>13</sup>) or the Enterprise Act 2002.<sup>14</sup>

# Market analysis procedure

## **Effective competition**

A2.16 The Act requires that, at such intervals as we consider appropriate, we carry out market analyses of identified markets for the purpose of making or reviewing market power determinations. In any event, such analyses are to be carried out as soon as reasonably practicable after recommendations are made by the European Commission that affect matters that were taken into account, or could have been taken into account, in the case of our last analysis of that market.

<sup>&</sup>lt;sup>11</sup> Where we set out how we consider the three criteria test is cumulatively satisfied for each of the relevant markets which are not included in the EC's Recommendation but which we propose are markets in which ex ante regulation is warranted.

<sup>&</sup>lt;sup>12</sup> <u>http://www.legislation.gov.uk/ukpga/1998/41/contents</u>

<sup>&</sup>lt;sup>13</sup> Previously Article 81 and Article 82 of the EC treaty, <u>http://eur-</u> lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2010:083:FULL:EN:PDF

<sup>&</sup>lt;sup>14</sup> <u>http://www.legislation.gov.uk/ukpga/2002/40/contents</u>

- A2.17 In carrying out a market analysis, the key issue for an NRA is to determine whether the market in question is effectively competitive. The 27<sup>th</sup> recital to the Framework Directive clarifies the meaning of that concept. Namely, "[it] is essential that *ex ante* regulatory obligations should only be imposed where there is not effective competition, i.e. in markets where there are one or more undertakings with significant market power, and where national and Community competition law remedies are not sufficient to address the problem".
- A2.18 The definition of SMP is equivalent to the concept of dominance as defined in competition law. The Framework Directive requires, however, that NRAs must carry out market analysis taking the utmost account of the SMP Guidelines. The latter emphasise that NRAs should undertake a thorough and overall analysis of the economic characteristics of the relevant market before coming to a conclusion as to the existence of significant market power.
- A2.19 In that regard, the SMP Guidelines set out, additionally to market shares, a number of criteria that can be used by NRAs to measure the power of an undertaking to behave to an appreciable extent independently of its competitors, customers and consumers, including (a) overall size of the undertaking; (b) control of infrastructure not easily duplicated; (c) technological advantages or superiority; (d) absence of or low countervailing buying power; (e) easy or privileged access to capital markets/financial; (f) resources; (g) product/services diversification (e.g. bundled products or services); (h) economies of scale; (i) economies of scope; (j) vertical integration; (k) highly developed distribution and sales network; (l) absence of potential competition; and (m) barriers to expansion. A dominant position can derive from a combination of these criteria, which taken separately may not necessarily be determinative.

# Sufficiency of competition law

- A2.20 As part of our overall forward-looking analysis, we also assess whether competition law by itself (without *ex ante* regulation) is sufficient, within the relevant markets we have defined, to address the competition problems we have identified. Aside from the need to address this issue as part of the three-criteria test, we also consider this matter in our assessment of the appropriate remedies which, as explained below, are based on the nature of the specific competition problems we identify in the relevant markets as defined. We also note that the SMP Guidelines clarify that, if NRAs designate undertakings as having SMP, they must impose on them one or more regulatory obligations.
- A2.21 In considering this matter, we bear in mind the specific characteristics of the relevant markets we have defined. Generally, the case for *ex ante* regulation is based on the existence of market failures, which, by themselves or in combination, mean that competition might not be able to become established, if the regulator relied solely on its *ex post* competition law powers that are established for dealing with more conventional sectors of the economy. Therefore, it is appropriate for *ex ante* regulation to be used to address these market failures and any entry barriers that might otherwise prevent effective competition from becoming established in the relevant markets we have defined. By imposing *ex ante* regulation that promotes competition, it may be possible to reduce such regulation over time, as markets become more competitive, and place greater reliance on *ex post* competition law.
- A2.22 *Ex post* competition law is also unlikely in itself to bring about effective competition, as it prohibits the abuse of dominance rather than the holding of a dominant position. In contrast, *ex ante* regulation is normally needed actively to promote the

development of competition. *Ex ante* regulation attempts to reduce the level of market power in identified relevant markets, thereby encouraging effective competition to become established. This is particularly the case when addressing the effects of network externalities, because the network externality effect generally re-enforces a dominant position and, as noted above, under general competition law there is no prohibition on the holding of a position of dominance in itself. Therefore, it is more appropriate to address the impact of network externality through *ex ante* obligations.

A2.23 Additionally, unless we consider otherwise in relation to a specific obligation in this review, we generally take the view that *ex ante* regulation is needed to create legal certainty for the market under review. Linked to that certainty is the fact that the SMP obligations we have proposed are necessary to enable us to intervene in a timely manner. For some other specific obligations, we generally consider that they are needed as competition law would not remedy the particular market failure, or we believe that specific clarity and detail of the obligation is required to achieve a particular result.

# **Remedies procedure**

## Powers and legal tests

- A2.24 The Framework Directive prescribes what regulatory action NRAs must take depending upon whether or not an identified relevant market has been found effectively competitive. Where a market has been found effectively competitive, NRAs are not allowed to impose SMP obligations and must withdraw such obligations where they already exist. On the other hand, where the market is found not effectively competitive, the NRAs must identify the undertakings with SMP on that market and then impose appropriate obligations.
- A2.25 NRAs have a suite of regulatory tools at their disposal, as reflected in the Act. Specifically, the Access Directive specifies a number of SMP obligations, including transparency, non-discrimination, accounting separation, access to and use of specific network elements and facilities, price control and cost accounting. When imposing a specific obligation, the NRA will need to demonstrate that the obligation in question is based on the nature of the problem identified, proportionate and justified in the light of the policy objectives as set out in Article 8 of the Framework Directive.
- A2.26 Specifically, for each and every proposed SMP obligation, we explain why it satisfies the test that the obligation is: (a) objectively justifiable in relation to the networks, services, facilities, apparatus or directories to which it relates; (b) not such as to discriminate unduly against particular persons or against a particular description of persons; (c) proportionate to what the condition or modification is intended to achieve; and (d) in relation to what it is intended to achieve, transparent.
- A2.27 Additional legal requirements may also need to be satisfied depending on the SMP obligation in question, for example, for price controls where the NRA's market analysis must indicate that the lack of effective competition means that the operator concerned might sustain prices at an excessively high level, or apply a price squeeze, to the detriment of end-users. In that instance, NRAs must take into account the investment made by the operator and allow him a reasonable rate of return on adequate capital employed, taking into account the risks involved, as well as ensure that any cost recovery mechanism or pricing methodology that is mandated serves to promote efficiency and sustainable competition and maximise

consumer benefits. Where an obligation to provide third parties with network access is considered appropriate, NRAs must take into account factors including the feasibility of the proposed network access, the technical and economic viability of creating networks<sup>15</sup> that would make the network access unnecessary, the investment of the network operator who is required to provide access<sup>16</sup> and the need to secure effective competition<sup>17</sup> in the long term.

A2.28 To the extent relevant to this review, we demonstrate the application of these requirements to the SMP obligations in question at Sections 9 to 14 of this document. In doing so, we also set our assessment of how, in our opinion, the performance of our general duties under section 3 of the Act is secured or furthered by our regulatory intervention, and that it is in accordance with the six Community requirements in section 4 of the Act. This assessment is also relevant to our assessment of the likely impact of implementing our proposals. A number of specific point should be noted in this regard.

## Ofcom's general duties - section 3 of the Act

- A2.29 Under the Act, our principal duty in carrying out functions is to further the interests of citizens in relation to communications matters and to further the interests of consumers in relevant markets, where appropriate by promoting competition.
- A2.30 In so doing, we are required to secure a number of specific objectives and to have regard to a number of matters set out in section 3 of the Act.
- A2.31 In performing our duties, we are also required to have regard to a range of other considerations, as appear to us to be relevant in the circumstances. In this context, we consider that a number of such considerations are relevant, namely:
  - the desirability of promoting competition in relevant markets;
  - the desirability of encouraging investment and innovation in relevant markets; and
  - the desirability of encouraging the availability and use of high speed data transfer services throughout the United Kingdom.
- A2.32 We have also had regard to the principles under which regulatory activities should be transparent, accountable, proportionate, consistent, and targeted only at cases in which action is needed, as well as the interest of consumers in respect of choice, price, quality of service and value for money.
- A2.33 Ofcom has, however, a wide measure of discretion in balancing its statutory duties and objectives. In so doing, we will take account of all relevant considerations, including responses received during our consultation process, in reaching our conclusions.

<sup>&</sup>lt;sup>15</sup> Including the viability of other network access products, whether provided by the dominant provider or another person.

<sup>&</sup>lt;sup>16</sup> Taking account of any public investment made.

<sup>&</sup>lt;sup>17</sup> Including, where it appears to us to be appropriate, economically efficient infrastructure-based competition.

# European Community requirements for regulation - section 4 of the Act

- A2.34 As noted above, our functions exercised in this review fall under the CRF. As such, section 4 of the Act requires us to act in accordance with the six European Community requirements for regulation.
- A2.35 In summary, these six requirements are:
  - to promote competition in the provision of electronic communications networks and services, associated facilities and the supply of directories;
  - to contribute to the development of the European internal market;
  - to promote the interests of all persons who are citizens of the European Union;
  - to take account of the desirability of Ofcom's carrying out of its functions in a manner which, so far as practicable, does not favour one form of or means of providing electronic communications networks, services or associated facilities over another – i.e. to be technologically neutral;
  - to encourage, to such extent as Ofcom considers appropriate for certain prescribed purposes, the provision of network access and service interoperability, namely securing efficient and sustainable competition, efficient investment and innovation, and the maximum benefit for customers of CPs;
  - to encourage compliance with certain standards in order to facilitate service interoperability and secure freedom of choice for the customers of CPs.
- A2.36 We considered that the first, third, fourth and fifth of those requirements are of particular relevance to the matters under review and that no conflict arises in this regard with those specific objectives in section 3 that we consider are particularly relevant in this context.

# **Regulated entity**

- A2.37 The power in the Act to impose an SMP obligation by means of an SMP services condition provides that it is to be applied only to a 'person' whom we have determined to be a 'person' having SMP in a specific market for electronic communications networks, electronic communications services or associated facilities (i.e. the 'services market').
- A2.38 The Framework Directive requires that, where an NRA determines that a relevant market is not effectively competitive, it shall identify 'undertakings' with SMP on that market and impose appropriate specific regulatory obligations. For the purposes of EC competition law, 'undertaking' includes companies within the same corporate group (*Viho v Commission* Case C-73/95 P [1996] ECR I-5447<sup>18</sup>), for example, where a company within that group is not independent in its decision making.
- A2.39 We consider it appropriate to prevent a dominant provider to whom a SMP service condition is applied, which is part of a group of companies, exploiting the principle of corporate separation. The dominant provider should not use another member of its group to carry out activities or to fail to comply with a condition, which would otherwise render the dominant provider in breach of its obligations.

<sup>&</sup>lt;sup>18</sup> <u>http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:61995CJ0073:EN:PDF</u>

# Annex 3

# Approach to market definition

- A3.1 This Annex supplements the analysis that identifies relevant leased lines markets set out in Sections 3 to 6 of this statement by discussing in more detail the approach we have taken in defining these markets. This Annex also builds on our more general description of the market definition procedure explained in Annex 2, which provides an overview of the market review process.
- A3.2 Specifically, this Annex is divided into three parts to explain the approach we have taken in our analysis:
  - first, we provide an overview of the various stages involved in our analysis of the retail and wholesale markets, including the sequencing that conceptually needs to be followed for a proper assessment;
  - second, we discuss issues and criteria for defining the services market;
  - finally, we provide background to our analysis of the geographical dimension of the related services market.

# **Overview of analytical stages**

## Sequencing of retail and wholesale market definition

- A3.3 In defining markets for market review purposes, our main EU law obligation is to define relevant markets appropriate to national circumstances in accordance with the principles of competition law, taking the utmost account of the Commission's Recommendation and the SMP Guidelines.<sup>19</sup>
- A3.4 We explain in Section 4 how we have taken such account in analysing the markets in light of the market identified in the Recommendation as wholesale terminating segments of leased lines (irrespective of the technology used to provide leased or dedicated capacity), together with our reasons for why we consider the three criteria referred to in the Recommendation are met in relation to our proposals.
- A3.5 Our focus in this Annex is therefore on describing our analytical approach in applying the competition law principles relevant to the identification of markets. We focus in particular on explaining our approach in relation to specific aspects of those principles to assist stakeholders in considering our analysis and proposals. For a fuller explanation of the principles themselves, stakeholders will find a useful summary of them in the SMP Guidelines.
- A3.6 While we describe below our analytical approach to market definition, it should be borne in mind that this is not a mechanical or abstract process. The approach is a dynamic one based on our overall understanding of the leased lines markets taking account of available evidence of past behaviour as well as our forward-looking analysis over the forecast period reflecting the characteristics of the retail and wholesale leased lines markets and the factors likely to influence their competitive development. It should therefore be recognised that market definition is not an end

<sup>&</sup>lt;sup>19</sup> Article 15(3) of the Framework Directive.

in itself, but a means to an end. Market definition aids the assessment of whether competitors, customers and ultimate consumers of a product are protected by effective competition and so whether there is a requirement for the imposition of *ex ante* regulation.

A3.7 There is another introductory point to make for the purpose of explaining the approaches we discuss in this Annex. Under competition law principles, it is conventional to consider two dimensions to the definition of a relevant market: the products to be included in the same market and the geographic extent of the market. As such, it is practical to define the relevant product market before exploring the geographic dimension of the market. However, there is another aspect that often needs to be taken into account - especially in the electronic communications sector - in dealing with those two dimensions, namely the possible existence of retail and wholesale markets relating to the products/services in question. In that regard, our starting point for identifying markets where there may be a requirement for the imposition of ex ante regulation is the definition of retail markets from a forward-looking perspective (Stage 1). The wholesale market is defined subsequent to this exercise being carried out (Stage 2). This approach follows the approach set out in the Recommendation.<sup>20</sup> Figure 71 below sets out the sequences of our market definition analysis.

## Figure 71: Sequencing of market definition analysis



A3.8 The analysis of retail market definition is logically prior to the definition of wholesale markets because the demand for the upstream wholesale service is a derived

<sup>&</sup>lt;sup>20</sup> See Recital 4 of the EC's Recommendation and sections 2.1 and 4 of the Explanatory Note to the EC's Recommendation.

demand – i.e. the level of the demand for the upstream input depends on the demand for the retail service. Hence, if the upstream input accounts for a sufficiently large proportion of the downstream price, the range of available substitutes at the downstream (retail) level will inform the likely range of substitutes for the upstream (wholesale) service. This is because a rise in the price of a wholesale service which is passed through in the price of one retail service will cause retail customers to switch to substitute retail products, reducing demand for the wholesale input.

A3.9 Consequently, Stages 1 (retail market definition) and 2 (wholesale market definition) should be regarded as one exercise, the purpose of which is to define those wholesale markets in the UK where there may be a requirement for the imposition of *ex ante* regulation.<sup>21</sup>

# Relevance of existing SMP regulation – the modified Greenfield approach

- A3.10 When we conduct our market definition, we assume that there is no SMP regulation in place in the market being considered.<sup>22</sup> This means we conduct Stage 1 in the absence of SMP regulation, both at the retail and at the wholesale level because, as stated above, Stages 1 and 2 have a single purpose which is to define the relevant wholesale markets. To do otherwise would mean that the subsequent wholesale market power assessment (Stage 3) would be informed by a previous retail market definition that itself relied on a wholesale regulatory remedy arising from the finding of wholesale market power. This would be a circular and incorrect approach to market definition.
- A3.11 We conduct Stage 2 of our market definition analysis in the absence of SMP regulation at the wholesale level. However, at Stage 2, it is appropriate to take into *ex ante* regulation arising from SMP findings in separate, upstream markets such as the wholesale local access markets, in particular the existence of regulated LLU inputs.<sup>23</sup>

# Stage 1 does not require defining the geographic scope of the retail markets

A3.12 As explained above, Stage 1 is conducted in the absence of SMP regulation, both at the retail and at the wholesale level. However, in the absence of SMP regulation, there would be no (or limited) voluntary sale of wholesale products to third parties<sup>24</sup> which would mean, effectively, there would be no (merchant) wholesale market. As we cannot observe retail markets as they would be in the absence of SMP regulation in wholesale markets, Stage 1 is therefore conducted under a

<sup>&</sup>lt;sup>21</sup> Recital 4 of the EC's Recommendation states "[h]aving defined retail markets, it is then appropriate to identify *relevant* wholesale markets" (emphasis added).

<sup>&</sup>lt;sup>22</sup> The so-called modified Greenfield approach. See also section 2.5 of the Explanatory Note to the EC's Recommendation.

<sup>&</sup>lt;sup>23</sup> E.g. the availability of LLU products could be used to provide symmetric DSL services and could potentially impact on operators' build or buy decisions regarding the particular retail products they provide and which may act as potential substitutes to leased lines services. The working assumption for the purpose of this market review is that such existing SMP regulation will remain for the period of this market review – i.e. for 3 years.

 $<sup>^{24}</sup>$  As was the case before BT was required to offer PPCs. The current extent of retail competition reflects the impact of regulation in wholesale leased lines markets which makes it possible for multiple operators to offer retail leased line services – i.e. by enabling operators to use a wholesale product BT is obliged to supply which enables them to provide a retail service.

hypothetical scenario<sup>25</sup> where the competitive provision of leased lines at the retail level relies either on:

- vertically integrated operators supplying retail end-users based on their own network; or
- commercially negotiated supply of wholesale services from third party operators.
- A3.13 As explained below<sup>26</sup>, regarding the commercially negotiated supply of wholesale services from third party operators, we consider incentives to provide wholesale services to rivals would be sufficiently weak as to have an insignificant impact on our assessment of competitive provision of leased lines at the retail level in our hypothetical scenario. Consequently, without access to a wholesale product from BT, competition at the retail level between BT and other operators would then be on the basis of end-to-end provision by operators with their own networks.
- A3.14 Since both Stages 1 and 2 are conducted in the absence of SMP regulation, it follows that for both Stage 1—where we consider the competitive provision of leased lines at the retail level between BT and other operators in our hypothetical scenario—and Stage 2—where we consider the competitive provision of leased lines at the wholesale level between BT and other operators—the provision of the service would be dependent on operators' own networks.
- A3.15 Consequently, given that competition would be between vertically integrated operators, the geographic pattern of retail competition in our hypothetical scenario would come to resemble the pattern of competition in the wholesale markets themselves. In the absence of SMP regulation and irrespective of whether a retail or wholesale service is being provided, the network used to provide the service will be deployed either directly to where the end-user is located or in sufficient proximity to where there is end-user demand for leased lines services.
- A3.16 Hence, at Stage 1, the retail geographic market definition is not necessary to inform the analysis of wholesale markets under Stage 2 and we proceed directly to our geographic market definition in wholesale markets once we have defined the retail product markets.

## Stage 4 does require defining the geographic scope of the retail markets

- A3.17 Stage 4 is conducted where we consider that the imposition of SMP regulation in the relevant wholesale market(s) would be insufficient to address the lack of effective competition at the retail level.<sup>27</sup>
- A3.18 Here the purpose is to identify a retail market, or markets, in which ex ante regulation may we warranted. It is done on the assumption all upstream i.e.

<sup>&</sup>lt;sup>25</sup> This is consistent with the EC's Recommendation (see Recital 4).

<sup>&</sup>lt;sup>26</sup> See our assessment of supply-side substitutability in the sub-section below Product market definition in this market review.

<sup>&</sup>lt;sup>27</sup> See Recital 15 of the EC's Recommendation. See also Annex 6 on the Regulatory Framework which explains this in more detail. We set out in Section 7 our proposed findings on SMP in the relevant retail markets we propose to define. In Sections 9 and 14 we identify the competition problems in each of the relevant retail markets and how we consider Community and national competition law remedies are not sufficient to address those competition problems, which leads us to consider that competition in the relevant retail markets is not effective. In Sections 10 to 15 we also demonstrate why, in our view, the imposition of SMP regulation in the relevant retail markets.

wholesale – SMP regulation, including proposed upstream SMP regulation, applies. In carrying out this exercise we conduct both a product, using the product market definitions from Stage 1, and a geographic market definition.

# Approach to services market

## Main criteria for defining the services market

- A3.19 As explained above, markets should be defined in a way that is independent of the infrastructure being used<sup>28</sup>, on a forward-looking basis and in accordance with the principles of competition law.
- A3.20 Market boundaries are determined by identifying constraints on the price setting behaviour of operators.<sup>29</sup> To identify the product market boundaries in this review, we consider the following<sup>30</sup>:
  - demand-side and supply-side substitution; and
  - homogeneous competitive conditions.

#### Demand-side and supply-side substitution

- A3.21 This involves considering the following:
  - to what extent is it possible for end-users to substitute to other products or services for those in question (demand-side substitution); and
  - to what extent can operators switch, or increase, production to supply the relevant products or services (supply-side substitution) in response to a relative price increase.
- A3.22 The hypothetical monopolist test (HMT) is a useful tool to identify close demandside and supply-side substitutes. A product is considered to constitute a separate market if a hypothetical monopoly operator could impose a small but significant, non-transitory price increase (SSNIP) above the competitive level without losing sales to such a degree as to make this unprofitable (so-called SSNIP test). If such a price rise would be unprofitable, the market definition should be expanded to include the substitute products. We have used a price 5 to 10% above competitive levels as our small but significant price increase.<sup>31</sup>
- A3.23 In applying the HMT, it is standard to begin with a fairly narrow view of the relevant market and then expand that market to include effective substitutes.

A3.24 We define markets first on the demand side.

<sup>&</sup>lt;sup>28</sup> Excluding Stage 4 of the market definition analysis where, as explained above, the purpose is to define retail markets in which ex ante regulation may we warranted and as such this exercise includes an assumption that all upstream – i.e. wholesale – SMP regulation, including proposed upstream SMP regulation, applies.

<sup>&</sup>lt;sup>29</sup> See, for example, paragraph 38 of the SMP Guidelines.

<sup>&</sup>lt;sup>30</sup> The SMP Guidelines also identify potential competition as a source of competitive constraint on an operator's behaviour. Consistent with the SMP Guidelines, we examine the existence of potential competition for the purpose of assessing whether a market is effectively competitive, that it whether there exist operators with SMP (see paragraph 38 of the SMP Guidelines).

<sup>&</sup>lt;sup>31</sup> Consistent with the EC's SMP Guidelines. See Annex 6] on the Regulatory Framework which explains the SMP Guidelines in more detail.

- A3.25 Demand-side substitution to one product is most likely to be a constraint on the price of another where the two products fulfil similar functions. They do not however have to be precisely the same: the question is whether there would be sufficient switching to act as a constraint on prices. For example, it may be appropriate to regard a number of broadly similar products which differ in price and quality as part of a single market. The relevant question is whether the price of higher quality variants is constrained to the competitive level by the lower quality product/service and vice versa.
- A3.26 In line with the SMP Guidelines we assume that prevailing prices are at the competitive level unless there is evidence that this is not the case.<sup>32</sup> This presumption applies both to unregulated prices and also to regulated, cost-based prices.<sup>33</sup>
- A3.27 Supply-side substitution possibilities are examined to assess whether other potential market players provide any additional constraints on the pricing behaviour of the hypothetical monopolist which have not been captured by the demand-side analysis. For this to be relevant operators will not be currently providing the product/service in question. First they must be able to enter the market quickly (e.g. up to 12 months) and at low cost by virtue of their existing position in the supply of other products or areas, and secondly, there must also be an additional competitive constraint arising from such potential entry into the supply of the service in question.
- A3.28 Therefore, in identifying potential supply-side substitutes it is important that operators supplying these services have not already been taken into consideration in the demand-side analysis. There might be operators who provide other services but who might also be materially present in the provision of demand-side substitutes to the service for which the hypothetical monopolist has raised its price. Such operators are not relevant to supply-side substitution since they supply services already identified as demand-side substitutes. As such, their entry has already been taken into account and so supply-side substitution from these suppliers cannot provide an additional competitive constraint on the hypothetical monopolist. However, the impact of expansion of such operators can be taken into account in the assessment of market power.

#### Homogeneous competitive conditions

A3.29 In certain circumstances, it may also be appropriate to define a product market by grouping together services which are subject to homogeneous competitive conditions, despite the absence of demand- and supply-side substitutability. Homogeneity of competitive conditions is chiefly used in defining geographic markets to combine geographic areas in which competitive conditions are sufficiently homogeneous, into one market<sup>34</sup>, but it can also be used in the product

<sup>&</sup>lt;sup>32</sup> See paragraph 42.

<sup>&</sup>lt;sup>33</sup> If the benchmark price is above the competitive price level then this may result in an over-estimation of the scope for substitution, resulting in an excessively broad market definition and vice versa. This is known as the 'cellophane fallacy' and is named after the US case US v EI Du Pont Nemours & Co, 1956. This effect occurs because if prevailing prices are already above the competitive level, even a monopolist reaches a point where further price increases become unprofitable and where competitive constraints come into action that would not have applied at competitive price levels. If this is not taken into account, the erroneous conclusion could be reached that a monopolist who has successfully exercised market power by raising price is subject to competitive constraints since, starting from monopoly price levels, it would be constrained from implementing further price increases.

<sup>&</sup>lt;sup>34</sup> See paragraphs A3.46 to A3.47 and A3.56 to A3.65 below.

market definition analysis. This approach can help streamline the subsequent market power analysis by reducing the need to review multiple markets for products the provision of which is subject to homogeneous competitive conditions.

A3.30 However, combining products and services based on homogenous competition conditions, is – by definition – only appropriate where this would not alter any subsequent findings on SMP (relative to defining those markets separately and making separate market power assessments accordingly). Provided this is the case, then we consider applying this criterion to both our product and geographic market definition analysis is appropriate since market definition, as explained above, is a means to an end and the end is an assessment of the effectiveness of competition in the relevant market which involves carrying out the market power analysis.

# Approach to services market definition

A3.31 We set out below our approach to product market definition in this market review. We note, in this respect, that our approach is consistent with the approach adopted in the 2007/08 Review.

## Unsuitability of supply-side substitution

- A3.32 As discussed above, the Greenfield approach suggests that, absent regulation, competition in retail markets would be based on vertically integrated operators supplying retail end-users based on their own network. We consider that in this hypothetical scenario (i.e. where there is no regulated provision of leased lines services) the constraints arising from supply-side substitution in leased lines markets are likely to be weak.
- A3.33 The leased lines markets are characterised by the majority of operators providing a range of services so as to realise the benefits of economies of scale and scope in investing in network infrastructure which has high fixed sunk costs. Consequently, an analysis of a market defined on the basis of demand-side substitution will typically include any operators with the technical capability for supply-side substitution because they will either already be included in the initially narrow view of the product market adopted at the beginning of the product market definition analysis, and/or providing a demand-side substitutable service that causes that narrow view to be broadened.
- A3.34 If there are operators not present in the supply of demand-side substitutable services but which supply those services using sufficiently similar technology<sup>35</sup>, then there could be a threat of entry. Absent regulation, supply-side substitution would require an operator to enter on the basis of either:
  - building necessary access (and any backhaul and core) networks (i.e. selfsupplying its own network); and/or
  - agreeing commercial terms with third-party suppliers to provide the necessary network inputs to deliver the retail service.
- A3.35 Unless operators can easily enter using existing physical infrastructure then this form of supply-side substitution based on self-supply is unlikely to be a strong

<sup>&</sup>lt;sup>35</sup> Such that they already own the assets needed to switch to providing a demand-side substitutable service and can therefore enter the product market quickly and at low cost by virtue of their existing position.

constraint in response to a 5 to 10% increase in the price of leased lines. This is because the costs of providing network (especially digging and ducting) include significant sunk costs and there would also be likely to be a time delay in responding to the price increase. In most cases, these sunk costs mean that operators will not be willing to extend their networks by more than a short distance in response to a SSNIP.<sup>36</sup>

- A3.36 With respect to operators being able to agree commercial terms for wholesale supply with third-parties, we have to take into account the fact that many wholesale leased lines providers would be vertically integrated operators. In these circumstances, there may be weakened incentives to provide wholesale services to rivals where this would deny the wholesale provider the opportunity to compete for the downstream end-user.
- A3.37 In our view therefore, we do not consider supply-side substitution would provide a sufficient competitive constraint on the price setting behaviour of operators and as such we do not consider it is relevant for defining leased lines product markets in this review.
- A3.38 We have instead focused on an analysis of demand-side substitution and homogeneous competitive conditions. Nonetheless, the impact of expansion by suppliers is something we have taken into account in the assessment of market power.
- A3.39 When assessing the relevance of demand-side substitution in retail markets for the purpose of informing our wholesale market definition, we take into account:
  - the service characteristics of the focal product and candidate substitutes (do different products have similar characteristics or are there service compromises in switching between products);
  - the importance of different service characteristics to consumers and the extent to which they would be willing to compromise on particular characteristics;
  - the extent to which pricing evidence suggests that different leased lines services provide competitive constraints on each other;
  - given observed price/quality trade-offs whether there is evidence of end-users switching between products; and
  - whether there are any barriers to switching that might explain the limited migration between products (e.g. long-terms contracts, inconvenience of changing products, the need to incur additional costs not reflected in retail prices, risks of switch-over).

## Homogeneous competitive conditions

A3.40 The homogeneous competitive conditions criterion is relevant for our product market definition analysis because in leased lines market there are a number of closely related services which are not demand-side substitutes but which are

<sup>&</sup>lt;sup>36</sup> As described in Section 5 Geographic market definition, in our analysis of competition in local geographic markets we consider that operators are unlikely to build more than 200 metres in order to connect to an end-user, except possibly in the case of very high value contracts.

supplied under homogeneous competitive conditions<sup>37</sup>. As a result, we consider it is appropriate to use homogeneity of competitive conditions to define a single product market including two or more services, together with the application of this criterion to our analysis of the geographic definition of that product market, precisely because where competitive conditions are sufficiently similar, doing so would not affect the subsequent SMP finding.<sup>38</sup>

# Approach to geographic market

## Main criteria for defining the geographic market

- A3.41 In addition to the services to be included within a market, market definition also requires the geographic scope of the market to be specified. The geographic market is the area within which demand-side and/or supply-side substitution can take place and is defined using a similar approach to that used to define the product market. In carrying out our geographic market definition, in addition to the SMP Guidelines, we have had regard to the ERG's Common Position.<sup>39</sup> We consider the following:
  - demand-side and supply-side substitution;
  - chains of substitution
  - common pricing constraints; and
  - homogeneous competitive conditions.

## Demand-side and supply-side substitution

- A3.42 Rather than considering alternative products, the analysis using the SSNIP test 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. On the demand-side, the objective is to identify producers located close enough so that they would constrain the behaviour of a hypothetical monopolist. If a substantial number of consumers would switch to producers in neighbouring areas then the geographic market should encompass those areas.
- A3.43 On the supply-side, consideration is given to whether producers can switch to supplying different areas within a relatively short period of time. As with product market definition such substitution should be able to occur within a relatively short period of time to present a sufficient competitive constraint.

## Chains of substitution

A3.44 Chains of substitution can also be an important factor in defining geographic markets. Consumers in any one area might not be willing to travel any great distance to purchase a product (i.e. a consumer purchasing products in one city

<sup>&</sup>lt;sup>37</sup> See Sections 3 and 4 where we identify those closely related services which are not demand-side substitutes but which, in our view and on the basis of our analysis, are supplied under homogeneous competitive conditions.

<sup>&</sup>lt;sup>38</sup> i.e. irrespective of whether the services are defined as falling within separate relevant markets or as falling in one relevant market, the subsequent SMP analysis would be the same.

<sup>&</sup>lt;sup>39</sup> ERG Common Position on Geographic Aspects of Market Analysis (definition and remedies), October 2008.

might be unwilling to travel to a nearby city to purchase those goods). However, if there are a number of suppliers located between two more distant areas (for example a market town that lies between the two cities), consumers' willingness to substitute to purchase services in another location (i.e. from the cities to the market town) can create a competitive constraint between suppliers of similar products in the more distant locations (the two cities), creating a wider geographic market.

#### Common pricing constraints

A3.45 The presence of common pricing constraints across geographic areas is also relevant for the purposes of defining the geographic scope of a market. If prices (of the incumbent and alternative operators) are geographically uniform – i.e. do not differ by geographic areas – then this may be indicative of there being insufficient geographic variations in competitive conditions to justify the definition of local geographic markets.

#### Homogeneous competitive conditions

A3.46 The SMP Guidelines state that in cases where there is a sufficient degree of variety in competitive conditions between 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."<sup>40</sup>

- A3.47 Therefore, geographic areas can comprise a single relevant geographic market to the extent that:
  - · competitive conditions in these areas are sufficiently homogeneous; and
  - the areas can be distinguished from neighbouring areas where the competitive conditions are appreciably different.

## Approach to geographic market definition

A3.48 We set out below our approach to geographic market definition in this market review. We note, in this respect, that our approach is consistent with the approach adopted in the 2007/08 Review.

<sup>&</sup>lt;sup>40</sup> See paragraph 56.

## Unsuitability of demand-side and supply-side substitution

- A3.49 As explained above, we define retail markets in order to inform our definition of wholesale markets. Retail leased lines, in keeping with communications networks more generally, have a fixed geographic location. This means that a retail consumer would only be able to switch its demand to an alternative area if it were willing to move to that alternative area. Thus, the relevant question is whether a sufficient number of retail customers would move location (business premise) in response to a SSNIP, such as to make the SSNIP unprofitable.
- A3.50 Given that the cost associated with moving location is likely to be significantly higher than a SSNIP on the price of a retail leased line, it is reasonable to consider that geographic demand-side substitution is either a very weak or a non-existent constraint in most cases. The cost and availability of connectivity options are only likely to be a driving factor in choice of location where connectivity forms a significant part of the total costs of a business and where it has not yet committed to a particular site. This may apply, for instance, to a new build data centre, which could choose to locate deliberately in an area where competitive networks exist<sup>41</sup>. However, once a data centre has been built, its location is fixed in the same way as that of any other business, and in our view it is unlikely that a data centre would subsequently move in response to a SSNIP.
- A3.51 An analysis of demand-side substitution alone would lead to the definition of very narrow markets, which are unlikely to be practical to analyse or to be representative of competitive constraints that exist. We therefore consider that demand-side substitution is not relevant to assessing the geographic market definition.<sup>42</sup>
- A3.52 Regarding supply-side substitution, the question being asked in this assessment is whether a supplier of retail leased lines which is operating in one geographic area would start supplying in another geographic area if this other area was subject to a SSNIP by a hypothetical monopolist, to the extent that it would render the SSNIP unprofitable. If the SSNIP would be unprofitable then these geographic areas should be grouped together for the purpose of defining the relevant market.
- A3.53 The point to note here is that, in applying the modified Greenfield approach, when we define retail markets in order to inform our definition of wholesale markets we assume an absence of regulated wholesale products which would, if available, allow an operator to supply-side substitute at the retail level.<sup>43</sup> In leased lines markets, geographic supply-side substitution is generally considered to be a weak or non-existent constraint due to the high cost and long lead times associated with deploying new network infrastructure. Therefore, similar to geographic demand-side substitution, we consider that supply-side substitution is not relevant to assessing the geographic market definition.<sup>44</sup>

<sup>&</sup>lt;sup>41</sup> We address the question of competition to supply data centres in our analysis of the geographic scope of the wholesale MISBO market in Section 5.

<sup>&</sup>lt;sup>42</sup> This is consistent with the ERG Common Position (see section 2).

<sup>&</sup>lt;sup>43</sup> i.e. an operator could use the regulated wholesale product as the necessary input to enable it to switch to supplying the relevant retail product.

<sup>&</sup>lt;sup>44</sup> This is consistent with the ERG Common Position (see section 2).

#### Unsuitability of chains of substitution

A3.54 Because of the limitations associated with the use of demand-side and supply-side substitution when applied to leased lines markets (as discussed above), we consider chains of substitution are of limited relevance for defining the geographic scope of leased lines markets.

#### Common pricing constraints

A3.55 We assess the presence of common pricing constraints as part of our analysis of homogeneous competitive conditions.<sup>45</sup>

#### Homogeneous competitive conditions

- A3.56 Given the unsuitability of demand-side and supply-side substitution, we consider an assessment of the homogeneity of competitive conditions is the most appropriate way for defining the geographic scope of lease lines markets. This is consistent with the ERG's Common Position.<sup>46</sup>
- A3.57 When assessing the geographic scope of a market on the basis of the homogeneity of competitive conditions it is normal practice to start with a narrow definition (small area) and then to see how this can be augmented. This raises the question of what geographic unit should be used as the area for the geographic market assessment. That is, what is the smallest unit of area to be considered and how should it be defined? The ERG Common Position states that the geographic units should satisfy the following criteria:
  - they should be mutually exclusive and less than national;
  - the network structure of all relevant operators and the services sold on the market can be mapped onto the geographic units;
  - they should have clear and stable boundaries;
  - they should be small enough that competitive conditions are unlikely to vary significantly within the unit but at the same time large enough that the burden o operators and NRAs<sup>47</sup> with regard to data delivery and analysis is reasonable<sup>48</sup>.
- A3.58 We explain our choice of geographic unit in Section 5 on Geographic market definition.
- A3.59 Having chosen the appropriate geographic unit, the ERG Common Position identifies criteria for the analysis of the homogeneity of competitive conditions in those units<sup>49</sup>. It states that:

"market definition should be based on the actual conditions of competition, reflected by the behaviour of the market players (e.g.

<sup>&</sup>lt;sup>45</sup> In applying the pricing and price differences criterion.

<sup>&</sup>lt;sup>46</sup> See section 2.

<sup>&</sup>lt;sup>47</sup> National regulatory authorities (such as Ofcom in the UK).

<sup>&</sup>lt;sup>48</sup> See section 2 of the Executive Summary.

<sup>&</sup>lt;sup>49</sup> In so doing, it recognises that the criteria it identifies "are those which are also of importance in an SMP analysis" (see section 4.1).

pricing) and the effect of their behaviour on market structure (e.g. market shares). As it is generally the case in ex ante regulation, the analysis of the criteria should also be forward-looking and should – as far as possible – take into account developments until the next review".<sup>50</sup>

- A3.60 The most important criteria identified by the ERG Common Position are:
  - barriers to entry;
  - number of suppliers;
  - distribution of market shares<sup>51</sup>; and
  - pricing and price differences.
- A3.61 As the ERG Common Position makes clear, which criteria are the most relevant will as in an SMP analysis depend on the circumstances and has to be decided by us as the relevant NRA. The relevant criteria should be applied cumulatively and such that differences in competitive conditions between different markets are large while differences in competitive differences within a market are small.<sup>52</sup>
- A3.62 As set out in detail in Section 5 on Geographic market definition, the criteria we apply cumulatively to define the geographic scope of the wholesale markets are:
  - number of suppliers;
  - distribution of service shares; and
  - pricing and price differences.
- A3.63 The criteria we apply cumulatively to define the geographic scope of the retail markets (those product markets which we identify where ex ante regulation may be warranted) are:
  - distribution of service shares;
  - pricing and price differences; and
  - the nature of demand, in particular the extent to which consumers source their retail leased lines services from multiple suppliers<sup>53</sup>.
- A3.64 We assess barriers to entry<sup>54</sup> when we define the geographic scope of the wholesale markets as part of the application of the number of suppliers criterion<sup>55</sup>.

<sup>&</sup>lt;sup>50</sup> See section 4.1.

<sup>&</sup>lt;sup>51</sup> The ERG Common Position notes "these are not market shares in the true sense as the precise scope of the market has not yet been defined" (see section 4.1). We refer to this criterion as the distribution of service shares however we apply the criterion in the same way as applied in the ERG Common Position.

<sup>&</sup>lt;sup>52</sup> See section 4.2.

<sup>&</sup>lt;sup>53</sup> This is consistent with the ERG Common Position (see sections 2 and 4).

<sup>&</sup>lt;sup>54</sup> We note the ERG Common Position states that "barriers to entry are usually related to economies of scale and sunk costs" (see section 4.1).

<sup>&</sup>lt;sup>55</sup> We do this by assessing the impact of operators' alternative infrastructure.

The reason for this is that the requirements for entry into wholesale leased lines markets are the same irrespective of the geographic area. An operator needs it own network to compete. Across geographic areas there will be variations in the costs of building a network resulting in varying levels of sunk costs and, in our view, more significant variations in the density of demand for leased lines services resulting in varying geographic areas where economies of scale can be realised. Entry is most likely to be economic where leased lines users are concentrated such as in the large urban centres – this is borne out by our assessment of the impact of operators' alternative infrastructure, in particular our network reach analysis.<sup>56</sup>

A3.65 Consequently, the extent of barriers to entry is reflected in the locations in which operators have built their networks and these are identified in our network reach analysis. Our network reach analysis also shows where barriers to future expansion to connect to new consumers are lowest, so it is by its nature a forward-looking analysis of potential competition which complements the service share analysis we undertake to assess the extent of actual competition.<sup>57</sup>

<sup>&</sup>lt;sup>56</sup> See our resulting wholesale market definition proposals which include identifying the London area, referred to as the WECLA (Western, Eastern and Central London Area), as a separate market.

<sup>&</sup>lt;sup>57</sup> See Section 5.

# Annex 4

# Approach to remedies

# Introduction

- A4.1 In this Section, we describe the background to issues we have taken into account in our assessment of the specific SMP remedies we are imposing in the business connectivity markets. Additionally this section also covers the following:
  - removal of regulation in markets where we have found that no person has SMP;
  - our approach to assessing whether competition law would be sufficient to address the competition problems we have identified; and
  - the requirements we have to satisfy in imposing SMP remedies, including the legal tests prescribed, and our statutory duties, under the Act.

# Removal of regulation

- A4.2 Where we determine that a person to whom any SMP conditions currently apply is no longer a person with SMP in a services market, we are required by section 84(4) of the Act to revoke every SMP services condition applied to that person by reference to the market power determination made on the basis of the earlier analysis. Similarly, where we determine that a person has no SMP in a new services market, we have no powers to impose SMP conditions on any person in such a market. Indeed, where we conclude that the relevant market is effectively competitive, Article 16(2) of the Framework Directive<sup>58</sup> precludes us from imposing or maintaining any SMP remedies.
- A4.3 For reasons discussed in Section 7, we have identified five markets in which we have concluded that no person has SMP, namely;
  - the market for wholesale medium bandwidth TISBO in the WECLA;
  - the market for wholesale high bandwidth TISBO in the WECLA;
  - the market for wholesale very high bandwidth TISBO in the UK excluding the Hull area;
  - the market for wholesale national TI trunk segments in the UK; and
  - the market for wholesale MISBO in the WECLA.
- A4.4 We have also made some changes to the SMP conditions we imposed in the 2007/8 Review for some of the markets we are now proposing to identify, for reasons which will be further explained in the remedies sections of this document. Whilst we have not changed the SMP conditions substantively for some markets, we have revoked all of the SMP conditions imposed on BT and KCOM in the 2007/8 Review and replace them with new SMP conditions. We set out the notice revoking

<sup>&</sup>lt;sup>58</sup> Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002.

those SMP conditions, together with the new SMP conditions we are imposing in the statutory notification which is published at Annex 8 to this document.

A4.5 This approach of revoking and imposing new SMP conditions has provided us with an opportunity to make certain presentational improvements to the proposed new SMP conditions. In particular, we have sought to avoid unnecessary duplication of what is essentially the same type of SMP remedy in different markets. The structure we now use is to set out, in effect, a single 'standard' SMP condition for each particular SMP condition and apply it to the relevant markets in question by indicating at the outset of the legal instrument, where such a condition applies to the market in question.

# Assessment of sufficiency of competition law

## The need for ex ante regulation

- A4.6 In contrast to the position discussed above where we determine that no person has SMP in a services market, we are required under Article 16(4) of the Framework Directive<sup>59</sup> to impose SMP remedies on those persons we identify as having SMP in relevant markets we determine are not effectively competitive. Indeed, the SMP Guidelines state that NRAs must impose one or more SMP remedies on a person having SMP, and that it would be inconsistent with the objectives of the Framework Directive not to impose any SMP remedies on such a person.
- A4.7 Recital 27 to the Framework Directive states that it is essential that *ex ante* regulatory obligations should only be imposed where there is not effective competition i.e. in markets where there are one or more operators with significant market power, and where national and Community competition law remedies are not sufficient to address the competition problem(s) identified in those markets.
- A4.8 Therefore, for those markets in which we have found that BT or KCOM has SMP, we have considered the sufficiency of competition law by itself (without *ex ante* regulation) to address the market failure in question. We discuss our assessment of this matter in relation to each of the relevant markets in the remedies sections of this document, in light of our general considerations below.

## Relative efficiency of competition law and complimentary ex ante regulation

- A4.9 The SMP Guidelines deal with the relationship with competition law. They emphasise that simultaneous application of competition law remedies and sector specific measures applied by NRAs would address different problems. In particular, they state that *ex ante* regulation obligations imposed by NRAs on undertakings with SMP aim to fulfil the specific objectives set out in the relevant directives, whereas competition law remedies aim to sanction agreements or abusive behaviour which restrict or distort competition in the relevant market.
- A4.10 In its Explanatory Memorandum to the EC's Recommendation, the EC further states that *"[e]x ante* regulation would be considered to constitute an appropriate complement to competition law in circumstances where the application of competition law would not adequately address the market failures concerned. Such circumstances would for example include situations where the regulatory obligation necessary to remedy a market failure could not be imposed under competition law

<sup>&</sup>lt;sup>59</sup> Implemented by s87 of the Act.

(e.g. access obligations under certain circumstances or specific cost accounting requirements), where the compliance requirements of an intervention to redress a market failure are extensive (e.g. the need for detailed accounting for regulatory purposes, assessment of costs, monitoring of terms and conditions including technical parameters and so on) or where frequent and/or timely intervention is indispensable, or where creating legal certainty is of paramount concern (e.g. multiperiod price control obligations)".

A4.11 At Annex 2 to this statement, we explain our own general thinking on the sufficiency of competition law. We note, in particular, that *ex ante* regulation is appropriate more often than not to address the types of market failures and entry barriers we frequently identify in our market analyses and, without such regulation, there is a risk that effective competition might not become established. Such ex ante regulation is normally needed to promote actively the development of competition, particularly when addressing the effects of network externalities. We generally also attach weight to creation of legal clarity and certainty for the markets under review, which in our view is likely to be achieved through specific SMP remedies. Linked to that certainty is the fact that such remedies enable us to intervene in a timely manner and to monitor market progress.

# The relationship with the BT Undertakings

- A4.12 In considering the sufficiency of competition law, we have also had regard to the BT Undertakings, which are in essence a remedy under national competition law, the Enterprise Act 2002.
- A4.13 We consider that the BT Undertakings are not sufficient to address the competition problems we have identified in the various relevant markets. In particular, as we explained in 2005 when we accepted them in lieu of a reference to the Competition Commission, the BT Undertakings are intended to complement *ex ante* regulation under the Act. They seek to deploy a variety of mechanisms aimed at defining equivalent treatment, and at preventing and detecting discriminatory conduct by BT when supplying wholesale network access and backhaul services to its downstream competitors. They also constitute a more comprehensive solution to the specific problem we identified in 2005 than could be achieved by a series of interventions under the Act.
- A4.14 In contrast, we consider that the SMP remedies we are proposing in the following sections are needed to effectively address the competition problems we have identified under this market review, including to achieve the aims prescribed by our statutory duties, even if this would lead to a series of interventions under the Act. For example, whilst some obligations in the BT Undertakings and our proposed SMP remedies may overlap<sup>60</sup>, we have strengthened powers under the Act since May 2011 to take enforcement action in respect of securing compliance with the SMP remedies. Parties are also able to bring regulatory disputes to us in relation to such remedies under the Act for swift resolution. We have already resolved a number of disputes relating to markets considered in this market review (e.g. PPCs and Ethernet Extension Services). We consider that such possible interventions are important to effectively redress the market failures we are seeking to remedy in this market review. We have also identified likely developments in certain markets and the importance to effective competition becoming established in those markets over the course of the review period of three years. We therefore consider that creating legal certainty is particularly of paramount concern for those markets and

<sup>&</sup>lt;sup>60</sup> E.g. with regard to Equivalence of Inputs (see Sections 11 and 12 below).

something which we consider can be achieved through the proposed SMP remedies.

# Background to the requirements for imposing SMP remedies

## Powers to impose SMP conditions

- A4.15 Section 87(1) of the Act provides that, where we have made a determination that an operator has SMP in a particular market, we must set such SMP conditions as we consider appropriate and as are authorised under the Act.<sup>61</sup>
- A4.16 Sections 87 to 91 of the Act set out the SMP conditions that we can impose.<sup>62</sup>

#### Wholesale SMP conditions

- A4.17 Under section 87(3) we have the power to impose requirements on an operator who we have found to have SMP, to give such entitlements as respects:
  - the provision of access to the network of the operator;
  - the use of that operator's network; and
  - the availability of relevant facilities by that operator.
- A4.18 In addition, requirements imposed under section 87(3) may include provision for:
  - securing fairness and reasonableness in the way in which requests for network access are made and responded to; and
  - securing that the requirements contained in the SMP conditions are complied with within the periods and at the times required by or under the condition.<sup>63</sup>
- A4.19 In determining what requirements to impose under section 87(3), we must take into account the following cumulative factors:
  - the technical and economic viability (including the viability of other network access products, whether provided by the operator to whom the requirement is intended to apply or another person), having regard to the state of market development, of installing and using facilities that would make the proposed network access unnecessary;
  - the feasibility of the provision of the proposed network access;
  - the investment made by the operator initially providing or making available the network or other facility in respect of which an entitlement to network access is proposed (taking account of any public investment made);

<sup>&</sup>lt;sup>61</sup> Section 87(1) implements Article 8 of the Access Directive (Directive 2002/22/EC of the European Parliament and of the Council of 7 March 2002 on access to, and interconnection of, electronic communications networks and associated facilities, OJ L 108, 24.04.2002, p.7, as amended).

<sup>&</sup>lt;sup>62</sup> Sections 87 to 91 implement Articles 9 to 13 of the Access Directive and Articles 17 to 19 of the Universal Service Directive (Directive 2002/22/EC of the European Parliament and of the Council of 7 March 2002 on universal service and users' rights relating to electronic communications networks and services, OJ L 108, 24.04.2002, p.51, as amended).

 $<sup>^{63}</sup>$  See section 87(5) of the Act.

- the need to ensure effective competition (including, where it appears to us to be appropriate, economically efficient infrastructure based competition) in the long term;
- any rights to intellectual property that are relevant to the proposal; and
- the desirability of securing that electronic communications services are provided that are available throughout the member States<sup>64</sup>.
- A4.20 Section 87 also provides us with the power to impose other requirements on an operator who we have found to have SMP, including transparency, non-discrimination and accounting separation.<sup>65</sup>
- A4.21 In particular, section 87(9) confers on us the power to impose SMP conditions about network access pricing, as set out below:
  - such price controls as we may direct in relation to matters connected with the provision of access to the network of the operator who we have found to have SMP, or with the availability of relevant facilities by that operator;
  - such rules as we may make in relation to those matters about the recovery of costs and cost orientation;
  - such rules as we may make for those purposes about the use of cost accounting systems; and
  - obligation to adjust prices in accordance with such directions give by us as we may consider appropriate.
- A4.22 Where we exercise our powers under section 87(9) we must consider certain criteria set out in section 88 of the Act are satisfied. These are the following:
  - there is a relevant risk that the dominant provider might price excessively or impose a price squeeze as to have adverse consequences for end-users; and
  - the setting of an SMP condition under section 87(9) is appropriate for the purposes of promoting efficiency, promoting sustainable competition and conferring the greatest possible benefits on end-users.
- A4.23 In addition, in setting an SMP condition under section 87(9) of the Act, section 88(2) requires that we take account of the extent of the investment, in the matters to which the condition relates, of the person to whom it is to apply.

# Retail SMP conditions

A4.24 Section 91 of the Act confers on us the power to impose SMP conditions on operators who we have found to have SMP in a relevant retail market. The sorts of SMP conditions we may impose include those authorised or required by sections 87 and 88.<sup>66</sup>

<sup>&</sup>lt;sup>64</sup> See section 87(4) of the Act.

 $<sup>^{65}</sup>$  See sections 87(6) to (8) of the Act.

<sup>&</sup>lt;sup>66</sup> See section 91(3).

A4.25 Section 91 also states retail SMP conditions may only be imposed where, in our view, it appears that the imposition of SMP conditions in the relevant wholesale market(s) would not enable us to perform, or fully perform, our duties under section 4 of the Act in relation to the situation in the retail market as revealed by our analysis of that market. We set out in Sections 9 and 14 how we consider we have satisfied this test.

## Section 47 test for all SMP conditions

- A4.26 Section 47 requires that for each and every proposed SMP condition, or modification to an SMP condition, we must explain why that SMP condition satisfies the test that it is:
  - objectively justifiable in relation to the networks, services, facilities, apparatus or directories to which it relates;
  - not such as to discriminate unduly against particular persons or against a particular description of persons;
  - proportionate to what the SMP condition, or modification, is intended to achieve; and
  - in relation to what it is intended to achieve, transparent.

#### **Statutory duties**

General duties under section 3 of the Act

- A4.27 In performing our market review, we have a statutory duty under section 3 of the Act to further the interests of citizens in relation to communications matters and to further the interests of consumers in relevant markets, where appropriate by promoting competition.
- A4.28 In so doing, we are required to secure a number of specific objectives and to have regard to a number of matters set out in section 3. As to the prescribed specific statutory objectives in section 3(2), we consider that the objective of securing the availability throughout the UK of a wide range of electronic communications services as particularly relevant to this review.
- A4.29 In performing our duties, we are also required to have regard to a range of other considerations, as appear to us to be relevant in the circumstances. In this context, we consider that a number of such considerations are relevant, namely:
  - the desirability of promoting competition in relevant markets;
  - the desirability of encouraging investment and innovation in relevant markets; and
  - the desirability of encouraging the availability and use of high speed data transfer services throughout the United Kingdom.
- A4.30 Also, in furthering the interests of consumers, we must have regard to choice, price, quality of service and value for money.

A4.31 Additionally, section 4 of the Act sets out the Community duties which flow from Article 8 of the Framework Directive and section 4A of the Act requires that we take due account of all applicable recommendations issued by the EC under Article 19(1) of the Framework Directive.

## European Community requirements for regulation - section 4 of the Act

- A4.32 As noted in Annex 2, our functions exercised in this review fall under the Common Regulatory Framework. As such, section 4 of the Act requires us to act in accordance with the six European Community requirements for regulation.
- A4.33 In summary, these six requirements are:
  - to promote competition in the provision of electronic communications networks and services, associated facilities and the supply of directories;
  - to contribute to the development of the European internal market;
  - to promote the interests of all persons who are citizens of the European Union;
  - to take account of the desirability of Ofcom's carrying out of its functions in a manner which, so far as practicable, does not favour one form of or means of providing electronic communications networks, services or associated facilities over another, i.e. to be technologically neutral;
  - to encourage, to such extent as Ofcom considers appropriate for certain prescribed purposes, the provision of network access and service interoperability, namely securing efficient and sustainable competition, efficient investment and innovation, and the maximum benefit for customers of CPs;
  - to encourage compliance with certain standards in order to facilitate service interoperability and secure freedom of choice for the customers of CPs.
- A4.34 In seeking to act in accordance with the six European Community requirements, and pursuant to obligations imposed on national regulatory authorities such as ourselves under Article 8(5) of the Framework Directive, we apply objective, transparent, non-discriminatory and proportionate regulatory principles.

# Annex 5

# Data analysis

# **Scope of the Annex**

- A5.1 This Annex describes the data analysis that has been undertaken to produce the service share estimates used in this market review, and the geographic analysis which underpins our geographic market definition. There are three subsections. The first deals with estimating service shares in symmetric broadband origination markets. It sets out our methodology, explaining how we measure volume based service shares in the relevant markets, and discussing the difficulties associated with processing the raw data. We then explain the practical steps we have taken to gather and process the data to produce our service share estimates and address these difficulties.
- A5.2 The second subsection then provides a similar explanation of our trunk market share estimates; and the final subsection describes the geographic network reach analysis.
- A5.3 A number of stakeholders commented on our data analysis and methodology. We summarise these comments and set out our responses at the end of each subsection. One of the comments was a request for greater transparency over the process and methodology of producing the service shares. We have therefore undertaken to set and explain our methodology, assumptions and analysis in more detail in this section.

# Service share methodology used in symmetric broadband origination markets

- A5.4 This subsection explains how we have calculated service shares in the wholesale and retail markets for symmetric broadband origination services. The general principle is that we wish to measure the relative amount that each CP supplies in the defined markets. Ideally, we would also measure shares of revenues, but as discussed in the section 7 revenue data was not available at a sufficiently disaggregated level to perform any meaningful market-based analysis.
- A5.5 Given that we are ultimately using the service shares to inform our understanding of the relative competitive strength of different CPs, we have taken all reasonably practicable steps to ensure that our estimates are free from systematic bias. It would be disproportionate to try to eliminate all possible error given the complexity of the task and inevitable discrepancies in the raw data. However, we are generally more concerned about the possibility of systematic bias, which could occur if data errors are more likely in relation to a particular subset of the data, such as a geographic area, a CP, or a product set. Therefore, keeping potential sources of bias to a minimum has been our key objective when developing the methodology and designing the tools to allow us to estimate service shares.

## Wholesale service share methodology

A5.6 The business connectivity value chain has many layers, with CPs buying various services from one another. As a result, competition takes place at various different levels. Our focus is primarily on competition in the provision of the underlying

physical infrastructure, and our objective is to measure supply at this level within the value chain, even though in practice the infrastructure will often be sold in combination with other elements of the value chain.

- A5.7 Wholesale symmetric broadband origination services are the furthest upstream active services in the business connectivity value chain. Therefore, in measuring the supply of these wholesale services, we are only interested in CPs who provide services using independent physical (passive) network infrastructure.<sup>67</sup>
- A5.8 In addition, in our analysis of symmetric broadband origination markets we draw a distinction between final access segments, regional trunk segments and national trunk segments. In this subsection, we are concerned with the final access segment. We consider markets for trunk segments separately, and discuss the calculation of service shares in trunk markets from paragraph A5.182 below.
- A5.9 A CP can only compete in wholesale symmetric broadband origination markets if it has its own infrastructure or is able to use passive access to the network infrastructure of another operator. Therefore, as a general rule, CPs which own intercity fibre networks but do not have access network infrastructure do not compete in wholesale symmetric broadband origination markets. They will exert a competitive constraint further downstream in the business connectivity value chain, but will not usually generate an effective competitive constraint at the wholesale level.
- A5.10 Therefore, when measuring supply in the wholesale market, we only want to count services which are supplied either using the CP's own network infrastructure (i.e. self-supplied), or on passive infrastructure used from another supplier.

Distinguishing between wholesale supply using the CPs own infrastructure and reselling of services purchased from other suppliers

# Method for counting the wholesale supply of OCPs

- A5.11 To ensure that units of supply provided by different CPs are equivalent and comparable, we only want to measure supply where the CP has activated ("lit") some passive infrastructure. We do not want to count supply where the CP is simply reselling a service which is already active.<sup>68</sup> However, CPs do not generally directly record whether their sales of lines use infrastructure that they provide for themselves or infrastructure that they have purchased from another CP. Therefore, we are forced to infer genuine wholesale supply using the data we do have available.
- A5.12 We draw this inference by taking the sum of all wholesale and retail sales made by the CP to customers or other CPs (external sales), which will include resold services, and subtracting from this total the CPs wholesale purchases of lines from

<sup>&</sup>lt;sup>67</sup> The CP does not need to own all of the primary infrastructure. They could, for example, lease a passive product, such as duct access, dark fibre, or copper local loop (Metallic Path Facility).

<sup>&</sup>lt;sup>68</sup> Although active services which are resold can and do exert competitive pressure on the rest of the market, we believe these constraints act principally in downstream retail markets, and therefore measure this supply when calculating the retail market shares.

other CPs. Specifically, for each CP and in each postcode sector<sup>69</sup>, we perform the following calculation to measure wholesale supply:



A5.13 Therefore, where a CP uses a third party circuit to reach a customer site, its supply volume will net off to zero in the relevant postcode sector. Consider the following generic example of a circuit between points A and B.

## Figure A5.1 Generic circuit diagram



- A5.14 We assume in this illustration that a CP sells the circuit AB to either a retail or wholesale customer, and records this sale in the data supplied to Ofcom. We will therefore count one circuit end in each of the respective postcode sectors for A and B. The CP is assumed to use a third party to reach site B by buying a wholesale circuit N<sup>2</sup>B, and provides details of this wholesale purchase in the data supplied to Ofcom. Our methodology will then subtract one circuit end from the postcode sector in which site B resides. The result is the correct net wholesale supply counts of one in the site A postcode sector, and zero in the site B postcode sector.
- A5.15 The supply of the wholesale circuit N<sup>2</sup>B would be counted as wholesale supply by the CP selling that circuit. Therefore, the total wholesale supply across all CPs and across all postcode sectors will be correctly counted as two circuit ends.

# Method of counting the wholesale supply of BT

A5.16 We use a slightly different formula to calculate BT's supply. This is to account for the fact that we use internal supply data from Openreach, rather than the retail sales data from BT's downstream divisions.<sup>70</sup> This only applies to the services supplied by Openreach on an Equivalence of Inputs basis, such as Ethernet services. The formula for these services is shown below. For all other services, including all TI services, the formula in paragraph A1.12 above applies.

$$BT Wholesale Supply = \begin{pmatrix} Wholesale circuit\\ends sold internally\\+\\Wholesale circuit\\ends sold externally \end{pmatrix} - \begin{pmatrix} Wholesale circuit\\ends bought \end{pmatrix}$$

<sup>&</sup>lt;sup>69</sup> As explained in Section 6, the postcode sector is the building block from which local geographic markets are constructed.

<sup>&</sup>lt;sup>70</sup> In terms of the element of supply that we seek to measure, the two formulae are equivalent and yield consistent results; the difference is the data we use to undertake the measurement.
# <u>Classifying circuit ends – distinguishing between "customer ends" and "network ends"</u>

- A5.17 Consistent with the approach taken in the 2008 BCMR, we use circuit ends as the unit of supply<sup>71</sup>. To allow the assessment of geographic variation in competitive conditions we count the volume of circuit ends supplied by each CP in each postcode sector in the UK. However, in our main service share calculations we only count circuit ends at customer buildings in the UK circuit ends at network sites and any circuit end outside the UK are not included.
- A5.18 Our reason for adopting this classification of circuit ends is that we want to adopt a measure of supply which is invariant to the manner in which circuits have been described in the raw data supplied to Ofcom. Without an appropriate adjustment, counting internally-supplied circuit ends could lead to systematic biases in our service share estimates. This is explained with reference to the generic circuit diagram above.
- A5.19 The diagram above shows a leased line between two retail customer buildings at sites A and B. The leased line passes through two network sites at locations N<sup>1</sup> and N<sup>2</sup>. In the raw data provided to Ofcom a CP might describe this service as a single circuit AB, or at the other extreme it might describe the three (self-supplied) component circuits AN<sup>1</sup>, N<sup>1</sup>N<sup>2</sup> and N<sup>2</sup>B. Therefore, the supply to meet the same demand for connectivity between A and B might be measured as 3 circuits (6 circuit ends), or a single circuit (2 ends) depending on how a CP describes its supply to Ofcom.
- A5.20 In most cases, CPs provided Ofcom with circuit data extracted from sales databases where circuits will generally be recorded as a single entry and are not broken down into their constituent parts.<sup>72</sup> However, in those instances where the CPs provided details from a network inventory, or where sales included internally supplied circuits,<sup>73</sup> then an equivalent retail sale may have been recorded as the three constituent component circuits. In particular, BT provided details of its internally supplied circuits sold by Openreach, and these will often represent constituent components of retail services. Therefore, an unadjusted count of circuit ends would tend to result in an upward bias in our measure of BT's supply relative to its competitors.
- A5.21 The solution<sup>74</sup> has been to identify circuit ends at network sites, and to exclude these from our supply count. In this way, the three component circuits AN<sup>1</sup>, N<sup>1</sup>N<sup>2</sup> and N<sup>2</sup>B will be counted as two circuit ends, whether the circuit is recorded as three constituent components or as a single circuit (since in both cases there are only two customer ends), thus removing the bias from the measurements of supply. The main issue with this solution is the practical problem of identifying network sites. This is discussed in detail below.

<sup>&</sup>lt;sup>71</sup> We count ends of wavelengths in relation to WDM services. The alternative would be to count just the underlying WDM bearer, but this would not capture potentially significant differences in the value of the service being supplied as the number of wavelengths on a bearer could range from 1 to 80 or more.

<sup>&</sup>lt;sup>72</sup> Unless the customer actually bought the component circuits separately, in which case we would want to measure each of these sales separately.

<sup>&</sup>lt;sup>73</sup> Internally supplied circuits are those supplied between different divisions of the same company. For example, Openreach supplies circuits to BT's downstream divisions.

<sup>&</sup>lt;sup>74</sup> Adopted in both this review and the previous BCMR.

#### Counting circuits within market boundaries

A5.22 The symmetric broadband origination markets are delineated by interface type, bandwidth and geography. Therefore, within each postcode sector (which is the building block of the geographic markets we identify), we need to differentiate supply volumes for each CP by circuit interface type and by bandwidth. The data we use to calculate market shares need to be consistent with the product market definition, which means that services which are deemed to fall outside the relevant market are not counted as part of the wholesale supply in that market. CPs provided data on a large range of services, so the following table sets out which services are included, and which excluded, from the wholesale service counts, and also shows which product market the relevant count would fall into.

Service / Interface	Counted as wholesale supply	Product market
ADSL	No	
Analogue	Yes	TISBO
ATM	Yes	TISBO
Broadband	No	
Broadcast access	No	
Cablelink	No	
CCTV	No	
Dark Fibre	No	
Ethernet	Yes	AISBO (MISBO if >1Gbit/s)
Frame Relay	Yes	TISBO
ISDN and PSTN	No	
Radio / Microwave	No	
SDH and PDH	Yes	TISBO (MISBO if >1Gbit/s)
Street access	No	
WDM - Bearer	No	
WDM - Wavelength	Yes	MISBO
X25	Yes	TISBO

#### Figure A5.2 Interface classifications for various service types

A5.23 The wholesale supply calculation, as described in paragraph A5.12, is applied only to circuits falling within the relevant market boundaries and within each postcode sector. In doing so, we implicitly assume that the interface for a service provided by a CP using a third party tail circuit will match the interface of the third party tail.

#### Bearers, wavelengths and circuits

- A5.24 Telecoms network are inherently hierarchical, with some routes carrying aggregated traffic and circuits ultimately destined for other sites. This creates two related issues when counting wholesale supply:
  - i) There is a risk of double counting, and of bias, if we count a mixture of bearer circuits and the traffic being carried by the bearer.

- ii) Differences in bandwidth compound the problem (introduced above) of circuits being described in terms of their constituent circuit elements.
- A5.25 Consider the hypothetical example of MNO connectivity presented in the figure A5.3 below. The radio base station at A generates traffic (voice and data) which must be carried back to the core network site at N<sup>1</sup> (e.g. an MSC). This traffic generates a requirement for 10Mbit/s of capacity between A and N<sup>2</sup>. The product that is supplied to the MNO is in the form of 5\*2Mbit/s circuits between A and N<sup>1</sup>. However, these 2Mbit/s TDM circuits are carried on larger TDM bearers throughout the network (the 34 and 155Mbit/s links in the diagram).
- A5.26 In addition, the core network nodes must be connected via even higher capacity links. However, once again most of the traffic will be carried between switches in 2Mbit/s circuits over these large capacity bearers.
- A5.27 Assuming the MNO buys wholesale circuits to meet this demand for connectivity, then the supplier of the connectivity could describe this supply in a number of different ways:
  - In terms of the bearer circuits i.e. a 34Mbit/s circuit from A to B, 2\*155Mbit/s from B to N<sup>1</sup>, and so on;
  - In terms of the end-to-end capacity requirement i.e. 5\*2Mbit/s circuits from A to N<sup>1</sup>; or
  - In terms of the capacity requirement on each bearer i.e. 5\*2Mbit/s circuits from A to B, and 5\*2Mbit/s circuits from B to N<sup>1</sup>.



## Figure A5.3 Hypothetical example of MNO connectivity

Capacity required from A to N<sup>1</sup>: 5\*2Mbit/s

A5.28 These would produce different measures of supply volume in the three TISBO markets. To ensure consistency, we would ideally use just one of the options. If we had details of the topology of the MNO network, it would be straightforward to work out which of the options a particular circuit falls under, but we do not have this information. In its absence, we have ourselves categorised the circuits based on the inventory of circuits with basic details of bandwidth, interface type, and the location of each end of the circuit provided by CPs.

- A5.29 The process of excluding circuit ends terminating at network sites should discount the third option where the circuit represents capacity on a single leg of an end-toend requirement.
- A5.30 We see a combination of all three options in the data supplied by CPs. This is not surprising as it mirrors the manner in which the services are bought and sold.<sup>75</sup>
- A5.31 We consider that the most appropriate measure of supply is one which is consistent with the units in which the services are bought and sold. To some degree, therefore, given that most of the circuit inventories supplied to Ofcom come from sales data, variations reflect the nature of the market and it is therefore correct to measure these differences in supply volume. Equally, double counting for the reasons given above should be unlikely as it would mean recording the same sale more than once.<sup>76</sup>
- A5.32 However, it remains important to measure services in a consistent manner where we are faced with a possible choice. Therefore, we adopt the following interface technology specific rules:
  - <u>WDM</u>. We count wavelengths for WDM services rather than bearers. In addition, where higher bandwidth wavelengths are being used to carry multiplexed lower bandwidth circuits, we will count just the higher bandwidth wavelength.
  - <u>Ethernet</u>. Where a high bandwidth Ethernet circuit is being used to provide multiple lower bandwidth circuits, for example using VLANs, we will count just the higher bandwidth circuit. Similarly, where the bandwidth of an Ethernet service has been throttled,<sup>77</sup> we will record the bandwidth of the underlying circuit.
  - <u>SDH</u>. Where an SDH bearer is being used to carry multiplexed low bandwidth circuits, we will count each of the low bandwidth circuits and will not count the bearer.
- A5.33 Two comments should be noted about these rules. First, we can only apply these rules where the raw data is sufficiently detailed to allow us to draw the relevant distinctions. There will be cases where we cannot determine whether a circuit is a bearer or the end-user service bandwidth. For example, if we see an Ethernet circuit with bandwidth of 80Mbit/s, we know that this will either be carried on a 100Mbit/s or 1Gbit/s bearer, but do not know which. In these circumstances, we will simply record the end-user service bandwidth of 80Mbit/s. However, if the circuit bandwidth has been recorded as "80/100", then we will follow the rule set out above and record bearer bandwidth of 100Mbit/s.
- A5.34 Secondly, we consider the rules are consistent with the manner in which the majority of circuits have been described in the raw data. That is, SDH services tend to be sold, and the sales recorded, in units of the multiplexed end-user service

<sup>&</sup>lt;sup>75</sup> MNOs buy individual point-to-point 2Mbit/s circuits from BT using the RBS Backhaul product; bearer circuits + capacity using BT products such as SiteConnect and NetStream; managed network services for core connectivity from BT Wholesale and Virgin Media; and self-supply a variety of circuits throughout the network using both fibre and microwave.

<sup>&</sup>lt;sup>76</sup> This is not true of products (such as WDM) where the customer pays recurring charges for both the bearer and for the capacity being used on that bearer (i.e. the wavelengths). For this reason, in conducting our SMP analysis we also consider an estimate of the volume of bearers supplied by each CP.

<sup>&</sup>lt;sup>77</sup> This refers to services where the bandwidth has been limited by the supplier to something less than the full capability of the underlying technology.

bandwidth (e.g. 2Mbit/s circuits); whereas Ethernet circuits are more likely to be sold and recorded in terms of the aggregate bearer. 82% of OCP sales of AI services in our data are at bandwidths of 10, 100 or 1000 Mbit/s. Therefore, even where we have insufficient information to determine how a rule should be applied in specific instances, the resulting supply measures ought to be consistent in the majority of cases.

A5.35 We consider that this formulation of the rules will produce the most consistent measures of supply, which implies these measures are the least likely to be biased.

## Retail service share methodology

- A5.36 Service shares in the retail market are calculated using the same general approach: we count the number of circuit ends at customer (as opposed to network) sites supplied by each CP in each postcode sector in the UK. However, we now want to count only the supply of leased lines in downstream markets. This requires three differences relative to the calculation of wholesale service shares:
  - We are now want to include the supply of services which are resold. Therefore, even where CP's rely on a third party for access to a particular site, the service still counts as supply by that CP. Therefore, we no longer need to subtract wholesale purchases from sales.
  - ii) However, we want to avoid double counting, and therefore want to exclude the wholesale supply of lines to other CPs (who then re-sell them in the retail markets) from our measures of supply. Therefore, we exclude any sales<sup>78</sup> to other CPs from whom we collected circuit sales data. But we include wholesale sales to CPs from whom we did not collect data, as otherwise this supply would be erroneously missing from the total market supply.
  - iii) Many wholesale symmetric broadband origination services are not used to support sales of retail leased lines, but are used to provide other downstream services such as VPNs, internet access and mobile network services. As discussed in section 3, retail leased lines are defined as services offering dedicated and symmetric bandwidth between two sites. Therefore, we exclude sales where we can see that the leased line is being supplied as part of a VPN, or is being used to support internet access, and exclude circuits sold to MNOs.

# Data processing – steps taken to calculate the service shares

- A5.37 The previous section explained the principles and theory behind our service share estimates. This section explains the practical steps that have been taken to process the data supplied by CPs and calculate the service share estimates. Although the calculation is ultimately straightforward just simple counting the processing of the data and implementation of the methodology are significant undertakings.
- A5.38 Ofcom sent requests for data to 19 CPs who had been identified as the main suppliers of leased line services in the UK on the basis of Ofcom's industry knowledge, the previous BCMR and information gathered during the call for inputs. This request asked for various details relating to the CP's network infrastructure and its current supply of connectivity services. In particular, we requested an inventory of all circuits sold to either retail or wholesale customers, and details of all circuits

<sup>&</sup>lt;sup>78</sup> This includes both wholesale and retail, since some retail services are supplied to CPs.

bought from other CPs. The following details were requested for each circuit listed in the inventory:

- i) Bandwidth;
- ii) Circuit type;
- iii) Product name;
- iv) Customer name, but only if the customer is a CP;
- v) Supplier name for wholesale purchases;
- vi) Location data for each end of the circuit; and
- vii) Whether each end is a network site or a customer site.
- A5.39 The information request was unavoidably complex, and Ofcom followed up the request with a number of meetings and calls with each of the CPs to ensure we received the correct data. Following the various discussions with Ofcom, and having gained a better understanding of our requirements, many CPs resubmitted data. However, despite these efforts, many CPs were unable to provide complete details for each of the circuits. Either the details requested had never been recorded, or were not recorded in a manner which allowed their retrieval without disproportionate levels of effort.
- A5.40 There was significant variation between CPs in the format of the data they supplied due to the fact that CPs have different systems and processes for recording circuit data. In addition, given the large quantities of data supplied, there are inevitably minor typographical errors. Therefore, before attempting to calculate service shares, Ofcom has had to perform a data cleaning exercise. Ultimately, we need to produce a set of circuit records which has the following information recorded in a fully consistent manner:
  - i) Bandwidth measured in common units;
  - ii) Whether the interface type is AI, TI, WDM wavelength, or falls outside our product markets;
  - iii) The postcode for each end of the circuit; and
  - iv) Whether each end is a network site or a customer site.

We also require the following information to allow the calculation of retail service shares:

- v) Whether the service is a VPN or internet access;
- vi) Whether the customer is one of the CPs who received an s135 request, a different CP, or not a CP.
- A5.41 Some of the processing required to produce this consistent set of data is purely data cleaning, such as making sure that bandwidths are presented in the same units. However, other steps, such as deciding whether a particular product should be classified as TI or AI, require a certain amount of judgement. The rest of this

section explains the various steps taken, and highlights the areas where we had to exercise our judgement.

A5.42 Since the BCMR consultation, Ofcom has designed a new set of tools to process the raw data. This has reduced the extent of discrepancies in the treatment of the data, and allows Ofcom to maintain an audit trail from the raw data to the final service share estimates, thus improving transparency and making all assumptions explicit. In addition, once the assumptions have been set, the processing is fully automated thus improving the consistency of the treatment of the raw data.

## Bandwidth data processing

- A5.43 The bandwidth processing was the most straightforward of the cleaning steps. All bandwidths were converted to units of Mbit/s. However, a number of assumptions were made in this process to follow the rules set out at paragraph A5.32. For example, if an Ethernet circuit was listed as having bandwidth "4/100", we would record the bandwidth of the underlying circuit, i.e. 100Mbit/s.
- A5.44 Similarly, if a CP described a service as  $N^*$  a particular bandwidth, then we made N duplicates of that entry. If the description was literally "N\*" a bandwidth, then we made the following assumptions about N:

Bandwidth description	Assumed value of N
N*64Kbit/s	2
N*2Mbit/s	4
N*10Mbit/s	2
N*100Mbit/s	2

#### Figure A5.4 Bandwidth assumptions for 'N\*' services

A5.45 Usually, "N\*" is used to refer to services where there are multiple circuits at the same bandwidth, but it should be noted that further investigation of these circuits revealed that in many cases the value of N was 1. As a result, we adopted relatively low values for N. The effect of these assumptions on the wholesale services shares are too small to measure as they affect so few circuits. Around 3,000 low bandwidth retail TI circuits are described in this way, which represents less than 2% of the total market volume. Similarly, less than 0.5% of low bandwidth AI circuit entries are affected by these assumptions. In both cases, the majority of the affected circuits are retail services based on wholesale inputs supplied by a third party. As such, they do not contribute to our measure of wholesale supply. Therefore, the precise choice of assumptions made in the table above have no material affect on the wholesale services share estimates.

## Location data processing

A5.46 Establishing the location of circuit ends is important because this allows us to measure supply activity in different geographic locations, and is also an input to our analysis of trunk segments. The first step in processing the location data for each end of a circuit was to extract a postcode. The postcode was not always recorded in the correct field, and was often within a larger field of data, such as the full address, and even within the product description. Ofcom has developed a macro to perform an automated search through all the circuit data to find postcodes. In general, we do not attempt to look up postcodes where an address has been supplied without a postcode. One exception is the [≫ ] wholesale dataset. This dataset was unique in having relatively complete address information, but missing a large number of postcodes. In addition, there were a number of LLU backhaul circuits in

this same dataset which were missing all address information, but contained a reference to the BT code which identified the relevant BT local exchange building. An extensive process was undertaken to identify the postcodes relevant to the addresses and the local exchanges.

#### **Classifying interface type**

- A5.47 Figure A5.2 above shows the type of classifications we are attempting to make when processing the raw data. Given the variability of circuit descriptions in the raw data, this is the most difficult step of the cleaning process, requiring some degree of judgement to make a decision in the circumstances where the CP description was insufficiently detailed or otherwise ambiguous.
- A5.48 The classification process we adopted is sequential and hierarchical, using different data fields to infer the interface type. We are able to classify more of the circuits with each iteration. There are around 850,000 circuit entries in the raw data, comprising both sales and purchases. We start by producing a table which contains every variant of the information in the "circuit type" field found in the raw data. We then allocate an interface type to each of these descriptions of circuit type. For example, a circuit type described as "Ethernet" would be allocated as "AI", and one described as "wavelengths" would be allocated as "WDM". This produces long tables for example, there are over 500 such variations of circuit type, but ensures that this step of the allocation process is transparent. The information in this field is often insufficient to determine the interface. For example, a circuit described as "internet access" could be supplied with a variety of technologies. As shown in Figure A5.5 below, we are able to allocate an interface type to 75% of circuit entries using this first step.
- A5.49 We then look at the product description, and again produce a lookup table based on the entries which have not yet been allocated an interface type.<sup>79</sup> After this step, around 8% of circuit entries remain unallocated. We therefore look for other sources of information about these circuits. For example, many CPs make reference to the BT circuit ID both in their purchase data and for sales which make use of a BT tail circuit. These IDs start with a four letter code which sometimes identifies the type of service being provided. For example, IDs starting with "CBUK" refer to DSL circuits.
- A5.50 As a final step, we make an assumption based on the bandwidth of the circuit. For example, if we find a 155Mbit/s circuit we will assume it is provided using SDH and is therefore allocated as TI. Some bandwidths are more ambiguous. We set out the key assumptions below:
  - Bandwidths in multiples of 10Mbit/s are likely to be Ethernet, and are therefore treated as AI;
  - All bandwidths over 1,000Mbit/s are treated as WDM, and will therefore fall into the MISBO markets; and
  - Bandwidths below 10Mbit/s are treated as TI.
- A5.51 At this stage we also change some previous allocations based on bandwidth. Specifically, we reclassify any circuits at 100Mbit/s and 1,000Mbit/s as AI. Although these services may have been delivered over SDH, we consider that their competitive effect will be strongest in AISBO markets. Circuits supplied at these

<sup>&</sup>lt;sup>79</sup> There is much greater variety in the product descriptions, resulting in a lookup table with over 2,700 entries.

bandwidths will most likely be handed over to the customer via an Ethernet interface.<sup>80</sup> That is, the customer required an Ethernet service. When the circuit was first installed, the CP may have chosen to deliver these services over an existing SDH network, perhaps to engineer a resilient service. However, it is now possible to deliver these services without using SDH. Therefore, on a forward-looking basis, it seems reasonable to assume that these services form part of the AISBO market.

A5.52 The following table shows the proportion of circuit entries classified at each stage described above. As is clear, the interface type was allocated on the basis of circuit type or product descriptions for the majority of circuit entries.

Information used to determine interface type	Proportion of circuit entries allocated using this information	
Circuit type description	75%	
Product description	17%	
Various inc BT product codes	0.6%	
Bandwidth	5%	

## Figure A5.5 How interface type was classified

A5.53 Given that we are not able to identify a bandwidth for some circuits, there remains a small but not insignificant number of circuits (<2%) which have yet to be allocated an interface type. Around one third of these relate to wholesale purchases. These circuits are allocated an interface type according to a simplifying assumption based on the known interface types of circuits sold by each CPs. Figure A5.6 below shows the assumptions we used. For example, the majority of CWW circuit sales are TI services, so we simply assume that all the outstanding circuits are TI. Although this is an approximation, it simplifies an already complex procedure and, as explained below, a more granular extrapolation of the known interface types produces almost identical results.

СР	Interface allocation
CWW	ТІ
COLT	AI
Exponential-e	AI
Global Crossing	TI
KCOM	TI
Neos	AI
Orange Business Services	ті
Verizon	AI
Virgin	AI

#### Figure A5.6 Final assumptions for allocating interface types

A5.54 We have considered an alternative method for allocating these circuits using the proportions of interfaces found in the rest of a CP's circuit inventory. However, this is relatively difficult to implement, requires additional assumptions about which

<sup>&</sup>lt;sup>80</sup> IEEE802.3 Ethernet standards define interfaces at 10, 100, 1000, 10000 Mbit/s and higher bandwidths.

circuit entries should be allocated to which interface, and yields results which are not materially different.

- A5.55 96% of the missing allocations come from three CP datasets: [≫
  ≫ ]. Many of the [≫ ] purchases fall in postcode sectors where we have not found any wholesale supply. Therefore, the effect of reallocating the interface for these purchases has little effect on wholesale supply.<sup>81</sup>
- A5.56 Moving to an approach based on equi-proportionate allocations would imply reallocating some of the [>]] circuit sales to AI, and some of the [ $\times$ ] sales to TI, but also potentially allocating some of the circuits to interfaces which fall outside the relevant markets, such as ADSL or ISDN. We have considered two scenarios: allocating according to the proportions including interfaces which fall outside the market; and allocating just to leased line interfaces. Neither scenario results in a material change to our estimate of BT's service share. In the first scenario, the net result would be a very slight reduction in total supply by competitors to BT in both AI and TI markets and a small increase in MI. In the second scenario there would be a small increase in OCP supply in TI and MI, and a small reduction in AI. The largest changes in BT's service share across all markets and from either scenario are a 0.5% increase in the low bandwidth AISBO market outside the WECLA, and a 0.5% decrease in the MISBO market outside the WECLA. Clearly, neither change is material to our understanding of competition in these markets.

## Identifying network and customer sites

- A5.57 As explained above, our counting methodology distinguishes between circuit ends at customer sites and those terminating at network sites. We therefore asked CPs to draw this distinction in their circuit inventory data. This proved difficult for many of the CPs although they knew when a circuit terminated in one of their own network buildings, they usually did not know when a circuit terminated at another CP's network site. This issue was discussed in the BCMR Consultation, where we noted that BT had resubmitted data when they had understood that we wanted information about both its own network buildings and those of other CPs. We also noted that BT was likely to have access to better information about the location of other CP network sites. As a result, we expected that BT would likely have identified more 'network' ends relative to other CPs, and that this would create a systematic bias in our service shares.
- A5.58 We suggested that we would undertake further work to classify circuit ends within Ofcom, and therefore produce unbiased estimates of service share. We now have a process which produces a number of different sets of possible circuit end classifications.
- A5.59 First, we clean the raw data, translating the descriptions provided by CPs into either 'customer' or 'network'. A number of CPs did not provide any classification of whether a circuit end was 'customer' or 'network' within their circuit inventories. However, they suggested that we adopt certain rules, for example, that one end of a VPN tail or circuit used for internet access would always be a network site. Therefore, in addition to the simple translation, we also implement these more

<sup>&</sup>lt;sup>81</sup> The reason is that, regardless of the interface, if we have not found any positive wholesale supply in that postcode sector, the addition of a wholesale purchase will result in a negative number in our wholesale supply calculation for that postcode sector. As explained above, these negative values are ignored when calculating the total supply for the CP across all the postcode sectors within a market area.

complex rules. This focuses on entries without a valid postcode, because those with valid postcodes can be categorised in the second stage.

- A5.60 The second stage starts by building a list of the postcodes of network sites used by the CPs. Part of the information request was for address details of all the sites where a CP maintained active network equipment. We collated this information to produce a list of over 7,000 unique six-digit postcodes where there appear to be network sites. We then performed a matching exercise of these postcodes against the postcodes for each end of every circuit entry in the database. If a match is found, we categorise that circuit end as a network site. If there is no match, we assume it must be a customer site. If we did not find a valid postcode, then we revert to the assignment from the first stage.
- A5.61 The supply volumes are sensitive to the classification of circuit end type, and the resulting service shares produced by the above method are sometimes significantly different from the shares calculated for the BCMR Consultation. Therefore, to ensure our results are robust, and to give assurance that we have removed the source of bias from these earlier results, we produce a number of different lists of network site postcodes. We consider the following four options based on the network location data supplied by CPs:
  - All sites listed as containing active network equipment, <u>including</u> MNO core sites (7,627 postcodes);
  - All sites listed as containing active network equipment, <u>excluding</u> MNO core sites (7,370 postcodes);
  - iii) All BT sites listed as containing active network equipment (5,689 postcodes); and
  - iv) All OCP sites listed as containing active network equipment (2,572 postcodes).
- A5.62 As a further test, we also consider the circuit end allocations in the inventory data supplied by the CPs as a source of information about network sites. Therefore, we produce candidate lists of network site postcodes by searching for the postcodes of circuit ends which CPs have labelled as network sites, and collate this information across all CPs.<sup>82</sup> Note that these lists are then used to reclassify all circuit ends in the raw data, and so produces different results to the classification in the raw data.<sup>83</sup> We produce three candidate lists of postcodes:
  - Postcodes where any CP described the site as a network location (12,461 postcodes);
  - ii) Just the postcodes where BT described the site as a network location (10,911 postcodes); and
  - iii) Just the postcodes where OCPs described the site as a network location (7,121).

<sup>&</sup>lt;sup>82</sup> Strictly speaking, these are the postcodes of sites which have been identified as network sites through the cleaning process described in paragraph A5.59. That is, it is based on both the information provided in the raw data and the rules suggested by CPs for classifying sites.

<sup>&</sup>lt;sup>83</sup> For example, CP1 may have allocated circuit end with postcode AB12 3CD as a network site. We would add this postcode to our network sites list, and then any circuit end at this postcode would be classified as a network end.

- A5.63 The benefit of our approach is that all CPs are treated alike. As a result, although there may be errors in the circuit end allocations, these errors will be unbiased. The following table shows how BT's service share varies according to the different assumptions used, and also under the method used for the consultation document (i.e. relying solely on the inputs provided by CPs). Our base case uses the first option in paragraph A5.61. The table shows that the method used in the Consultation produced consistently lower estimates than any of those produced using the method described above.<sup>84</sup> Further details of the sensitivities, and our interpretation of these results, is presented in section 7.
- A5.64 Also, despite the wide range in the number of network sites identified and the consequent difference in volume of ends counted in our wholesale supply measures, most of the service share ranges are narrow. The exception is the low bandwidth AISBO market in the WECLA. However, the two extremes of the range come from two of the more extreme scenarios: the 43% estimate is the result when we only exclude BT sites; and the 62% estimate is the result when we exclude just those sites identified by OCPs as network sites. The WECLA is also more sensitive than other areas due to the relatively large volume of circuit ends at data centre sites.

Product segment	Geographic market	Ofcom base case	Range of estimates under different circuit end classifications	BCMR Consultation method	Ignore end type (count both ends)
TI Low	UK less Hull	88%	86%-92%	83%	87%
TI Medium	UK less Hull less WECLA+	77%	75%-78%	70%	81%
TI Medium	WECLA+	13%	12%-18%	8%	16%
TI High	UK less Hull less WECLA+	51%	47%-51%	42%	54%
TI High	WECLA+	8%	7%-18%	5%	10%
TI Very High	UK less Hull	15%	11%-23%	13%	23%
AI Low	UK less Hull less WECLA+	74%	73%-76%	72%	76%
AI Low	WECLA+	51%	43%-62%	37%	49%
мі	UK less Hull less WECLA+	57%	53%-59%	53%	63%
МІ	WECLA+	24%	19%-33%	15%	27%

#### Figure A5.7 Service share sensitivity results – circuit end classification

A5.65 There are two related potential sources of error associated with our new methodology for classifying circuit ends. First, postcodes often cover a group of buildings. Therefore, a circuit which terminates at a customer building in close proximity to a network site may be mistakenly classified as a network end. Secondly, and similarly, many network nodes are located in buildings shared with non-network customers. In both cases, the result is that we ultimately undercount

<sup>&</sup>lt;sup>84</sup> The only exception is the Very High bandwidth TISBO market, in which BT has a very low share of a very low volume. As such, these share estimates are less robust than the other markets.

total supply.<sup>85</sup> However, we do not believe that the size of the undercount is likely to be large, and have no reason to believe that the undercount will not be distributed evenly between CPs. As such, we do not consider that this source of error is likely to result in a systematic bias of the service share estimates.

A5.66 It is possible that OCPs would be more likely to have customers in very close proximity to their network nodes due to the costs of extending physical network infrastructure from the node. However, we do not see any such pattern of clustering around CP nodes because CPs have long since extended their networks some distance from their network nodes. Other than this, we can see no reason why any group of CPs should be more likely to have customers in or near network nodes, and accordingly, we consider that the approach set out above will remove the systematic bias which existed in the service share estimates in the BCMR Consultation.

## **Retail specific processing**

- A5.67 The first of the additional steps for the retail market service shares was to identify services which were used as VPNs or internet access. This was done of the basis of a keyword search on product names and circuit type data. For example, circuits mentioning "VPN", "MPLS", or "ATM" we identified as being VPN services. Similarly, all circuits which mentioned "internet" and acronyms such as "DIA" (i.e. dedicated internet access) were identified as internet access services.
- A5.68 The second step was to process the customer names to identify the CPs and MNOs, and then to further classify the CPs as being either one from whom we received circuit data or not.

## The wholesale service share calculation

- A5.69 Once the process of classifying circuits into product groups, between customer and network ends, and geographic locations has been completed, the calculation of wholesale supply volumes and service shares is relatively simple. First, the circuits are filtered to include only those circuits which fall within the relevant product market boundaries. For example, low bandwidth AISBO will include only circuits which have been categorised as having interface type AI, and having bandwidth of less than or equal to 1,000Mbit/s. Then we perform the simple calculation set out in the formula listed at paragraph A5.12 above<sup>86</sup> for each CP within each postcode sector. Finally, we aggregate the results of these calculations across the postcode sectors in each of the defined geographic market areas.
- A5.70 Despite the simplicity of the calculation, there remain practical difficulties due to the size of the dataset. Since the BCMR Consultation Ofcom has developed a new tool for performing the service share calculation. The calculation remains the same, but the new tool fully automates the process.
- A5.71 This has improved our ability to undertake sensitivity testing of the results, that is, to calculate service shares under various different assumptions about the treatment of the raw data, and about which services should fall into which market. This is a useful step to help us assess the reliability of the service share estimates, and

<sup>&</sup>lt;sup>85</sup> Circuit ends at customer sites will be classified as network sites as they share the same postcode, and therefore will not contribute towards our measure of supply.

<sup>&</sup>lt;sup>86</sup> Formula at paragraph 0 for BT.

therefore to help us decide how much weight we should place on our estimates as an indicator of competitive conditions.

## Treatment of missing and incomplete data

A5.72 As noted above, there are a number of entries in the circuit data for which we were unable to identify a bandwidth and/or geographic location. As such, we do not know which market these services should be counted under. The approach we have taken is to allocate this supply using an equi-proportionate mark-up. Specifically, we calculate a mark-up for entries missing bandwidth and one for circuit ends missing a valid postcode as follows:

 $Markup \ factor = rac{total \ entries}{entries \ with \ a \ valid \ allocation}$ 

- A5.73 The bandwidth mark-ups are differentiated by interface type and calculated separately for wholesale sales, retail sales and wholesale purchase datasets for each CP. The geographic mark-ups are calculated within product market boundaries, i.e. differentiated by bandwidth and interface type, and also calculated separately for the different datasets for each CP.
- A5.74 These mark-ups are applied to the supply calculations within each postcode sector. The general formula for wholesale supply taking account of these mark-ups is shown below. The mark-ups are shown as  $M_y^x$ , where x is either WS (wholesale supply), RS (retail supply) or P (purchase dataset), and y is either Geo or Band to indicate either geographic or bandwidth mark-up.

$$\binom{Wholesale}{Supply} = M_{Geo}^{WS} * M_{Band}^{WS} * \binom{Wholesale \ circuit \ ends}{sold \ with \ valid \ allocation} +$$

 $M_{Geo}^{RS} * M_{Band}^{RS} * \begin{pmatrix} Retail circuit ends \\ sold with valid allocation \end{pmatrix} - M_{Geo}^{p} * M_{Band}^{p} * \begin{pmatrix} Wholesale circuit \\ ends bought with \\ valid allocation \end{pmatrix}$ 

## Changes since the Consultation

- A5.75 There have been a number of changes to the way we calculate service shares since the publication of the BCMR Consultation. We have already discussed most of these above. The main additional changes are as follows:
  - We have developed a new Excel model and a set of macros to automate the process of calculating service shares for a given set of clean circuit data. This allows us to perform the calculation a number of times using different assumptions about the allocation of interface type, and bandwidth, and to introduce new changes. Using the previous tools and spreadsheets, the resource required to undertake such calculations was prohibitive. The end result is that we can provide greater assurance that the service shares are representative of competitive conditions in the relevant markets.
  - We have designed a new set of database tools to automate the cleaning of the raw data. This ensures that we can maintain a complete audit trail of the data processing, from the files supplied by CPs in response to the Information request, all the way through to the service share calculations. In addition, the new tools allow greater transparency over the steps taken to clean the data.

- The new tools and model have been externally audited by [%]. In summary, [%] found that the tools and model implemented our service share methodology accurately.<sup>87</sup>
- A5.76 The changes noted above were at the level of the mechanics of processing the data. They involved no inherent change to the principles, or methodology, of the service share calculations.
- A5.77 Separately, we have made three changes to our supply calculation assumptions.
  - 5.77.1 First, we no longer include TAN circuit ends in the supply counts in wholesale symmetric broadband origination market shares.<sup>88</sup> In the BCMR Consultation, we had followed the approach taken in the previous BCMR of including TAN ends in the wholesale supply measure. We had assumed that this would merely double the service count (since every circuit end was associated with a TAN end) but would ensure that our total supply figures were comparable with the previous BCMR. However, in reviewing this aspect of the methodology following the Consultation, we noticed that the geographic distribution of TANs was different to the distribution of circuit ends, and therefore the inclusion of TAN ends in our measures of supply could potentially bias service shares between different geographic markets.<sup>89</sup> Therefore, we have decided to exclude TAN ends from our measure of wholesale supply. The result is a small reduction in BT's service shares in the WECLA. For example, BT's share in the low bandwidth AISBO market in the WECLA falls by 2%.
  - 5.77.2 Secondly, there have been a number of clarifications in the rules used to allocate interface types. The most notable is that all VPN tail circuits are included in our measurements of wholesale supply, but will be excluded from the retail market. Therefore, and as discussed in section 7, we count ATM and Frame Relay tail circuits in the wholesale TISBO markets<sup>90</sup>. However, as a sensitivity test, we also calculate shares excluding ATM and Frame Relay circuits from the wholesale market. The result is a small decrease in BT's service share, ranging from less than .5% in the low bandwidth TISBO market.
  - 5.77.3 Thirdly, the task of classifying circuit ends as being either network or customer sites is now done by Ofcom in order to ensure that differences in the ability of CPs to perform such an allocation do not

<sup>&</sup>lt;sup>87</sup> The scope of the audit did not extend to an assessment of the assumptions used in our analysis, such as the content of the tables mapping circuit type data to standard interface types discussed in paragraph A5.48. As such, [ $\times$   $\gg$ ] were not able to validate the actual service share numbers, but taking our assumptions as given, they were happy that the analytical steps we have taken would produce accurate service share figures in accordance with our methodology.

<sup>&</sup>lt;sup>88</sup> We continue to work out TAN nodes for each circuit end as this forms the basis for the trunk service share calculations. This is discussed further in the trunk shares subsection below.

<sup>&</sup>lt;sup>89</sup> This point was also noted by BT in its response to the Consultation as set out below from paragraph A5.146.

<sup>&</sup>lt;sup>90</sup> In the BCMR Consultation, circuits which were known to be ATM circuits were excluded from the wholesale service share analysis on the grounds that ATM services were not part of the retail market. However, other ATM services, which were not identified as being provided using ATM technology, were included and treated as TI circuits.

introduce a bias into our service share estimates. See above for a detailed explanation of the new method.

- A5.78 Another difference between the results presented in the Consultation and this Statement is that we have used additional raw data. In re-processing the source data, we identified two additional sets of circuits that were not included in the Consultation results but which we now believe should have been included. One set of [≫] circuits had been excluded in the original cleaning process on the basis that these entries might not have been leased lines. Having reviewed the data, we now consider that these services should be included in the analysis. Secondly, in its original submission [≫] had excluded a number of entries on the basis that these related to modifications to circuits and therefore duplicated details of the circuit in question. After reviewing the submission, we have discovered that this interpretation was incorrect, and that each entry referred to a separate circuit.
- A5.79 One final development is the introduction of a sensitivity test to account for potentially missing circuit supplied by some CPs that were not included in the data provided to us(this is distinct from the mark-ups which account for inaccuracies and detail missing from the circuit data that was supplied). Two CPs [≫] informed Ofcom that their sales datasets might not be complete. Two possible causes were given:
  - First, both CPs were in the process of amalgamating records from different sources following mergers and acquisitions. The sales data supplied to Ofcom was gathered from a number of different systems, and there were inconsistencies between the different source datasets. The result was that neither CP could be certain that the resulting dataset was complete; and equally, neither could be sure that it did not contain duplicates.
  - Secondly, some VPN sales might have been recorded as a single entry in the sales data (rather than listing all the connected sites).
- A5.80 In meetings with Ofcom, both CPs suggested that the number of potentially missing circuits was likely to be small. Since the consultation we have worked with these CPs to estimate an upper bound on the number of missing circuits by producing an independent estimate of the total number of circuits supplied by the relevant CP, for example, using network inventory data, the number of connected buildings, the typical number of sites where a third party tail circuit would be required, and the number of third party tail circuits by that CP.<sup>91</sup>
- A5.81 Ultimately, we use the estimated upper bounds to mark-up the supply volumes of the relevant CPs as one of our sensitivity tests of the service shares. Therefore, we make prudent assumptions in order to be confident that the CP's actual supply is not greater than the resulting estimate.
- A5.82 For [≫] our upper bound estimate results in a 39% increase in its wholesale supply volume, and for [≫] it results in a 5% increase. In both cases, the relevant CP considers that these figures imply a number of missing circuits which exceeds the true figure. However, they also agreed with these assumptions given our requirement for an upper bound. We calculate service shares where each CP's supply is increased by the relevant factor, and the results are presented in the table below. Clearly, BT's service share falls under these assumptions, but only by a

<sup>&</sup>lt;sup>91</sup> The CPs advised us that their circuit purchase data does not suffer from the issues affecting the sales data.

small amount, and not enough to materially change our view of competition in the relevant markets.

Product segment	Geographic market	Base case	[≫] upper bound volume estimates
TI Low	UK less Hull	88%	87%
TI Medium	UK less Hull less WECLA+	77%	74%
TI Medium	WECLA+	13%	13%
TI High	UK less Hull less WECLA+	51%	46%
TI High	WECLA+	8%	8%
TI Very High	UK less Hull	15%	14%
AI Low	UK less Hull less WECLA+	74%	73%
AI Low	WECLA+	51%	50%
MI	UK less Hull less WECLA+	57%	56%
МІ	WECLA+	24%	24%

# Figure A5.8 Service share sensitivity results with [≫] volume set to an upper bound estimate

A5.83 We perform a further test where we mark-up all OCP supply by 10% in addition to the two mark-ups already considered. As discussed throughout this section, we are aware of a number of reasons why we might be missing some circuit data from OCPs, but consider that it is extremely unlikely that OCP supply would be understated to this degree. Despite making such an extreme assumption, we find little change in the estimates of BT's service shares, as shown in the table of results below. Additional sensitivities are discussed in section 7, where we explain how all the results are used to inform our understanding of competition in the relevant markets.

Product segment	Geographic market	Base case	Upper bound volume estimates for all OCPs
TI Low	UK less Hull	88%	87%
TI Medium	UK less Hull less WECLA+	77%	73%
TI Medium	WECLA+	13%	12%
TI High	UK less Hull less WECLA+	51%	46%
TI High	WECLA+	8%	7%
TI Very High	UK less Hull	15%	13%
AI Low	UK less Hull less WECLA+	74%	73%
AI Low	WECLA+	51%	48%
мі	UK less Hull less WECLA+	57%	54%
MI	WECLA+	24%	23%

# Figure A5.9 Service share sensitivity results with upper bound volume estimates for all OCPs

# Stakeholder comments on data analysis

- A5.84 This section discusses points raised by stakeholders concerning our data analysis and service share estimates in response to the two consultations. Specific points are discussed below under separate subheadings. Overall, a number of CPs also expressed a lack of confidence in the service share estimates. In essence, the cumulative effect of the various issues with the source data, and the complexity of the methodology, meant that the CPs did not have much confidence that the service shares were an accurate reflection of competitive conditions in business connectivity markets.
- A5.85 In particular, UKCTA, Exponential-e and MBNL all noted that BT's shares in the WECLA seemed to be low, and that this did not accord with their experience in the market. However, BT set out a number of arguments as to why it considered that our estimates of BT's service shares were likely to be systematically overstated (across all geographic markets, but in the WECLA in particular).
- A5.86 Both BT and the OCPs concluded that the issues with service shares meant that we should not be relying on them so heavily in conducting the SMP assessment.
- A5.87 Overall, we consider that the additional work and analysis that has been conducted since the consultation means that the service share estimates are a reasonable basis for drawing inferences on BT's market power. We now calculate service shares under a variety of different assumptions, which produces a range of estimates. We can therefore use this range of values in our assessment of competitive conditions, rather than relying on a single point estimate. This gives us greater confidence that any inferences about competitive conditions are correct.

- A5.88 However, we also continue to acknowledge that there are a number of issues, both practical and theoretical, which mean that the service share estimates will never be precise. In low volume markets in particular, we are more likely to encounter extremes in service shares, purely as a result of statistics.<sup>92</sup> Therefore, in every market, but especially in low volume markets, we have taken extra care when using our service share estimates as an indicator of competitive conditions, and ensured that our conclusions draw on a variety of sources of evidence in addition to the range of service share estimates.
- A5.89 The rest of this section discusses the following issues raised by CPs in their responses:
  - i) Circuits missing from the raw data
  - ii) Inaccuracies in the raw data
  - iii) MISBO issues and dark fibre
  - iv) Issues regarding methodology
  - v) Inclusion of TAN ends
  - vi) Network end classification
  - vii) Treatment of self supply by CPs
  - viii) Whether to count bearers or end-user services
  - ix) Issues specific to retail service share calculations
  - x) Miscellaneous

#### **Missing circuit data**

#### Stakeholder comments

- A5.90 In its response to the first consultation, BT gave a number of reasons why it believed that we are likely to be missing circuit data relating to some services supplied by OCPs. BT goes on to argue that these issues do not affect BT, and so it will have provided a more complete dataset, with the end result that our measure of OCP supply will be systematically biased downwards.
- A5.91 BT gives the following three reasons why it believes that OCP datasets are likely to be incomplete (or at least relatively less complete than BT's dataset):
  - 5.91.1 The services supplied by OCPs do not map well onto our market/service categories. In contrast, BT notes that its products fit precisely to the market boundaries since they are often the product of regulation within these markets, and to a large degree the markets are defined according to BT's products. BT then argues that OCPs need not record the underlying symmetric broadband origination element of

<sup>&</sup>lt;sup>92</sup> That is, small areas, in which the population of leased line customers is also small, are more likely to produce extreme results. For example, if we look at the connectivity to a single customer (because it is the only one in the area of interest), a CP's service share will be either 0% or 100%. This does not tell us much about the relative competitive strength of that CP.

its services as this is not very closely related to the services being sold to its customers. Therefore, BT suggests that it is "inevitable that OCPs will not be able to accurately respond to Ofcom's information requests".<sup>93</sup>

- 5.91.2 We have adopted a number of different and inconsistent definitions of VPNs in the consultation document and in the information requests sent to OCPs. BT states that, "the combination of imprecise and contradictory definitions of VPNs with the very narrow definition of focal products, leaves considerable ambiguity for OCPs in categorising their own products"<sup>94</sup>. BT's case is that CPs are unlikely to have supplied complete data regarding the circuits which underpin VPNs either because they do not keep records of these underlying network services, or because they assumed that these services were excluded from the information request because VPN services are considered to be downstream of leased line markets.
- 5.91.3 OCPs may adopt a network architecture in which customer sites are connected on a 'daisy-chain' basis, in contrast to the Openreach network where customer connections are routed back to a network node. Given that the services supplied in a daisy-chain configuration are almost always running over shared bandwidth, BT argues that OCPs could, justifiably, have not reported these services.<sup>95</sup>
- A5.92 BT then argues that the issue of potential bias is likely to be compounded by the fact that OCPs target relatively larger customers.
- A5.93 Separately, BT comments that if wholesale purchase data tends to focus on circuits bought from BT, and is therefore missing purchases from other CPs, this will affect service shares in all markets.<sup>96</sup>
- A5.94 BT also notes that we are missing data from a number of smaller suppliers. We address this point in the following subsection discussing MISBO specific issues.

#### Ofcom response

A5.95 We do not consider that the issues raised by BT are likely to result in significant volumes of missing circuits, or systematic mis-classification of circuits. We consider that we have taken all reasonably practicable steps to produce a comprehensive inventory of services which will fall in the relevant markets considered in this review. We also took great care to ensure that CPs understood what they were being asked to provide. This process started with stakeholder meetings to discuss the type of information that CPs would be able to supply, and consultation on the drafting of information request. Following the information request, there were a large number

<sup>&</sup>lt;sup>93</sup> Para 6, page 172, BT response to first consultation. BT also argues that our service categories are too narrowly defined, and that the retail markets we define are too narrow. This is really a question of market definition, and therefore discussed in sections 3 and 4 above. In the discussion below, we take the market definition as given, and focus on the consequences BT suggested would flow from this definition in terms of data gathering from OCPs.

<sup>&</sup>lt;sup>94</sup> Para 28, page 176, ibid.

<sup>&</sup>lt;sup>95</sup> This is explained most clearly between paras 70-72, ibid. For example, in para 72 BT suggests that, "if all the services are statistically multiplexed packet services, Ofcom's counting methodology seems certain to record no relevant traffic at the site at all at either retail or wholesale levels."

<sup>&</sup>lt;sup>96</sup> Para 107, page 196, ibid.

of meetings and discussions with stakeholders to clarify our requirements and assist the CPs in producing the data.

- A5.96 We collected data regarding wholesale purchases as well as supply. As a result, we are able to perform checks on the consistency of the data.<sup>97</sup> Through this process we identified likely omissions from the data, and were able to follow up with the relevant CPs. A number of CPs, including BT, revised their original submissions or provided additional data as a result of this process.
- A5.97 We do not consider that the process of matching services to one of our categories or definitions will have resulted in erroneously missing data. BT itself notes that there need not be any problem if the definitions are only used as an 'aide-memoire'.<sup>98</sup> It is clear that CPs were not overly strict in their interpretation of the definitions as the data provided to Ofcom contains information covering a broader range of activities than the set implied by even a loose reading of the definitions.

We see a large number of entries in the database which do not relate to leased lines. For example, ADSL, CCTV, PSTN lines, and in-building cabling services. Therefore, we do not believe we are likely to be missing large sets of data because CPs either did not understand our requirements, or were unable to match their services precisely to the definitions we gave in the information request.

- A5.98 Similarly, we do not believe that we will be missing data regarding VPNs because of a definition of a VPN service which was either technically inaccurate, or inconsistent. The data supplied by CPs includes a large number of services described as VPNs. Although OCPs sell a wide variety of services, including a variety of VPN products, the mere fact that we did not specify the information request using each CP's product nomenclature does not mean that the CP would not be able to understand our requirement and identify its own VPN services.
- A5.99 BT also notes that a CP might never make a record of the circuit underlying a VPN service. As such, the CP would not be able to provide the details of this circuit that we requested. We accept that e CPs might not record full details of the leased lines used to supply VPN tail circuits, but we would still expect the CP to keep a record of the sale of a VPN service and the sites served by the VPN. We see many entries in the raw data from OCPs which appear to be VPN tail circuits. Therefore, we do not believe that this is a valid reason why we should be missing data from the circuit inventories.<sup>99</sup>
- A5.100 For similar reasons, we do not consider that BT's argument concerning network architecture is valid. Although there may be no record of the (self-supplied) underlying circuits which make up a daisy-chain, CPs will still maintain a record of the sales of services which use this network. Therefore, we do not believe that differences in network architecture will have influenced a CP's ability to respond accurately to our request for information concerning retail and wholesale sales.
- A5.101 On the issue of missing wholesale purchase data, BT had noted that we identified an issue in the Consultation in relation to the markets in Hull. We found that CP

<sup>&</sup>lt;sup>97</sup> For example, if CP1 provides details of purchases from CP2, we can check that these circuits appear in CP2's inventory of circuit sales.

<sup>98</sup> Para 32, page 177, ibid.

<sup>&</sup>lt;sup>99</sup> There is a separate issue concerning the fact that the VPN service could have a different bandwidth and interface from the underlying circuit. This is discussed below in the sections concerning self-supply and whether to count bearers or end-user services.

purchase data appeared to be missing circuits purchased from Kingston Communications in Hull. As a result, our calculations erroneously inferred wholesale supply in the Hull area for a number of CPs. Our network reach analysis showed that BT had very limited network presence in the Hull area, and no other CP had access network.<sup>100</sup> Also, we were able to match the retail circuit sales by CPs in Hull to sales of circuits to these CPs by Kingston Communications. We concluded, therefore, that we were simply missing entries in the wholesale purchase data from CPs. We also noted a general trend that CP purchase data tended to be complete with regards to circuits purchased from BT, but sometimes did not include many circuits purchased from other CPs.

A5.102 We accept that this could, in principle, affect markets other than those in the Hull area. The impact would be to increase our measurement of OCP wholesale supply, and this would create a downward bias in our estimates of BT's service share. However, many datasets appear to include full details of purchases from CPs other than BT. Based on an analysis of customer names, we see just under 21,500 sales from OCPs to other CPs. Based on the supplier name, we see just over 16,000 purchases by CPs from an OCP. However, the supplier name field was left blank in almost 27% of entries. Assuming these blanks are distributed evenly between OCPs and BT, the revised volume of purchases is approximately 20,500. On this evidence, we consider that the volume of entries missing from the purchase data is limited, and therefore we do not consider that the potential bias stemming from these missing entries will be material.

## Data inaccuracies and the mark-up calculations

#### Stakeholder comments

- A5.103 BT notes that, although our solution to the issue of incomplete details for circuit entries is pragmatic, if the missing details were not evenly distributed throughout a CP's dataset (that is, if these errors were in some way systematic), then proportionate mark-ups would create a bias in the resulting service shares.<sup>101</sup> As an example, BT suggested that COLT's low service shares outside the WECLA might indicate a systematic data recording issue.
- A5.104 BT also raised a concern that out of date postcodes may be leading to errors in our analysis, and suggests that this may be one reason why we cannot locate a number of circuit ends.

#### Ofcom response

A5.105 We agree with BT that, if there are systematic errors in the raw data, they will not be completely corrected by an equiproportionate mark-up. However, we do not have any reason to believe that there are reasons why the data errors or omissions should be skewed geographically. The only systematic reason why a CP did not provide address details that we could discern was that the relevant site was a network node. For example, in relation to VPN and internet access services, or for leased lines supplied using MPF, CPs have often only provided the address details for the customer site.

<sup>&</sup>lt;sup>100</sup> We are now aware of MS3 operating in the Hull area, as discussed in section 5.

<sup>&</sup>lt;sup>101</sup> Para 97, page 195, ibid.

- A5.106 Even if there were omissions of this type, there are two reasons why this will not lead to a bias in our service share estimates.
  - First, there is no reason to believe that the location of OCP network nodes will be materially skewed relative to the location of OCP customer sites<sup>102</sup>.
  - In any event, we do not count circuit ends at network nodes in our measures of wholesale supply.
- A5.107 Regarding the COLT example suggested by BT, in light of evidence from our network reach analysis and discussions with COLT, we are satisfied that the difference between its service shares inside and outside the WECLA are an accurate reflection of supply in these areas.
- A5.108 However, we do note that this approach unavoidably entails an approximation, and we are therefore cautious when interpreting service shares in small geographic areas, especially when volumes are low.
- A5.109 We agree with BT that postcodes change over time and we have factored this into our data cleaning process. In the service share analysis where we encountered an old postcode that no longer existed, we found its centroid, found the new postcode it sat within and used that to determine the postcode sector. In the network reach analysis (where we are using the location of OCP flex points and large business sites to determine which sectors are high network reach see Section 5) we used the old centroid to give the most accurate location.
- A5.110 BT commented specifically on a new postcode sector around Kings Cross station which contained parts of sectors included in the CELA but was not included in our determination of the WECLA. This was an omission and the new sector (NC1 4) has now been included in the WECLA+.

#### **MISBO** issues and dark fibre

#### Stakeholder comments

- A5.111 BT argued that the MISBO service shares, in particular, are both biased and unreliable. There are various strands to the BT argument:
  - that we should have included MISBO services self-supplied over dark fibre;
  - that low MISBO volumes, in conjunction with the very high potential capacity of WDM systems, will tend to amplify the ambiguity and bias in Ofcom's MISBO service shares;
  - that our approach to geographic market definition is inappropriate for MISBO services; and
  - that the classification of circuit ends is ambiguous in general and inappropriate for MISBO services.
- A5.112 Our response to the issues surrounding geographic market definition is set out in section 5 above. Also, the issue of circuit end classification is discussed separately

<sup>&</sup>lt;sup>102</sup> To be clear, we are referring to customers served using the relevant CP's own access network infrastructure, i.e. those which contribute to the CP's wholesale supply volume.

below, as this relates to all markets (although it is of greater significance for our examination of MISBO market shares).

- A5.113 BT notes that there are a number of specialist suppliers of dark fibre and duct, and states that some large customers will self-supply MISBO services using these passive inputs. Some of these specialist CPs were not sent the original Ofcom information request. In any event, since we did not include services provided over dark fibre in our measure of MISBO supply, BT argues that our estimate of its service share in MISBO markets will be biased upwards.<sup>103</sup>
- A5.114 By way of example, BT notes that academic institutions often use MISBO services to connect to JANET.<sup>104</sup> Sometimes these are lit services, but there are likely to be circumstances where the relevant institutions self-supply MISBO using dark fibre.<sup>105</sup>
- A5.115 BT also states that Table 40 in the Consultation document appears to imply that there are no MISBO services in Edinburgh, and it did not find this to be credible given the presence of academic and financial institutions in this city. BT makes a similar comment in relation to Hull. BT suggests that this may be evidence that we are missing data regarding the supply of MISBO services.
- A5.116 BT comments that even a single dark fibre link could be running WDM, and therefore could contain over 100 wavelengths. As such, even a small number of dark fibre sales could be material to our analysis.

#### Ofcom response

- A5.117 Since the BCMR Consultation, we have undertaken further research into the suppliers mentioned by BT, and a number of other suppliers who did not receive the original s135 information request. We have assessed over 70 smaller CPs, initially with desk based research. This showed that many of the CPs either did not sell leased lines, or did not manage or own network infrastructure. 19 of the CPs were contacted for further information about their network infrastructure and supply of leased lines. These suppliers have very limited network reach in general, and are therefore limited in their ability to offer MISBO services beyond a very small number of routes. In particular, we found little evidence of fibre network infrastructure outside the WECLA being used to supply MISBO services. This is significant because we do not find BT to have SMP in MISBO in the WECLA that would merely reinforce our conclusion.
- A5.118 A number of these additional CPs provided details of the volume of leased line services that they supply. These figures suggested that the volume of supply which was missing from our service share analysis was small, and not material to our understanding of competitive conditions. We have carried out a number of sensitivity tests on our service shares, including making an assumption about the volume of circuits we might be missing from suppliers included in the analysis. This is discussed further in section 7 and in paragraphs A5.82 and A5.83 above. We, consider that the test in paragraph A5.83 is relevant to the present problem, and based on the evidence on supply volume collected from the additional CPs,

<sup>&</sup>lt;sup>103</sup> Para 26, page 176, ibid.

<sup>&</sup>lt;sup>104</sup> JANET is a government funded network which provides connectivity to academic (especially higher and further education) institutions. See http://<u>www.ja.net</u>/.

<sup>&</sup>lt;sup>105</sup> Paras 110 and 113, pages 196-197, ibid.

represents an overestimate of the amount of missing data. Despite this extreme assumption, BT's share of MISBO supply changes very little.

- A5.119 Whilst we agree that a single fibre route could be being used to carry over 100 wavelengths, the data we have regarding wavelength sales suggests that this is unlikely. We do not see any routes with 100 or more wavelengths, and less than 2% with more than 20 wavelengths. Overall, we estimate that the average number of wavelengths per route is approximately 3. Therefore; we do not consider that the effect of dark fibre omissions from niche regional providers would be material to our analysis.
- A5.120 BT gave a number of examples where MISBO services have been bought and sold, with the suggestion that these might be missing from our raw data. We have checked that these services appear in the circuit data, and are satisfied that they do. There are two reasons why they might not have appeared in the tables in the consultation document. First, these tables only gave information about services supplied within the high network reach postcode sectors of the relevant city. Secondly, the supply volume in the tables only included customer circuit ends. Therefore, MISBO services terminating at network sites would not have been included. For MISBO in particular, we also calculate service shares where the supply volumes include network ends. This is discussed further below.
- A5.121 We have now also undertaken an analysis of the sales of dark fibre. This is explained in full in the SMP section above.

## Issues regarding methodology

#### Stakeholder comments

- A5.122 In this subsection, we address BT's concerns regarding<sup>106</sup>:
  - i) the consistency of volume measures given the complex hierarchical nature of connectivity services;
  - ii) ambiguity in the classification of circuit interface type; and
  - iii) our treatment of "negative" wholesale service shares.
- A5.123 The only other comment concerning methodology in general was from Exponentiale. They asked us to "verify that Exponential-e (and other CP) circuits provisioned through BT Wholesale and hence supplied using Openreach access products, are counted as BT market share and not the CP's market share."<sup>107</sup>

#### Hierarchical nature of connectivity services

A5.124 On the first of these points, BT provides a number of detailed examples to explain why it believes that a count of circuit end points is likely to be ambiguous, and cannot provide a reliable measure of market volume. The following summary represents our understanding of BT's argument.<sup>108</sup>

<sup>&</sup>lt;sup>106</sup> BT made a number of other comments about our circuit counting methodology, but these are discussed under a more specific topic subheading elsewhere in this annex.

<sup>&</sup>lt;sup>107</sup> Para 1.2, Exponential-e response.

<sup>&</sup>lt;sup>108</sup> For full details see paras 34-52, pages 177-184, ibid.

- A5.125 BT uses a set of five scenarios to discuss the different ways in which a particular customer demand for multi-site connectivity might be met. The specific example concerns a customer requiring connectivity between six sites. BT notes that the customer demand is for connectivity between these sites, and not for leased lines *per se.* Leased lines underpin the various different solutions given in the five scenarios, but need not be specified in the retail service that the customer ultimately buys.
- A5.126 The five scenarios are summarised as follows:
  - Scenario A: a number of dedicated circuits are built between the six sites. A minimum of 5 circuits are required to connect all the sites, but there is a possible maximum of 15 circuits if each site were directly connected to each of the others.
  - Scenario B: this is the same as scenario A, but if there is more than one circuit to a single site, these are delivered over a single access bearer. However, each of the site-to-site circuits remains the same, with the customer being presented with separate interfaces for each of these circuits.
  - Scenario C: this is the same as scenario B, but the site-to-site circuits are now presented to the customer as logical paths over a single physical interface. The individual circuits are now identified logically, for example as SDH timeslots or Ethernet VLANs.
  - Scenario D: this is similar to scenario C, but there is no longer dedicated bandwidth for each site-to-site pairing. There are still logical paths between sites, but the bandwidth is shared and contended.
  - Scenario E: this scenario is also similar to C, but there the customer is no longer presented with logical paths between the sites. According to BT, this is a genuine VPN solution in which the CP routes traffic between end-users at the various sites rather than creating logical circuits between the sites.
- A5.127 BT notes that there are significant differences in the number of circuit ends which could be counted between the scenarios. In scenario A we could see between 10 and 30 customer circuit ends, depending on the level of interconnectivity between the sites. In scenario B we might see just 6 customer access tails, and therefore count just 6 customer ends. However, if the CP reported the circuits sold at the retail level, we might still see between 10 and 30 as in scenario A.
- A5.128 Under scenario C, we are most likely to see just the 6 access circuits. However, BT argues that with scenario C, and even more so with D and E, there is a chance that the CP will not provide any data regarding the services believing these to be outside the scope of the market review. This is because it is increasingly difficult to define something equivalent to a circuit at the retail level.
- A5.129 However, the CP could also provide a single access circuit to each of the sites, and then configure the connectivity to be delivered over these access tails in a variety of ways. In this scenario we would likely measure just 6 customer circuit ends at the wholesale level.
- A5.130 BT argues that this ambiguity in counting implies that we should reduce our reliance on service share estimates. It also argues that these issues will tend to create a bias in the service shares because:

- BT keeps better records than CPs;
- BT's services map more closely to our product definitions; and
- OCPs might not record anything that we can use to count leased lines in relation to some multi-site services, but we will see BT's internal sales from Openreach when BT sells an equivalent service.

## Classification of interface type

A5.131 BT notes that Ethernet can now be used to carry emulated TDM services, and SDH has often been used to carry Ethernet services.<sup>109</sup> As such, BT suggests it is not always possible to classify circuits unambiguously as either AI or TI.<sup>110</sup>

## Negative wholesale supply

A5.132 Our wholesale supply calculations for OCPs, i.e. the calculation using the formula at paragraph A5.74 above, result in a negative number in some instances. One explanation is that purchase data is relatively more complete than sales data. BT notes that, if this is true, OCP wholesale volumes will tend to be understated. Specifically, if a CP were to self-supply one circuit end within a postcode sector and use a third party to provide another circuit end within the same postcode sector, but was missing information about the retail sale relating to one or other of these, we would mistakenly infer that there was no wholesale supply from the CP in that postcode sector. As a result, BT's service shares would be biased upwards.<sup>111</sup>

## Ofcom response

A5.133 Before responding to BT's comments, we answer the question from Exponential-e. We can confirm that services supplied by BT Wholesale to OCPs using inputs from Openreach will be counted as volume supplied by BT. The relevant supply by CPs will net off to zero in the wholesale supply calculation as explained at paragraphs A5.11-0 above.

#### Hierarchical nature of connectivity services

- A5.134 BT argues that the complex hierarchical nature of connectivity services suggests that our measures of supply will be ambiguous, and that we may be missing data regarding circuit sales from OCPs. We have already responded to the second of these conclusions from paragraph A5.95 above. In this section, we focus on the question of ambiguity in our supply calculations.
- A5.135 As set out in its scenarios, multi-site connectivity can be configured and provided in a number of different ways, and our measure of supply volume is likely to vary depending on which option is used. However, we do not agree that this necessarily constitutes an error, or ambiguity, in our measure of wholesale supply. We consider that many of these differences in the volume of wholesale access circuit ends between the scenarios reflect service differentiation which should be taken into account in a measurement of supply volume.

<sup>&</sup>lt;sup>109</sup> See also footnote 9, page 181, ibid.

<sup>&</sup>lt;sup>110</sup> Para 69, page 188, ibid.

<sup>&</sup>lt;sup>111</sup> Para 105, page 196, ibid.

- A5.136 For example, BT notes that the circuit end count under scenario A could range from 10 up to 30. We agree with this analysis at a technical level, but consider that a service with 5 circuits (10 ends) and fully meshed connectivity using 15 circuits (30 ends) will not be viewed as equivalent. That is, they are fulfilling qualitatively and quantitatively different demands. The fully meshed option uses three times as many circuits, providing considerably more bandwidth to the customer (assuming the circuits are the same), and much greater resilience of the connectivity. It is likely to cost much more to supply due to the additional links, and will therefore only be demanded by customers who actually require the additional bandwidth and resilience.
- A5.137 As noted above, we are measuring wholesale supply volumes and calculating service shares in order to inform our understanding of the relative competitive strength of CPs in supplying symmetric broadband origination services. We want to understand how successful CPs have been in winning business at this level of the value chain. In general, where services in a market are differentiated, market shares calculated on the basis of revenue may often be more informative than those based on volumes. We note that the differences in the cost of the services provided in the various BT scenarios set out above would be captured in market shares calculated on the basis of revenue rather than volume. As we are unable to calculate revenue shares, the fact that our circuit count method also captures these differences suggests that it is appropriate.
- A5.138 The difference between scenarios A and B is an example of the issue of deciding whether to count the bearer circuit or the end-user services. This can lead to inconsistencies in the supply measure, and we address this problem in a separate discussion below.

#### Classification of interface type

- A5.139 We agree that it is not always possible to classify a circuit as being unambiguously AI or TI without applying some judgment. However, we believe that this is only likely to arise in a very small number of cases, and do not consider that any resulting error would be systematically different between CP, and therefore do not consider that it will bias our service share estimates.
- A5.140 In addition, in the cases of 155Mbit/s and 622Mbit/s Ethernet extension services, the fact that 155Mbit/s and 622Mbit/s are standard bandwidths in the SDH hierarchy suggests that these circuits are provided with SDH interfaces and we have therefore performed a sensitivity test. Changing their allocation between AI and TI makes no material difference to our service share estimates.

#### Negative wholesale supply

- A5.141 The improvements in data processing and analysis<sup>112</sup> have resulted in a decrease in the number of instances where we find negative wholesale supply as the result of the calculation from the formula at paragraph A5.74. However, we still see examples of this issue. There are a number of reasons why it might occur:
  - We were not able to find a valid postcode in the sales data, but did find one in the purchase data.

<sup>&</sup>lt;sup>112</sup> Discussed above from paragraph A5.75.

- A circuit has been described using a different postcode in the sales and purchase data. This will only result in negative wholesale supply if the postcode sectors differ.
- Sales will only match purchases when a circuit is simply resold. Consider again the generic circuit diagram above at Figure A5.1. If a CP reports the sale of circuit AB, and uses a third party tail circuit to reach site B, then we are likely to see the purchase of a circuit between B and a network node, such as N<sup>2</sup>B. If we do not correctly identify N<sup>2</sup> as a network node, then our supply calculation would suggest a supply of -1 in the network node postcode sector.
- A5.142 We ignore negative numbers when adding a CP's supply over a number of postcode sectors to calculate its total supply within a geographic market. Therefore, from a simple arithmetic perspective, the negative supply measures do not affect service shares.
- A5.143 BT's contention is that the existence of the negative measures indicates that we may be missing retail sales circuit data. Although we cannot rule this out, we consider that most cases of negative supply will be explained by the first of the reasons given above: we are missing a relatively large number of addresses from the sales datasets of some CPs; whereas the purchase datasets tend to be more complete. Overall, we do not consider that the existence of negative supply measures is an indicator that we are missing entries altogether for the relevant circuit sales.
- A5.144 However, even if incomplete address data does provide the explanation, the effect that BT describes could still occur: if, within a postcode sector, a CP supplies circuits using its own network and using third party tails, and has not provided sufficient address information regarding the retail circuit sales to allow us to associate these sales with the same postcode sector, then we may mistakenly infer that there is no wholesale supply from the CP in that particular sector. However, as explained above, we account for incomplete address information through an equiproportionate mark-up to a CP's supply volume. The net result, across the large number of postcode sectors within our geographic markets, is that there will be no under-recording in aggregate and the chance of a bias to the service shares is significantly reduced.
- A5.145 Finally, if there is an overall effect from all of the above reasons, then it is not clear whether it would tend to increase or decrease BT's service share in our geographic markets consisting of the aggregation of many postcode sectors.

## **Inclusion of TAN ends**

#### Stakeholder comments

A5.146 BT notes that the inclusion of TAN ends in our measures of supply in the Consultation is likely to lead to an upward bias in BT's service share in the WECLA. The reason is that the customers just outside the WECLA are served by TAN nodes inside the WECLA, and BT supplies a higher proportion of customers just outside the WECLA than OCPs.<sup>113</sup>

<sup>&</sup>lt;sup>113</sup> This is explained in detail between paragraphs 89 and 93, pages 192-194, ibid.

#### Ofcom response

A5.147 TAN ends were included in our supply measures to ensure that total volumes would be comparable with the previous BCMR. However, we agree with BT that the inclusion of TAN ends in the service share estimates tends to bias BT's shares upwards in the WECLA. The difference in BT's share between including or excluding TAN ends is small - usually less than 3%. In order to remove this bias, and because there are a variety of other reasons why total volumes are not comparable with the previous BCMR, we have now changed the methodology and do not include TAN ends in our supply measure.

#### **Network end classification**

#### Stakeholder comments

A5.148 Some OCPs<sup>114</sup> raised concerns that BT used a different methodology to prepare its circuit data, and that this perhaps explained why our market share estimates did not accord with their experience. For example, UKCTA wrote,

"It appears that BT has compiled its circuit data utilising a revised methodology for counting circuits. We are concerned that BT's approach bears no resemblance to the approach adopted by UKCTA members when submitting responses to Ofcom's information requests, and as such has resulted in Ofcom underestimating BT's market share and hence its dominance in WECLA."<sup>115</sup>

- A5.149 We understand that these comments refer to the fact that BT submitted revised data regarding its network end classifications, as highlighted in the BCMR Consultation. In relation to the sample calculations performed for the BCMR Consultation regarding this issue, BT comments that we used BT's submission to classify OCP circuit ends, but did not perform a reciprocal analysis using OCP submissions to classify BT circuit ends.<sup>116</sup>
- A5.150 Separately, BT notes several times that the classification of some sites will be ambiguous. BT argues that this is particularly true of large sites and datacentres, concluding that,

"any share calculation methodology that relies on a somewhat ambiguous site-type classification which excludes more than half the circuit ends cannot be relied upon as one of the indicators of SMP."<sup>117</sup>

#### Ofcom response

A5.151 As explained in detail from paragraph A5.57, we have now adopted a revised methodology with the classification of circuit ends being performed by Ofcom to ensure that is done in a consistent way. This addresses the concerns that BT and OCP service shares were prepared on a different basis. Regardless of the set of network site postcodes used, the new methodology produces BT service shares

<sup>&</sup>lt;sup>114</sup> For example, see para 1.4, Exponential-e response.

<sup>&</sup>lt;sup>115</sup> Page 16, UKCTA response.

<sup>&</sup>lt;sup>116</sup> Para 100, page 195, ibid.

<sup>&</sup>lt;sup>117</sup> Para 102, page 195, ibid.

which are higher than the estimates using the original method. As explained in the consultation document and above, we expected the original methodology to produce biased service share estimates. The new results provide strong support for this argument.

- A5.152 We have also addressed BT's concern that we did not use OCP submissions to reclassify BT circuit ends. We do now perform this analysis, and the result is still a higher BT service share relative to the original methodology.
- A5.153 Overall, we are satisfied that the service share estimates are no longer biased as a result of differences in the ability of CPs to provide information regarding network end classification.
- A5.154 BT was also concerned that excluding circuit ends at network sites may not be appropriate in relation to WDM services. We agree that some sites can be both customer sites and network sites at the same time. For example, data centres are often used by OCPs as network nodes, housing various pieces of network equipment. However, the same buildings may contain servers which host content and applications for end-users. Therefore, a circuit terminating at a data centre could be a wholesale component of a retail leased line (in which case the site is acting as a network node), or the entirety of a retail leased line to connect a customer to its content in the data centre.
- A5.155 We also agree that our rationale for not counting circuit ends at network sites is less relevant to WDM services. Given the technical and economic difficulty interconnecting WDM services, it is more difficult for a CP to compete by supplying just one end of a WDM service. As such, the relevant unit of supply should perhaps be complete wavelengths rather than wavelength ends.
- A5.156 We address these issues through the various network end sensitivity tests. As explained above, we calculate service shares using several different sets of postcodes to perform the network end classification. These sensitivities include extreme examples where we include only BT sites and only OCP sites. In doing so we aim to assess the range of possible values with respect to variations in the network end classification.
- A5.157 In addition, we also provide a sensitivity calculating the service shares ignoring the site classifications altogether (i.e. simply including all circuit ends in the share calculations). We do not believe that this is appropriate for AISBO and TISBO services, but it may be appropriate for WDM services. It is therefore useful as a further sensitivity test for the MISBO service shares (given that MISBO volumes are predominantly wavelengths).

## Self-supply issues

## Stakeholder comments

A5.158 In its response, and in a letter to Ofcom,<sup>118</sup> BT argues that we may be missing OCP data regarding the sales of services which fall outside the scope of the market review, but which are delivered to the customer using a leased line. BT gives the example of broadcast services. We exclude circuits with a broadcast specific interface from leased lines markets and hence from the circuit count.BT notes that, as it is required to provide these services using a leased line input from Openreach,

<sup>&</sup>lt;sup>118</sup> Letter dated 30<sup>th</sup> November 2012.

we will, in effect, count BT's supply of these services in our market share estimates. However, if an OCP sold an equivalent retail broadcast service, BT argues that we will not see the self-supplied leased line that the OCP uses to provide the broadcast service, and will therefore not count any wholesale supply.

A5.159 BT argues that the same concern arises in the case of services sold by its downstream BT Media and Broadcast division, which BT says could use a broadcast specific interface. However, the upstream input from Openreach will be Ethernet or WDM and will, according to BT, be included in our circuit count even though we do not include the equivalent self-supplied circuits where an OCP supplies a service with a broadcast specific interface. In its letter BT makes a separate point that we should also be including circuits which are used internally within Virgin to carry cable TV traffic.

#### Ofcom response

- A5.160 In relation to the contention that we are likely to be missing broadcast circuit data, we see 130 'broadcast' circuits supplied by [≫], and over 1,000 circuits supplied by [≫], which we assume are likely to be used for broadcast purposes. We consider that this represents strong evidence that broadcast services have not been systematically excluded from the raw data supplied by CPs. This is to be expected as the information request asked for details of all circuits supplied using any interface type.
- A5.161 On the issue of the upstream input to broadcast services, we note that the [≫] services just mentioned do not use a broadcast specific interface. That is, we are already seeing the upstream input as this is what the customer appears to be buying.<sup>119</sup> As such, these services are included in our wholesale supply measures.
- A5.162 We consider that transport of traffic over Virgin's core network, and any other purely internal connectivity, should not be counted in our market supply estimates. We note that, in our measurement of service shares, we exclude all circuit ends at network sites. By definition, an internal circuit will be from one network site to another, and therefore would not in fact contribute towards our measure of supply. So we do not agree that there is inconsistency or bias against BT in our approach.
- A5.163 As a sensitivity test, we have considered the effect on service shares of including all broadcast services; and also of excluding all of BT's broadcast services not only those with a broadcast specific interface, but all the circuits sold by Openreach to BT's Media and Broadcast division. The results of these tests are presented in the table below. The inclusion of broadcast specific interface services results in a small increase in BT's share in the MISBO market in the WECLA. The exclusion of all of BT's broadcast services, which will be a biased estimate since we have not performed a similar exercise for other CPs, reduces BT's service shares, but not to a sufficient degree to change our view of competition within the relevant markets.

Product segment	Geographic market	Base case	Include broadcast interface services	Exclude all BT broadcast services
AI Low	UK less Hull less WECLA+	74%	74%	74%
AI Low	WECLA+	51%	50%	50%
МІ	UK less Hull less WECLA+	57%	57%	51%
MI	WECLA+	24%	29%	22%

#### Figure A5.10 Service share sensitivity results – broadcast services

## Bearer circuits and bandwidth measurement

#### Stakeholder comments

- A5.164 BT's discussion of the hierarchical nature of connectivity services, summarised above from paragraph A5.122, highlights what it sees as the ambiguity over the number of services which should be counted when measuring supply volume. BT introduces a further example in which an OCP sells a variety of services to a customer at a single site. The services include:<sup>120</sup>
  - A 10Mbit/s point to point circuit, handed over to the customer as a VLAN and presented via a dedicated 100Mbit/s interface;
  - A 20Mbit/s IPVPN port presented to the customer via a dedicated 100Mbit/s interface;
  - A number of emulated 2Mbit/s circuits presented via TDM interface.
- A5.165 The OCP provides all the services over a single aggregate 1Gbit/s Ethernet bearer circuit to the customer site.
- A5.166 BT asks how these services would be accounted for using our methodology. In particular, BT questions whether the IPVPN service and the emulated TDM services should be counted as relevant supply volume. Assuming some of the services are to be counted, BT asks which of the various possibilities for bandwidth ought to be recorded. BT concludes that there is considerable uncertainty in the count of relevant services and the market into which a particular service should belong.
- A5.167 In a separate comment, BT claims that there is an inconsistency in our approach to the definition and counting of MISBO, TISBO and AISBO services.<sup>121</sup> BT repeats its assertion that our service definitions are calibrated to BT services, and therefore it is easy to allocate BT products to the relevant service categories. The same does not apply to OCP services, and so BT concludes that,

<sup>&</sup>lt;sup>120</sup> For full details of this example, see para 63-69, pages 186-188, ibid.

<sup>&</sup>lt;sup>121</sup> Para 125, page 198-199, ibid.

"[i]t again seems inevitable that errors and ambiguities will result in OCP service volumes being under counted and therefore errors will have a systematic bias against BT."<sup>122</sup>

#### Ofcom response

- A5.168 We accept that this is a difficult issue. However, even if some ambiguity in the measurement of supply volumes is unavoidable, we do not consider that it is likely to lead to a material bias in the service share estimates. Indeed, as explained below, if any bias does exist it is more likely to mean that BT's service shares are understated.
- A5.169 Our understanding of this issue and how we have addressed it are set out above. Our measurement of supply will depend to a large degree on the description of the service in the relevant CP datasets. In relation to Ethernet services, if a CP describes a sale in terms of a bearer and a service bandwidth, then we will count the bearer.
- A5.170 In relation to BT's example, we accept that CPs could describe the services in a number of different ways, and that this may result in differences in our measurement of supply volume. As already discussed, we do not accept BT's argument that the complexities of defining a service mean that we are likely to be missing a material amount of circuit data from OCPs. However, on some occasions we are likely to be counting the multiple end-user services rather than the bearers for OCPs because we rely on external sales data. In contrast, we have used Openreach internal sales data, and will therefore always record the equivalent of the single access bearer when calculating BT's supply volume. Therefore, for an equivalent retail service, we would measure a single circuit if the customer is supplied by BT, but multiple circuits if the customer is supplied by an OCP. This potentially leads to a downward bias in BT's service shares in AISBO markets.
- A5.171 We have tried to quantify this potential bias and based on this analysis we conclude that it is not likely to be material to our results. We have calculated the number of AISBO services supplied by each CP to each unique postcode served. Then, for customer sites, we work out the proportion of sites which are supplied with multiple AISBO services. The results are presented in the table below:

#### Figure A5.11 Proportion of sites supplied with multiple Al circuits

СР	% sites with multiple circuits in WECLA	% sites with multiple circuits in UK excluding WECLA	
BT	48%	33%	
All OCPs	48%	29%	

- A5.172 Although the average hides some variation between CPs, across all CPs we find that the number of sites taking multiple services is almost exactly the same as for BT. As a result, we consider it unlikely that there is a material volume of circuits in the raw data which represent multiple end-user services sold to customers over a single access bearer.
- A5.173 We agree with BT that our approach to counting circuits is different between Ethernet, WDM and SDH. However, as set out above, this is intentional. Of greatest importance is that the counting methodology should be internally consistent within

<sup>&</sup>lt;sup>122</sup> Para 127, page 199, ibid.

markets since we do not make any comparison of volumes between these markets. Since Ethernet and SDH services usually fall into different markets the difference in counting of bearers will not affect the market shares.

A5.174 In relation to the MISBO market, there is a potential discrepancy between the counting of SDH services when compared to WDM or Ethernet services. That is, we count bearers in relation to Ethernet, and wavelengths for WDM<sup>123</sup>, but count end-user service bandwidth for SDH. However, since all SDH services at these very high bandwidths are likely to be bearers, our approach remains consistent within the market. In any event, the volume of SDH services which do not appear to use WDM in the MISBO market is very low. Therefore, we do not agree with BT's conclusion that these discrepancies will lead to a bias in the service share estimates.

## **Retail specific issues**

#### Stakeholder comments

A5.175 BT suggested that there will be errors in the retail service shares presented in the consultation document because they did not exclude sales of VPNs and internet access.<sup>124</sup>

## Ofcom response

- A5.176 We acknowledged this point in the BCMR Consultation.<sup>125</sup> The developments in our modelling and data processing since the Consultation<sup>126</sup> now allow us to identify VPN and internet access circuits more reliably. Therefore, the retail share estimates presented in the consultation document now exclude circuits used for these services.
- A5.177 The result is a small reduction in BT's service share. This reduction will be caused in part by the fact that it is easier to identify VPN and internet access services in the BT dataset relative to OCP datasets. However, we consider that the revised figures provide a better reflection of competitive conditions in the supply of retail leased lines, and are therefore the most appropriate figures to use.

## Miscellaneous

#### Stakeholder comments

A5.178 BT noted that since we have excluded ISDN30 lines from the retail market, we will not impute the supply of the bearer circuits in the wholesale market.

#### Ofcom response

A5.179 ISDN30 bearer circuits can be technically equivalent to 2Mbit/s SDH services. As such, it may be appropriate to include these upstream inputs to ISDN30 services in the wholesale low bandwidth TISBO markets. BT is correct that we did not request

<sup>&</sup>lt;sup>123</sup> And the highest bandwidth service if a wavelength is subdivided into smaller bandwidth circuits.

<sup>&</sup>lt;sup>124</sup> Para 104, page 195, ibid.

<sup>&</sup>lt;sup>125</sup> Para 7.358.

<sup>&</sup>lt;sup>126</sup> Detailed above.

details of ISDN30 sales from OCPs or BT, and therefore cannot account for these sales within our market share estimates.

- A5.180 However, we consider that it would not always be appropriate to include ISDN30 bearers within the leased line market. In some cases the ISDN30 bearer will not be equivalent to a leased line. In any event, were we to include ISDN30 bearers, then we would most likely want to include a proportion of those supplied by both BT and OCPs.
- A5.181 Furthermore, we have performed a sensitivity test, making the assumption that all ISDN30 bearers supplied by OCPs should be included in the market and none of BT's supply of these services. Based on information in the ISDN30 Charge Control Statement<sup>127</sup>, we estimate that there would be less than 42,000 2Mbit/s bearer circuits. Including this supply in the wholesale low bandwidth TISBO market reduces our estimate of BT's share from 88% to 79%, which does not materially change our view of competition in this market.

## **TI Trunk service share calculation method**

- A5.182 As set out in Section 6, we propose to identify separate TI trunk markets for regional and national trunk segments at all bandwidths. In this subsection, we set out our approach to measuring market shares for these markets.
- A5.183 As per our assessment of market shares for terminating segments (AISBO, TISBO and MISBO markets), in our base case we rely on CP's circuit data (retail sales and wholesale purchases and sales) to derive market shares for trunk markets. We have based CPs' share of circuits in trunk markets on circuit information drawn from exactly the same dataset used to assess BT's shares for other leased lines markets. Hence, our trunk analysis is based on the data that was obtained, cleaned and checked in line with the steps set out above.
- A5.184 The particular circuit information used to assess trunk market shares using this dataset includes:
  - Name of the CP providing or purchasing the circuit;
  - Interface of the circuit used (we assess TI circuits only);
  - Bandwidth of the circuit;
  - Location of each end of the circuit (based on easting and northing coordinates and/or postal data); and
  - Whether the circuit was sold as part of a VPN-solution.<sup>128</sup>

A5.185 We follow five main analytical steps to derive trunk market shares, namely:

<sup>&</sup>lt;sup>127</sup> <u>http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-2011/summary/isdn30-2011.pdf</u>

<sup>&</sup>lt;sup>128</sup> Under our base case, we exclude circuits used as part of a VPN-solution from our trunk assessment. However, we have run sensitivity analysis to understand the impact of including TI circuits used as VPN-tails (as discussed below).
- i) We identify TI circuits that contain trunk segments;
- ii) We determine whether those circuits are used for national or regional trunk;
- iii) We apply adjustments to trunk circuit counts to take into account the bandwidth of the trunk circuits sold;
- iv) For each CP, we uplift the circuit counts to account for missing geographic and bandwidth information; and
- v) We estimate (bandwidth weighted) market shares for the national and regional trunk markets using each CP's self-supply and its sales of trunk to other CPs to compute its total trunk supply.

# We use Trunk Aggregation Node 'catchment areas' to identify terminating and trunk segments

- A5.186 As explained in Section 6, we identify the boundary between TI trunk and terminating segment markets based on the location of trunk aggregation nodes (TANs).
- A5.187 We have identified 46 such TAN locations based on key urban centres where CPs are likely to locate (at least) one of their key interconnect points to pick up termination traffic. The catchment areas associated with each TI TAN are shown in Figure A5.12 below.



### Figure A5.12 **TAN catchment areas**

- A5.188 The catchment areas shown in Figure A5.12 are based on the information BT has provided on its PPC logical routing model, whereby<sup>129</sup>:
  - each address in the UK is served by a particular local exchange;
  - every local exchange is parented to one of BT's 67 Tier 1 nodes; and
  - every Tier 1 node is assigned to the TAN grouping to which it belongs.
- A5.189 So for example, the Southampton/Portsmouth TAN includes all addresses associated with local exchanges logically parented to the Southampton and Portsmouth Tier 1 nodes. In turn, the Southampton and Portsmouth Tier 1 nodes form part of a single Southampton TAN (TAN number 41 in Figure A5.12 above).
- A5.190 On the basis of these TAN catchment areas, then for each CP and for every single circuit (retail circuits and wholesale sales and purchases) we determine whether that circuit contains a trunk segment. We rely on the A-end and B-end address details of each circuit to determine the relevant TAN catchment area. Where both ends of a TI circuit fell entirely within a defined TAN catchment area we count a circuit as a terminating segment only. Consistent with our market definition proposals in Section 6, we assume that any TI circuit that links different TAN catchment areas contains a trunk segment.

<sup>&</sup>lt;sup>129</sup> BT applies this logical routing model for charging purposes to determine the proportion of circuits that contain trunk or terminating segment.

### We determine TI trunk segments that are national or regional circuits

- A5.191 Having identified that the TI circuit in question contains a trunk segment, we then identify whether the trunk segment falls either within the national or regional trunk markets. Again, we use TAN catchment areas to determine the boundary between national and regional trunk:
  - a regional trunk segment is a circuit between adjacent TANs; and
  - a national trunk segment is a circuit between non-adjacent TANs.
- A5.192 Figure A5.13 shows the 46 TAN catchment areas based on the information BT has provided on its logical parenting of local exchanges back to its Tier 1 nodes. Routes between adjacent TANs, which would be regarded as regional trunk, are shaded differently to routes between non-adjacent TANs which are regarded as national trunk.



Figure A5.13 Adjacent and non-adjacent trunk aggregation nodes

A5.193 Figure A5.13 shows, for example, that we would count circuits between the Aberdeen and Edinburgh and between the Aberdeen and Glasgow/Clyde TANs as regional trunk, whereas all remaining circuits from Aberdeen to another TAN would be counted within the national trunk market (e.g. Aberdeen to London Docklands).

A5.194 For each CP, we generate two measures of supply:

- a count of TI circuits that contain a trunk segment (i.e. using the first step to identify circuits which run between different catchment areas); and
- a count of trunk circuits that belong either in the national or regional trunk markets (based on the second step, that checks whether the circuit ends reside in adjacent or non-adjacent TAN areas).

### We apply bandwidth weights to trunk circuit counts

- A5.195 As set out in Section 6, in our market definition for regional and national TI trunk services we do not propose to identify breaks in the market by bandwidth. However, if we were simply to count each trunk circuit without adjusting for the bandwidth provided over that link, we may end up with a bias in our market share estimates. This is because a CP may purchase a 155 Mbit/s trunk circuit in the wholesale market and use that trunk segment to deliver a number of lower capacity retail circuits (e.g. a number of 2Mbit/s retail circuits). If we did not adjust for these differences in bandwidth then we would not be assessing circuit sales on a comparable basis. We therefore adjust our trunk counts by assigning greater weight to higher speed circuits relative to lower speed circuits.
- A5.196 The bandwidth weightings we apply use the Commission's recommendation on retail leased lines prices as referred to in Ofcom's disaggregated markets statement<sup>130</sup> and as used in the 2007/8 Review (see paragraphs 7.358-7.359). The weightings we use are shown in Figure A5.14 below.

#### Figure A5.14 Bandwidth weightings applied to trunk circuits (Mbps = Mbit/s)

RANGE	WEIGH TING FAC TOR
Range 1(>0 <=0.064Mbps)	1
Range 2 (>0.064 <=0.512Mbps)	1
Range 3 (>0.512 <=1.5Mbps)	4
Range 4(>1.5 <=2.5Mbps)	4
Range 5 (>2.5 <=8.2Mbps)	4
Range 6(>82 <=40Mbps)	18
Range 7 (>40 <=50Mbps)	18
Range 8(>50 <=110Mbps)	22
Range 9 (>110 <=160 Mbps)	26
Range 10 (> 160 <=623Mbps)	50
Range 11 (>623 <=15000Mbps)	50

Source: Ofcom 2006

A5.197 Hence, in our circuit counts, if a CP sold two circuits at 155 Mbit/s (which has a weight of 26) and ten trunk circuits at 64 kbit/s (which has a weight of 1), we would produce a weighted average supply measure of 62 trunk circuits.<sup>131</sup>

# We apply mark-ups to our data to account for circuit entries with incomplete geographic and bandwidth information

A5.198 In our data analysis, we apply equi-proportionate mark-ups to our measures of supply to account for entries in the circuit inventory data with missing, or otherwise incomplete, geographic and bandwidth information.<sup>132</sup>

<sup>&</sup>lt;sup>130</sup> See page 98: "Disaggregated markets – leased lines", Ofcom, Discussion document, March 2006 <u>http://stakeholders.ofcom.org.uk/binaries/consultations/disagg/summary/consultation.pdf</u>

 $<sup>^{131}</sup>$  2 x 26 (the weighting factor for 155 Mbit/s circuits) plus 10 x 1 (the weighting factor for 64 kbit/s circuits) = 62.

#### Mark-ups for missing geographic information

- A5.199 The steps we follow to calculate whether a circuit contains a national and regional trunk segment rely on geographic information on the A-end and B-end of each circuit (as set out above). However, as discussed from paragraph A5.72 above, in some cases CPs were not able to provide complete geographic information for both ends of every circuit they buy or sell. For circuits with missing geographic data, it is not possible to calculate directly whether or not a particular circuit might contain a trunk segment. But to ensure that our trunk services take into account all circuit sales, and not just those with complete address information, we mark-up CP volumes such that the resulting total supply (of circuits with and without trunk segments) matches the total number of circuit sales in the data inventory.
- A5.200 For each CP, we perform separate mark-up calculations in the different circuit categories (retail sales, wholesale purchases and wholesale sales) to account for missing data. This process is exactly analogous to that used in relation to the symmetric broadband origination service share calculations, as described above. We take the total number of circuits with missing data and allocate these in proportion to our estimates of circuits that contain trunk (and in proportion to the split between regional or national trunk segments).<sup>133</sup>

#### Bandwidth assumptions for missing bandwidth information

- A5.201 As explained above, our market share analysis is based on circuit counts weighted by bandwidth. As such, we also need to apply an appropriate assumption for the bandwidth of circuits with missing bandwidth information.<sup>134</sup>
- A5.202 Where bandwidth information is missing for particular circuit we assume that the circuit sold would be 2Mbit/s. The practical implication of this assumption is that any circuit with missing bandwidth information would be assigned a value of 4 in our bandwidth weighted circuit counts (consistent with the bandwidth weights set out in Figure A5.14 above).<sup>135</sup>

#### We estimate wholesale market shares using retail and wholesale circuits

A5.203 Analogous to the wholesale symmetric broadband origination markets, we base our calculation of trunk market shares on data provided to us regarding CPs' wholesale and retail activities. Our estimates of market share are based on the following calculation:

<sup>&</sup>lt;sup>132</sup> The dataset we use to estimate trunk market shares does not require further adjustments to account for missing information on interface types. This is because we allocate all circuits with missing interface types to relevant markets (e.g. to AI and TI markets) at the data processing stage as discussed from paragraph A5.47 above.

<sup>&</sup>lt;sup>133</sup> For example, if a CP sold, say, 1,000 wholesales circuits with a national trunk segment, 4,000 with a regional trunk segment and 5,000 circuits with a terminating segments only, then it follows that 10% of a CP's wholesale sales would be 'national trunk segment; 40% 'regional trunk'; and the remaining 50% would be terminating segments only. If the CP in question had, say, 100 wholesale circuit sales with missing geographic information, then we would allocate 10 circuits to the national trunk and 40 circuits to the regional trunk. The CPs final count of wholesale sales of trunk would be 1,010 (national) and 4,040 (regional).

<sup>&</sup>lt;sup>134</sup> The assumption applied to circuits with missing bandwidth information sold is only relevant to the extent that we apply bandwidth weights in our trunk market share analysis For example, where we do not apply bandwidth weights, we would simply count individual circuits in the relevant trunk market irrespective of the bandwidth of the circuit.

<sup>&</sup>lt;sup>135</sup> This assumption is consistent with the most common bandwidth weight, based on circuits for which we have bandwidth information (and consistent with average bandwidth weight (3.48)).

#### Total trunk market

BT selfsupply + BT sales to OCPs + OCP selfsupply + OCP sales to CPs
 A5.204 In order to calculate market shares, we therefore required data on sales of trunk circuits and data on self-supply. The data on 'BT's sales to OCPs' and 'OCP sales to CPs' was directly provided to us by CPs. However, we did not obtain direct information on CPs' self-supply and hence we have had to estimate the amount of self-supplied trunk.

#### We infer OCP self-supplied trunk from retail requirements

- A5.205 We estimate a particular CP's self-supply by examining the total trunk requirements that correspond to its activities in the various retail leased line markets relative to its purchases of trunk circuits from others. We assume that the difference between the 'retail requirements' and 'wholesale purchases' constitutes self-supplied trunk.
- A5.206 For BT it is possible to estimate self-supply of trunk based on its retail sales, as BT self supplies the majority of its retail circuits using internally supplied wholesale circuits.<sup>136</sup> For OCPs, we do not have information from our circuit data whether an OCP is able to self-supply trunk segments. Therefore, we infer an OCP's self-supply based by subtracting its purchases of trunk segments (i.e. trunk purchases from other CPs including BT) from its total trunk requirements (derived from its sales of leased lines). This is consistent with the approach we have used to assess market shares in wholesale symmetric broadband origination markets, as described from paragraph A5.11 above.

#### We combined CP's self-supply and sales of trunk to derive wholesale shares

A5.207 We then calculate each CP's trunk market share by adding its self-supply and any sales it made to other CPs and dividing this by the overall number of trunk segments in the market.

#### Outputs of our trunk analysis

- A5.208 In light of the above calculation steps, we present in our SMP analysis estimates of BT's market share in the regional trunk and national trunk markets.
- A5.209 In Section 6, we have also presented a number of sensitivities around this base case estimate:
  - Scenario 1 we do not apply bandwidth weightings. In effect, all bandwidths are weighted equally. For example, a 2Mbit/s trunk segment will count the same as a 45Mbit/s segment. This reflects volume-based market shares.
  - Scenario 2 we apply no mark-ups to account for missing geographic data. Therefore, only circuits with complete information are considered.
- A5.210 We have also run alternative scenarios (scenarios 4 and 5) to address BT's concerns in response to the BCMR Consultation that our approach to measuring market share is biased upwards. We have set out below in more detail BT's concerns before explaining the alternative scenarios we have calculated to address this issue.

<sup>&</sup>lt;sup>136</sup> BT purchases a small number of wholesale TI circuits from third parties, but the inclusion of these circuits would have an insignificant impact on our estimated service shares.

A5.211 We also discuss in Section 6 a scenario that includes circuits sold as part of a VPNsolution (VPN-tail circuits) in our circuit counts.<sup>137</sup> However, this scenario does not have a material impact on the market shares, therefore we have not presented this as one of the four main sensitivities.<sup>138</sup>

#### Stakeholder comments

- A5.212 BT was the only stakeholder to comment on our approach to measuring market shares for trunk. BT criticised our market share analysis and claimed that it cannot be relied upon to measure market power for national and regional trunk markets.
- A5.213 BT referred to the SPC report which argued that Ofcom's estimate of market shares relies on a flawed measure of the number of circuits and overstates the supply of trunk by BT. SPC noted Ofcom's formula to calculate the total volume of wholesale trunk segments for an individual operator:

Wholesale = Retail - Wholesale Purchases + Wholesale Provision to OCPs

A5.214 SPC set out its concerns with respect to our approach to estimating market shares by referring to Figure A5.15 (which was presented in the BCMR consultation) where an OCP and BT were providing trunk circuits.



#### Figure A5.15 SPC's example of circuit counting issues

A5.215 In this example, the underlying retail requirement is for the circuit AB (which would include a national trunk segment as it is between non-adjacent TAN catchment areas). BT provides two regional wholesale trunk segments (AX and BY) and the OCP self-provides one regional trunk segment (XY).

<sup>&</sup>lt;sup>137</sup> The possible reason for the inclusion of TI circuits sold as part of a VPN-solution is that a VPN-tail may well cross the boundary of a TAN catchment area and fall within the regional trunk circuit count. On the other hand, it is likely that wholesale circuits provided as VPN-tails will be relatively short distances. On this basis, it would not be appropriate to include them in the trunk market.

<sup>&</sup>lt;sup>138</sup> We estimated that it had a 1 percentage point impact on BT's market share, which was not sufficiently large to affect our analysis of differences between regional and national trunk segments or our overall SMP findings.

- A5.216 SPC stated that using our method to calculate BT and OCPs' shares at the wholesale level:
  - we would count BT's sale of two regional trunk segments; and
  - we would identify 'zero' retail circuits requiring a 'regional trunk' (as retail circuit AB is between non-adjacent TANs).
- A5.217 On this basis, SPC calculated the counts of circuits for regional trunk for BT and the OCP as follows:

Wholesale regional trunk (OCP) = 0 - (AX+BY) - XY= 0 - 2 - 0= -2Wholesale regional trunk (BT) = 0 - 0 + (AX+BY)= 0 - 0 + 2= +2

- A5.218 SPC argued that this example invalidates Ofcom's methodology as it gives a negative number of trunk segments supplied by OCPs for regional trunk. It said we would incorrectly infer that OCPs are not self-supplying any trunk and purchasing two trunk circuits from BT (and BT would be responsible for the entirety of wholesale regional trunk).<sup>139</sup>
- A5.219 SPC accepted that such an error is unlikely to apply to all circuits; it has the effect of overstating the market share of a net supplier of trunk segments and understating the share of net purchasers. SPC also argued that reliance on this methodology for calculating service shares would be misleading and result in Type 1 errors (false negatives): i.e. geographic areas being found not potentially competitive that are in fact potentially competitive.

#### Ofcom response

- A5.220 We accept that there are some uncertainties associated with matching the wholesale trunk inputs to the underlying retail demand. In principle this can create some biases in measuring market shares. However, we do not consider that they cannot be resolved or that they materially affect our findings of differences in competitive conditions between regional and national trunk or with respect to our SMP findings. In addition, we note that these biases do not always work 'against' BT as they can sometimes also overstate OCPs' market shares.
- A5.221 The bias that BT has referred to arises, in its example, from scenarios where a retail requirement is provided by an OCP using its own core network in combination with BT circuits (regional trunk). In some scenarios it is possible that BT is providing the two ends of the retail circuit requirement and the OCP is providing the remainder on its own trunk network.

<sup>&</sup>lt;sup>139</sup> "BCMR: Economic Aspects of the Market Definition of TI Trunk", SPC Network, Page 15, (06 Sept 2012)

- A5.222 We have therefore run two alternative scenarios (labelled scenarios 4 and 5 in Section 6) to understand BT's market share:
  - Scenario 4: where we assume that every national OCP retail circuit in fact generates a requirement for two wholesale regional trunk circuits and one wholesale national trunk circuit; and
  - Scenario 5: where we assume that every OCP retail circuit requiring a trunk (either national or regional) would generate a requirement for two regional trunk circuits.
- A5.223 We note that in these scenarios, there is likely to be a downward bias in BT's market share because, as acknowledged by SPC, the alleged flaw in Ofcom's method does not apply to all circuits. To take a specific example, suppose we observe an OCP selling a retail circuit that spans non-adjacent TANs and we do not observe any purchases from BT. In this case, our formula would correctly identify the OCP as supplying the national trunk segment and there would be no regional trunk segments. However, under scenarios 4 and 5, for this circuit we would allocate an additional two regional trunk segments to the OCP, even though no regional trunk circuits are used.

## Network reach analysis

### Introduction

- A5.224 This sub-section describes in further detail the methodology and data underpinning the network reach analysis set out in Section 5.
- A5.225 The purpose of the network reach analysis is to identify geographic areas where there is alternative infrastructure to BT. The metric measures the average number of OCPs that are able to provide services to end users in each geographic analysis unit, which, in this market review, is set to a postcode sector.
- A5.226 In practical terms, there are a number of different steps to the analysis:
  - the flexibility points for each operator (excluding BT) are plotted on a map;
  - the locations of businesses 250 or more employees UK-wide are also plotted on the map;
  - a buffer area of 200m is drawn around each business site;
  - the number of different OCPs that fall within the 200m buffer area around each business site (counting each OCP only once) is calculated; and
  - The average network reach score is calculated for every UK postcode sector.
- A5.227 In addition to our network reach assessment based on large business sites, we undertook a separate network reach assessment for three particular types of site; mobile base stations, BT local exchanges and data centres. We also investigated the sensitivity of our results to changes in our assumptions, such as the build distance, or the set of businesses considered in our analysis.

- A5.228 In the later stages of the BCMR we developed a dedicated computer program that greatly increased the speed of our network reach analysis.<sup>140</sup>
- A5.229 All the network reach maps were generated using MapInfo professional.
- A5.230 We set out the reasons for the parameters used (i.e. why we use businesses with more than 250 employees and a 200m buffer assumption) in Section 5. Below we set out how we gathered the data to perform the network reach analysis.
- A5.231 Our analysis was independently audited by Ernest and Young which verified the correctness of our calculations and results.

#### **Data processing**

#### **Postcodes**

- A5.232 Some of the data we received provided location information based on postcodes. Our network reach analysis uses Eastings and Northings.<sup>141</sup> Thus it is important to be able to convert postcodes into Eastings and Northings as accurately as possible.
- A5.233 We purchased postcode data sets from Dotted Eyes<sup>142</sup> for England, Scotland, Wales and Northern Ireland. These data sets provide polygons which describe the geographical boundaries of unit postcodes (e.g. SW1A 0AA, also referred to as 'postcode'), sectors (e.g. SW1A 0), districts (e.g. SW1A) and areas (e.g. SW). The datasets also include an Easting and Northing coordinate point representative of each unit postcode location.
- A5.234 To some extent, postcodes are dynamic and change over time, for example to accommodate new premises development. Some of the data we used in our analysis contained postcodes that are not present in the 2011 postcode dataset.
- A5.235 To deal with this we used postcode data from previous years' Ordnance Survey datasets and merged them with the 2011 dataset. The 'merged postcode dataset' included more than 1.9 million postcodes. In our network reach analysis we used the Easting and Northing coordinates for the original postcode (irrespective of whether the postcode was present in the 2011 dataset or not).
- A5.236 To ensure the data was gathered into the correct postcode sector we used the most up to date postcode.<sup>143</sup> If a postcode was not current, we used its Easting and Northing coordinates to convert it to the most recent equivalent postcode that is present in the 2011 dataset.

<sup>&</sup>lt;sup>140</sup> The computer program calculates, for each user site, the distance to the nearest flexibility point of each OCP. In addition, the program also calculates the number of different OCPs within a range of configurable distances.

<sup>&</sup>lt;sup>141</sup> Eastings and Northings provide the coordinates of any given location in the UK in meters East and North of an origin just to the South West of the Isles of Scilly.

<sup>&</sup>lt;u>https://www.ordnancesurvey.co.uk/oswebsite/gps/information/coordinatesystemsinfo/guidetonationalgrid/page5.html</u>

<sup>&</sup>lt;sup>142</sup> Dotted Eyes datasets are based on the Ordnance Survey Code-Point with polygons dataset.

<sup>&</sup>lt;sup>143</sup> To convert postcodes to postcode sectors the last two digits of the postcode are removed.

### Locations of business sites

A5.237 We purchased the Experian business database to provide information on the location of business sites in the UK. As noted above, we refined the dataset to identify businesses that employ 250 or more employees across the UK. The Experian data provided the postcodes for each large business site. We used our merged postcode dataset to find an Easting and Northing for each business site postcode.

### Locations of mobile sites

- A5.238 We requested information on mobile base stations and other network site locations from MNOs.
- A5.239 We converted postcode based locations into Eastings and Northings and removed mobile operator specific duplicate entries.
- A5.240 We divided mobile sites into those using leased lines and those self served by the mobile operator. In the BCMR network reach analysis only the mobile sites using leased lines were considered.
- A5.241 We carried out the same checks on the mobile site data as described in the 'Locations of OCP flexibility points' section below.

### Locations of BT exchanges<sup>144</sup>

A5.242 There are three sets of BT locations required for the network reach analysis: BT local exchange locations, BT tier 1 site locations and Openreach site locations. We used data provided by BT for the Eastings and Northings of these sites.

#### Locations of data centres

A5.243 We gathered data centre locations from two sources:

- The web site www.datacentremap.com; and
- A list of data centres provided by BT.
- A5.244 Combining the two lists and removing duplicates resulted in 197 data centres where we could identify Eastings and Northings. We noted that five pairs of data centres have the same Eastings and Northings because they are so close to each other that they share the same postcode.

### Locations of OCP flexibility points

- A5.245 For the June BCMR Consultation we requested (through a formal information request) data from 18 OCPs on their network infrastructure in actual or potential use (i.e. irrespective of whether the OCPs' fibre was lit or not). We asked OCPs to provide the location of the flexibility points in their networks by supplying the Easting and Northing coordinates for each flexibility point.
- A5.246 We defined flexibility points as the points:

<sup>&</sup>lt;sup>144</sup> In Section 5 local exchanges are referred to as LLU sites.

- a) where an OCP can access its existing infrastructure in order to connect an enduser premise; and
- b) from which an OCP would consider, within its current network planning practice, extending its network reach in order to provide services to additional end-user premises.
- A5.247 For example, flexibility points may be buildings where fibre terminates on an Optical Distribution Frame or underground chambers where fibre can be accessed, such as where ducts meet at a junction in a footway box.
- A5.248 Prior to receiving the flexibility point data sets, we looked at the data from the 2007/8 Review to familiarise ourselves with the quantity of data and the previous extent of OCPs' networks.
- A5.249 Of the 18 OCPs contacted three did not own or lease physical infrastructure and two merged during the course of the analysis leaving 14 OCP networks.
- A5.250 On receipt of the flexibility point data, we checked each flexibility point data set to confirm whether it conformed to our format. Where possible, we made a set of appropriate corrections:
  - converting text to numbers;
  - removing leading zeros;
  - splitting 12 digit references into two 6 digit Eastings and Northings;
  - converting two letter based 4 digit references to 6 digit references;
  - requesting missing and incomplete references;
  - checking the total number of flexibility points against the last BCMR totals; and
  - checking the total number of flexibility points against artificial limits e.g. 65k lines for older version of Excel.<sup>145</sup>
- A5.251 As a second step, we plotted the data received and we performed a set of visual checks, which involved:
  - converting any flexibility points expressed in terms of latitude and longitude coordinates into a format that allows us to plot the data on maps;
  - querying with the OCP obvious mistakes such as flexibility points in the sea or implausible arrangements of flexibility points (e.g. a line of flexibility points all with the same Easting or same Northing or Easting equal to Northing);
  - checking each data set against the 2007/8 Review to compare coverage;
  - comparing the network coverage plot to any information available from the operators' websites regarding network coverage;

<sup>&</sup>lt;sup>145</sup> We noticed that a database submitted to us was incomplete since it appeared truncated at 65k entries. This number is the limit number of entries that can be copied in an excel spreadsheet if using an older version of Excel. This matter was raised with the OCP, which then provided the full dataset.

- performing a further sense-check by asking our internal experts to compare the network coverage as arrived at through our analysis with their knowledge of the topology of different operators' networks; and
- contacting the OCP in all cases where the above checks raised concerns so as to discuss the matter until the concern was dealt with.
- A5.252 Where the OCP confirmed to us that data was not available in a format that we could easily use, we then asked the operator to provide data in the format available to them and we then performed the conversion ourselves to the format needed for our visual mapping software (MapInfo Professional).

#### Network reach calculation

A5.253 The above steps enabled us to gather information to plot the Experian large business sites and OCP flexibility points on a map. We then calculated the number of OCP flexibility points (counting each operator once) within a 200m buffer distance of each large business site for each sector in the UK. This process is illustrated in the example below, where there are 5 business locations in the postcode sector each with between 2 and 4 different operators with a flexibility point within 200m.

	OCP	Tot							
	1	2	3	4	5	6	7	8	al
Business site 1	Y	Y	N	N	N	N	Y	Y	4
Business site 2	Y	N	Y	N	N	N	N	Y	3
Business site 3	N	N	N	Y	Y	Y	Y	N	4
Business site 4	N	N	Y	Y	Y	N	N	N	3
Business site 5	N	N	N	N	N	N	Y	Y	2
Total									16

# Figure A5.16 Example calculation of average number of OCPs that can serve business sites in a postcode sector

- A5.254 We first sum the number of OCPs within reach of each large business location, and then sum the total for all business sites in the postcode sector (in this case that total is 16). Then we divide that total by the number of business locations. For this example postcode sector the network reach indicator equals 3.2 (16/5).
- A5.255 A similar analysis was carried out for the mobile sites.
- A5.256 The network reach analysis for BT local exchange and data centre sites was used to determine proximity to OCPs and not as an input to the definition of competitive areas. For this reason this data was not averaged by postcode sector.

#### Network reach outputs

A5.257 For the large business and mobile site locations the network reach data was processed to give:

- Average network reach by postcode sector. This provided the input to generate maps of high network reach postcode sectors; to calculate the numbers of businesses and circuit ends in high network reach sectors; and ultimately helped define the WECLA+;
- OCP presence by postcode sector (i.e. whether an OCP had a flexibility point in a given sector). This provides an indication of the physical extent of OCP networks;
- Sum and percentage of sites within 200m by OCP. This provides an indication of the business coverage of OCP networks; and
- Absolute number of sites within 200m of 0, 1, 2, 3 etc. OCPs. This provides an indication of the number of OCPs able to supply to businesses.
- A5.258 For the BT local exchange and data centre sites the network reach data was processed further to give:
  - Sum of sites within 200m, 500m and 1000m by OCP. This provides an indication of the number of OCPs able to serve these sites for a given build distance; and
  - absolute number of sites within 200m, 500m and 1000m of 0, 1, 2, 3 etc. OCPs. This gives an indication of the number of OCPs able to supply these sites.
- A5.259 The above analyses were repeated for particular geographic areas e.g. the WECLA+.

#### Sensitivity analysis

- A5.260 Some of the assumptions used in the network reach analysis were subject to sensitivity analysis.
- A5.261 We ran the large business site network reach analysis using alternative buffer distance assumptions of 150m and 250m. The following table shows the number of postcode sectors in the WECLA+ under these alternative assumptions.

#### Figure A5.17 Alternative buffer distance assumptions

Buffer assumption	150m	<b>200</b> m	250m	
Postcode sectors included in WECLA+	381 (-10%)	421	469 (+11%)	

A5.262 Self provided mobile sites were included in the mobile site network reach analysis and found to make little difference to the result.<sup>146</sup>

#### Network reach audits

A5.263 The network reach assessment involved the gathering and analysis of considerable amounts of data. To check that this process has been carried out consistently and accurately we performed an internal audit. The documented process, along with the data, including intermediate stage files, was then subject to an external audit by [≫] in January 2013.

<sup>&</sup>lt;sup>146</sup> Mobile high network reach sectors across the UK, with self provide sites included rose by 1.6%.

- A5.264 The purpose of the [>] audit was to check that the process we documented had been followed and that the calculations and results were accurate based on that process.
- A5.265 [×<sup>147</sup>]

### Stakeholder comments

- A5.266 A number of stakeholders commented on the underlying assumptions in the network reach analysis (i.e. the use of Experian large business sites and the 200m buffer assumption). These points are discussed in detail in Section 5. Any additional data analysis we completed in light of these comments is noted below.
- A5.267 BT commented specifically on the OCP network data. It thought our information was incomplete and failed to capture their full extent of OCP network. To support its assessment, in Annex 1 of BT's response it provided an overview of the main OCP networks including network maps.
- A5.268 BT also noted that some networks have 'no obvious flexibility points'.

#### Ofcom's response

- A5.269 A number of CPs criticised our use of Experian large business sites as a proxy for potential and actual users of leased lines (see discussion in Section 5). In light of these comments we undertook two further sensitivity analyses.
- A5.270 First, we created a grid of points spaced 100m apart over the wider London area. These grid points were used in place of the business sites to calculate network reach (using a 200m buffer assumption). The results from this analysis show that the general shape of the WECLA+ is retained when evenly spaced locations are substituted for the Experian businesses (see Section 5).
- A5.271 Second, we took all of the circuit data provided by CPs and determined the location of every A and B end. We removed circuit ends that corresponded to network sites, leaving the circuit ends corresponding to customer sites. The resulting data set was then used in place of the Experian business locations and a network reach analysis performed (using a 200m buffer assumption). The resulting HNR sectors were a close match to those produced using the Experian business location data (see paragraphs 5).
- A5.272 The customer end analysis allowed us to isolate specific circuit types, such as MISBO. We performed a network reach analysis using just MISBO circuit ends with 200m and 500m buffers. The results are presented in Section 5.
- A5.273 With respect to the BT comment that our network information was incomplete we took the following steps:
  - We compared the maps BT provided to our information. We concluded that most OCP network was already captured. In several cases we had more data than BT identified;

<sup>147 [≫]</sup> 

- Where we identified discrepancies (three OCPs, [≫]), we requested further information from those OCPs. We also requested information from three additional OCPs ([≫]);
- In addition we reviewed the entire list of operators with code<sup>148</sup> powers to determine whether they have physical network. An Internet search revealed that many of these operators did not have physical infrastructure. Of the remaining we directly contacted 9 and questioned them about the services they offer and whether they provision physical network; and
- The result of our extensive review was that additional flexibility points were added for two OCPs ([≫]) already included in our analysis, and flexibility point data for two new OCPs ([≫]) were added. We also found that two OCPs share the same physical network ([≫]). One OCP only has a small regional network ([≫]) which was evaluated as a sensitivity for that area. The network extent of one OCP queried by BT ([≫]) was confirmed.
- The network reach analysis was rerun with this additional data in January 2013.
- Subsequent to the main network reach analysis in January 2013, we were advised ([≫]) of an additional flexibility point (in Heathrow Airport). This was checked and found to have no material effect on our conclusions.
- A5.274 With respect to BTs comment, that some networks have 'no obvious flexibility points', we found that only three OCPs ([≫]) had this issue. One ([≫]) advised us that they do not restrict where they connect end-customers. For the other two we were able to take their duct location data and use MapInfo to construct 200m buffers around it. All of the other OCPs were able to identify flexibility points and provide us with their coordinates.
- A5.275 A further sensitivity analysis was performed by including the locations of all Virgin street cabinets. The results of this are discussed in section 5.

<sup>&</sup>lt;sup>148</sup> Operators with powers under the Code can seek, by issuing an Electronic Communications Code Notice, to exercise these powers to perform works on land.

## Annex 6

# Data centres

# Summary

- A6.1 As part of this review we have considered a case presented to us by BT that we should treat data centres as a distinct market, reflecting its view that there is more competition in the supply of leased lines to data centres than to other sites. BT argued that multi-tenanted carrier-neutral data centres constitute CPs' core network nodes which contain high concentrations of customers on site, and that any connectivity into those data centres is effectively competitive. It suggested that we identify some data centres as core nodes, remove them from the market for terminating segments at all bandwidths and interfaces and remove SMP remedies at those sites.
- A6.2 We consider that it would not be appropriate to define a separate market for all connections at data centre sites or at a subset of those sites, as suggested by BT. In addition, having taken account of stakeholder's views, and considered competitive conditions in the supply of the different types of circuit which connect to data centres, we have also decided not to apply differentiated remedies to data centres in this review.
- A6.3 While BT is by far the largest wholesale supplier of leased lines in the UK, we recognise that those CPs which are investing in competing infrastructure are doing so increasingly at certain data centres. In doing so, they are establishing potentially important network nodes in some data centres to serve the market generally, as well as providing connectivity to collocated customers' ICT equipment.
- A6.4 In our view, BT's characterisation of competitive conditions at such data centres fails in a number of respects to place those sites appropriately in this general context of the leased lines market. For example, it ignores the essential feature of a leased line segment, which is that it connects two sites. An assessment of competitive conditions requires examination of both sites, as well as of the economics of provision of the infrastructure between them.
- A6.5 It is possible that there are granular variations in competitive conditions which customers experience in purchasing leased line services to connect their equipment collocated within particular data centres. For example, while there may be no effective alternative to a BT service to fulfil demand for a connection from a data centre to a particular end-user's site nearby, there may be more choice of providers for a service between two data centres or for part of a link between a data centre and a more distant location. We have estimated that, for 21 large multi-tenanted carrier-neutral data centres, the total annual revenue of services in market segments that we will regulate, but in which BT is most likely to face more competition than in those segments generally, is less than £21m p.a. This includes £8m p.a. revenue for connection between data centres in our selected subset in which it is likely that there is a choice of providers and £13m of circuits between any of the 21 data centres and other sites where the extent of choice of providers

is less clear. The total corresponds to about 1% of the annual wholesale leased lines revenue in the UK.  $^{\rm 149}$ 

- A6.6 We consider that it would be impractical and inappropriate to define such small segments as separate markets. In addition, a variation of remedies in this instance would operate at a level more granular than site level to cover specifically only particular routes between particular sites, and carve out what our market analysis has revealed to be a very small segment of the relevant markets in which we are imposing *ex ante* regulation. In our view a variation of remedies at this very granular level would serve to break the clarity, transparency and stability resulting from our approach to market definition.
- A6.7 We note that data centres are continuing to develop rapidly, and that regulation does not appear to have constrained their development. Only one party, apart from BT, commented on our analysis of data centres in the June BCMR Consultation, and the comments we have received may not take full account of views of other CPs.
- A6.8 BT has argued that it should have more freedom to meet the very specific needs of data centre customers, and be able to offer non-standard, bespoke solutions at unpublished variable prices. We consider that our existing market definitions and associated remedies provide for a substantial degree of appropriate deregulation, in respect of many of the connections to the data centres we have considered, particularly in the WECLA, in which most are located. We also consider that there is scope for BT to use flexibility in the regulations to develop services tailored to the specific requirements of data centres, for example by adapting its provision processes to the circumstances which apply in them.
- A6.9 Accordingly, we are not persuaded by the case for treating connections to data centres as a separate market or for applying different remedies to them at this stage.
- A6.10 In light of the apparently rapid pace of development, we intend to consider the effect of the development of data centres on competition in leased lines markets in our next review of those markets.

### Introduction

- A6.11 Data centres, in the broadest sense, are premises whose main purpose is to house computing and communications equipment.
- A6.12 In this review we analysed competitive conditions at data centres in two ways, in response to BT's representations. Prior to the June BCMR Consultation, we attempted to identify criteria which would enable us to distinguish data centres from other sites which use leased lines in a clear and precise way. After the June BCMR Consultation, taking account of BT's responses, we analysed more closely the competitive conditions at a specific sub-set of large multi-tenanted carrier-neutral data centres.

<sup>&</sup>lt;sup>149</sup> We selected the 21 data centres from a set of 32 multi-tenanted carrier-neutral data centres suggested by BT. From the initial set of 32, we selected those data centres at which either at least 100 AISBO circuits were provided or at least 50 AISBO and at least 20 MISBO circuits were provided.

- A6.13 In the early part of our review, BT argued that there is more competition in leased lines to data centres than to other sites and suggested that we consider whether we should treat data centres as a distinct market.
- A6.14 We analysed the reach of BT's competitors' networks close to data centres and presented the results in the June BCMR Consultation. We have updated the analysis recently to show the effects of expanding the original WECLA to WECLA+ and in light of the general update to our network reach analysis following the June BCMR Consultation. Our analysis covered 197 data centres across the UK (we obtained the data centre locations from a publicly available repository and from data that BT submitted to us).<sup>150</sup>
- A6.15 The WECLA+ contains 54 (27%) of the UK-wide set of data centres that we identified. The table below shows the cumulative distribution of OCPs' networks within reach of data centre sites UK-wide and in the WECLA/WECLA+. In addition to the standard 200m buffer assumption, we have performed a sensitivity test using a longer buffer assumption of 1km. This recognises the potentially high volume of higher value circuits concentrated at data centres meaning that OCPs may be prepared to build further to supply a data centre than they would to connect the average leased line customer. The results are presented in the figure below.

		200m buf	fer		1km buff	er
# of OCPs within reach	UK- wide	WECLA	WECLA+	UK- wide	WECLA	WECLA+
0+	100%	100%	100%	100%	100%	100%
1+	82%	98%	98%	97%	100%	100%
2+	63%	98%	96%	89%	100%	100%
3+	45%	91%	89%	78%	100%	100%
4+	35%	89%	81%	66%	100%	100%
5+	27%	81%	74%	55%	100%	100%
6+	24%	77%	70%	48%	98%	98%
7+	18%	66%	59%	43%	98%	96%
8+	14%	53%	48%	38%	94%	93%
9+	12%	43%	39%	30%	91%	83%
10+	10%	34%	31%	27%	89%	81%
11+	6%	19%	17%	19%	68%	59%
12+	3%	11%	9%	15%	60%	52%

# Table A6.1: Cumulative distribution of OCPs within 200m and 1km reach of data centre locations

Source: Operators/Ofcom

A6.16 Focusing first on the results for the 200m buffer assumption, in the WECLA+, 96% of the data-centres are on average within reach of two or more OCPs' networks.

<sup>&</sup>lt;sup>150</sup> The publicly available repository is available at <u>WWW.datacentermap.com</u>. This website is a free web service acting as the link between providers and clients in the data centre industry (worldwide). Data centres sign up to this register to advertise their services. The register focuses on co-location and IP transit, but also covers a lot of other data-centre services such as wholesale space, dedicated servers, internet exchanges and others.

This is similar to the equivalent figure of 95% which we assessed for large business sites in the Experian data set (see figure 5.9 in Section 5). Across the whole UK (including the WECLA) 63% of the data centres are on average within reach of two or more OCPs' networks, compared to 24% for large business sites in the Experian data set.

- A6.17 When the buffer assumption is extended to 1km, the majority of data centre locations within and outside the WECLA+ have access to two or more OCPs. However, it remains the case that data centres located within the WECLA+ have access to a larger number of OCPs the average data centre located anywhere in the UK has five OCPs within reach (1km), compared to 12 OCPs for the WECLA+ i.e. over twice the UK-wide average.
- A6.18 In Annex 12 of the June BCMR Consultation we set out our considerations as to whether it may be possible to identify data centres as a distinct category of customer site within the markets we proposed to define, and, if so whether it would be appropriate to apply a lighter-touch set of remedies to services provided to the types of customer in question in areas where BT is found to have SMP.
- A6.19 We did not consider it appropriate to identify a separate specific competitive market for connections at data centres in all bandwidths using any type of interface, as BT had argued that we should do because we considered that doing so would not have resulted in a clear, transparent and stable market definition. We considered, alternatively, whether it may be possible to identify data centres as a distinct category of customer within the markets we proposed to define, and, if so, whether it would be appropriate to apply a lighter-touch set of remedies to services provided to that type of customer.
- A6.20 We found provisionally that there were significant difficulties in defining data centres in a clear and precise way to distinguish them from other types of sites which demand leased lines.
- A6.21 Notwithstanding the difficulties we had identified, we considered whether data centres could be distinguished from other users of leased lines by their scale, measured by total bandwidth and the number of circuits purchased. We did so by analysing 151 data centres outside the WECLA which BT and we had identified by researching organisations which described themselves as data centres. We found provisionally that there was no clear dividing line to identify a category of customer on the basis of scale alone.
- A6.22 We then combined the results of the latter analysis with our analysis of network reach, which is a way of assessing the extent of potential competition in a geographic area by counting the number of CPs able to supply leased lines to customers in that area using their own infrastructure. Using this approach, we found some evidence that the extent of competition at data centre sites tends to increase with the amount of bandwidth and quantity of circuits used at those sites, but we did not find a scale above which competitive conditions were clearly and materially different from those below it.
- A6.23 The charts in the two figures below show the relationship between two indicators of demand at a data centre number of circuits and total bandwidth and the proportion of sites meeting a network reach criterion. For this purpose, a data centre was classified as meeting the criterion if it was within a given distance of the physical networks of more than two CPs (other than BT). It can be seen from the charts that there is some tendency for data centres which demand a larger number

of circuits or larger bandwidth to have more competing network infrastructure within reach. The proportion of sites with more than two alternative CPs' networks within 200m is naturally smaller than the proportion having more than two such networks within 1km, but the same pattern of competition increasing with size is displayed in each case. This suggests that there will tend to be greater competition in the supply of connectivity to data centres which demand a greater volume of circuits. There is however no very clear break point in either chart.



# Figure A6.2 Proportion of sites which meet the 200 metres/1km network reach criterion against the size of the sites as measured by the volume of circuits supplied



Figure 90 Proportion of sites which meet the 200 metres/1km network reach criterion against the size of the sites as measured by the total bandwidth supplied

A6.24 Finally we considered whether and how it might be appropriate to reflect this pattern of competition in our proposals for remedies in the markets in which we had proposed that BT would have SMP. We took into account the absence of an effective WDM interconnection product, since very high bandwidth services appeared to be particularly relevant to data centres, and the absence of such a product meant that CPs would need to provide an end-to-end service using their own networks, and would therefore need to build their networks out to both ends of a circuit connecting two sites in order to compete. We considered therefore that the presence of competing CPs' infrastructure at a data centre site would not therefore of itself be sufficient to demonstrate that competition was effective in providing leased lines at that site. Taking the absence of effective WDM interconnection together with the lack of an identifiable subset of data centres which was clearly more competitive than the rest, we considered that we should not propose variations to remedies at data centres.

### Stakeholders views and our reasoning

A6.25 BT devoted a section of its written response to the June BCMR Consultation to an economic assessment of data centres, arguing that we should deregulate a set of carrier-neutral multi-tenanted data centres. UKCTA, Level 3 and [≫] commented more briefly on our assessment of data centres in their respective responses.

#### Stakeholders responses to the June BCMR Consultation

A6.26 In its response to the June BCMR Consultation, BT said that some data centres which operate as carrier-neutral, collocation hostels were, by definition, competitive and hence outside the markets for terminating segments of leased lines. In its view, we should deregulate those sites for all bandwidths and interfaces.

- A6.27 BT argued that we had not described the unique role of data centres in the UK telecommunications market and that we had overlooked the distinctly different set of conditions which governed the application hosting and cloud computing markets, and had failed to recognise the intensely competitive nature of the market in multi-tenanted carrier-neutral data centres, which, in BT's view, was distinct. It explained that a retail customer can select from a wider choice of CPs than would be available at its own site by hosting its application in a data centre, and can subsequently switch easily to a different CP, particularly in a carrier-neutral data centre.
- A6.28 BT postulated that this level of competition distinguishes the retail market for data centre connectivity from the more general retail market for business connectivity, whose customers are tied to a particular geographic location. In BT's view, barriers to entry of infrastructure CPs are lower in such a data centre because CPs are able to re-use infrastructure for different customers at the end of a contract.
- A6.29 In BT's view, what distinguishes multi-tenanted data centres from other sites is the high customer concentration and direct access to competitive fibre infrastructure, usually closely connected to the CP's core network.
- A6.30 In BT's experience, the distribution of connections in data centres is heavily skewed to the larger ones, with the top six accounting for over half of the circuits BT provides to data centres. It explained that these large data centres house tier-one Internet peering points, international circuit termination points and mass-market applications such as Facebook and Twitter, making them particularly important to CPs, because customers are likely to demand proximity to these facilities in order to reduce cost or latency or both. Usually, the owner of a group of large data centres, such as Equinix, for example, connects its sites together, often with dark fibre, to support distributed and resilient operation of applications across those sites. BT noted that 59% of data centres throughout the UK which we had considered in the June BCMR Consultation were within reach of two or more OCPs.
- A6.31 It appeared to BT that we had confined our analysis of data centres in the June BCMR Consultation inappropriately to sites outside the WECLA, while the largest sites are located in the WECLA. Nevertheless, BT stated that Manchester and Edinburgh are established UK centres for hosting, and that large new data centres are being built in Portsmouth, Newport, Lincoln, Norwich and Enfield, demonstrating that power supply, flood risk and access to primary communication routes are often more important considerations in the location of data centres than geography or density of business opportunities the surrounding area.
- A6.32 BT quoted research showing that the third party carrier-neutral sector was growing at a CAGR of 31% in terms of space, faster than all other sectors of the data centre market.
- A6.33 [≻]
- A6.34 BT concluded that there was no justification for regulating any of the connectivity into the data centre as it is effectively competitively supplied core network capacity and constitutes a node of the CP's network.
- A6.35 In BT's view our inability to find a break point in the distribution of both total circuit count and total bandwidth across the range of data centres should not mean that the manifestly competitive large sites should not be deregulated. It also argued that our linking competitive conditions in data centres with the topic of DWDM interconnection had been based on spurious and illogical reasoning, because, in its

view, CPs do not need such interconnection with Openreach in data centres in which CPs have their own fibre and because the vast majority of BT circuits in data centres are low-bandwidth TISBO and AISBO.

- A6.36 BT appreciated that the novel and diverse character of data centres challenged our ability to analyse and classify them. It suggested, alternatively to the approach we had set out in the June BCMR Consultation, that we identify some carrier-neutral multi-tenanted data centres which meet tests qualifying them as effectively core nodes.
- A6.37 Doing so would, in BT's view, remove them from the market for terminating segments at all bandwidths and interfaces and remove SMP remedies at those sites. BT suggested that we identify the starting set of data centres as those which offer carrier-neutral co-location and count the number of CPs present at each site. If more than two CPs were present we should, in BT's view, classify them as competitively served with core network. BT thought that the number of data centre sites meeting the qualifying criteria would be likely to be relatively small, and that the list would be reasonably stable over time. It presented a candidate list of 32 sites.<sup>151</sup>
- A6.38 Once a site had been classified as competitively served, SMP conditions appropriate to that geography would fall for all product markets, and BT would be free of any regulatory obligations. For end-to-end circuits, the remote end would be subject to the conditions applied at the remote geography.
- A6.39 BT argued that removing regulations from specific data centres would create more freedom for BT to meet the specific needs of data centre customers in terms of price, delivery and packaged solutions. Non-standard, bespoke solutions at variable prices would enable innovation and increased choice for business consumers. Removal of constraints on price notification, charges, and non-discrimination at these key sites would, in BT's view, improve greatly its ability to compete against its rivals' use of switching infrastructure interconnected with dark fibre to offer flat-rate, any-to-any data centre Ethernet connectivity at a variety of speeds.
- A6.40 BT also explained that some data centre operators require CPs to terminate their circuits in a "meet me" room, and only permit their own staff to run fibre to the customer's equipment racks. This means not only that BT has to rely on third-party cabling to complete the circuit but also that substantial charges may be levied for cable termination, equipment racks and cross connection facilities. Removal of regulations would, in BT's view, allow BT to adopt procedures and business models specific to data centres in its processes.
- A6.41 [ $\times$ ], a provider of data centres, said that [ $\times$ ].
- A6.42 UKCTA noted BT's call for Ofcom to identify more geographic deregulation and also to consider deregulation at a much more granular level, such as data centres. UKCTA supported our reasoning for not defining a larger number of geographic markets. Such a finding, in UKCTA's view, is consistent with the EC's stated policy, as none of the EC's additional criteria for supporting a finding of a geographic market had been satisfied.
- A6.43 UKCTA agreed that there was no objective case for treating data centres differently. In its view, it is vital that we apply consistent remedies and that such remedies are

<sup>&</sup>lt;sup>151</sup> BT actually provided two slightly different lists. We combined the two lists to produce a set of 32 sites.

included in SMP conditions to ensure that the necessary safeguards are clearly communicated to all parties.

A6.44 Level 3, in its discussion of remedies in the MISBO market, agreed with our view that we should not implement a differential remedy for data centres.

### Our reasoning

#### Context - our approach to market definition

- A6.45 In Sections 3,4,5 and 6, we have set out our definitions of the relevant leased lines markets
- A6.46 As explained in those Sections, our approach to market definition remains as set out in the June BCMR consultation, and is set out in Annex 3 to this Statement. It involves identifying those geographic areas across which there is a sufficient presence of competing CPs' infrastructure such that wholesale services within the relevant geographic area are potentially competitively served, at least for some relevant wholesale product markets
- A6.47 BT remains by far the largest wholesale supplier of leased lines in the UK. For illustrative purposes, if we consider all wholesale circuits, we estimate that BT has a share of 82% of volumes. Furthermore, the majority of CPs remain reliant on BT's network. BT's physical network is ubiquitous in the UK and BT can deliver leased lines almost everywhere in the country. While other CPs including, for example, Virgin Media, C&WW and Level 3, own and operate sizeable physical networks in the UK, the coverage of each of those networks is significantly less extensive than BT's. Although BT clearly remains the predominant supplier of leased lines in aggregate, we have been able to recognise over time that, for some products and in certain geographic areas, it faces more competition than the overarching picture illustrated above suggests.
- A6.48 As explained in Section 4, our approach to defining the geographic scope of the relevant product markets is based on identifying areas in which the competitive conditions:
  - are sufficiently homogeneous; and
  - can be distinguished from neighbouring areas where the competitive conditions are appreciably different.
- A6.49 As explained in Section 4, in carrying out our approach we have chosen postcode sectors as the geographic unit. We considered a number of options in the June BCMR consultation however, in summary, our view was that postcode sectors were the most appropriate for the following reasons:
  - they are mutually exclusive and less than national;
  - the network structure of all relevant operators and the services sold on the market can be mapped onto the geographic units;
  - they have clear and stable boundaries; and
  - they are small enough that competitive conditions within the sector are likely to be broadly similar in most cases but at the same time large enough that the

burden on operators and us, the relevant NRA, with regard to data delivery and analysis is reasonable.  $^{^{\rm 152}}$ 

A6.50 The important point to draw out is that, with over 10,000 geographic units, we did not define single units as separate geographic markets. As explained in Section 4, the geographic scope of the relevant product markets consists of a number of these units which we identified and then aggregated as a result of the application of clear and unambiguous criteria. In this respect, we regard our approach as consistent with the ERG Common Position:

"[w]ith a large number of small areas...there is likely to be a continuum of competitive conditions and therefore it will usually be difficult to draw a clear line between "more" or "less" competitive areas. One approach would be to evaluate competitive conditions in each geographic unit on its own and classify the area accordingly. However, this would cause a huge workload for [us, the NRA] and also is likely to be arbitrary to some extent. A more practical and appropriate approach is to define clear and unambiguous criteria according to which the geographic units are grouped. In this regard, it is important for NRAs to bear in mind the purpose of market definition which...is not an end in itself but a means to undertake an analysis of competitive conditions, for the purposes of determining whether ex ante regulation is required or not." <sup>153</sup>

- A6.51 We recognise that competitive conditions within the relevant markets are not perfectly homogeneous. There may be some circuits within the WECLA that are less competitively served than our market analysis, in particular our SMP assessment, would suggest. Equally, there are likely to be some circuits outside of the WECLA where BT faces more competition than our market analysis, in particular our SMP assessment, would suggest. However, consistent with the SMP Guidelines,<sup>154</sup> the relevant geographic market does not comprise an area in which the competitive conditions must be perfectly homogeneous.
- A6.52 Importantly, we consider that our approach to market definition results in a clear, transparent and stable definition of the geographic scope of all relevant product markets in which the competitive conditions are sufficiently similar and can be distinguished from neighbouring areas where the competitive conditions are appreciably different. We note that stability does not imply that market definition cannot evolve: it should where there are clear and material changes in market circumstances. This approach translates into an approach to *ex ante* regulation which is equally clear, transparent and stable over the course of the three year review period and which enables us to carry out our general duties under section 3 in particular our principal duty and to act in accordance with all our Community requirements under section 4 in particular the first Community requirement of the Act.
- A6.53 In this respect, our approach to *ex ante* regulation is aimed primarily at promoting competition in the long term at the wholesale level based on investment in

<sup>&</sup>lt;sup>152</sup> This is consistent with the ERG Common Position (see Executive Summary and Section 6).

<sup>&</sup>lt;sup>153</sup> See Section 4.2 of the ERG Common Position. As the ERG Common Position also notes, "[i]f areas where conditions of competition are sufficiently homogeneous are integrated into a single market, the result of the market analysis (and the imposition of remedies) is the same as if each area had been considered individually" (see Section 2).

<sup>&</sup>lt;sup>154</sup> See paragraph 56.

economically efficient alternative infrastructure, and supplemented by seeking to ensure that CPs can compete effectively elsewhere in downstream markets by using regulated access to BT's wholesale services. We consider this approach is appropriate since our market analysis has shown that the existence of alternative infrastructure is the means by which wholesale competition, and consequently downstream competition, develops to become effective. Our approach to *ex ante* regulation is consistent with the approach taken in previous reviews of leased lines and, from a forward-looking perspective, should provide continued regulatory certainty over the course of the three year review period.

#### BT's core argument on data centres

- A6.54 BT argues that the general methodology above should be relaxed in the case of data centres, arguing that there are some data centres that are directly connected to the networks of many rival CPs (not least because some CPs have chosen to locate core nodes of their networks in those data centres), and that BT does not have market power in providing connectivity to these data centres. While BT recognises the general concerns regarding taking an overly granular approach, it nevertheless argues that the scale of activity of data centres is sufficiently large that an exception to our general approach is warranted.
- A6.55 BT argues that, if regulation were removed in respect of provision of connectivity to an appropriately defined set of specific large carrier-neutral multi-tenanted data centres, BT would be able to compete more effectively to provide that connectivity, with benefits for users. BT is particularly concerned about regulatory constraints on price notification, charges, and non-discrimination.

#### Our assessment

- A6.56 We have sought to define relevant markets with clear and stable boundaries which can be easily understood by all stakeholders. Equally we have considered likely developments in leased lines in general over the three year review period and their potential impact on our market definition analysis.
- A6.57 Consequently, we have adopted an appropriate, practical and proportionate approach in defining the product and geographic scope of the 15 relevant markets recognising the burden both on stakeholders (with regard to data gathering) and on us (with regard to both data gathering and the analysis) bearing in mind also that the purpose of market definition is not an end in itself but a means to undertake an analysis of competitive conditions for the purposes of determining whether *ex ante* regulation is required or not.
- A6.58 We recognise that data centres are playing an increasingly important role in the business connectivity market, both as a significant source of demand for leased lines, and also as the location for some CPs' investment in network nodes. We also recognise that there is likely to be a choice of providers of some connections into data centres.
- A6.59 However, we do not agree with the general thrust of BT's proposal, which advocates that we take the role of data centres in the market into account in our analysis by adopting a premise-by-premise approach to market definition. Much of the general reasoning that underpins our approach to market definition and associated regulatory remedies continues to apply. An assessment and variation of remedies on a premise-by-premise approach is liable to yield a patchwork of remedies, with reduced transparency and less stability regarding the regulatory

arrangements that should apply. There are particular concerns with a building-bybuilding approach since the analysis at this level of granularity is significantly more prone to error, the list of buildings may change over time, and it is difficult to draw a line separating those buildings that are to be presumed "competitive" from those that are "not competitive".

A6.60 More specifically, we do not accept BT's argument that data centres should be defined as separate markets where two or more OCPs have connected their networks to them on the grounds that they are competitively served. Seeking to assess the competitive conditions at a particular site would not reflect the economic characteristics of the use of leased lines and of their provision. Wholesale leased lines services provide connectivity between two points, and an assessment of competitive conditions requires examination of both points, as well as of the economics of the provision of the infrastructure between them. We illustrate this with the example below, with reference to Figure A6.1. Our example is based on our market analysis which has revealed, at a high level, that competitive conditions are sufficiently distinct between the wholesale provision of trunk connections, which tend to be long, and terminating segments, which tend to be shorter.

# Figure A6.1 Illustration of differences in competitive conditions between short and long circuits



- A6.61 In fulfilling a service from a London data centre to a customer site in Manchester, most CPs are likely to require a BT regulated wholesale access service at the customer's site in Manchester (link Z to B in the figure above) because, while BT's access network is ubiquitous, other CPs' networks are not. CPs which have physical networks that enable them to fulfil the link from the data centre to a BT exchange in Manchester (link D to Z) can compete in the provision of that link, and the provision of wholesale services from D to Z may therefore be effectively competitive.
- A6.62 Similar to the situation in the case of the customer site in Manchester, in fulfilling a service from the same data centre to a customer's site in London, most CPs are likely to require a BT regulated wholesale access service between D and A. BT is likely to be able to provide this link as a single circuit from D to A. Another CP may be able to use its own physical network to fulfil part of this requirement, and may already be interconnected with BT in a local exchange, but using its infrastructure in this way will mean the solution involves building two circuits from D to X and from X to A. In general, the single circuit solution is likely to be more efficient. Effective competition in the provision of the local wholesale connection between the data centre and the customer site in London is therefore less likely.

- A6.63 While the differences in competitive conditions may be sufficiently clear for wholesale services used in the downstream services between the London data centre and customer sites in London and Manchester respectively, the degree of difference becomes less clear when the difference in distances between two similar cases is less stark. For example, more extensive analysis would be required to determine whether, in the case of a downstream service from the same data centre to a customer site in Croydon, the corresponding wholesale competitive conditions would be more similar to DA or to DB in the figure above. Assessing the competitive conditions at data centres fully on this basis would be likely to require examination of hundreds of circuits from each data centre to other locations.
- A6.64 We note that, while the competitive conditions relating to long connections illustrated by the example above apply generally to AISBO and TISBO services, they may not apply to MISBO services, the large majority of which use wavelength division multiplex (WDM) technology. This is because the interconnection between different networks' WDM-based services is currently generally more costly and/or often less effective technically, particularly in respect of end-to-end service management, than interconnection of different networks' AISBO or TISBO services. This means that wholesale WDM-base services are often provided from end to end by one infrastructure provider, irrespective of their lengths. Competitive conditions for such services, irrespective of their lengths, are therefore similar to those described in the example above in respect of short circuits.
- A6.65 The example illustrates that, at a very granular route-by-route level, competitive conditions for different types of connection into a particular data centre will, unsurprisingly, vary. Delineating between types that on the basis of sufficiently different competitive conditions is not straightforward, and the competition analysis required for such delineation would impose a significant and, for the reasons set out in this Annex, unnecessary burden on operators (with regard to data delivery).
- A6.66 In addition, the share of connections at a data centre may provide a distorted representation of the competitive conditions downstream. For example, our analysis suggests that in a substantial proportion of leased lines services connected to large data centres, the retail customer end points are not located in those data centres. In such cases it appears that the involvement of those data centres is limited to the fact that CPs choose to house core network equipment in them. In other words, the data centre is not a destination point for retail leased line demand but rather a point through which retail leased lines pass. This is illustrated in the figure below.



# Figure A6.2: Illustration of downstream competition between a CP using a data centre as a network node and BT

- A6.67 The relevant connectivity that supports some of the downstream markets served from data centres is therefore wider than that which is provided at data centres. Consequently, the assessment of competitive conditions at data centres forms part of the necessarily broader assessment of competitive conditions that must be undertaken in order to analyse the economic characteristics of the wholesale provision of business connectivity services. As Figure A6.2 above shows, this involves taking into account the extent of BT's ability to compete effectively to provide those downstream services by using its core network equipment located, in accordance with BT's current practice, in its own exchange buildings and not in data centres. Our approach to market definition recognises this broader dynamic of wholesale competition.
- A6.68 Our approach also recognises that business connectivity services to and from data centres include those services provided in markets in which, as a result of the 2007/8 Review, BT has been subject to SMP remedies, including a general network access obligation. We consider the degree of OCP presence observed in certain data centres has been facilitated by the cumulative effect of these SMP remedies.

#### Data analysis

- A6.69 In order to understand potential implications of BT's proposal we used the circuit data we have gathered from CPs, and examined specifically data concerning connections provided at a subset of large data centres. We used this data to estimate the volumes and values of those connections, and to consider potential variations in their competitive conditions.
- A6.70 We considered the set of 32 multi-tenanted carrier neutral data centres suggested by BT, and selected a subset of 21 of those sites for further analysis on the basis of the volume of circuits terminating at each site.<sup>155</sup> We estimate that there are more

<sup>&</sup>lt;sup>155</sup> We set a minimum threshold of either at least 100 AISBO services to the relevant data centre, or at least 50 AISBO services and 20 MISBO services. This removed a number of data centres which appeared, on the basis

than 34,000 circuits terminating at one of the 21 sites across AISBO, MISBO and TISBO markets.

A6.71 The table below sets out the numbers of the data centre ends of all those circuits, broken down by interface type, our estimate of the annual wholesale revenue they generate, and the proportion of that revenue which falls in wholesale leased lines product markets which will be regulate by our decisions in this Statement.

AISBO <=1Gbits/s	МІ	TI <=8Mbits/s	Other TI	Revenue (£m p.a.)	Revenue in regulated markets (£m p.a.)
12,550	902	21,454	1,188	92	70

Figure A6.3 Number and revenues of circuit ends at data centres in the subset

- A6.72 As the table shows, we estimate that the total revenue from wholesale leased line ends in data centres in our selected subset is £92m p.a. Of that, £30m, or about one third, is in respect of services which will not be regulated as a result of our decisions in this Statement. The remaining £70m of revenue arises in markets which will be regulated, and is equivalent to about 3.5% of the £2bn total annual wholesale revenue in these markets throughout the UK.
- A6.73 We considered that provision of wholesale services *between* data centres in the subset may well vary from those observed in the relevant market, for example, because we infer from our data that at least four CPs' physical networks are connected at both ends of each such service. We therefore divided the inventory of circuit ends at data centres to distinguish between two types of circuits:
  - Type 1 circuits between data centres in our selected subset; and
  - Type 2 circuits between a data centre in the subset and any other site.
- A6.74 The break-down of the inventory between Types 1 and 2 is shown in the figure below.

	AISBO <=1Gbits/s	МІ	TI <=8Mbits/s	Other TI	Revenue (£m p.a.)	Revenue in regulated markets (£m p.a.)
Type 1	1,502	189	1,759	259	13	8
Type 2	11,048	714	19,695	929	79	62

# Figure A6.4: Circuit ends at data centres in the subset, broken down by connection types

of the circuit inventory data, to offer potential suppliers relatively limited demand compared to the largest data centres. Our analysis shows that a number of CPs which operate physical networks, including [ $\gg$ ], provide services to at least 18 of the 21 sites. There was a minimum of four CPs which we inferred were directly connected to a site, or which claimed to be present at the site; the average across all 21 sites was 11. Within the subset, 15 sites are located in the WECLA.

- A6.75 The table shows that the ends of Type 1 circuits the circuits between data centres in the subset – account for approximately £8m of annual revenue in markets that will be regulated by our decisions in this Statement. Circuits of Type 2 – between a data centre in the subset and any other site – account for approximately £62m of annual revenue in such markets.
- A6.76 As explained below, distinguishing between the different competitive conditions which might apply to ends of circuits of Type 2 proved to be inconclusive.
- A6.77 First, inspection of the circuit data in our inventory suggested strongly that CPs use many Type 2 circuits to provide services in which they use data centres as service nodes, for example to provide a set of a customer's branch offices with a service which emulates an internal office network. In such cases, no part of the downstream service is provided to the end-user at the data centre. The market for connectivity which can be used to support some of this downstream service is wider than that which is provided at those data centres, as explained in paragraphs A6.66 and A6.67 above. The regulated connectivity which supports downstream services specific to a particular data centre may therefore be significantly smaller than is suggested by the figure of £62m in the table above.
- A6.78 Second, as illustrated in paragraphs A6.60 to A6.63 above, we have found competitive conditions in the provision of data centre ends of long circuits of Type 2 do appear to be different to those for short circuits of this type. We illustrate in the figure below the potential effect of delineation based on the length of a circuit by distinguishing circuits of Type 2 according to their lengths.

	AISBO <=1Gbits/s	МІ	TI <=8Mbits/s	Other TI	Revenue (£m p.a.)	Revenue in regulated markets (£m p.a.)
>50km	2,324	-	4,440	172	15	13
<=50km	8,725	714	15,255	758	64	50

# Figure A6.5: Data centre ends of circuits of Type 2 with radial distances above and below 50km<sup>156</sup>

- A6.79 The table above shows that the revenue in regulated markets of data centre ends of Type 2 circuits longer than 50km is approximately £13m. Sensitivity studies on our analysis showed that reducing the distance threshold from 50km to 25km increased this amount to £18m, while increasing the threshold to 75km reduced the amount to £11m.
- A6.80 Overall, our analysis does not yield a robust figure for the revenue in regulated markets of data centre ends of long circuits to other sites. The figure could be approximately £13m, but could also be significantly lower because the relevant connectivity that supports some of the downstream services which CPs deliver

<sup>&</sup>lt;sup>156</sup> Note: In this figure we have included all MISBO circuit ends, irrespective of radial distance, in the lower row. This is because we consider that wave-division multiplex technology, used in the majority of MISBO circuits, does not allow effective interconnection of different CPs' networks, so that a CP is only likely to deliver such a service effectively if its physical network extends to both ends. We consider that competitive conditions for such circuits, irrespective of their lengths, are similar to those which apply to short circuits which use other technologies.

using the data centres is wider than that which is provided at those data centres and can include, for example, connectivity at BT exchanges.

A6.81 We have also classified the data centre ends of circuits which we analysed above by relevant market in which we found that BT has SMP, and estimated the proportion of each relevant market by volume represented by data centre ends.<sup>157</sup> Our resulting estimates are shown in the table below. The table shows, for example, that data centre ends account for 20% by volume of the market for AISBO <=1Gbits/s in the WECLA+. At the same time, it also shows that data centre ends of wholesale leased lines for which BT may face more competition than in the corresponding markets generally, i.e. Type 1 circuits (of any length) and Type 2 circuits longer than 50km, account for 2% and 4% respectively of the market for AISBO <=1Gbit/s in the WECLA+, and that such circuit types account for much smaller proportions of other relevant markets.

	AISBO <= 1Gbits/s		MISBO UK ex	MISBO UK ex		Revenue in regulated
	WECLA+	UK ex WECLA+	WECLA+	<=8WIDItS/S	WECLA+	markets (£m p.a.)
All	20%	0.4%	8%	3%	1%	70
of which:						
Type 1	2%	0.0%	1%	0%	0%	8
Type 2	17%	0.4%	7%	3%	1%	62
of which:						
>50km	4%	0.1%	0%	1%	0.5%	13
<=50km	14%	0.3%	7%	2%	0.5%	50

# Figure A6.6: Data centre ends which fall in relevant markets as a percentage of total volumes in their respective market<sup>158</sup>

- A6.82 In summary, we have estimated that the total annual revenue of services in markets in which we have decided to impose SMP remedies, but in which BT may face more competition than in the relevant markets generally, is less than £21m p.a. However, this includes £8m of Type 1 circuits between data centres in our selected subset in which it is likely that there is a choice of providers and £13m of Type 2 circuits between data centres in the subset and other sites where the extent of choice of providers is less clear. The total corresponds to 22% of the total wholesale value of service ends in circuits serving the 21 data centres in our selected subset, and about 1% of the annual wholesale leased lines revenue in the UK.
- A6.83 The SMP Guidelines note that for the purposes of *ex ante* regulation "in certain exceptional cases, the relevant market may be defined on a route-by-route basis".<sup>159</sup>

<sup>&</sup>lt;sup>157</sup> For this purpose, we have included all circuit ends in the relevant markets, including networks ends, because data centres are used as core network nodes by some CPs.

<sup>&</sup>lt;sup>158</sup> Note: In this figure we have included all MISBO circuit ends, irrespective of radial distance, in the lower row. This is because we consider that wave-division multiplex technology, used in the majority of MISBO circuits, does not allow effective interconnection of different CPs' networks, so that a CP is only likely to deliver such a service effectively if its physical network extends to both ends. We consider that competitive conditions for such circuits, irrespective of their lengths, are similar to those which apply to short circuits which use other technologies.

The Type 1 circuits routes – i.e. those connecting the data centres in our selected subset to each other – represent a very small segment of leased lines services, with  $\pounds$ 8m p.a. revenue. This accounts for approximately 0.4% of the UK wholesale leased lines revenue of approximately  $\pounds$ 2bn p.a., and taking into account our prospective analysis, we do not consider the percentage represented by Type 1 circuits as a proportion of total annual wholesale revenue will increase sufficiently over the course of the three year review period. We consider that it would be impractical and inappropriate to define such a small segment as a separate market.

- A6.84 In summary, and in light of all of the above, our market analysis therefore does not lead us to conclude that Type 1 routes i.e. those connecting the data centres in our selected subset to each other should be regarded as an exceptional case. In this respect, we recognise, as noted above, that the purpose of market definition is not an end in itself but a means to undertake an analysis of competitive conditions for the purposes of determining whether *ex ante* regulation is required or not.
- A6.85 With regard to varied remedies, we note that within a national market it could still be the case that there exist geographic differences in competitive conditions which do not vary so much that it undermines the finding of a national market but which may lead to differences in identified competition problems and hence differences in appropriate remedies.<sup>160</sup> In this respect, the different price controls we have imposed in the two AISBO markets are an example of where we have taken into account, and concluded it is appropriate to impose, geographically differentiated constraints on an SMP operator who operators nationally i.e. BT in the context of remedies.<sup>161</sup>
- A6.86 However, with regard to varied remedies for the sub-set of data centres we have looked at, our market analysis does not lead us to conclude that varied remedies are warranted. In reaching this conclusion we have also taken into account the guidance provided by the ERG Common Position where it states: "NRAs should be aware that a geographic segmentation is likely to increase the complexity of regulation and the effort necessary to perform proper market analysis and to effectively implement appropriate remedies".<sup>162</sup>
- A6.87 Such a variation of remedies in this instance would operate at a level more granular than site level to cover specifically only particular routes between particular sites, and carve out what our market analysis has revealed to be a very small segment of the relevant markets in which we are imposing *ex ante* regulation. As noted above, the clarity, transparency and stability resulting from our approach to market definition translates into an approach to *ex ante* regulation that produces the same degree of clarity, transparency and stability over the course of the three year review period. In our view, a variation of remedies at this very granular level would serve to break the necessary connection between these two chronological steps of our market review process.

<sup>162</sup> See Section 6.

<sup>&</sup>lt;sup>159</sup> See paragraph 61 of the SMP Guidelines. We note, though, footnote 46 to paragraph 61 which states "[i]t is highly unlikely that the provision of electronic communications services could be segmented on the basis of national (or local) bilateral routes"

<sup>&</sup>lt;sup>160</sup> See, in this respect, the ERG Common Position, Section 5, and also the EC's Explanatory Note, Section 2.4. See also our conclusions on our approach to SMP assessment (Section 7).

<sup>&</sup>lt;sup>161</sup> See Section 12.

- A6.88 BT has argued that it should have more freedom to meet the very specific needs of data centre customers, and be able to offer non-standard, bespoke solutions at unpublished variable prices. We consider that BT has sufficient flexibility to meet the needs of data centre customers without being able to make such offers for products in market in which it has SMP. First, our existing suite of market definitions and associated remedies provides for a substantial degree of appropriate deregulation in respect of many of the connections to data centres. Most of the major data centres are located in the WECLA. Circuits connecting these data centres to other parts of the WECLA face no regulation in the cases of MISBO services and of TISBO services faster than 8Mbits/s, and, in the case of AISBO at or below 1Gbits/s, there is less stringent price regulation than outside of the WECLA. Second, whilst addressing the competition problems we have identified in markets, we also consider that the SMP remedies we are imposing in the relevant markets do accord BT sufficient flexibility to respond to the needs of data centre customers, for example by adapting its provision processes to reflect the connectivity requirements and circumstances which generally apply in data centres appropriately.
- A6.89 Accordingly, we are not persuaded by the case for treating connections to data centres as a separate market or for applying different remedies to them at this stage.
- A6.90 Nevertheless, in light of the apparently rapid pace of development, we intend to consider the effect of the development of data centres on competition in leased lines markets in our next review of those markets.

# Legal Instrument (Draft notification)

## NOTIFICATION OF PROPOSALS FOR EU CONSULTATION UNDER SECTIONS 48B (SMP CONDTIONS) AND 80B (MARKET IDENTIFICATIONS AND MARKET POWER DETERMINATIONS) OF THE COMMUNICATIONS ACT 2003

### Background

**1.** In June 2004, Ofcom completed its first market review in relation to retail leased lines, wholesale symmetric broadband origination and wholesale trunk segments under the new EU regulatory framework that has applied since 25 July 2003, by setting out its main conclusions in a statement entitled '*Review of the retail leased lines, symmetric broadband origination and wholesale trunk segments markets* — *Final Statement and Notification* — *Identification and analysis of markets, determination of market power and setting of SMP conditions*'.<sup>163</sup>

2. On 8 December 2008, Ofcom published a joint statement and consultation document entitled 'Business Connectivity Market Review — Review of the retail leased lines, wholesale symmetric broadband origination and wholesale trunk segments' ("2008 BCMR Statement").<sup>164</sup> That document set out Ofcom's main conclusions of its second review of the retail and wholesale markets for leased lines in the UK, by identifying markets, making certain market determinations and setting SMP conditions. At Annex 8 to that document, Ofcom published a notification under section 48(1) of the Act dated 8 December 2008 containing its market identifications, market power determinations and the setting of SMP conditions to be applied to BT and KCOM, respectively (with the exception of the SMP conditions imposing various charge controls on BT, see paragraph 4. below)("December 2008 Notification").

**3.** On 13 February 2009, Ofcom published another statement entitled '*Business* Connectivity Market Review — Review of the retail leased lines, wholesale symmetric broadband origination and wholesale trunk segments markets'.<sup>165</sup> In that document, Ofcom concluded its consultation on the proposals set out in the 2008 BCMR Statement by deciding that no undertaking, individually or jointly with others, has significant market power in relation to the market for the provision of alternative interface symmetric broadband origination with a bandwidth capacity above one gigabit per second within the Hull Area.

**4.** On 2 July 2009, Ofcom published a statement entitled '*Leased Lines Charge Control* — A new charge control framework for wholesale traditional interface and alternative interface products and services'.<sup>166</sup> In that document, Ofcom set out its conclusions on the charge controls for wholesale traditional and alternative interface leased lines services supplied by BT in markets which it was found to have significant market power as concluded in the 2008 BCMR Statement, by setting SMP conditions to be applied to BT under a

<sup>&</sup>lt;sup>163</sup> <u>http://stakeholders.ofcom.org.uk/binaries/consultations/llmr/statement/state\_note.pdf</u>

<sup>&</sup>lt;sup>164</sup> http://stakeholders.ofcom.org.uk/binaries/consultations/bcmr08/summary/bcmr08.pdf

<sup>&</sup>lt;sup>165</sup> <u>http://stakeholders.ofcom.org.uk/binaries/consultations/bcmr08/statement/statement.pdf</u>

<sup>&</sup>lt;sup>166</sup> <u>http://stakeholders.ofcom.org.uk/consultations/llcc/statement/</u>
notification under section 48(1) of the Act as dated 2 July 2009 and published at Annex 9 to that document ("**July 2009 Notification**").

**5.** On 30 September 2010, Ofcom published a statement entitled '*Leased Lines Charge Control* — Adoption of Revised SMP Services Conditions following the Competition Appeal Tribunal's Directions of 20 September 2010'.<sup>167</sup> In that document, Ofcom made various modifications to the SMP conditions set out in Annex 9 to the July 2009 Notification in accordance with the directions given by the Competition Appeal Tribunal.

6. In 2011, Ofcom commenced its third review of the relevant markets relating to leased lines and backhaul circuits used by businesses and communication providers, which review has been called the Business Connectivity Market Review. On 21 April 2011, Ofcom began its consultation process with stakeholders by publishing a consultation document entitled *'Business Connectivity Market Review — Call for Inputs'* ("April 2011 Consultation").<sup>168</sup>

**7.** Following Ofcom's consideration of responses received to the April 2011 Consultation and its analysis of the relevant markets (including extensive evidence gathering), Ofcom published on 18 June 2012 a further consultation document entitled '*Business Connectivity Market Review* — *Review of the retail leased lines, wholesale symmetric broadband origination and wholesale trunk segments markets*' ("**June 2012 Consultation**").<sup>169</sup> At Annex 14 to that document, Ofcom published a notification under sections 48A and 80A of the Act dated 18 June 2012 ("**June 2012 Notification**"), which notification set out for domestic consultation its proposals for market identifications, market power determinations and SMP conditions to be applied to BT and KCOM, respectively (with the exception of proposed SMP conditions imposing various charge controls to be applied to BT, see paragraph **8.** below). Ofcom invited responses by 24 August 2012.

**8.** On 5 July 2012, Ofcom published another consultation document entitled '*Leased Lines Charge Control — Proposals for a new charge control framework for certain leased lines services*' ("**July 2012 Consultation**").<sup>170</sup> At Annex 8 to that document, Ofcom published a notification under section 48A of the Act dated 5 July 2012, which notification set out for domestic consultation its proposals for SMP conditions imposing various charge controls to be applied to BT. Ofcom invited responses by 30 August 2012.

**9.** On 15 November 2012, Ofcom published a further consultation document entitled *'Business Connectivity Market Review* — *Further consultation'* ("**November 2012 Consultation**").<sup>171</sup> At Annex 5 to that document, Ofcom published a notification under section 48A of the Act dated 14 November 2012, which notification set out for domestic consultation its proposals for SMP conditions imposing various regulatory financial reporting obligations to be applied to BT and KCOM, respectively, together with some proposed changes to the SMP conditions set out in the June 2012 Notification. Ofcom invited responses by 17 December 2012.

<sup>&</sup>lt;sup>167</sup> <u>http://stakeholders.ofcom.org.uk/binaries/consultations/Ilcc/statement/LLCC\_decision\_final.pdf</u>

<sup>&</sup>lt;sup>168</sup> <u>http://stakeholders.ofcom.org.uk/binaries/consultations/bcmr-inputs/summary/BCMR\_Call\_for\_Inputs.pdf</u>

<sup>&</sup>lt;sup>169</sup> <u>http://stakeholders.ofcom.org.uk/consultations/business-connectivity-</u> mr/?utm\_source=updates&utm\_medium=email&utm\_campaign=bcmr-june2012

<sup>&</sup>lt;sup>170</sup> <u>http://stakeholders.ofcom.org.uk/consultations/llcc-2012/</u>

<sup>&</sup>lt;sup>171</sup> <u>http://stakeholders.ofcom.org.uk/binaries/consultations/bcmr-reconsultation/summary/BCMR\_Nov\_2012.pdf</u>

**10.** Copies of the June 2012 Consultation, the July 2012 Consultation and the November 2012 Consultation (collectively, the "**BCMR Consultation Documents**") were also sent to the Secretary of State in accordance with sections 48C(1) and 81(1) of the Act.

**11.** Ofcom received several responses to its proposals set out in the BCMR Consultation Documents, and it has considered every such representation. The Secretary of State has not notified Ofcom of any international obligation on the United Kingdom for the purposes of those proposals.

**12.** The proposals set out in the BCMR Consultation Documents contain proposals of EU significance for the purposes of the Act. Therefore, after making such modifications of the proposals that appear to Ofcom to be appropriate following domestic consultation, Ofcom hereby sends a copy of them, and of the Draft Statement accompanying this notification setting out the reasons for them, to the European Commission, BEREC and the regulatory authorities of every other member State for EU consultation, in accordance with sections 48B(2) and 80B(2) of the Act.

## Proposals for EU consultation for the United Kingdom outside the Hull Area

#### Market identifications and market power determinations

**13.** Of comproposes to identify the relevant markets listed in Column 1 of **Table A** below for the purposes of making a determination (if any) that the person specified in the corresponding row in Column 2 of that Table has significant market power in that identified services market.

# Table A: Proposed market identifications and market power determinations in the UK outside the Hull Area

Column 1: Market identification	Column 2: Market power determination (if any)
(a) Wholesale market for low bandwidth traditional interface symmetric broadband origination in the UK excluding the Hull area, at bandwidths up to and including 8Mbit/s.	ВТ
<b>(b)</b> Wholesale market for medium bandwidth traditional interface symmetric broadband origination in the UK excluding the Hull Area and the WECLA, at bandwidths above 8Mbit/s and up to and including 45Mbit/s.	BT
(c) Wholesale market for medium bandwidth traditional interface symmetric broadband origination in the WECLA, at bandwidths above 8Mbit/s and up to and including 45Mbit/s.	[—]
(d) Wholesale market for high bandwidth traditional interface symmetric broadband origination in the UK excluding the Hull Area and the WECLA, at bandwidths above 45Mbit/s and up to and including 155Mbit/s.	BT
(e) Wholesale market for high bandwidth traditional interface symmetric broadband origination in the WECLA, at bandwidths above 45Mbit/s and up to and including 155Mbit/s.	[—]

(f) Wholesale market for very high bandwidth traditional interface symmetric broadband origination in the UK excluding the Hull Area, at bandwidths of 622Mbit/s.	Ľ
(g) Wholesale market for low bandwidth alternative interface symmetric broadband origination in the UK excluding the Hull Area and the WECLA, at bandwidths up to and including 1Gbit/s.	BT
(h) Wholesale market for low bandwidth alternative interface symmetric broadband origination in the WECLA, at bandwidths up to and including 1Gbit/s.	ВТ
(i) Wholesale market for multiple interface symmetric broadband origination in the UK excluding the Hull Area and the WECLA.	BT
(j) Wholesale market for multiple interface symmetric broadband origination in the WECLA.	[—]
(k) Wholesale market for regional trunk segments in the UK.	BT
(I) Wholesale market for national trunk segments in the UK.	[—]
(m) Retail market for very low bandwidth traditional interface leased lines in the UK excluding the Hull Area, at bandwidths below 2Mbit/s.	BT

14. For the avoidance of doubt, Ofcom proposes that the markets listed at (c), (e), (f), (j) and (l) in **Table A** above are effectively competitive and, therefore, that no person has significant market power in those markets.

**15.** The effect of, and Ofcom's reasons for making, the proposals to identify the markets and to make the market power determinations referred to in **paragraph 13.** above are set out in the Draft Statement accompanying this notification.

# SMP conditions

16. Of com proposes to set, in relation to each of the proposed services markets in which Of com proposes to make the market power determinations as listed at (a), (b), (d), (g), (h), (i), (k) and (m) in Table A above, the SMP conditions set out in Schedule 2 to this notification to be applied to BT to the extent specified in that Schedule, which SMP conditions shall, unless otherwise is stated in that Schedule, take effect on the date of Of com's publication of a notification under section 48(1) of the Act following the end of the EU consultation.

17. Ofcom proposes to set, in relation to each of the proposed services markets in which Ofcom proposes to make the market power determinations as listed at (a), (b), (d), (g), (h), (i) and (k) in Table A above, the SMP conditions OA1 to OA28, OA32 and OA33 to be applied to BT as set out in Schedule 2 to the July 2004 (BT) Notification, as read in light of the proposed modifications to that Notification set out in paragraph 19. below. Those SMP conditions shall, unless otherwise is stated in that Schedule, take effect on the date of Ofcom's publication of a notification under section 48(1) of the Act following the end of the EU consultation.

**18.** Of com proposes to set, in relation to the proposed services market in which Of com proposes to make the market power determination as listed at **(m)** in **Table A** above, the SMP conditions OA1 to OA25, OA29 to OA31 and OA34 to be applied to BT, but excluding subparagraphs (b), (d) and (e) of SMP condition OA23, set out in the July 2004 (BT) Notification, but as read in light of the proposed modifications to that Notification set out in **paragraph 19.** below. Those SMP conditions shall, unless otherwise is stated in that Schedule, take effect on the date of Of com's publication of a notification under section 48(1) of the Act following the end of the EU consultation.

- **19.** Ofcom proposes to modify the July 2004 (BT) Notification as follows—
- (a) the words "and 17a" in paragraph 4.(a)(i) shall be deleted;
- (b) in Part 1 (entitled 'Wholesale Markets') of Schedule 1—

(i) for the words "Provision of traditional interface symmetric broadband origination with a bandwidth capacity up to and including eight megabits per second within the United Kingdom but not including the Hull Area" in paragraph 14 there shall be substituted the words "Wholesale market for low bandwidth traditional interface symmetric broadband origination in the UK excluding the Hull Area, at bandwidths up to and including 8Mbit/s";

(ii) for the words "Provision of traditional interface symmetric broadband origination with a bandwidth capacity above eight megabits per second and up to and including forty five megabits per second within the UK but not including the Hull Area and the Central East London Area" in paragraph 15 there shall be substituted the words "Wholesale market for medium bandwidth traditional interface symmetric broadband origination in the UK excluding the Hull Area and the WECLA, at bandwidths above 8Mbit/s and up to and including 45Mbit/s";

(iii) after paragraph 15, the following paragraph 15a "Wholesale market for high bandwidth traditional interface symmetric broadband origination in the UK excluding the Hull Area and the WECLA, at bandwidths above 45Mbit/s and up to and including 155Mbit/s" shall be inserted;

(iv) for the words "Provision of alternative interface symmetric broadband origination with a bandwidth capacity up to and including one gigabit per second in the United Kingdom but not including the Hull Area" in paragraph 16 there shall be substituted the words "Wholesale market for low bandwidth alternative interface symmetric broadband origination in the UK excluding the Hull Area and the WECLA, at bandwidths up to and including 1Gbit/s";

(v) after paragraph 16, the following paragraph 16a "Wholesale market for low bandwidth alternative interface symmetric broadband origination in the WECLA, at bandwidths up to and including 1Gbit/s" shall be inserted;

(vi) after paragraph 16a, the following paragraph 16b "Wholesale market for multiple interface symmetric broadband origination in the UK excluding the Hull Area and the WECLA" shall be inserted;

(vii) for the words "Provision of wholesale trunk segments at all bandwidths within the UK" in paragraph 17 there shall be substituted the words "Wholesale market for regional trunk segments in the UK";

(viii) paragraph 17a shall be deleted;

(ix) in the Column entitled 'Date', for the dates specified in relation to paragraphs 14 to 17 there shall be substituted the date of Ofcom's publication of a notification

under section 48(1) of the Act following the end of the EU consultation;

(c) in Part 2 (entitled 'Retail Markets') of Schedule 1—

(i) for the words "Provision of traditional interface retail leased lines up to and including a bandwidth capacity of eight megabits per second within the UK but not including the Hull Area" in paragraph 25 there shall be substituted the words "Retail market for very low bandwidth traditional interface leased lines in the UK excluding the Hull Area, at bandwidths below 2Mbit/s"; and

(ii) in the Column entitled 'Date', for the date specified in relation to paragraph 25 there shall be substituted the date of Ofcom's publication of a notification under section 48(1) of the Act following the end of the EU consultation.

**20.** Of com proposes to revoke the SMP conditions to be applied to BT as set out in Schedules 1 to 6 (with the exceptions of conditions G4, GG4, GH4, HH4 and H4 which relate to charge controls) to the December 2008 Notification on the same day as Ofcom's proposals in relation to the SMP conditions referred to in **paragraphs 16. to 19.** above would take effect.

**21.** The effect of, and Ofcom's reasons for making, the proposals in relation to the SMP conditions referred to in **paragraphs 16. to 20.** above are set out in the Draft Statement accompanying this notification.

# Proposals for EU consultation for the Hull Area

## Market identifications and market power determinations

**22.** Of comproposes to identify the relevant markets listed in Column 1 of **Table B** below for the purposes of making a determination (if any) that the person specified in the corresponding row in Column 2 of that Table has significant market power in that identified services market.

# Table B: Proposed market identifications and market power determinations for the Hull Area

Column 1: Market identification	Column 2: Market power determination (if any)
(a) Wholesale market for low bandwidth traditional interface symmetric broadband origination in the Hull Area, at bandwidths up to and including 8Mbit/s.	КСОМ
<b>(b)</b> Wholesale market for medium bandwidth traditional interface symmetric broadband origination in the Hull Area, at bandwidths above 8Mbit/s and up to and including 45Mbit/s.	КСОМ
(c) Wholesale market for high bandwidth traditional interface symmetric broadband origination in the Hull Area, at bandwidths above 45Mbit/s and up to and including 155Mbit/s.	КСОМ
(d) Wholesale market for very high bandwidth traditional interface symmetric broadband origination in the Hull Area, at bandwidths of 622Mbit/s.	КСОМ

(e) Wholesale market for low bandwidth alternative interface symmetric broadband origination in the Hull Area, at bandwidths up to and including 1Gbit/s.	КСОМ
(f) Retail market for low bandwidth traditional interface leased lines in the Hull Area, at bandwidths up to and including 8Mbit/s.	КСОМ
(g) Retail market for low bandwidth alternative interface leased lines in the Hull Area, at bandwidths up to and including 1Gbit/s	КСОМ

**23.** The effect of, and Ofcom's reasons for making, the proposals to identify the markets and to make the market power determinations referred to in **paragraph 22.** above are set out in the Draft Statement accompanying this notification.

# SMP conditions

24. Ofcom proposes to set, in relation to each of the proposed services markets in which Ofcom proposes to make the market power determinations as listed at (a) to (g) in **Table B** above, the SMP conditions set out in **Schedule 3** to this notification to be applied to KCOM to the extent specified in that Schedule, which SMP conditions shall, unless otherwise is stated in that Schedule, take effect on the date of Ofcom's publication of a notification under section 48(1) of the Act following the end of the EU consultation.

**25.** Ofcom proposes to set, in relation to each of the proposed services markets in which Ofcom proposes to make the market power determinations as listed at **(a) to (e)** in **Table B** above, the SMP conditions OB1 to OB27 and OB31 to OB33 to be applied to KCOM, but excluding subparagraphs (a) to (c) and (f) of SMP condition OB23, set out in the July 2004 (KCOM) Notification, but as read in light of the proposed modifications to that Notification set out in **paragraph 26.** below. Those SMP conditions shall, unless otherwise is stated in that Schedule, take effect on the date of Ofcom's publication of a notification under section 48(1) of the Act following the end of the EU consultation.

- 26. Of com proposes to modify the July 2004 (KCOM) Notification as follows—
- (a) paragraph 4.(a)(ii) shall be deleted;
- (b) in paragraph 4.(a)(iii), after the words "numbered 5 and 8", the words "and 9 to 12" shall be inserted;
- (c) in Part 1 (entitled 'Wholesale Markets') of Schedule 1—

(i) for the words "Provision of traditional interface symmetric broadband origination with a bandwidth capacity up to and including eight megabits per second within the Hull Area" in paragraph 9 there shall be substituted the words "Wholesale market for low bandwidth traditional interface symmetric broadband origination in the Hull Area, at bandwidths up to and including 8Mbit/s";

(ii) for the words "Provision of traditional interface symmetric broadband origination with a bandwidth capacity above eight megabits per second and up to and including forty five megabits per second within the Hull Area" in paragraph 10 there shall be substituted the words "Wholesale market for medium bandwidth traditional interface symmetric broadband origination in the Hull Area, at bandwidths above 8Mbit/s and up to and including 45Mbit/s";

(iii) for the words "Provision of traditional interface symmetric broadband origination

with a bandwidth capacity above forty five megabits per second and up to and including one hundred and fifty five megabits per second within the Hull Area" in paragraph 11 there shall be substituted the words "Wholesale market for high bandwidth traditional interface symmetric broadband origination in the Hull Area, at bandwidths above 45Mbit/s and up to and including 155Mbit/s";

(iv) after paragraph 11, the following paragraph 11a "Wholesale market for very high bandwidth traditional interface symmetric broadband origination in the Hull Area, at bandwidths of 622Mbit/s" shall be inserted;

(v) for the words "Provision of alternative interface symmetric broadband origination with a bandwidth capacity of up to and including one gigabit per second within the Hull Area" in paragraph 12 there shall be substituted the words "Wholesale market for low bandwidth alternative interface symmetric broadband origination in the Hull Area, at bandwidths up to and including 1Gbit/s"; and

(vi) in the Column entitled 'Date', for the dates specified in relation to paragraphs 9 to 12 there shall be substituted the date of Ofcom's publication of a notification under section 48(1) of the Act following the end of the EU consultation.

**27.** Ofcom proposes to revoke the SMP conditions to be applied to BT as set out in Schedules 7 to 10 to the December 2008 Notification on the same day as Ofcom's proposals in relation to the SMP conditions referred to in **paragraphs 24. to 26.** above would take effect.

**28.** The effect of, and Ofcom's reasons for making, the proposals in relation to the SMP conditions referred to in **paragraphs 24. to 27.** above are set out in the Draft Statement accompanying this notification.

# Ofcom's duties

**29.** In identifying and analysing the markets referred to in **paragraphs 13. and 22.** above, and in considering whether to make the proposals set out in this notification, Ofcom has, in accordance with section 79 of the Act, taken due account of all applicable guidelines and recommendations which have been issued or made by the European Commission in pursuance of the provisions of an EU instrument and which relate to market identification and analysis or the determination of what constitutes significant market power. In so doing, pursuant to Article 3(3) of Regulation (EC) No 1211/2009, Ofcom has also taken the utmost account of any relevant opinion, recommendation, guidelines, advice or regulatory practice adopted by BEREC.

**30.** In addition, in making all of the proposals referred to in this notification, Ofcom has considered and acted in accordance with its general duties set out in section 3 of the Act and the six Community requirements in section 4 of the Act.

# Interpretation

**31.** For the purpose of interpreting this notification—

- (a) except in so far as the context otherwise requires, words or expressions shall have the meaning assigned to them in paragraph 32. below, and otherwise any word or expression shall have the same meaning as it has in the Act;
- (b) headings and titles shall be disregarded;

- (c) expressions cognate with those referred to in this notification shall be construed accordingly; and
- (d) the Interpretation Act 1978 (c. 30) shall apply as if this notification were an Act of Parliament.
- 32. In this notification—
- (a) "2008 BCMR Statement" has the meaning given to it by paragraph 2. of this notification;
- (b) "Act" means the Communications Act 2003 (c. 21);
- (c) "April 2011 Consultation" has the meaning given to it by paragraph 6. of this notification;
- (d) "BCMR Consultation Documents" has the meaning given to it by paragraph 10. of this notification;
- (e) "BT" means British Telecommunications plc, whose registered company number is 1800000 and any British Telecommunications plc subsidiary or holding company, or any subsidiary of that holding company, all as defined in section 1159 of the Companies Act 2006;
- (f) "December 2008 Notification" has the meaning given to it by paragraph 2. Of this notification;
- (g) "Hull Area" means the area defined as the 'Licensed Area' in the licence granted on 30 November 1987 by the Secretary of State under section 7 of the Telecommunications Act 1984 to Kingston upon Hull City Council and KCOM Group plc;
- (h) "June 2012 Consultation" has the meaning given to it by paragraph 7. Of this notification;
- (i) "June 2012 Notification" has the meaning given to it by paragraph 7. Of this notification;
- (j) "July 2004 (BT) Notification" means the notification under sections 48(1) and 86(1) of the Act as dated 22 July 2004 and published at Annex 2 to the statement entitled '*The regulatory financial reporting obligations on BT and Kingston Communications Final statement and notification Accounting separation and cost accounting: Final statement and notification*' published by Ofcom on 22 July 2004<sup>172</sup>, as subsequently amended by Ofcom;

(k) "July 2004 (KCOM) Notification"

means the notification under sections 48(1) and 86(1)

<sup>&</sup>lt;sup>172</sup> http://stakeholders.ofcom.org.uk/binaries/consultations/fin\_reporting/statement/finance\_report.pdf

of the Act as dated 22 July 2004 and published at Annex 3 to the statement entitled '*The regulatory financial reporting obligations on BT and Kingston Communications Final statement and notification* — *Accounting separation and cost accounting: Final statement and notification*' published by Ofcom on 22 July 2004<sup>173</sup>, as subsequently amended by Ofcom;

(I) "July 2009 Notification" has the meaning given to it by paragraph 4. of this notification;

(m) "July 2012 Consultation" has the meaning given to it by paragraph 8. of this notification;

- (n) "KCOM" means KCOM Group plc, whose registered company number is 2150618, and any of its subsidiaries or holding companies, or any subsidiary of such holding companies, all as defined in section 1159 of the Companies Act 2006;
- (o) "November 2012 Consultation" has the meaning given to it by paragraph 9. of this notification;
  - means the Office of Communications;
- (q) "WECLA" means the area in London consisting of the postal sectors set out in Schedule 1 to this notification; and
- (r) "United Kingdom" has the meaning given to it in the Interpretation Act 1978 (1978 c30).
- **33.** The Schedules to this notification shall form part of this notification.

A person duly authorised in accordance with paragraph 18 of the Schedule to the Office of Communications Act 2002

[DATE]

(p) "Ofcom"

<sup>&</sup>lt;sup>173</sup> <u>http://stakeholders.ofcom.org.uk/binaries/consultations/fin\_reporting/statement/finance\_report.pdf</u>

# Schedule 1: List of postal sectors constituting the WECLA

E1 0	EC1R 5	EC3A 5	EC4R 9	SL1 3	TW3 3	W1B 1	W1S 3	W8 6
E1 1	EC1V 0	EC3A 6	EC4V 2	SL1 4	TW3 4	W1B 2	W1S 4	W8 7
E1 2	EC1V 1	EC3A 7	EC4V 3	SL1 5	TW3 9	W1B 3	W1T 1	W8 9
E1 3	EC1V 2	EC3A 8	EC4V 4	SL1 6	TW4 6	W1B 4	W1T 2	W9 3
E1 5	EC1V 3	EC3M 1	EC4V 5	SL2 5	TW4 7	W1B 5	W1T 3	WC1A 1
E1 6	EC1V 4	EC3M 2	EC4V 6	SL3 9	TW5 0	W1C 1	W1T 4	WC1A 2
E1 7	EC1V7	EC3M 3	EC4Y 0	SL6 0	TW5 9	W1C 2	W1T 5	WC1B 3
E1 8	EC1V 8	EC3M 4	EC4Y 1	SL6 1	TW7 4	W1D 1	W1T 6	WC1B 4
E14 0	EC1V 9	EC3M 5	EC4Y 7	SL6 2	TW7 5	W1D 2	W1T 7	WC1B 5
E14 1	EC1Y 0	EC3M 6	EC4Y 8	SL6 4	TW8 0	W1D 3	W1U 1	WC1E 6
E14 2	EC1Y 1	EC3M 7	EC4Y 9	SL6 8	TW8 8	W1D 4	W1U 2	WC1E 7
E14 3	EC1Y 2	EC3M 8	N1 0	SL9 7	TW8 9	W1D 5	W1U 3	WC1H 0
E14 4	EC1Y 4	EC3N 1	N1 6	SW1A 0	UB1 1	W1D 6	W1U 4	WC1H 8
E14 5	EC1Y 8	EC3N 2	N1 7	SW1A 1	UB1 3	W1D 7	W1U 5	WC1H 9
E14 6	EC2A 1	EC3N 3	N1 8	SW1A 2	UB11 1	W1F 0	W1U 6	WC1N 1
E14 7	EC2A 2	EC3N 4	N1 9	SW1E 5	UB18 7	W1F 7	W1U 7	WC1N 2
E14 8	EC2A 3	EC3P 3	NW1 0	SW1E 6	UB18 9	W1F 8	W1U 8	WC1N 3
E14 9	EC2A 4	EC3R 5	NW1 1	SW1H 0	UB3 1	W1F 9	W1W 5	WC1R 4
E1W 1	EC2M 1	EC3R 6	NW1 2	SW1H 9	UB3 2	W1G 0	W1W 6	WC1R 5
E1W 2	EC2M 2	EC3R 7	NW1 3	SW1P 1	UB3 3	W1G 6	W1W 7	WC1V 6
E2 6	EC2M 3	EC3R 8	NW1 5	SW1P 2	UB3 4	W1G 7	W1W 8	WC1V 7
E2 7	EC2M 4	EC3V 0	NW1 6	SW1P 3	UB3 5	W1G 8	W2 1	WC1X 0
E3 2	EC2M 5	EC3V 1	NW1 7	SW1P 4	UB4 0	W1G 9	W2 2	WC1X 8
E3 3	EC2M 6	EC3V 3	NW1 8	SW1V1	UB5 6	W1H 1	W2 3	WC1X 9
E77 1	EC2M 7	EC3V 4	NW1 9	SW1V2	UB6 9	W1H 2	W2 4	WC2A 1
E8 9	EC2N 1	EC3V 9	NW10 5	SW1W 0	UB7 0	W1H 4	W2 6	WC2A 2
E98 1	EC2N 2	EC4A 1	NW10 6	SW1W 9	UB7 7	W1H 5	W4 1	WC2A 3
EC1A 1	EC2N 3	EC4A 2	NW10 7	SW1X 0	UB7 8	W1H 6	W4 2	WC2B 4
EC1A 2	EC2N 4	EC4A 3	SE1 0	SW1X7	UB7 9	W1H 7	W4 3	WC2B 5
EC1A 4	EC2P 2	EC4A 4	SE1 1	SW1X 8	UB8 1	W1J 0	W4 4	WC2B 6
EC1A 7	EC2R 5	EC4M 5	SE1 2	SW1X 9	UB8 2	W1J 5	W4 5	WC2E 7
EC1A 9	EC2R 6	EC4M 6	SE1 3	SW1Y4	UB8 3	W1J 6	W5 2	WC2E 8
EC1M 3	EC2R 7	EC4M 7	SE1 4	SW1Y 5	UB8 9	W1J 7	W5 3	WC2E 9
EC1M 4	EC2R 8	EC4M 8	SE1 6	SW1Y6	UB9 4	W1J 8	W5 5	WC2H 0
EC1M 5	EC2V 5	EC4M 9	SE1 7	SW3 1	W11 1	W1J 9	W5 9	WC2H 7
EC1M 6	EC2V 6	EC4N 1	SE1 8	SW3 2	W11 2	W1K 1	W6 0	WC2H 8
EC1M 7	EC2V 7	EC4N 4	SE1 9	SW3 3	W12 0	W1K 2	W6 6	WC2H 9
EC1N 2	EC2V 8	EC4N 5	SE11 5	SW7 1	W12 6	W1K 3	W6 7	WC2N 4
EC1N 6	EC2Y 5	EC4N 6	SE11 6	SW7 4	W13 0	W1K 4	W6 8	WC2N 5
EC1N 7	EC2Y 8	EC4N 7	SE16 2	SW7 5	W13 8	W1K 5	W6 9	WC2N 6
EC1N 8	EC2Y 9	EC4N 8	SE16 4	SW8 1	W14 8	W1K 6	W7 1	WC2R 0
EC1R 0	EC3A 1	EC4R 0	SE8 5	SW8 5	W1A 1	W1K 7	W7 3	WC2R 1
EC1R 1	EC3A 2	EC4R 1	SL1 0	SW95 9	W1A 3	W1S 1	W8 4	WC2R 2
EC1R 3	EC3A 3	EC4R 2	SL1 1	SW99 0	W1A 9	W1S 2	W8 5	WC2R 3
EC1R 4	EC3A 4	EC4R 3	SL1 2	TW3 1				

# Schedule 2: SMP conditions (BT)

## Part 1: Application

1. The SMP conditions in Part 3 of this Schedule 2 shall, except where specified otherwise, apply to the Dominant Provider in each of the relevant markets listed in Column 1 of **Table 1** below to the extent specified in Column 2 of **Table 1**.

## Table 1: Relevant markets for the purposes of this Schedule

Column 1: Relevant market	Column 2: Applicable SMP conditions as set out in Part 3 of this Schedule 2
Wholesale market for low bandwidth traditional interface symmetric broadband origination in the UK excluding the Hull Area, at bandwidths up to and including 8Mbit/s	Condition 1 Condition 3 Conditions 5.1, 5.5 and 5.6 Conditions 6 to 10 inclusive
Wholesale market for medium bandwidth traditional interface symmetric broadband origination in the UK excluding the Hull Area and the WECLA, at bandwidths above 8Mbit/s and up to and including 45Mbit/s	Condition 1 Condition 3 Conditions 5.1, 5.5 and 5.6 Conditions 6 to 10 inclusive
Wholesale market for high bandwidth traditional interface symmetric broadband origination in the UK excluding the Hull Area and the WECLA, at bandwidths above 45Mbit/s and up to and including 155Mbit/s	Condition 1 Condition 3 Conditions 5.1, 5.5 and 5.6 Conditions 6 to 10 inclusive
Wholesale market for regional trunk segments in the UK	Condition 1 Condition 3 Conditions 5.1, 5.5 and 5.6 Conditions 6 to 10 inclusive
Wholesale market for low bandwidth alternative interface symmetric broadband origination in the UK excluding the Hull Area and the WECLA, at bandwidths up to and including 1Gbit/s	Condition 1 Condition 2 (except 2.1(b)) Condition 3 Condition 4 (except 4.3) Conditions 5.2, 5.5 and 5.6 Conditions 6 to 10 inclusive
Wholesale market for low bandwidth alternative interface symmetric broadband origination in the WECLA, at bandwidths up to and including 1Gbit/s	Condition 1 Condition 2 (except 2.1(b)) Condition 3 Condition 4 (except 4.3) Conditions 5.3, 5.5 and 5.6 Conditions 6 to 10 inclusive
Wholesale market for multiple interface symmetric broadband origination in the UK excluding the Hull Area and the WECLA	Conditions 1 to 4 inclusive Conditions 5.3, 5.5 and 5.6 Conditions 6 to 10 inclusive
Retail market for low bandwidth traditional interface leased lines in the UK excluding the Hull Area, at bandwidths up to and including 8Mbit/s	Condition 5.4 Conditions 11 to 13 inclusive

The Conditions referred to in Column 2 of Table 1 are entitled as follows-

Condition 1	Network access on reasonable request
Condition 2	Specific forms of network access
Condition 3	No undue discrimination (wholesale)
Condition 4	Equivalence of Inputs basis
Condition 5	Charge controls
Condition 6	Publication of a Reference Offer (wholesale)
Condition 7	Notification of charges and terms and conditions
Condition 8	Quality of service
Condition 9	Notification of technical information
Condition 10	Requests for new forms of network access
Condition 11	Provision of retail leased lines
Condition 12	No undue discrimination (retail)
Condition 13	Publication of a Reference Offer (retail)

# Part 2: Definitions and interpretation

- 1. In this Schedule 2—
- (a) "Access Charge Change" means any amendment to the charges, terms and conditions on which the Dominant Provider provides network access or in relation to any charges for new network access;
- (b) "Access Charge Change Notice" means a notice given by the Dominant Provider of an Access Charge Change;
- (c) "Access Agreement" means an agreement entered into between the Dominant Provider and a Third Party for the provision of network access in accordance with Condition 1;
- (d) "Access Segment" mean a service providing uncontended bandwidth connecting an end-user premise to—
  - (a) a Local Access Node; or
  - (b) an operational building of the Dominant Provider; or
  - (c) an operational building of a Third Party.
- (e) "Accommodation Services" mean the provision of space permitting a Third Party to occupy part of an MDF/ODF Site reasonably sufficient to permit the use of one or more disaggregated access and backhaul leased lines products, and in particular to permit the connection of the Dominant Provider's electronic communications network

with that of a Third Party at that location and having the following characteristics-

(a) the Third Party's electronic communications network is situated in an area of the MDF/ODF Site which—

(i) is a single undivided space;

(ii) after proper performance by the Dominant Provider of its obligation to provide network access pursuant to Condition 1, would permit the normal operation of the Third Party's electronic communications network (or would permit if the Dominant Provider removed any object or substance whether toxic or not, which might reasonably prevent or hinder the occupation of the MDF/ODF Site for such use); and

(iii) if so requested by the Third Party, is not unreasonably distant from the Dominant Provider's electronic communications network within the MDF/ODF Site;

(b) no permanent physical partition is erected in the space between the Third Party's electronic communications network and the Dominant Provider's electronic communications network; and

(c) the Third Party's electronic communications network is neither owned nor run by the Dominant Provider or by any person acting on the Dominant Provider's behalf;

- (f) "Act" means the Communications Act 2003 (c. 21);
- (g) "Backhaul Segment" means a service providing uncontended bandwidth connecting either—
  - (a) an operational building of the Dominant Provider to-
    - (i) another operational building of the Dominant Provider; or
    - (ii) an operational building of a Third Party;

or—

- (b) an operational building of a Third Party to-
  - (i) another operational building of the Third Party; or
  - (ii) an operational building of the Dominant Provider.
- (h) "Commercial Information" means information of a commercially confidential nature relating to products and services to which Condition 4 applies, and which relates to any or all of the following in relation thereto—
  - (a) product development;
  - (b) pricing;
  - (c) marketing strategy and intelligence;
  - (d) product launch dates;

(e) cost;

- (f) projected sales volumes; or
- (g) network coverage and capabilities;

save for any such information in relation to which Ofcom consents in writing.

(i) "Core Node" means a node listed in Column 1 of Table 2 below consisting of an

operational building of the Dominant Provider listed in Column 2 of Table 2 below;

Column 1: Core Nodes	Column 2: Dominant Provider's operational buildings
Core Node 1	Inverness Macdhui
Core Node 2	Portadown
Core Node 3	Yeovil
Core Node 4	Aberystwyth
Core Node 5	Bridgwater
Core Node 6	Swansea
Core Node 7	Southend On Sea
Core Node 8	Lincoln
Core Node 9	Truro
Core Node 10	Plymouth
Core Node 11	Dundee Tay
Core Node 12	Norwich City
Core Node 13	Pontefract
Core Node 14	Wrexham Grosvenor
Core Node 15	Bangor (Wales)
Core Node 16	Ashford
Core Node 17	Tunbridge Wells
Core Node 18	Bedford Town
Core Node 19	Bournemouth
Core Node 20	Hemel Hempstead
Core Node 21	Shrewsbury

Table 2: Core Nodes

- (j) "Customer-Sited Handover" means interconnection between the electronic communications network of the Dominant Provider and the electronic communications network of a Third Party at an operational building of the Third Party;
- (k) "Dominant Provider" means British Telecommunications plc, whose registered company number is 1800000 and any British Telecommunications plc subsidiary or holding company, or any subsidiary of that holding company, all as defined in section 1159 of the Companies Act 2006;
- (I) "Equivalence of Inputs" means that the Dominant Provider provides, in respect of a particular product or service, the same product or service to all Third Parties (including itself) on the same timescales, terms and conditions (including price and service levels) by means of the same systems and processes, and includes the provision to all Third Parties (including itself) of the same Commercial Information about such products, services, systems and processes as the Dominant Provider provides to its own divisions, subsidiaries or partners subject only to: (a) trivial differences; and (b) differences relating to; (i) credit vetting procedures, (ii) payment procedures, (iii) matters of national and crime-related security (which for the avoidance of doubt includes for purposes related to the Regulation of Investigatory Powers Act 2000), physical security, security required to protect the operational integrity of the network, (iv) provisions relating to the termination of a contract, or (v)contractual provisions relating to requirements for a safe working environment. For the avoidance of any doubt, unless seeking Ofcom's consent, the Dominant Provider may not show any other reasons in seeking to objectively justify the provision in a different manner. In particular, it includes the use by the Dominant Provider of such systems and processes in the same way as other Third Parties and with the same

degree of reliability and performance as experienced by other Third Parties.

- (m) "Ethernet Services" mean services that are presented with the standard networking protocol defined under that name in IEEE 802.3 and published by the Institute of Electrical and Electronics Engineers;
- (n) "Hull Area" means the area defined as the 'Licensed Area' in the licence granted on November 1987 by the Secretary of State under section 7 of the Telecommunications Act 1984 to Kingston upon Hull City Council and KCOM Group plc;
- (o) "In-Building Handover" means interconnection between the electronic communications network of the Dominant Provider and the electronic communications network of a Third Party within an operational building of the Dominant Provider;
- (p) "In-Span Handover" means interconnection between the electronic communications network of the Dominant Provider and the electronic communications network of a Third Party in an external structure located reasonably adjacent to an operational building of the Dominant Provider such as, but not limited to, a manhole;
- (q) "In-Span Handover Extension" means interconnection between the electronic communications network of the Dominant Provider and the electronic communications network of a Third Party in an external structure located remote from an operational building of the Dominant Provider such as, but not limited to, a manhole;
- (r) "Interconnection Services" means each of the following, individually and collectively-
  - (a) In-Span Handover (in relation to traditional interface services only);
  - (b) Customer-Sited Handover;
  - (c) In-Span Handover Extension; and
  - (d) In-Building Handover;
- (s) "Local Access Node" means an operational building of the Dominant Provider which supports the provision of services to end-users and to which the end user is directly connected. For the avoidance of doubt, such nodes include sites housing a main distribution frame or an optical distribution frame;
- (t) "MDF/ODF Site" means the site of an operational building of the Dominant Provider that houses a main distribution frame or an optical distribution frame;
- "Network Component" means, to the extent they are used in the relevant market listed in Column 1 of Table 1 in Part 1 of this Schedule, the network components specified in a direction given by Ofcom from time to time for the purpose of these Conditions;
- (v) "Network Termination Point" means the physical point at which a customer is provided with access to an electronic communications network;
- (w) "Reference Offer" means the terms and conditions on which the Dominant Provider is willing to enter into an Access Agreement;

- (x) "Retail Reference Offer" means the terms and conditions on which the Dominant Provider is willing to enter an agreement for the provision of a retail leased line;
- (y) "Special Offer" means a temporary price reduction for a particular product or service, applicable to all customers on a non-discriminatory basis, which is stated to apply for a limited and predefined period and where the price immediately on expiry of that period is no higher than the price immediately before the start of that period;
- (z) "Third Party" means a person providing a public electronic communications service or a person providing a public electronic communications network;
- (aa) "Transfer Charge" means the charge or price that is applied, or deemed to be applied, by the Dominant Provider to itself for the use or provision of an activity or group of activities. For the avoidance of doubt such activities or group of activities include, amongst other things, products and services provided from, to or within a relevant market listed in Column 1 of Table 1 in Part 1 of this Schedule and the use of Network Components in that market;
- (bb) "Trunk Aggregation Node" means a node listed in Column 1 of Table 3 below consisting of any one or more of the Dominant Provider's operational buildings as listed in Column 2 of Table 3 below;

Table 3: Trunk Aggregation Nodes

Column 1: Trunk Aggregation Nodes	Column 2: Dominant Provider's operational buildings
Aberdeen	Aberdeen Central
Basingstoke Belfast	Basingstoke/Bounty Belfast/City; Belfast/Seymour
Birmingham	Birmingham Central; Birmingham Midland Birmingham Perryfields (Bromsgrove); Erdington
Bishops Stortford Brighton Bristol	Bishops Stortford Brighton Hove Bedminster, Bristol Redcliffe
Cambridge Cardiff/Newport Carlisle	Cambridge Trunks Cardiff; Newport (Gwent) Carlisle
Chelmsford	Chelmsford Town
Coventry	Coventry Grevfriar: Learnington Spa
Crawley	Crawley
Croydon	Croydon
Darlington	Darlington
Derby	Derby
Doncaster	Doncaster
Edinburgh	Edinburgh Donaldson
Exeter	Exeter Castle
Falkirk	Falkirk
Glasgow/Clyde Valley	Glasgow Central; Glasgow Douglas
Gloucester	Gloucester
Guildford	Guildford/Martyr
Ipswich	Colchester Town; Ipswich Town
Irvine	Irvine
Kendal	Kendal

Kingston	Kingston
Leeds	Bradford (2); Leeds (3)
Leicester	Leicester Montfort
Liverpool	Liverpool Central
London Central	BT Tower (West Block); Covent Garden, Faraday Te (Moorgate), South Kensington; Southbank
London Docklands	Bermondsey; Stepney Green
London East	Hornchurch, Kidbrooke, Upton Park; Woodford
London North	Potters Bar
London West	Colindale; Ealing; Southall
Luton	Luton Ate/Tower Block
Maidstone	Maidstone
Manchester	Bolton; Dial House (Manchester); Oldham; Pendleton
Milton Keynes	Milton Keynes
Newcastle	Newcastle Central; South Shields
Northampton	Northampton
Nottingham	Nottingham Longbow
Oxford	Oxford City
Peterborough	Peterborough Wentw
Portsmouth/Southampton	Cosham; Southampton
Preston	Preston (Lancs)
Reading	Bracknell
Salisbury	Salisbury
Sheffield	Chesterfield; Sheffield Cutler
Slough	High Wycombe; Slough
Stoke	Stoke Trinity/Pott
Swindon	Swindon
Warrington	Ashton In Makerfield; Northwich
Watford	Watford
Wolverhampton	Walsall Central, Wolverhampton Central
York	Malton

- (cc) "Trunk Segment" means a service connecting any two of the Dominant Provider's operational buildings listed in Column 2 of Table 3 for purposes of the definition of "Trunk Aggregation Node" to the extent they are part of different Trunk Aggregation Node as listed in Column 1 of that Table (for example, a service connecting Potters Bar and Southall would constitute a Trunk Segment but not one connecting Ealing and Southall);
- (dd) "Usage Factor" means the average usage by any Communications Provider (including the Dominant Provider itself) of each Network Component in using or providing a particular product or service or carrying out a particular activity;
- (ee) "WDM Services" mean services provided using wavelength division multiplexing equipment located at the customer's premises and which is capable of supporting multiple leased line services over a single fibre or pair of fibres;
- (ff) "WECLA" means the area in London consisting of the postal sectors set out in Schedule 1 to this Notification; and
- (gg) "Wholesale End-to-End Segments" mean services providing uncontended bandwidth between an end-user premise and another end-user premise.

- 2. For the purpose of interpreting this Schedule—
- (a) except in so far as the context otherwise requires, words or expressions shall have the meaning assigned to them in paragraph 1. of this Part 2, and otherwise any word or expression shall have the same meaning as it has in the Act;
- (b) headings and titles shall be disregarded;
- (c) expressions cognate with those referred to in this Schedule shall be construed accordingly; and
- (d) the Interpretation Act 1978 (c. 30) shall apply as if this Schedule were an Act of Parliament.

#### Part 3: SMP conditions

#### Condition 1 – Network access on reasonable request

- 1.1 The Dominant Provider must provide network access to a Third Party where that Third Party, in writing, reasonably requests it.
- 1.2 The provision of network access by the Dominant Provider in accordance with this Condition must—

(a) take place as soon as reasonably practicable after receiving the request from a Third Party;

(b) be on fair and reasonable terms, conditions and charges; and

(c) be on such terms, conditions and charges as Ofcom may from time to time direct.

- 1.3 The provision of network access by the Dominant Provider in accordance with this Condition shall also include such associated facilities as are reasonably necessary for the provision of network access and such other entitlements as Ofcom may from time to time direct and, for the avoidance of doubt, associated facilities include Accommodation Services and Interconnection Services.
- 1.4 The Dominant Provider must comply with any direction Ofcom may make from time to time under this Condition.

#### Condition 2 – Specific forms of network access

2.1 Without prejudice to the generality of Condition 1, the provision of network access under Condition 1 shall include the following specific forms of network access—

(a) Ethernet Services (which do not contain a Trunk Segment) including the provision of the following services—

- (i) Access Segments;
- (ii) Backhaul Segments;

(iii) Wholesale End-to-End Segments, up to a maximum straight-line distance of 25km;

(b) WDM Services (which do not contain a Trunk Segment) including the provision of the following services—

- (i) Backhaul Segments; or
- (ii) Wholesale End-to-End Segments.
- 2.2 The provision of network access by the Dominant Provider in accordance with this Condition shall also include such other entitlements as Ofcom may from time to time direct.
- 2.3 The Dominant Provider must comply with any direction Ofcom may make from time to time under this Condition.

#### Condition 3 – No undue discrimination (wholesale)

- 3.1 The Dominant Provider must not unduly discriminate against particular persons or against a particular description of persons, in relation to the provision of network access in accordance with Conditions 1 and/or 2.
- 3.2 In this Condition, the Dominant Provider may be deemed to have shown undue discrimination if it unfairly favours to a material extent an activity carried on by it so as to place one or more Third Parties at a competitive disadvantage in relation to activities carried on by the Dominant Provider.

#### **Condition 4 – Equivalence of Inputs basis**

- 4.1 The Dominant Provider must provide network access in accordance with Conditions 1 and/or 2 on an Equivalence of Inputs basis.
- 4.2 The obligation in Condition 4.1 shall not apply to—

(a) Accommodation Services other than in relation to the allocation of space (to be allocated on a first-come-first-serve basis) and power in operational buildings belonging to the Dominant Provider;

(b) a Backhaul Segment connecting either:

(i) the operational building of the Dominant Provider which is a Core Node and another operational building of the Dominant Provider which is either a Core Node or a Trunk Aggregation Node; or

(ii) two operational buildings of the Dominant Provider within a Trunk Aggregation Node.

(c) WDM Services with a straight line distance of more than 70km;

(d) network access which the Dominant Provider was not providing on an Equivalence of Inputs basis as at 31 March 2013; or

(e) such provision of network access as Ofcom may from time to time otherwise consent in writing.

4.3 Where WDM Services provided by the Dominant Provider to a Third Party differs from WDM Services provided by the Dominant Provider to itself only in respect of the interface used—

(a) subject to Condition 4.3(b), the obligation in Condition 4.1 shall apply;

(b) the obligation in Condition 4.1 shall not apply to the price for the provision of such WDM Services, but the Dominant Provider must ensure that such a price is not unduly discriminatory within the meaning of Condition 3.

- 4.4 Without prejudice to the generality of Condition 4.1, the Dominant Provider must not provide (or seek to provide) network access for its own services (including for those of its subsidiaries or partners), unless at the same time the Dominant Provider provides and/or offers to provide such network access to Third Parties on an Equivalence of Inputs basis.
- 4.5 For the avoidance of doubt, the obligations set out in this Condition 4 shall apply in addition to the obligations set out in Condition 3.

# **Condition 5 – Charge controls**

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Condition 5.7 Definitions

Condition 5.1

#### Controls of the TI Basket

- (a) Subject to paragraph (b), the Dominant Provider shall take all reasonable steps to secure that, at the end of each Relevant Year, the Percentage Change (as determined in accordance with paragraph (c)) in the aggregate of charges for all of the products and services in the TI Basket is not more than the Controlling Percentage (as determined in accordance with paragraph (d)).
- (b) For the purpose of complying with paragraph (a), the Dominant Provider shall take all reasonable steps to secure that the revenue it accrues as a result of all relevant individual charge changes during any Relevant Year shall be no more than that which it would have accrued had it made a single charge change equal to the Controlling Percentage on the first day of the Relevant Year.

For the avoidance of doubt, this obligation shall be deemed to be satisfied where the following formula is satisfied:

$$\sum_{i=1}^{n} \left[ W_1 R_i \frac{(p_{1,i} - p_{0,i})}{p_{0,i}} + W_t R_i \frac{(p_{t,i} - p_{0,i})}{p_{0,i}} \right] \le TRC$$

where---

*n* is the number of products and services in the specified category (i.e. the basket in question);

p0,i is the published charge made by the Dominant Provider for the specific product or service, *i*, on the day immediately before the beginning of the Relevant Year excluding any discounts offered by the Dominant Provider;

p1,i is the published charge after the first change in charge made by the Dominant Provider for the specific product or service, *i*, in the Relevant Year excluding any discounts offered by the Dominant Provider;

*pt,i* is the published charge made by the Dominant Provider for the specific product or service, *i*, at time, *t*, during the Relevant Year excluding any discounts offered by the Dominant Provider;

*Ri* is the Accrued Revenue in the Relevant Year in respect of the specific product or service, *i*, including in respect of equivalent products or services provided by the Dominant Provider to itself, calculated to exclude any discounts offered by the Dominant Provider;

W1 is the proportion of the Relevant Year in which the first charge change applies, calculated by the number of days during which the charge was in effect and dividing

by the total number of days in the Relevant Year;

*Wt* is the proportion of the Relevant Year in which each subsequent charge,  $p_t$ , is in effect, calculated by the number of days during which the charge is in effect and dividing by the total number of days in the Relevant Year; and

*TRC* is the target revenue change required in the Relevant Year to achieve compliance with paragraph (a), calculated by the Controlling Percentage multiplied by the Accrued Revenue in the Relevant Year.

(c) The Percentage Change for the purpose of the TI Basket specified in paragraph (a) shall be calculated by employing the following formula—

$$C_{t} = \frac{\sum_{i=1}^{n} \left[ R_{i} \frac{(p_{t,i} - p_{0,i})}{p_{0,i}} \right]}{\sum_{i=1}^{n} R_{i}}$$

where---

*Ct* is the Percentage Change in the aggregate of charges for the products and/or services in the specified category (i.e. the basket in question) at a particular time, *t*, during the Relevant Year;

*n* is as defined in paragraph (b);

*Ri* is as defined in paragraph (b);

*p0,i* is as defined in paragraph (b); and

*pt,i* is as defined in paragraph (b).

(d) Subject to paragraphs (e) and (f), the Controlling Percentage in relation to any Relevant Year means for the TI Basket specified in paragraph (a), RPI increased by 2.5 percentage points.

#### Calculation of Carry Forward Percentage

- (e) Where the Percentage Change in any Relevant Year is less than the Controlling Percentage, then for the purpose of the TI Basket specified in paragraph (a) the Controlling Percentage for the following Relevant Year shall be determined in accordance with paragraph (d), but increased by the amount of such deficiency.
- (f) Where the Percentage Change in any Relevant Year is more than the Controlling Percentage, then for the purpose the TI Basket specified in paragraph (a) the Controlling Percentage for the following Relevant Year shall be determined in accordance with paragraph (d), but decreased by the amount of such excess.

Controls of sub-baskets

(g) In the case of the TI Mobile Services Sub-basket, the Dominant Provider shall also and, in any event, take all reasonable steps to secure that, at the end of each Relevant Year, the Percentage Change in the aggregate of charges for all of the products and services of the TI Mobile Services Sub-basket is not more than RPI increased by 2.5 percentage points.

For the purpose of this paragraph (g), the Percentage Change shall be calculated by employing the formula set out in paragraph (c).

(h) In the case of the TI POH Sub-basket, the Dominant Provider shall also and, in any event, take all reasonable steps to secure that, at the end of each Relevant Year, the Percentage Change in the aggregate of charges for all of the products and services of the TI POH Sub-basket is not more than RPI reduced by 0 percentage points.

For the purpose of this paragraph (h), the Percentage Change shall be calculated by employing the formula set out in paragraph (c).

#### Controls of sub-caps

(i) In the case of the TI Ancillary, Equipment and Infrastructure Sub-cap Services, the Dominant Provider shall also and, in any event, take all reasonable steps to secure that, during each Relevant Year, the Percentage Change in each of the charges for each and every TI Ancillary, Equipment and Infrastructure Service is not more than RPI increased by 2.5 percentage points.

For the purpose of this paragraph (i), the Percentage Change shall be calculated by employing the formula set out in paragraph (k).

(j) In the case of the TI All Sub-cap Services, the Dominant Provider shall also and, in any event, take all reasonable steps to secure that, during each Relevant Year, the Percentage Change in each of the charges for each and every TI All Service is not more than RPI increased by 10 percentage points.

For the purpose of this paragraph (j), the Percentage Change shall be calculated by employing the formula set out in paragraph (k).

(k) The Percentage Change for the purpose of—

i. the TI Ancillary, Equipment and Infrastructure Sub-cap Services; and

ii. the TI All Sub-cap Services,

shall be calculated by employing the following formula-

$$C_t = \frac{(p_t - p_0)}{p_0}$$

where---

Ct is the Percentage Change in charges for the products and services in the subbasket in question at a particular time t during the Relevant Year;

p0 is the published charge made by the Dominant Provider for the specific product or service, *i*, on the day immediately before the beginning of the Relevant Year excluding any discounts offered by the Dominant Provider; and

*pt* is the published charge made by the Dominant Provider for the specific product or service prevailing at the time, *t*, during the Relevant Year excluding any discounts offered by the Dominant Provider.

#### General provisions

(I) Where the Dominant Provider makes a material change (other than to a charge) to any product or service which is subject to this Condition 5.1 or to the date on which its financial year ends or there is a material change in the basis of the Retail Prices Index, paragraphs (a) to (k) shall have effect subject to such reasonable adjustment to take account of the change as Ofcom may direct to be appropriate in the circumstances.

For the purposes of this paragraph, a material change to any product or service which is subject to this Condition 5.1 includes the introduction of a new product or service wholly or substantially in substitution for that existing product or service.

(m) The Dominant Provider shall record, maintain and supply to Ofcom in an electronic format, no later than three months after the end of each Relevant Year, the data necessary for Ofcom to monitor compliance of the Dominant Provider with the price control by performing the calculation of the Percentage Change. The data shall include—

i. pursuant to paragraph (a), the calculated percentage change relating to the aggregate of charges for all of the products and services in the TI Basket;

ii. pursuant to paragraph (b), calculation of the Accrued Revenue as a result of all relevant individual charge charges during any Relevant Year compared to the TRC;

iii. all relevant data the Dominant Provider used in the calculation of the percentage change, Ct, pursuant to paragraph (c), including for each specific product or service, *i*;

iv. all Accrued Revenue in the Relevant Year in respect of each specific product or service, *i*;

v. published charges made by the Dominant Provider at time, *t*, during the Relevant Year excluding any discounts offered by the Dominant Provider;

vi. the relevant published charges at the start of the Relevant Year;

vii. other data necessary for monitoring compliance with the charge control.

(n) In this Condition 5.1, "Accrued Revenue" means, in any Relevant Year, the revenue deemed to be accrued in that Relevant Year in respect of a specific product or

service calculated: (i) in respect of a rental product, by multiplying the volume of rentals as at 30 September preceding the start of the Relevant Year by the average charge (weighted according to the number of days during the Relevant Year on which that charge applied) exclusive of discounts in the Relevant Year; and (ii) in respect each product or service other than a rental product, by multiplying volumes supplied in the 12 months up to and including 30 September preceding the start of the Relevant Year by average actual charges exclusive of discounts in the Relevant Year.

(o)

For the avoidance of doubt, where the Annex to this Condition 5.1 lists a product or service as being available with more than one minimum contract period, the charge for the purposes of determining compliance with this Condition 5.1 shall be deemed to be the charge for the product or service with the shortest minimum contract period.

#### (p)

Paragraphs (a) to (o) shall not apply to such extent as Ofcom may direct.

(q) The Dominant Provider shall comply with any direction Ofcom may make from time to time under this Condition 5.1.

Annex to Condition 5.1

# Products and services subject to charge control pursuant to Condition 5.1

#### Section 1

#### Meaning of "TI Mobile Services Sub-basket"

For the purposes of Condition 5.1 the expression "**TI Mobile Services Sub-basket**" shall be construed as including the list below of the following products and/or services, and the following charges imposed by the Dominant Provider of which such products and/or services comprise. The list is subject to such changes, unless Ofcom direct otherwise, following:

- the withdrawal by the Dominant Provider of one or more of the products and/or services, and/or of one or more of the charges; and/or
- the introduction by the Dominant Provider of a new product and/or service, and/or a new charge, wholly or substantially in substitution for an existing product and/or service and/or charge, in which case this list should shall be construed accordingly.

#### Radio Base Station Backhaul services<sup>174</sup>

Radio Base Station Backhaul -Annual Circuit Rental charges for the following distances:

metro, 0 - 15 km, 16 - 35 km, 36 - 75 km, 76 - 150 km, 151 - 300 km and 301 km+

- 128 Kbit/s (new)
- 192 Kbit/s (new)
- 256 Kbit/s (new)
- 320 Kbit/s (new)
- 384 Kbit/s (new)
- 448 Kbit/s (new)
- 512 Kbit/s (new)
- 576 Kbit/s (new)
- 640 Kbit/s (new)
- 704 Kbit/s (new)
- 768 Kbit/s (new)
- 832 Kbit/s (new)
- 896 Kbit/s (new)
- 960 Kbit/s (new)
- 1024 Kbit/s (new)
- 2048kbit/s (new)
- 8Mbit/s package (new)
- 8Mbit/s Subsequent package (new)

<sup>&</sup>lt;sup>174</sup> These charges correspond to the Carrier Price List, Section B11, Part 11.03

#### Radio Base Station Backhaul Assured Resilience charges

- 128Kbit/s to 960Kbit/s Full Man Link/ End to End Diversity per circuit
- 128Kbit/s to 960Kbit/s Basic Diversity per circuit
- 2Mbit/s Full Main Link/ End to End Diversity per circuit
- 2Mbit/s Basic Diversity per circuit

#### Multiple Diversity Monitoring charges

• Annual monitoring charge per circuit 128Kbit/s to 960Kbit/s and 2Mbit/s only

#### NetStream<sup>175</sup> services

#### NetStream 16 Longline charges

- Hub Buyout charge (per site)
- Small Satellite Site
- Small Satellite Site (existing MegaStream in situ)
- Large Satellite Site
- Large Satellite Site (existing MegaStream 34 & above in situ)
- one-off fee to configure 155Mbit/s circuit as 63x2Mbit/s
- Connection charge per Longline 2 Mbit/s circuit
- Connection charge per Longline 34/45 Mbit/s circuit
- Connection charge per Longline 155 Mbit/s circuit

Annual rental charges for the following distances: metro, 0 - 15 km, 16 - 75 km, 76 - 300 km and 301 km+

- small satellite site to serving exchange (2 Mbit/s)
- large satellite site to serving exchange (34/45 Mbit/s)
- large satellite site to serving exchange (155 Mbit/s)

# SiteConnect<sup>176</sup> services

Major site linkage charges

- Major Site Linkage Connection Charge where infrastructure does not exist (per Site)
- Major Site Linkage Connection Charge where infrastructure exists (per site)
- Major Site Linkage Rental Charge (per site)

#### Remote site linkage charges

<sup>&</sup>lt;sup>175</sup> These charges correspond to the Carrier Price List, Section 57 subpart 3

<sup>&</sup>lt;sup>176</sup> These charges correspond to the Carrier Price List, Section B12, Part 12.01

- Remote Site Linkage Charge
- Subsequent Remote Site Linkage Charge

Subsequent remote site linkage charges (three year option)

- 3 Year Option year 1
- 3 Year Option year 2
- 3 Year Option year 3

#### Bandwidth charges

- 2 Mbit/s bandwidth charge (up to 75 km)
- 2 Mbit/s bandwidth charge (76 to 125 km)
- 2 Mbit/s bandwidth charge (126 to 200 km)
- 2 Mbit/s bandwidth charge (201 to 300 km)
- 2 Mbit/s bandwidth charge (301 km +)

#### 8 Mbit/s bandwidth charges

- 8 Mbit/s bandwidth charge (up to 75 km)
- 8 Mbit/s bandwidth charge (76 to 125 km)
- 8 Mbit/s bandwidth charge (126 to 200 km)
- 8 Mbit/s bandwidth charge (201 to 300 km)
- 8 Mbit/s bandwidth charge (301 km +)

#### 155 Mbit/s circuit linkage charges

- Circuit connection charge per 155Mbit/s
- New SMA-1 (or equivalent) at site
- New SMA-4 (or equivalent) at site
- New circuit on spare tributary on existing infrastructure outside SiteConnect contract per 155 Mbit/s

#### 155 Mbit/s bandwidth charge

- Metro (currently London only)
- 0 15 km
- 16 35 km
- 36 75 km
- 76 150 km
- 151 300 km
- 300+ km

# Section 2

# Meaning of "TI POH Sub-basket"

For the purposes of Condition 5.1 the expression "**TI POH Sub-basket**" shall be construed as including the list below of the following products and/or services, and the following charges imposed by the Dominant Provider of which such products and/or services comprise. The list is subject to such changes, unless Ofcom direct otherwise, following:

- the withdrawal by the Dominant Provider of one or more of the products and/or services, and/or of one or more of the charges; and/or
- the introduction by the Dominant Provider of a new product and/or service, and/or a new charge, wholly or substantially in substitution for an existing product and/or service and/or charge, in which case this list should shall be construed accordingly.

# Partial Private Circuits – Point of Handover<sup>177</sup> services

CSH Configuration SMA-16 connection and rental charges

- SMA-16 ADM with no trib interfaces (single fibre working) existing site
- SMA-16 ADM with no trib interfaces (dual fibre working 1300nm) existing site
- SMA-16 ADM with no trib interfaces (dual fibre working 1550nm) existing site
- SMA-16 ADM with no trib interfaces (dual fibre working 1300 + 1550nm) existing site
- SMA-16 ADM with no trib interfaces (Single Fibre Working + dual fibre working 1300nm) existing site
- SMA-16 ADM with no trib interfaces (Single Fibre Working + dual fibre working 1550nm) existing site
- Protected Path enabled SMA-16 ADM with no trib interfaces (single fibre working) existing site.
- Protected Path enabled SMA-16 ADM with no trib interfaces (dual fibre working 1300nm) existing site.
- Protected Path enabled SMA-16 ADM with no trib interfaces (dual fibre working 1500nm) existing site.
- STM-1 electrical trib interface (2 ports)
- STM-1 optical (1300nm) trib interface (1 port)
- STM-1 electrical trib card (2 ports), required for 1+1 card protection
- STM-1 optical (1300nm) trib card (1 port), required for MSP protection
- STM-4 optical (1300nm) trib interface (1 port)
- STM-4 optical (1300nm) trib card (1 port), required for MSP protection
- STM-1 optical (1300nm) trib interface (2 port)
- STM-1 optical (1300nm) trib card (2 port), required for MSP protection

<sup>&</sup>lt;sup>177</sup> These charges correspond to the Carrier Price List, Section B8, Part 8.01

- STM-1 electrical trib interface (4 port)
- STM-1 electrical trib interface (4 port) required for 1+1 card protection, can be used for MSP 1+1 Protection
- STM-1 optical (1300nm) trib interface (4 port)
- STM-1 optical (1300nm) trib card (4 port), required for MSP protection

CSH Configuration SMA-4 connection and rental charges

- SMA-4 ADM with no trib interfaces (single fibre working) existing site
- SMA-4 ADM with no trib interfaces (dual fibre working 1300nm) existing site
- SMA-4 ADM with no trib interfaces (dual fibre working 1550nm) existing site
- SMA-4 ADM with no trib interfaces (dual fibre working 1300 + 1550nm) existing site
- SMA-4 ADM with no trib interfaces (Single Fibre Working + dual fibre working 1300nm) existing site
- SMA-4 ADM with no trib interfaces (Single Fibre Working + dual fibre working 1550nm) existing site
- Protected Path enabled SMA-4 ADM with no trib interfaces (single fibre working) existing site
- Protected Path enabled SMA-4 ADM with no trib interfaces (dual fibre working 1300nm) existing site
- Protected Path enabled SMA-4 ADM with no trib interfaces (dual fibre working 1500nm) existing site
- STM-1 electrical trib interface (1 port)
- STM-1 optical (1300nm) trib interface (1 port)
- STM-1 electrical trib card (1 port), required for 1+1 card protection
- STM-1 optical (1300nm) trib card (1 port), required for MSP protection
- STM-4 optical (1300nm) trib interface (1 port)
- STM-4 optical (1300nm) trib card (1 port), required for MSP protection
- STM-1 optical (1300nm) trib interface (2 port)
- STM-1 optical (1300nm) trib card (2 port), required for MSP protection
- STM-1 electrical trib interface (2 port)
- STM-1 electrical trib interface (2 port), required for 1+1 card protection, can be used for MSP 1+1 Protection
- STM-1 electrical trib interface (4 port)
- STM-1 electrical trib interface (4 port) required for 1+1 card protection, can be used for MSP 1+1 Protection
- STM-1 optical (1300nm) trib interface (4 port)

• STM-1 optical (1300nm) trib card (4 port), required for MSP protection

CSH Configuration SMA-1 connection and rental charges

- SMA-1ADM with no trib interfaces (single fibre working) existing site
- SMA-1 ADM with no trib interfaces (dual fibre working 1300nm) existing site
- SMA-1 ADM with no trib interfaces (dual fibre working 1550nm) existing site
- SMA-1 ADM with no trib interfaces (dual fibre working 1300+1550nm) existing site
- SMA-1 ADM with no trib interfaces (single fibre working + dual fibre working 1300nm) existing site
- SMA-1 ADM with no trib interfaces (single fibre working + dual fibre working 1550nm) existing site
- Protected Path enabled SMA-1 ADM with no trib interfaces (single fibre working) existing site
- Protected Path enabled SMA-1 ADM with no trib interfaces (dual fibre working 1300nm) existing site
- Protected Path enabled SMA-1 ADM with no trib interfaces (dual fibre working 1550nm) existing site
- Protected Path enabled SMA-1 ADM with no trib interfaces (single fibre + dual fibre working 1300nm) existing site
- Protected Path enabled SMA-1 ADM with no trib interfaces (single fibre + dual fibre working 1550nm) existing site
- Protected Path enabled SMA-1 ADM with no trib interfaces (dual fibre working 1300nm +1550nm) existing site
- STM-1 electrical trib interface (1 port)
- STM-1 optical (1300nm) trib interface (1 port)
- STM-1 electrical trib card (1 port), required for 1+1 card protection
- STM-1 optical (1300nm) trib card (1 port), required for MSP protection

# CSH Configuration MSH51 connection and rental charges

- MSH51 ADM with no trib interfaces (single fibre working) existing site
- MSH51 ADM with no trib interfaces (dual fibre working 1300nm) existing site
- MSH51 ADM with no trib interfaces (dual fibre working 1550nm) existing site
- MSH51c ADM with no trib interfaces (dual fibre working 1300 + 1550nm) existing site
- MSH51c ADM with no trib interfaces (Single Fibre Working + dual fibre working 1300nm) existing site

- MSH51c ADM with no trib interfaces (Single Fibre Working + dual fibre working 1550nm) existing site
- Per km from serving exchange to MSH node single fibre working
- Per km from serving exchange to MSH node dual fibre working
- STM-1 electrical trib interface (4 ports)
- STM-1 optical (1300nm) trib interface (2 ports)
- STM-1 electrical trib card (4 ports), required for 1+1 card protection
- STM-1 optical (1300nm) trib card (2 ports), required for MSP protection
- STM-4 optical (1300nm) trib interface (1 port)
- STM-4 optical (1300nm) Trib card (1 port), required for MSP protection

ISH Configuration SMA-16 connection and rental charges

- SMA –16 ADM with single STM-16 handover (1300nm)
- Optional STM-16 1550nm handover

ISH Configuration SMA-4 connection and rental charges

- SMA-4 ADM with single STM-4 handover (1300nm)
- Optional STM-4 1550nm handover
- SMA-4 ADM with single STM-1 handover (1300nm)
- Additional cost for STM-1 1550nm handover
- Additional STM-1 handovers (1300nm) max 3
- Additional STM-1 handovers (1550nm) max 3

ISH Configuration SMA-1 connection and rental charges

- SMA-1 ADM with single STM-1 Handover (1300nm)
- SMA-1 ADM with Single STM-1 handover (1550nm)

ISH Configuration MSH51 connection and rental charges

- MSH51 ADM with single STM-16 handover (1300nm)
- Optional STM-16 1550nm handover

Re-Designation and Grandfathering charges for Customer Sited Handover rental

- CSH Re-Designated SMA-16 ADM
- CSH Re-Designated SMA-4 ADM
- CSH Re-Designated SMA-1 ADM
- CSH Re-Designated MSH-51 ADM
- Grandfathered SMA- 1 legacy equipment
- Grandfathered 16x2 legacy equipment
- Grandfathered 4x2 legacy equipment

ISH Extension Configuration STM-16 connection and rental charges

- SMA –16 ADM with single STM-16 handover (1300nm)
- Optional STM-16 1550nm handover

ISH Extension Configuration STM-4 connection and rental charges

- SMA-4 ADM with single STM-4 handover (1300nm)
- Optional STM-4 1550nm handover
- SMA-4 ADM with single STM-1 handover (1300nm)
- Optional STM-1 1550nm handover
- Additional STM-1 handovers (1300nm) max 3
- Additional STM-1 handovers (1550nm) max 3

ISH Extension Configuration STM-1 connection and rental charges

• SMA-1 ADM with single STM – 1 handover (1300nm)

ISH Extension Configuration MSH51 connection and rental charges

- MSH51 ADM with single STM-16 handover (1300nm)
- Optional STM-16 1550nm handover

Miscellaneous Generic Equipment charges

- Additional charge for new site connection and rental
- Standby batteries if required connection and rental
- 2M Bearer Access required for access to DPCN connection and rental
- Plus rental per km from POH BT Serving Node to DPCN node rental

#### POH Rental charges

- SMA-1
- SMA-4
- SMA-16
- Bearer

# Circuit Rental/Maintenance<sup>178</sup> charges

For 3<sup>rd</sup> party POH rental fixed charge per annum

- 2.4k-64k
- 128k
- 192k
- 256k
- 320k
- 384k
- 448k
- 512k
- 576k
- 640k
- 704k
- 768k
- 832k
- 896k
- 960k
- 1024
- 1M
- 2M
- 34/45M
- 140/155M

Partial Private Circuit 155 MSH - MSH charges

• 3rd party PoH rental fixed charge p.a.

Protected Path Variant 1 and 2 Rental - 2M, 34/45M and 140/155M charges

• 3rd party PoH rental fixed charge p.a.

# In Span Handover/In Span Handover Extension Single Fibre / Dual Fibre Working (SFW/DFW)<sup>179</sup> services

Equipment charges:

- STM1 Single Wavelength
- STM4/STM16 Dual Wavelength

<sup>&</sup>lt;sup>178</sup> These charges correspond to the Carrier Price List, Section B8, Part 8.03

<sup>&</sup>lt;sup>179</sup> These charges correspond to the Carrier Price List, Section B8, Part 8.06

# Radio Base Station Backhaul – Point of Connection<sup>180</sup> services

CSC Configuration SMA-16 connection and rental charges

- SMA-16 ADM with no trib interfaces (single fibre working) existing site
- SMA-16 ADM with no trib interfaces (dual fibre working 1300nm) existing site
- SMA-16 ADM with no trib interfaces (dual fibre working 1550nm) existing site
- SMA-16 ADM with no trib interfaces (dual fibre working 1300 + 1550nm) existing site
- SMA-16 ADM with no trib interfaces (Single Fibre Working + dual fibre working 1300nm) existing site
- SMA-16 ADM with no trib interfaces (Single Fibre Working + dual fibre working 1550nm) existing site
- Additional charge for new site
- Standby batteries if required
- STM-1 electrical trib interface (2 ports)
- STM-1 optical (1300nm) trib interface (1 port)
- STM-1 electrical trib card (2 ports), required for 1+1 card protection
- STM-1 optical (1300nm) trib card (1 port), required for MSP protection
- STM-4 optical (1300nm) trib interface (1 port)
- STM-4 optical (1300nm) trib card (1 port), required for MSP protection
- STM-1 optical (1300nm) trib interface (2 port)
- STM-1 optical (1300nm) trib card (2 port), required for MSP protection
- STM-1 electrical trib interface (4 port)
- STM-1 electrical trib interface (4 port) required for 1+1 card protection, can be used for MSP 1+1 Protection
- STM-1 optical (1300nm) trib interface (4 port)
- STM-1 optical (1300nm) trib card (4 port), required for MSP protection

#### CSC Configuration SMA-4 connection and rental charges

- SMA-4 ADM with no trib interfaces (single fibre working) existing site
- SMA-4 ADM with no trib interfaces (dual fibre working 1300nm) existing site
- SMA-4 ADM with no trib interfaces (dual fibre working 1550nm) existing site
- SMA-4 ADM with no trib interfaces (dual fibre working 1300 + 1550nm) existing site
- SMA-4 ADM with no trib interfaces (Single Fibre Working + dual fibre working 1300nm) existing site

<sup>&</sup>lt;sup>180</sup> These charges correspond to the Carrier Price List, Section B11, Part 11.01.1

- SMA-4 ADM with no trib interfaces (Single Fibre Working + dual fibre working 1550nm) existing site
- Additional charge for new site
- Standby batteries if required
- STM-1 electrical trib interface (1 port)
- STM-1 optical (1300nm) trib interface (1 port)
- STM-1 electrical trib card (1 port), required for 1+1 card protection
- STM-1 optical (1300nm) trib card (1 port), required for MSP protection
- STM-4 optical (1300nm) trib interface (1 port)
- STM-4 optical (1300nm) trib card (1 port), required for MSP protection
- STM-1 optical (1300nm) trib interface (2 port)
- STM-1 optical (1300nm) trib card (2 port), required for MSP protection
- STM-1 electrical trib interface (2 port)
- STM-1 electrical trib interface (2 port), required for 1+1 card protection, can be used for MSP 1+1 Protection
- STM-1 electrical trib interface (4 port)
- STM-1 electrical trib interface (4 port) required for 1+1 card protection, can be used for MSP 1+1 Protection
- STM-1 optical (1300nm) trib interface (4 port)
- STM-1 optical (1300nm) trib card (4 port), required for MSP protection

CSC Configuration SMA-1 connection and rental charges

- SMA-1ADM with no trib interfaces (single fibre working) existing site
- SMA-1 ADM with no trib interfaces (dual fibre working 1300nm) existing site
- SMA-1 ADM with no trib interfaces (dual fibre working 1550nm) existing site
- SMA-1 ADM with no trib interfaces (dual fibre working 1300+1550nm) existing site
- SMA-1 ADM with no trib interfaces (single fibre working + dual fibre working 1300nm) existing site
- SMA-1 ADM with no trib interfaces (single fibre working + dual fibre working 1550nm) existing site
- Additional charge for new site
- Standby batteries if required
- STM-1 electrical trib interface (1 port)
- STM-1 optical (1300nm) trib interface (1 port)
- STM-1 electrical trib card (1 port), required for 1+1 card protection

• STM-1 optical (1300nm) trib card (1 port), required for MSP protection

# CSC Configuration MSH51 charges

- MSH51 ADM with no trib interfaces (single fibre working) existing site rental
- MSH51 ADM with no trib interfaces (dual fibre working 1300nm) existing site rental
- MSH51 ADM with no trib interfaces (dual fibre working 1550nm) existing site rental
- Per km from serving exchange to MSH node single fibre working rental
- Per km from serving exchange to MSH node dual fibre working rental
- Standby batteries if required connection and rental
- STM-1 electrical trib interface (4 ports) connection and rental
- STM-1 optical (1300nm) trib interface (2 ports) connection and rental
- STM-1 electrical trib card (4 ports), required for 1+1 card protection connection and rental
- STM-1 optical (1300nm) trib card (2 ports), required for MSP protection connection and rental
- STM-4 optical (1300nm) trib interface (1 port) connection and rental
- STM-4 optical (1300nm) Trib card (1 port), required for MSP protection connection and rental

Provision of STM1 Radio Access system at CSC charges

- SMA-1 ADM with no trib interfaces (dual fibre working 1300nm) connection
- SMA-1 ADM with no trib interfaces (dual fibre working 1300 +1500nm) connection
- SMA-1 ADM with no trib interfaces (single fibre working + dual fibre working 1300nm) connection

2Mbit/s Bearer Access - required for access to DPCN connection and rental charge

• 2Mbit/s Bearer from POC BT Serving Node to DPCN Node

ISH Configuration SMA-16 connection and rental charges

- SMA –16 ADM with single STM-16 handover (1300nm)
- Optional STM-16 1550nm handover

ISH Configuration SMA-4 connection and rental charges

- SMA-4 ADM with single STM-4 handover (1300nm)
- Optional STM-4 1550nm handover
- SMA-4 ADM with single STM-1 handover (1300nm)
- Additional cost for STM-1 1550nm handover

- Additional STM-1 handovers (1300nm) max 3
- Additional STM-1 handovers (1550nm) max 3

ISH Configuration SMA-1 connection and rental charges

- SMA-1 ADM with single STM-1 Handover (1300nm)
- SMA-1 ADM with Single STM-1 handover (1550nm)

In Span Handover (ISH) Extension (in addition to above charges) connection and rental charges

• ISH Extension for all ADM Configurations

## Grandfathering Charges for Customer Sited Connection services

Customer Sited Connection (CSC) rental charges

- Grandfathered SMA-16 ADM
- Grandfathered SMA-4 ADM
- Grandfathered SMA-1 ADM
- Grandfathered MSH51ADM
- Grandfathered 16 x 2
- Grandfathered 4 x 2

#### Section 3

#### Meaning of "TI Ancillary Equipment and Infrastructure Sub-cap Services"

For the purposes of Condition 5.1 the expression "**TI Ancillary Equipment and Infrastructure Sub-cap Services**" shall be construed as including the list below of the following products and/or services, and the following charges imposed by the Dominant Provider of which such products and/or services comprise. The list is subject to such changes, unless Ofcom direct otherwise, following:

- the withdrawal by the Dominant Provider of one or more of the products and/or services, and/or of one or more of the charges; and/or
- the introduction by the Dominant Provider of a new product and/or service, and/or a new charge, wholly or substantially in substitution for an existing product and/or service and/or charge, in which case this list should shall be construed accordingly.

Connection of a new 'protected path variant two' circuit single charge<sup>181</sup>

- Protected Path Variant Two 2Mbit/s
- Protected Path Variant Two 34Mbit/s 45Mbit/s
- Protected Path Variant Two 140Mbit/s 155Mbit/s

<sup>&</sup>lt;sup>181</sup> These charges correspond to the Carrier Price List, Section B8, Part 8.02

Third party customer link infrastructure single charges

- NTU 64k 256k on existing copper
- NTU 64k 256k on new copper
- NTU 320k 640k on existing copper
- NTU 320k 640k on new copper
- NTU 128k 640k on2Mbit infrastructure
- NTU 704k 960k all delivery options
- 1Mbit/s circuit on existing copper
- 1Mbit/s circuit on new copper
- 2Mbit/s circuit delivered by HDSL on existing copper
- 2Mbit/s circuit delivered by HDSL on new copper
- Provide a 2Mbit/s 4x2 at existing fibre sites
- Provide a 2Mbit/s 16x2 at existing fibre sites
- Subsequent 2Mbit/s circuit on existing PPC 4x2 or 16x2
- 34/45Mbit/s ASDH NTE at existing fibre sites
- 34/45Mbit/s ASDH NTE Expansion Unit
- Additional charge to provide new fibre infrastructure at a new site

# Third party customer sited SMA-16 ADM single charges

- SMA-16 with no trib interfaces (single fibre working) existing site
- SMA-16 with no trib interfaces (dual fibre working 1300nm) existing site
- SMA-16 with no trib interfaces (dual fibre working 1500nm) existing site
- Protected Path enabled SMA-16 with no trib interfaces (single fibre working) existing site
- Protected Path enabled SMA-16 with no trib interfaces (dual fibre working 1300nm) existing site
- Protected Path enabled SMA-16 with no trib interfaces (dual fibre working 1500nm) existing site
- 2Mbit/s trib cards (32 ports)
- 34Mbit/s trib card (3 ports)
- 45Mbit/s trib card (3 ports)
- STM-1 electrical trib card (2 ports)
- STM-1 optical (1300nm) trib card (1 port)
- 140Mbit/s electrical trib card (1 port)
- STM-4 optical (1300nm) trib card (1 port)

Third party customer sited SMA-4 ADM single charges

- SMA-4 with no trib interfaces (single fibre working) existing site
- SMA-4 with no trib interfaces (dual fibre working 1300nm) existing site
- SMA-4 with no trib interfaces (dual fibre working 1500nm) existing site
- Protected Path enabled SMA-4 with no trib interfaces (single fibre working) existing site
- Protected Path enabled SMA-4 with no trib interfaces (dual fibre working 1300nm) existing site
- Protected Path enabled SMA-4 with no trib interfaces (dual fibre working 1500nm) existing site
- 2Mbit/s trib cards (32 ports)
- 34Mbit/s trib card (3 ports)
- 45Mbit/s trib card (3 ports)
- STM-1 electrical trib card (1 port)
- STM-1 optical (1300nm) trib card (1 port)
- 140Mbit/s electrical trib card (1 port)
- STM-4 optical (1300nm) trib card (1 port)

Third party customer sited SMA-1 ADM single charges

- SMA-1 with no trib interfaces (single fibre working) existing site
- SMA-1 with no trib interfaces (dual fibre working 1300nm) existing site
- SMA-1 with no trib interfaces (dual fibre working 1500nm) existing site
- Protected Path enabled SMA-1 with no trib interfaces (single fibre working) existing site
- Protected Path enabled SMA-1 with no trib interfaces (dual fibre working 1300nm) existing site
- Protected Path enabled SMA-1 with no trib interfaces (dual fibre working 1500nm) existing site
- 2Mbit/s trib cards (32 ports)
- 2Mbit/s trib cards (16 ports)
- 34Mbit/s trib card (3 ports)
- 45Mbit/s trib card (3 ports)
- STM-1 electrical trib card (1 port)
- STM-1 optical (1300nm) trib card (1 port)
- 140Mbit/s electrical trib card (1 port)

Third party customer sited MSH-51C ADM single charges

- MSH51 with no trib interfaces (single fibre working) existing site
- MSH51 with no trib interfaces (dual fibre working 1300nm) existing site
- MSH51 with no trib interfaces (dual fibre working 1500nm) existing site
- Per km from serving exchange to MSH node single fibre working
- Per km from serving exchange to MSH node dual fibre working
- STM-1 electrical trib card (4 ports)
- STM-1 optical (1300nm) trib card (2 ports)
- 140Mbit/s electrical trib card (1 port)
- STM-4 optical (1300nm) trib card (1 port)

Miscellaneous generic equipment connection and rental charges

- Additional charge for new site
- Standby batteries if required
- Radio site share

# Protected Path Variant 1 and 2 services – for 2M, 34/45M and 140/155M<sup>182</sup> Rental charges

- Local end fixed charge p.a. (3rd party customer link)
- Main link fixed charge p.a.
- Terminating segment charge per km p.a.
- Regional trunk segment charge per km p.a.

#### **Assured Resilience services**

Annual monitoring charges for Full Diversity End to End and Main Link and Basic Diversity

- 64K
- 128K to 960K
- 1Mbit/s and 2Mbit/s

#### **Multiple Resilience Monitoring services**

Annual monitoring charge

• Charge per circuit 64K, 128K to 960K, 1Mbit/s and 2Mbit/s only

# **Partial Private Circuits - Migration & Infrastructure Tariff Conversion**<sup>183</sup> services Circuit Migration charges

<sup>&</sup>lt;sup>182</sup> These charges correspond to the Carrier Price List, Section B8, Part 8.03

<sup>&</sup>lt;sup>183</sup> These charges correspond to the Carrier Price List, Section B8, Part 8.04

- Successful Circuit Migration to PPC 2.4Kbit/s -155Mbit/s
- Failed Circuit Migration to PPC 2.4Kbit/s 155Mbit/s

#### Infrastructure Tariff Conversions services

Charge for BT Retail Private Circuits Installed up to and including 31st December 2001

• All bandwidths

Charges for BT Retail Private Circuits Installed after 31st December 2001

- 2.4-960kbit/s 1 month or under
- 2.4-960kbit/s 2 months
- 2.4-960kbit/s 3 months and over
- 1 Mbit Any age
- 2Mbit/s Any age
- 34 & 45Mbit/s 1 month or under
- 34 & 45Mbit/s 2 months
- 34 & 45Mbit/s 3 months
- 34 & 45Mbit/s 4 months
- 34 & 45Mbit/s 5 months
- 34 & 45Mbit/s 6 months
- 34 & 45Mbit/s 7 months
- 34 & 45Mbit/s 8 months
- 34 & 45Mbit/s 9 months and over
- 140 155Mbit/s Up to 1 month
- 140 155Mbit/s 2 months
- 140 155Mbit/s 3 months
- 140 155Mbit/s 4 months
- 140 155Mbit/s 5 months
- 140 155Mbit/s 6 months
- 140 155Mbit/s 7 months
- 140 155Mbit/s 8 months
- 140 155Mbit/s 9 months
- 140 155Mbit/s 10 months
- 140 155Mbit/s 11 months
- 140 155Mbit/s 12 months
- 140 155Mbit/s 13 months

- 140 155Mbit/s 14 months
- 140 155Mbit/s 15 months
- 140 155Mbit/s 16 months
- 140 155Mbit/s 17 months
- 140 155Mbit/s 18 months
- 140 155Mbit/s 19 months
- 140 155Mbit/s 20 months
- 140 155Mbit/s 21 months
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- 140 155Mbit/s 26 months
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- 140 155Mbit/s 28 months
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- 140 155Mbit/s 30 months
- 140 155Mbit/s 31 months
- 140 155Mbit/s 32 months
- 140 155Mbit/s 33 months
- 140 155Mbit/s 34 months
- 140 155Mbit/s 35 months
- 140 155Mbit/s 36 months
- 140 155Mbit/s 37 months
- 140 155Mbit/s 38 months
- 140 155Mbit/s 39 months
- 140 155Mbit/s 40 months
- 140 155Mbit/s 41 months
- 140 155Mbit/s 42 months and over

#### Partial Private Circuits – Third Party Customer Sited Equipment Re-use<sup>184</sup> services

- Deferred Use Set Up Charge
- Managed Handover Set Up Charge

<sup>&</sup>lt;sup>184</sup> These charges correspond to the Carrier Price List, Section B8, Part 8.05

• Managed Handover Administration Charge

# Partial Private Circuits - Other services<sup>185</sup>

Bandwidth Upgrade and Change of Interface Presentation charges

Change of speed charges within 320Kbit/s – 1024Kbit/s bandwidths in increments of 64Kbit/s at the Third Party premises:

• 1Mbit

Bandwidth Upgrade charges:

- 2.4Kbit/s 64Kbit/s
- 64Kbit/s up to 155Mbit/s

Change of Interface charge

• 64Kbit/s up to 155Mbit/s

## Third Party Internal and External Moves services

Internal move charge of a circuit at the Third Party premises **services** within the same BT serving exchange area (64 Kbit/s- 2Mbit/s only)

- 64 Kbit/s 2 Mbit/s (Mon Fri standard working hours)
- 64 Kbit/s 2 Mbit/s (Monday Friday Out of Hours; Saturdays & Sundays)
- 64 Kbit/s 2 Mbit/s (Public/Bank Holiday)

Internal move charge of a circuit at the Third Party premises in a different BT serving exchange area (64 Kbit/s to 2 Mbit/s only)

- 64 Kbit/s 2 Mbit/s (Mon Fri standard working hours)
- 64 Kbit/s 2 Mbit/s (Monday Friday Out of Hours; Saturdays & Sundays)
- 64 Kbit/s 2 Mbit/s (Public/Bank Holiday)

External move charge of a Circuit to another Third Party premises within the same BT serving Exchange Area

- 64 Kbit/s 2 Mbit/s (Mon Fri standard working hours)
- 64 Kbit/s 2 Mbit/s (Monday Friday Out of Hours; Saturdays & Sundays)
- 64 Kbit/s 2 Mbit/s (Public/Bank Holiday)

<sup>&</sup>lt;sup>185</sup> These charges correspond to the Carrier Price List, Section B8, Part 8.06

- 34 155Mbit/s Mon Fri standard working hours
- 34 155Mbit/s Monday Friday Out of Hours; Saturdays & Sundays
- 34 155Mbit/s Public/Bank Holiday

External move charge of a Circuit to another Third Party premises in a different BT serving Exchange Area

• All bandwidths Mon – Fri (Standard Working Hours), full Connection charge applies as shown in section B8.2

# Point of Handover (PoH) Internal and External Moves (within the Same Exchange Area or to a Different Exchange Area) services

Internal & External Move charges: 1M/bits - 155Mbit/s Circuits & 2M/bits Access Bearer

- Move Charge Per Circuit (Mon Fri standard working hours)
- Move Charge Per Circuit (Monday Friday Out of Hours; Saturdays & Sundays)
- Move Charge Per Circuit (Public/Bank Holiday)

Internal & External Move charges: Circuits on 2M/bits Access Bearer (64Kit/s - 960Kbit/s)

- Move Charge Per Circuit (Mon Fri standard working hours)
- Move Charge Per Circuit (Monday Friday Out of Hours; Saturdays & Sundays)
- Move Charge Per Circuit (Public/Bank Holiday)

Pre Order Survey charge - normal working hours

• All Bandwidths

Visit and Time Related charges

• As required

#### **Excess Construction Charge (ECC) services**

- Customer Cabinet
- Radio Monopole
- Elevated Platform Usage (charge per day)

#### **Cancellation services**

Cancellation charges for circuits a requisite period of 10 working days

• % of connection charge related to number of working days before committed delivery

Cancellation charges for circuits with a requisite period of 30 working days

• % of connection charge related to number of working days before committed delivery

Cancellation charges for all other circuits & PoH ISH and CSH Infrastructures

• % of connection charge related to number of working days before committed delivery

# Cancellation charges to be applied to all Third Party Link Infrastructures for wideband delivered circuits

- Copper NTE (New and existing)
- Fibre 4x2 & 16x2 (New and existing)
- Radio 4x2 & 16x2 (New and existing)

#### Installation/Conversion charges

- Installation/Conversion Charge Mon Sat standard working hours
- Installation/Conversion Charge Monday Friday Out of Hours; Sundays and Public/Bank Holiday

#### Managed Conversion charges

- Managed Conversion Mon Fri standard working hours
- Managed Conversion Monday Friday Out of Hours; Saturdays, Sundays and Public/Bank Holiday

#### 2 Day FOC charge

• 2 Day FOC charge

#### Managed A End Shift charge (between CPs)

- Managed A End Shift Per Circuit Mon Fri standard working hours
- Managed A End Shift Per Circuit Monday Friday Out of Hours; Saturdays, Sundays and Public/Bank Holiday

#### Diagnostic Test Officers charges

 Charge for Use of BT Diagnostic Test Officers Mon – Fri standard working hours & Monday – Friday Out of Hours; Sundays and Public/Bank Holiday

## Radio Base Station Backhaul services<sup>186</sup>

Circuit connection and Cell Site Infrastructure charges

- NTU 128Kbit/s 256Kbit/s on existing copper
- NTU 128Kbit/s 256Kbit/s on new copper
- NTU 320Kbit/s 640Kbit/s on existing copper
- NTU 320Kbit/s 640Kbit/s on new copper
- NTU 128Kbit/s 640Kbit/s on 2Mbit infrastructure
- NTU 704Kbit/s 960Kbit/s all delivery options
- 2Mbit/s circuit delivered by HDSL on existing copper
- 2Mbit/s circuit delivered by HDSL on new copper
- Provide 4 x 2Mbit/s Access at existing fibre site
- Provide 16 x 2Mbit/s Access at existing fibre site
- Provide 4 x 2Mbit/s Access to New Fibre Site
- Provide 16 x 2Mbit/s Access to New Fibre Site
- Subsequent 2Mbit/s circuit on existing Radio Base Station Backhaul 4 x 2 or 16 x 2 (provided after 10/01/05)
- Provision of 4 x 2Mbit/s Radio Access system
- Provision of 16 x 2Mbit/s Radio Access system
- Radio Site Share
- Singleton NTE
- Multiple NTE

#### SiteConnect services

Re-Parenting charges<sup>187</sup>

- Re-Parent carried out during BT Normal Working Hours
- Additional charge for re-parent carried out outside of BT Normal Working Hours an additional charge will apply.

Re-Arrangement charges<sup>188</sup>

• Rearrange carried out during BT Normal Working Hours

<sup>&</sup>lt;sup>186</sup> These charges correspond to the Carrier Price List, Section B11, Part 11.02.02

<sup>&</sup>lt;sup>187</sup> These charges correspond to the Carrier Price List, Section B12, Part 12.01.4

<sup>&</sup>lt;sup>188</sup> These charges correspond to the Carrier Price List, Section B12, Part 12.01.5

• Additional charge for rearrange carried out outside of BT Normal Working Hours an additional charge will apply.

External Move of a Circuit to another Remote Site<sup>189</sup> charge

• 2Mbits

#### Survey charges<sup>190</sup>

• All Bandwidths

#### Visits and Time Related charges<sup>191</sup>

• As required

#### Bandwidth Changes<sup>192</sup> per VP charges

- Reconfiguration carried out during BT Normal Working Hours
- Additional charge for reconfiguration carried out outside of BT Normal Working Hours an additional charge will apply.

#### ATM Circuit Conversion<sup>193</sup> per VP per move charges

- Conversion carried out during BT Normal Working Hours
- Additional charge for conversion carried out outside of BT Normal Working Hours an additional charge will apply.

#### Excess Construction Charges<sup>194</sup>

- As per Openreach ECCs except for radio ECCs below
  - o Customer Cabinet
  - o Radio Monopole
  - Elevated Platform Usage (charge per day)

#### Standby power<sup>195</sup> charges

• Standby batteries if required

<sup>&</sup>lt;sup>189</sup> These charges correspond to the Carrier Price List, Section B12, Part 12.01.6

<sup>&</sup>lt;sup>190</sup> These charges correspond to the Carrier Price List, Section B12, Part 12.01.7

<sup>&</sup>lt;sup>191</sup> These charges correspond to the Carrier Price List, Section B12, Part 12.01.8

<sup>&</sup>lt;sup>192</sup> These charges correspond to the Carrier Price List, Section B12, Part 12.01.9

<sup>&</sup>lt;sup>193</sup> These charges correspond to the Carrier Price List, Section B12, Part 12.01.10

<sup>&</sup>lt;sup>194</sup> These charges correspond to the Carrier Price List, Section B12, Part 12.01.11

<sup>&</sup>lt;sup>195</sup> These charges correspond to the Carrier Price List, Section B12, Part 12.01.12

## **Cancellation charges**<sup>196</sup> **services**

Major and hub sites charges

• % of connection charge related to number of working days before contracted delivery date

#### Remote sites charges

• % of connection charge related to number of working days before contracted delivery date

Under achievement against commitment<sup>197</sup> charges

For site linkage charge and 2Mb bandwidth charge

- Year 1
- Year 2
- Year 3
- Year 4
- Standard charges

Charging for Diagnostic Test Officers<sup>198</sup>

 Charge for Use of BT Diagnostic Test Officers Mon – Fri standard working hours & Monday – Friday Out of Hours; Sundays and Public/Bank Holiday

#### Section 4

#### Meaning of "TI All Sub-cap Services"

For the purposes of Condition 5.1 the expression "**TI All Sub-cap Services**" shall be construed as including the list below of the following products and/or services, and the following charges imposed by the Dominant Provider of which such products and/or services comprise. The list is subject to such changes, unless Ofcom direct otherwise, following:

- the withdrawal by the Dominant Provider of one or more of the products and/or services, and/or of one or more of the charges; and/or
- the introduction by the Dominant Provider of a new product and/or service, and/or a new charge, wholly or substantially in substitution for an existing product and/or service and/or charge,

in which case this list should shall be construed accordingly.

#### All services contained within this Annex to condition 5.1 sections 1, 2 and 3.

#### Partial Private Circuits services<sup>199</sup>

Connection of a new circuit single charge

<sup>&</sup>lt;sup>196</sup> These charges correspond to the Carrier Price List, Section B12, Part 12.01.13

<sup>&</sup>lt;sup>197</sup> These charges correspond to the Carrier Price List, Section B12, Part 12.01.14

<sup>&</sup>lt;sup>198</sup> These charges correspond to the Carrier Price List, Section B12, Part 12.01.18

<sup>&</sup>lt;sup>199</sup> These charges correspond to the Carrier Price List, Section B8, Part 8.02

- 64Kbit/s 960Kbit/s
- 1Mbit/s
- 2Mbit/s
- 34Mbit/s 45Mbit/s
- 140Mbit/s 155Mbit/s

### Circuit Rental/Maintenance<sup>200</sup> charges

For the following bandwidths covering: local end fixed charge per annum (third party customer link), main link fixed charge per annum, terminating segment charge (per km p.a.), regional trunk segment charge (per km p.a.), enhanced maintenance - fixed p.a., enhanced maintenance - per km p.a. and enhanced care + fixed p.a.

- 2.4k-64k
- 128k
- 192k
- 256k
- 320k
- 384k
- 448k
- 512k
- 576k
- 640k
- 704k
- 768k
- 832k
- 896k
- 960k
- 1024
- 1M
- 2M
- 34/45M
- 140/155M

Partial Private Circuit 155 MSH – MSH rental per annum charges

• Local end fixed charge p.a. (3rd party customer link)

 $<sup>^{\</sup>rm 200}$  These charges correspond to the Carrier Price List, Section B8, Part 8.03

- Main link fixed charge p.a.
- Core transportation link per km
- Enhanced maintenance fixed p.a.
- Enhanced maintenance per km p.a.

Rental charges - 4X2Mbit/s Package

- 0 5km
- 6 15km
- 16 35km
- 36 75km
- 76 150km
- 151 300km
- 301km+

#### Interpretation

Except insofar as the context otherwise requires, the terms or descriptions of products and/or services, and charges charges imposed by the Dominant Provider of which such products and/or servces comprise, used in this Annex shall be construed as having the same meaning as those provided by the Dominant Provider on its website for definitions and explanations of its products in addition to future updates. These are currently found as follows:

• Products and/or services, and charges of which such products and/or services comprise, within the "**TI Basket**", being the products and/or services, and charges of which such products and/or services comprise, in Sections 1 to 4 of this Annex, please refer to

https://www.btwholesale.com/pages/static/homepage/index.htm

- Specifically:
  - For Partial Private Circuits services including POH services, please refer to <u>https://www.btwholesale.com/pages/static/Products/Data and IP Connectivit</u> <u>y/Partial Private Circuits/index.htm</u>
  - For Netstream services, please refer to <u>https://www.btwholesale.com/pages/static/Products/Data\_and\_IP\_Connectivity/Netstream/index.htm</u>
  - For Radio Base Station Backhaul services, please refer to https://www.btwholesale.com/pages/static/Products/Data\_and\_IP\_Connectivity/Radio\_Base\_Station\_Backhaul/index.htm
  - For SiteConnect services, please refer to https://www.btwholesale.com/pages/static/Library/Pricing\_and\_Contractual\_In formation/carrier\_price\_list/cpl\_sectionb12siteconnect.htm

#### Condition 5.2

#### Controls of the AI WECLA Services

(a) Subject to paragraph (b), the Dominant Provider shall take all reasonable steps to secure that, during each Relevant Year, the Percentage Change in each of the charges for each and every AI WECLA Service is not more than RPI reduced by RPI<sup>201</sup>.

For the purpose of this paragraph (a), the Percentage Change shall be calculated by employing the formula set out in paragraph (b).

(b) The Percentage Change shall be calculated by employing the following formula—

$$C_t = \frac{(p_t - p_0)}{p_0}$$

where---

Ct is the Percentage Change in charges for the products and services in the subbasket in question at a particular time, t, during the Relevant Year;

p0 is the published charge made by the Dominant Provider for the specific product or service, *i*, on the day immediately before the beginning of the Relevant Year excluding any discounts offered by the Dominant Provider; and

*pt* is the published charge made by the Dominant Provider for the specific product or service at the time, *t*, during the Relevant Year excluding any discounts offered by the Dominant Provider.

#### General provisions

(c) Where the Dominant Provider makes a material change (other than to a charge) to any product or service which is subject to this Condition 5.2 or to the date on which its financial year ends or there is a material change in the basis of the Retail Prices Index, paragraphs (a) and (b) shall have effect subject to such reasonable adjustment to take account of the change as Ofcom may direct to be appropriate in the circumstances.

For the purposes of this paragraph, a material change to any product or service which is subject to this Condition 5.2 includes the introduction of a new product or service wholly or substantially in substitution for that existing product or service.

(d) The Dominant Provider shall record, maintain and supply to Ofcom in an electronic format, no later than three months after the end of each Relevant Year, the data necessary for Ofcom to monitor compliance of the Dominant Provider with the price

<sup>&</sup>lt;sup>201</sup> But where RPI exceeds 5% the control for the purposes of this paragraph **(a)** will be RPI decreased by 5%.

control by performing the calculation of the Percentage Change. The data shall include----

i. pursuant to paragraph (a), the calculated percentage change relating to each of the charges for each and every AI WECLA Service;

ii. all relevant data the Dominant Provider used in the calculation of the percentage change, Ct, pursuant to paragraph (b), including for each specific product or service, *i*;

iii. published charges made by the Dominant Provider at time, *t*, during the Relevant Year excluding any discounts offered by the Dominant Provider;

iv. the relevant published charges at the start of the Relevant Year; and

v. other data necessary for monitoring compliance with the charge control.

- (e) Paragraphs (a) to (d) shall not apply to such extent as Ofcom may direct.
- (f) The Dominant Provider shall comply with any direction Ofcom may make from time to time under this Condition 5.2.

# Annex to Condition 5.2

# Products and services subject to charge control pursuant to Condition 5.2

#### Section 1

#### Meaning of "AI WECLA Services"

For the purposes of Condition 5.2 the expression "**AI WECLA Services**" shall be construed as including the list below of the following products and/or services, and the following charges imposed by the Dominant Provider of which such products and/or services comprise. The list is subject to such changes, unless Ofcom direct otherwise, following:

- the withdrawal by the Dominant Provider of one or more of the products and/or services, and/or of one or more of the charges; and/or
- the introduction by the Dominant Provider of a new product and/or service, and/or a new charge, wholly or substantially in substitution for an existing product and/or service and/or charge, in which case this list should shall be construed accordingly.

#### **Backhaul Extension Service (BES)**

BES 100MBit/s and above Rental charges - Prices are per end

- BES 100
  - BES 155
  - BES 622
  - BES 1000
  - BES 1000- Extended Reach

BES Daisy Chain 100MBit/s and above Rental charges - Prices are per end

- BES 100
- BES 155
- BES 622
- BES 1000

BES 100MBit/s and above Term Rental charges

Charges are per end for 3 year and 5 year minimum annual rental for the following services:

- BES 1000
- BES 1000 Extended Reach

BES Daisy Chain 100MBit/s and above Term Rental charges - Prices are per end Charges are per end for 3 year and 5 year minimum annual rental for the following services:

• BES 1000

BES/BES Daisy Chain 10MBit/s Connection and Rental charges

- BES 10 annual rental price per end
- BES 10 daisy chain rental price per end

Main Link charges - Prices are per metre of part thereof

• Main link per metre or part thereof (>0m up to 25,000 metres) - up to and including 1Gb/s annual rental

Circuit Upgrades (pricing includes engineering visit) charges

- BES 10 to BES 100
- BES 10 to BES 155
- BES 10 to BES 622
- BES 10 to BES 1000
- BES 100 to BES 155
- BES 100 to BES 622
- BES 100 to BES 1000
- BES 155 to BES 622
- BES 155 to BES 1000
- BES 622 to BES 1000

Circuit Migration charges

- Successful Circuit Migration to BES (For LES10 LES1000)
- Failed Circuit Migration to BES (For LES10 LES1000
- Successful Circuit Migration to BES (For all other LES circuits)
- Failed Circuit Migration to BES (For all other LES circuits)

BES Circuit Shift charges

- Shift Internal. Internal Shift of a BES local end within the existing building
- Shift External Resite. Resiting of a BES local end in another building served by the same local serving exchange
- Shift External Rearrange. Rearranging a BES local end in another building served by a different local serving exchange

#### Resilient Option 2

Charges for annual rental, 3 year and 5 year minimum annual rentals for the following services:

- Backhaul Extension Services Generic Resilience Facility fee per circuit (all bandwidths)
- Main link per metre or part thereof up to and including 1Gb/s
- Resilience link per metre or part thereof up to and including 1Gb/s

# Cancellation charges

• CDD - 2 days

- CDD 10 days CDD -3 days
- KCI3 CDD minus 11 days

# Wholesale Extension Service (WES) & Wholesale End to end Extension Service (WEES)

WES/WEES 100MBit/s circuits and above Annual Rental charges - Prices are per end

- WES/WEES 100
- WES/WEES 155
- WES/WEES 622
- WES/WEES 1000 (LAN /SAN)
- WES/WEES 1000 Extended Reach

WES/WEES 10Mbit/s Annual Rental charges - Prices are per end

- WES/WEES 10
- WES/WEES 10 (Local Reach)
- WES/WEES 10 Managed

WES/WEES Main Link charge - Prices are per metre of part thereof

• Main link - up to and including 1Gb/s

WES/WEES Circuit Upgrades (pricing includes engineering visit) charges

- WES/WEES 10 to WES/WEES 100
- WES/WEES 10 to WES/WEES 155
- WES/WEES 10 to WES/WEES 622
- WES/WEES 10 to WES/WEES 1000 (LAN or SAN)
- WES/WEES 10 to WES/WEES 1000 Extended Reach
- WES/WEES 100 to WES/WEES 155
- WES/WEES 100 to WES/WEES 622
- WES/WEES 100 to WES/WEES 1000 (LAN or SAN)
- WES/WEES 155 to WES/WEES 622
- WES/WEES 155 to WES/WEES 1000 (LAN or SAN)
- WES/WEES 622 to WES/WEES 1000 (LAN or SAN)

WES LA Circuit Regrade charges:

- WES 10 (managed) to WES-LA 10
- WES 100 to WES LA 100
- WES 1000 to WES LA 1000
- WES 1000 (LAN extension) to WES LA 1000 (LAN extension)
- WES 1000 (SAN extension) to WES LA 1000 (SAN extension)

Wholesale Extension Services Local Access Annual Rental charges - Prices are per circuit

- WES Local Access 10 managed
- WES Local Access 100 managed
- WES Local Access 1000 managed

WES LA Circuit Upgrade charges:

- WES LA10 to WES LA 100
- WES LA10 to WES LA 1000
- WES LA100 to WES LA 1000
- Upgrade Engineering Visit Per Circuit

Cancellation charges

- CDD 2 days
- CDD 10 days CDD -3 days
- KCI3 CDD minus 11 days

WES / WEES Circuit Shift charges

- Shift Internal. Internal Shift of a WES/WEES local end within the existing building
- Shift External Resite. Resiting of a WES/WEES local end in another building served by the same local serving exchange
- Shift External Rearrange. Rearranging a WES/WEES local end in another building served by a different local serving exchange

WES/WEES Resilience Option 1 (Hot Standby) Connection & Rental charges

- WES 100 Resilient Option 1 Connection per end (1) annual rental charge
- WES 1000 Resilient Option 1 Connection per end (1) annual rental charge
- WEES 100 Resilient Option 1 Connection per end (1) annual rental charge
- WEES 1000 (LAN/SAN) Resilient Option 1 Connection per end (1) annual rental charge
- Generic Resilience Facility fee per path annual rental charge
- Main link per metre or part thereof up to and including 1Gb/s annual rental charge
- Resilience link per metre or part thereof up to and including 1Gb/s annual rental charge

WES Resilience Option 2 - Rental charges

- WES Generic Resilience Facility fee per circuit (all bandwidths) annual rental charge
- Main link per metre or part thereof up to and including 1Gb/s annual rental charge
- Resilience link per metre or part thereof up to and including 1Gb/s annual rental charge

WEES Resilience Option 2 - Rental charges

- WEES Generic Resilience Facility fee per circuit (all bandwidths) annual rental charge
- Main link per metre or part thereof up to and including 1Gb/s annual rental charge
- Resilience link per metre or part thereof up to and including 1Gb/s annual rental charge

WES - Aggregation Connection and Rental charges

Connection and annual rental charges for all of the following services:

- WES Aggregation Tail 10Mb managed (up to 25km radial)
- WES Aggregation Tail 100Mb managed (up to 25km radial)
- Distance charge between exchanges metre or part thereof (spoke) rental only
- WES Aggregation Aggregated Link RJ45 Handover
- WES Aggregation Aggregated Link 1Gb optical VLAN Remote Handover
- WES Aggregation Aggregated Link 1Gb optical VLAN Local Handover
- Distance charge between exchanges (Aggregated link) per metre or part thereof ( > 0m ) rental only

WES - Aggregation Resilience RO1 Connection & Rental charges

Connection and annual rental charges for all of the following services:

- WES Aggregation Resilient Link 1Gb Remote Handover only (incremental to Aggregated Link charge)
- Distance charge between exchanges (includes charge for both Aggregated link and Resilient link) per metre or part thereof ( > 0m ) rental only
- WES Aggregation Resilient Link 1Gb Remote Handover only Monitoring Fee per path (Charged for both Aggregated Link and Resilient Link) rental only

Upgrade charge as follows:

• Spoke Upgrades from 10Mb to 100Mb

Circuit Migration charges

- Successful Circuit Migration to WES (LES10 LES1000)
- Failed Circuit Migration to WES (LES10 LES1000)
- Successful Circuit Migration to WES/ WEES (All other LES circuits)
- Failed Circuit Migration to WES/WEES (All other LES circuits)

#### **Backhaul Network Services (BNS)**

BNS Component Pricing Table

Charges for 1 year, 3 year and 5 year fixed periods (1 to 32 spokes per hub) for the following services:

• 1G Connection

- 1G Rental per Annum
- STM4 Connection
- STM4 Rental per Annum
- Spoke radial distance rental per Metre, per Annum
- Hub Module 1 Connection
- Hub [Spokes 1- 8] Rental per Annum
- Hub Module 2,3,4 Connection
- Hub [Spokes 9-16], [17-24] & [25-32] Rental per Annum
- Main link Connection
- Main link Rental per Annum
- Main link radial distance First Main Link Rental per Metre, per Annum
- Main link radial distance Subsequent Main Link Rental per Metre, per Annum
- PoP Module 1 Connection
- PoP [Spokes 1-8] Rental per Annum
- PoP Module 2,3,4 Connection
- PoP [Spokes 9-16], [17-24] & [25-32] Rental per Annum

Additional charges: Interfaces

- M Mode 1000 Base SX (850nm Multi Mode) 50mm presentation. Reach approx 300 Metres. Used on DLE sites
- S Mode 1000 Base LX (1310nm Single Mode). Reach approx 10km. Used on customer PoP sites One off additional

**Cancellation charges** 

- 2 or less working days before Contractual Delivery Date
- 3 > 19 or less working days before Contractual Delivery Date
- 20 to 22 or less working days before Contractual Delivery Date
- 23 to 25 or less working days before Contractual Delivery Date
- 26 or more or less working days before Contractual Delivery Date

# **Openreach Network Backhaul Services (ONBS)**

Connection and rental charges

- ONBS 100 per End Connection
- ONBS 100 per End Annual Rental
- ONBS 1000 per End Annual Rental
- Main link per metre or part thereof (> 0m) 1Gb/s service Annual Rental
- Main link per metre or part thereof (> 0m) 100Mb/s service Annual Rental

Resilient Option 1charges

- Openreach Network Backhaul Services 100M Bandwidths per end Connection
- Openreach Network Backhaul Services 100M Bandwidths per end Annual Rental
- Openreach Network Backhaul Services Generic Resilience option 1 monitoring fee per path Annual Rental
- Main link per metre or part thereof 100Mb/s service Annual Rental
- Main link per metre or part thereof 1Gb/s service Annual Rental
- Resilience link per metre or part thereof up to 1Gb/s Annual Rental
- Resilience link per metre or part thereof 1Gb/s Annual Rental

Resilient Options 2 & 3 charges

- Openreach Network Backhaul Services All Bandwidths per circuit Connection
- Openreach Network Backhaul Services All Bandwidths per circuit Annual Rental
- Main link per metre or part thereof 100Mb/s service Connection
- Main link per metre or part thereof 100Mb/s service Annual Rental
- Main link per metre or part thereof 1Gb/s service Connection
- Main link per metre or part thereof 1Gb/s service Annual Rental
- Resilience link per metre or part thereof 100Mb/s service Connection
- Resilience link per metre or part thereof 100Mb/s service Annual Rental
- Resilience link per metre or part thereof 1Gb/s service Connection
- Resilience link per metre or part thereof 1Gb/s service Annual Rental

Cancellation charges

- 2 or less working days before Contractual Delivery Date
- 3 > 19 or less working days before Contractual Delivery Date
- 20 to 22 or less working days before Contractual Delivery Date
- 23 to 25 or less working days before Contractual Delivery Date
- 26 or more or less working days before Contractual Delivery Date

#### Ethernet Backhaul Direct (EBD) services

Ethernet Backhaul Direct Connection and Rental charges

Charges for connection and rental in bands A, B and C for the following services:

- 1Gbps
- 1Gbps Extended Reach
- 10Gbps
- 10Gbps Extended Reach

Migration charges from BES to EBD (1 Gbps Only)

- BES to EBD Migration Connection Charge
- BES to EBD Migration Annual Rental Band A Charge
- BES to EBD Migration Annual Rental Band B Charge
- BES to EBD Migration Annual Rental Band C Charge

Ethernet Backhaul Direct Resilience Option 2 charges

- Generic Facility Fee per Circuit Annual Rental Band A Charge
- Generic Facility Fee per Circuit Annual Rental Band B Charge
- Generic Facility Fee per Circuit Annual Rental Band C Charge

Cancellation charges

- 2 or less working days before Contractual Delivery Date
- 3 > 19 working days before Contractual Delivery Date
- 20 to 22 working days before Contractual Delivery Date
- 23 to 25 working days before Contractual Delivery Date
- 26 or more working days before Contractual Delivery Date

## Bulk Transport Link (BTL) services

Bulk Transport Link for 1Gbps Openreach Handover Point (OHP) Hub Charges are for 1 year, 3 year and 5 year minimum period options for the following services:

- Module 1 Connection
- Module 1 Rental per Annum
- Module 2,3,4 Connection
- Module 2,3,4 Rental per Annum
- Main Link Connection
- Main Link Rental per Annum

Charges are for 5 year minimum period option only for the following services:

- Migration from BES to BTL Hub Module 1 Migration
- Migration from BES to BTL Hub Module 1 Rental per Annum
- Migration from BES to BTL Hub Module 2,3,4 Migration
- Migration from BES to BTL Hub Module 2,3,4 Rental per Annum
- Migration Charge from BES to BTL Main Link
- Migration Charge from BES to BTL Main Link Rental per Annum

Main Link Radial Distance charges for 1 year, 3 year and 5 year minimum period options for the following service:

• 1st Main Link Rental per annum per metre or part thereof (>0m up to 35,000 metres)

Point of Presence (PoP) charges for 1 year, 3 year and 5 year minimum period options for the following services:

- Module 1 Connection
- Module 1Rental per Annum
- Module 2,3,4 Connection
- Module 2,3,4 Rental per Annum

Point of Presence (PoP) charges for 5 year minimum period option only for the following services:

- Migration from BES to BTL PoP Module 1 Migration
- Migration from BES to BTL PoP Module 1 Rental per Annum
- Migration from BES to BTL PoP Module 2,3,4 Migration
- Migration from BES to BTL PoP Module 2,3,4 Rental per Annum

#### Additional charges: Interfaces

• S Mode Interface 1000 Base LX (1310nm Single Mode). Reach approx 10km used on customer PoP sites

**Cancellation charges** 

- 2 or less working days before Contractual Delivery Date
- 3 > 19 working days before Contractual Delivery Date
- 20 to 22 working days before Contractual Delivery Date
- 23 to 25 working days before Contractual Delivery Date
- 26 or more working days before Contractual Delivery Date

#### Ethernet Access Direct (EAD) including EAD Enable services

EAD circuit charges

- EAD 10 connection
- EAD 10 annual rental
- EAD 10 Extended Reach connection
- EAD 10 Extended Reach rental
- EAD 100 connection
- EAD 100 annual rental
- EAD 100 Extended Reach connection
- EAD 100 Extended Reach rental
- EAD 1000 connection
- EAD 1000 annual rental
- EAD 1000 (60 month minimum period) connection
- EAD 1000 (60 month minimum period) annual rental

- EAD 1000 Extended Reach connection
- EAD 1000 Extended Reach annual rental
- EAD 1000 Extended Reach (60 month minimum period) connection
- EAD 1000 Extended Reach (60 month minimum period) annual rental

# EAD Modify - Upgrade charges

- EAD Access 10 to 100
- EAD Access 10 to 1000 or 1000 (60 month minimum period)
- EAD Access 100 to 1000 or 1000 (60 month minimum period)
- EAD Access 1000 to 1000 (60 month minimum period)
- EAD 10 Extended Reach to 100 Extended Reach
- EAD 10 Extended reach to 1000 Extended Reach or 1000 Extended reach (60 month minimum period)
- EAD 100 Extended reach to 1000 Extended Reach or 1000 Extended reach (60 month minimum period)
- EAD Local Access 10 LA to 100 LA
- EAD Local Access 10 LA to 1000 LA or 1000 LA (60 month minimum period)
- EAD Local Access 100 LA to 1000 LA or 1000 LA (60 month minimum period)
- EAD Local Access 1000 LA to 1000 LA (60 month minimum period)

#### WES/WEES/BES to EAD Transfer Migration charges

- WES/WEES 10 Unmanaged to EAD 100
- WES/WEES 10 Unmanaged to EAD 1000 (standard or 60 month minimum period)
- WES/WEES 10 Managed to EAD 100
- WES/WEES 10 Managed to EAD 1000 (standard or 60 month minimum period)
- WES/WEES 10 LA to EAD 100 LA
- WES/WEES 10 LA to EAD 1000 LA (standard or 60 month minimum period)
- WES/WEES 10 LR to EAD 100
- WES/WEES 10 LR to EAD 100 LA
- WES/WEES 10 LR to EAD 1000 (standard or 60 month minimum period)
- WES/WEES 10 LR to EAD 1000 LA (standard or 60 month minimum period)
- WES/WEES 100 to EAD 1000 (standard or 60 month minimum period)
- WES/WEES 100 Resilience Option 1 to EAD 1000 Resilient Option 1 (Standard or 60 month minimum period)
- WES/WEES 100 LA to EAD 1000 LA (standard or 60 month minimum period)
- WES/WEES 155 to EAD 1000 (standard or 60 month minimum period)
- WES/WEES 622 to EAD 1000 (standard or 60 month minimum period)

- BES/BES Daisy Chain 10 to EAD 100
- BES/BES Daisy Chain 10 to EAD 1000 (standard or 60 month minimum period)
- BES/BES Daisy Chain 100 to EAD 1000 (standard or 60 month minimum period)
- BES/BES Daisy Chain 155 to EAD 1000 (standard or 60 month minimum period)
- BES/BES Daisy Chain 622 to EAD 1000 (standard or 60 month minimum period)

#### EAD Local Access 10 Mbit/s circuits and above charges

- EAD Local Access 10 connection
- EAD Local Access 10 annual rental
- EAD Local Access 100 connection
- EAD Local Access 100 annual rental
- EAD Local Access 1000 connection
- EAD Local Access 1000 annual rental
- EAD Local Access 1000 (60 month minimum period) connection
- EAD Local Access 1000 (60 month minimum period) annual rental

EAD Main Link charge

• Main link per metre or part thereof annual rental

EAD Resilience Option 1 (Hot Standby) charges

- EAD 10 Local Access Resilient Option 1 connection
- EAD 10 Local Access Resilient Option 1 annual rental
- EAD 100 Local Access Resilient Option 1 connection
- EAD 100 Local Access Resilient Option 1 annual rental
- EAD 1000 Local Access Resilient Option 1 connection
- EAD 1000 Local Access Resilient Option 1 annual rental
- EAD 1000 Local Access Resilient Option 1 (60 month minimum period) connection
- EAD 1000 Local Access Resilient Option 1 (60 month minimum period) annual rental
- EAD 10 Resilient Option 1 connection
- EAD 10 Resilient Option 1 annual rental
- EAD 100 Resilient Option 1 connection
- EAD 100 Resilient Option 1 annual rental
- EAD 1000 Resilient Option 1 connection
- EAD 1000 Resilient Option 1 annual rental
- EAD 1000 Resilient Option 1 (60 month minimum period) connection
- EAD 1000 Resilient Option 1 (60 month minimum period) annual rental
- EAD 1000 Extended Reach Resilient Option 1 connection

- EAD 1000 Extended Reach Resilient Option 1 annual rental
- EAD 1000 Extended Reach Resilient Option 1 (60 month minimum period) connection
- EAD 1000 Extended Reach Resilient Option 1 (60 month minimum period) annual rental

RO2 Resilience Main Link charges

- Generic Resilience Facility fee per path annual rental
- RO2 Main link per metre or part thereof annual rental
- RO2 Resilience main link per metre or part thereof annual rental

RO1 Resilience Main Link charges

- Generic Resilience Facility fee per path annual rental
- RO1 Resilience main link per metre or part thereof annual rental

#### EAD Enable charges

- EAD Enable 10 connection
- EAD Enable 10 annual rental
- EAD Enable 10 Resilient Option 1 connection
- EAD Enable 10 Resilient Option 1 annual rental
- EAD Enable 10 Local Access connection
- EAD Enable 10 Local Access annual rental
- EAD Enable 10 Local Access Resilient Option 1 connection
- EAD Enable 10 Local Access Resilient Option 1 annual rental
- EAD Enable 100 connection
- EAD Enable 100 annual rental
- EAD Enable 100 Resilient Option 1 connection
- EAD Enable 100 Resilient Option 1 annual rental
- EAD Enable 100 Local Access connection
- EAD Enable 100 Local Access annual rental
- EAD Enable 100 Local Access Resilient Option 1 connection
- EAD Enable 100 Local Access Resilient Option 1 annual rental
- EAD Enable 1000 connection
- EAD Enable 1000 annual rental
- EAD Enable 1000 Resilient Option 1 connection
- EAD Enable 1000 Resilient Option 1 annual rental
- EAD Enable 1000 Local Access connection
- EAD Enable 1000 Local Access annual rental
- EAD Enable 1000 Local Access Resilient Option 1 connection

- EAD Enable 1000 Local Access Resilient Option 1 annual rental
- EAD Enable 1000 Extended Reach connection
- EAD Enable 1000 Extended Reach annual rental
- EAD Enable 1000 Extended Reach Resilient Option 1 connection
- EAD Enable 1000 Extended Reach Resilient Option 1 annual rental
- EAD Enable 1000 (60 month term) connection
- EAD Enable 1000 (60 month term) annual rental
- EAD Enable 1000 Resilient Option 1 (60 month term) connection
- EAD Enable 1000 Resilient Option 1 (60 month term) annual rental
- EAD Enable 1000 Local Access Resilient Option 1 (60 month term) connection
- EAD Enable 1000 Local Access Resilient Option 1 (60 month term) annual rental
- EAD Enable 1000 Local Access (60 month term) connection
- EAD Enable 1000 Local Access (60 month term) annual rental
- EAD Enable 1000 Extended Reach (60 month term) connection
- EAD Enable 1000 Extended Reach (60 month term) annual rental
- EAD Enable 1000 Extended Reach Resilient Option 1 (60 month term) connection
- EAD Enable 1000 Extended Reach Resilient Option 1 (60 month term) annual rental

EAD Enable Main Link charge

• Main link per metre or part thereof annual rental

EAD Enable RO2 Resilience Main Link charge

- Generic Resilience Facility fee per path annual rental
- RO2 Resilience Main link per metre or part thereof annual rental

EAD Enable RO1 Resilience Main Link charge

- Generic Resilience Facility fee per path annual rental
- RO1 Resilience Main link per metre or part thereof annual rental

Cancellation charges: all bandwidths, except 1Gb/s (60 month minimum period) - before delivery

- CDD minus 2 days Working Days before CDD or on completion of following activities
- CDD minus 10 days to CDD minus 3 days Working Days before CDD or on completion of following activities
- KCI3 to CDD minus 11 days Working Days before CDD or on completion of following
- KCI3 Working Days before CDD or on completion of following activities

Cancellation charges: 1Gb/s (60 month minimum period) - before delivery

• 2 or less working days before Contractual Delivery Date

- 3 to 20 working days before Contractual Delivery Date
- 21 to 29 working days before Contractual Delivery Date
- 30 to 38 working days before Contractual Delivery Date
- 39 or more working days before Contractual Delivery Date

Termination charges: 1Gb/s (60 month minimum period) - after delivery

- <1 Years after Contractual Delivery Date
- <2 Years after Contractual Delivery Date
- <3 Years after Contractual Delivery Date
- <4 Years after Contractual Delivery Date
- <5 Years after Contractual Delivery Date

EAD Modify Circuit Shift charges

- Shift Internal. Internal Shift of an EAD local end within the existing building.
- Shift External Resite. Resiting of an EAD local end in another building served by the same local serving exchange
- Shift External Rearrange. Rearranging an EAD local end in another building served by a different local serving exchange

#### Interpretation

Except insofar as the context otherwise requires, the terms or descriptions of products and/or services, and charges imposed by the Dominant Provider of which such products and/or services comprise, used in this Annex shall be construed as having the same meaning as those provided by the Dominant Provider on its website for definitions and explanations of its products in addition to future updates. These are currently found as follows:

- Products and/or services, and charges of which such products and/or services comprise, within the meaning of "AI WECLA Services", please refer to <u>http://www.openreach.co.uk/orpg/home/home.do</u>
- Specifically:
  - For EAD services, please refer to <u>http://www.openreach.co.uk/orpg/home/products/ethernetservices/ethernetac</u> <u>cessdirect/ead.do</u>
  - For EBD services, please refer to <u>http://www.openreach.co.uk/orpg/home/products/ethernetservices/ethernetba</u> <u>ckhauldirect/ebd.do</u>
  - For BTL services, please refer to <u>http://www.openreach.co.uk/orpg/home/products/ethernetservices/bulktransportlink.do</u>

- For WES/WEES services, please refer to <u>http://www.openreach.co.uk/orpg/home/products/ethernetservices/wholesalee</u> <u>xtensionservices/wes.do</u>
- For BES services, please refer to <u>http://www.openreach.co.uk/orpg/home/products/ethernetservices/backhaulex</u> <u>tensionservices/bes.do</u>
- For Openreach Network Backhaul Service, please refer to <u>http://www.openreach.co.uk/orpg/home/products/ethernetservices/openreach</u> <u>networkbackhaulservices/onbs.do</u>
- For Backhaul Network Service, please refer to <u>http://www.openreach.co.uk/orpg/home/products/ethernetservices/backhauln</u> <u>etworkservices/bns.do</u>
- For Cablelink services, please refer to <u>http://www.openreach.co.uk/orpg/home/products/ethernetservices/cablelink/cablelink.do</u>
# Condition 5.3

#### Controls of the Ethernet Services Basket

- (a) Subject to paragraph (b), the Dominant Provider shall take all reasonable steps to secure that, at the end of each Relevant Year, the Percentage Change (as determined in accordance with paragraph (c)) in the aggregate of charges for all of the products and services of the Ethernet Services Basket is not more than the Controlling Percentage (as determined in accordance with paragraph (d)).
- (b) For the purpose of complying with paragraph (a), the Dominant Provider shall take all reasonable steps to secure that the revenue it accrues as a result of all relevant individual charge changes during any Relevant Year shall be no more than that which it would have accrued had it made a single charge change equal to the Controlling Percentage on the first day of the Relevant Year.

For the avoidance of doubt, this obligation shall be deemed to be satisfied where the following formula is satisfied—

$$\sum_{i=1}^{n} \left[ W_1 R_i \frac{(p_{1,i} - p_{0,i})}{p_{0,i}} + W_t R_i \frac{(p_{t,i} - p_{0,i})}{p_{0,i}} \right] \le TRC$$

where-

*n* is the number of products and services in the specified category (i.e. the basket in question);

p0,i is the published charge made by the Dominant Provider for the specific product or service, *i*, on the day immediately before the beginning of the Relevant Year excluding any discounts offered by the Dominant Provider;

*p1,i* is the published charge after the first change in charge in the Relevant Year excluding any discounts offered by the Dominant Provider;

*pt,i* is the published charge made by the Dominant Provider for the specific product or service, *i*, at time, *t*, during the Relevant Year excluding any discounts offered by the Dominant Provider;

*Ri* is the Accrued Revenue in the Relevant Year in respect of the specific product or service, *i*, including in respect of equivalent products or services provided by the Dominant Provider to itself, calculated to exclude any discounts offered by the Dominant Provider;

W1 is the proportion of the Relevant Year in which the first charge change applies, calculated by the number of days during which the charge was in effect and dividing by the total number of days in the Relevant Year;

*Wt* is the proportion of the Relevant Year in which each subsequent charge,  $p_t$ , is in effect, calculated by the number of days during which the charge is in effect and dividing by the total number of days in the Relevant Year; and

*TRC* is the target revenue change required in the Relevant Year to achieve compliance with paragraph (a), calculated by the Controlling Percentage multiplied by the Accrued Revenue during the Relevant Year.

(c) The Percentage Change for the purpose of the Ethernet Services Basket specified in paragraph (a) shall be calculated by employing the following formula—

$$C_{t} = \frac{\sum_{i=1}^{n} \left[ R_{i} \frac{(p_{t,i} - p_{0,i})}{p_{0,i}} \right]}{\sum_{i=1}^{n} R_{i}}$$

where---

Ct is the Percentage Change in the aggregate of charges for the products and/or services in the specified category (i.e. the basket in question) at a particular time, t, during the Relevant Year;

*n* is as defined in paragraph (b);

*Ri* is as defined in paragraph (b);

*p0,i* is as defined in paragraph (b); and

*pt,i* is as defined in paragraph (b).

(d) Subject to paragraphs (e) and (f), the Controlling Percentage in relation to any Relevant Year means for the Ethernet Services Basket specified in paragraph (a), RPI decreased by 11 percentage points.

## Controls of sub-baskets

(e) In the case of the Ethernet Interconnection Services Sub-basket, the Dominant Provider shall also and, in any event, take all reasonable steps to secure that, at the end of each Relevant Year, the Percentage Change in the aggregate of charges for all of the products and services of Interconnection Services Sub-basket is not more than RPI reduced by 11 percentage points.

For the purpose of this paragraph (e), the Percentage Change shall be calculated by employing the formula set out in paragraph (c).

(f) In the case of the EAD 1Gbit/s Services Sub-basket, the Dominant Provider shall also and, in any event, take all reasonable steps to secure that, at the end of each Relevant Year, the Percentage Change in the aggregate of charges for all of the products and services of Interconnection Services Sub-basket is not more than RPI reduced by 11 percentage points.

For the purpose of this paragraph (f), the Percentage Change shall be calculated by employing the formula set out in paragraph (c).

# Calculation of Carry Forward Percentage

- (g) Where the Percentage Change in any Relevant Year is less than the Controlling Percentage, then for the purpose of each of: (i) the Ethernet Services Basket specified in paragraph (a); (ii) the Ethernet Interconnection Services Sub-basket specified in paragraph (e); and (iii) the EAD 1Gbit/s Services Sub-basket specified in paragraph (f), the Controlling Percentage for the following Relevant Year shall be determined in accordance with paragraph (d), but increased by the amount of such deficiency.
- (h) Where the Percentage Change in any Relevant Year is more than the Controlling Percentage, then for the purpose of each of: (i) the Ethernet Services Basket specified in paragraph (a); (ii) the Ethernet Interconnection Services Sub-basket specified in paragraph (e); and (iii) the EAD 1Gbit/s Services Sub-basket specified in paragraph (f), the Controlling Percentage for the following Relevant Year shall be determined in accordance with paragraph (d), but decreased by the amount of such excess.

# Controls of sub-cap

(i) In the case of the Ethernet All Sub-cap Services, the Dominant Provider shall also and, in any event, take all reasonable steps to secure that, during each Relevant Year, the Percentage Change in each of the charges for each and every Ethernet All Sub-cap Service is not more than RPI decreased by RPI<sup>202</sup>.

For the purpose of this paragraph (i), the Percentage Change shall be calculated by employing the formula set out in paragraph (j).

(j) The Percentage Change for the purpose of the Ethernet All Sub-cap Services shall be calculated by employing the following formula—

$$C_t = \frac{(p_t - p_0)}{p_0}$$

where---

Ct is the Percentage Change in charges for the products and services in the subbasket in question at a particular time t during the Relevant Year;

p0 is the published charge made by the Dominant Provider for the specific product or service, *i*, on the day immediately before the beginning of the Relevant Year excluding any discounts offered by the Dominant Provider; and

*pt* is the published charge made by the Dominant Provider for the specific product or service at the time, *t*, during the Relevant Year excluding any discounts offered by

<sup>&</sup>lt;sup>202</sup> Where RPI exceeds 5% the control for the purposes of this paragraph **(h)** will be RPI decreased by 5%.

the Dominant Provider.

#### General provisions

(k) Where the Dominant Provider makes a material change (other than to a charge) to any product or service which is subject to this Condition 5.3 or to the date on which its financial year ends or there is a material change in the basis of the Retail Prices Index, paragraphs (a) to (i) shall have effect subject to such reasonable adjustment to take account of the change as Ofcom may direct to be appropriate in the circumstances.

For the purposes of this paragraph, a material change to any product or service which is subject to this Condition 5.3 includes the introduction of a new product or service wholly or substantially in substitution for that existing product or service.

(I) The Dominant Provider shall record, maintain and supply to Ofcom in an electronic format, no later than three months after the end of each Relevant Year, the data necessary for Ofcom to monitor compliance of the Dominant Provider with the price control by performing the calculation of the Percentage Change. The data shall include—

i. pursuant to paragraph (a), the calculated percentage change relating to the aggregate of charges for all of the products and services in the Ethernet Services Basket;

ii. pursuant to paragraph (b), calculation of the Accrued Revenue as a result of all relevant individual charge charges during any Relevant Year compared to the TRC;

iii. all relevant data the Dominant Provider used in the calculation of the percentage change, Ct, pursuant to paragraph (c), including for each specific product or service, *i*;

iv. all Accrued Revenue during the Relevant Year in respect of each specific product or service, *i*;

v. published charges made by the Dominant Provider at time, *t*, during the Relevant Year excluding any discounts offered by the Dominant Provider;

vi. the relevant published charges at the start of the Relevant Year;

vii. other data necessary for monitoring compliance with the charge control.

(m) In this Condition 5.3, "Accrued Revenue" means:

(1) in the First Relevant Year, the revenue deemed to be accrued in the First Relevant Year in respect of a specific product or service calculated: (i) in respect of a rental product, by multiplying the forecast volume of rentals in the First Relevant Year as set out in Annex 12 to this Draft Statement by average charges exclusive of discounts in the First Relevant Year; and (ii) in respect of each product or service

other than a rental product, by multiplying forecast volumes supplied as set out in Annex 12 to this Draft Statement by average charges exclusive of discounts in the First Relevant Year. Where services are aggregated in the forecast volumes in Annex 12, the aggregated volume forecast will apply to each aggregated product.

(2) in any Relevant Year except the First Relevant Year, the revenue deemed to be accrued in that Relevant Year in respect of a specific product or service calculated: (i) in respect of a rental product, by multiplying the volume of rentals as at 31 December preceding the start of the Relevant Year by the average charge (weighted according to the number of days during the Relevant Year on which that charge applied) exclusive of discounts in the Relevant Year; and (ii) in respect of each product or service other than a rental product, by multiplying volumes supplied in the 12 months up to and including 31 December preceding the start of the Relevant Year.

- (n) For the avoidance of doubt, where the Annex to this Condition 5.3 lists a product or service as being available with more than one minimum contract period, the charge for the purposes of determining compliance with this Condition 5.3 shall be deemed to be the charge for the product or service with the shortest minimum contract period.
- (0) Paragraphs (a) to (n) shall not apply to such extent as Ofcom may direct.
- (p) The Dominant Provider shall comply with any direction Ofcom may make from time to time under this Condition 5.3.

#### Annex to Condition 5.3

#### Products and services subject to charge control pursuant to Condition 5.3

#### Section 1

#### Meaning of "Ethernet Interconnection Services Sub-basket"

For the purposes of Condition 5.3 the expression "**Ethernet Interconnection Services Sub-basket**" shall be construed as including the list below of the following products and/or services, and the following charges imposed by the Dominant Provider of which such products and/or services comprise. The list is subject to such changes, unless Ofcom direct otherwise, following:

- the withdrawal by the Dominant Provider of one or more of the products and/or services, and/or of one or more of the charges; and/or
- the introduction by the Dominant Provider of a new product and/or service, and/or a new charge, wholly or substantially in substitution for an existing product and/or service and/or charge, in which case this list should shall be construed accordingly.

## Bulk Transport Link (BTL) for 1Gbps services

Openreach Handover Point (OHP) Hub

Charges are for 1 year, 3 year and 5 year minimum period options for the following services:

- Module 1 Connection
- Module 1 Rental per Annum
- Module 2,3,4 Connection
- Module 2,3,4 Rental per Annum
- Main Link Connection
- Main Link Rental per Annum

Main Link Radial Distance charges for 1 year, 3 year and 5 year minimum period options for the following service:

• 1st Main Link Rental per annum per metre or part thereof (>0m up to 35,000 metres)

Point of Presence (PoP) charges for 1 year, 3 year and 5 year minimum period options for the following services:

- Module 1 Connection
- Module 1 Rental per Annum
- Module 2,3,4 Connection
- Module 2,3,4 Rental per Annum

#### Section 2

#### Meaning of "1 Gbit/s EAD Service Sub-basket"

For the purposes of Condition 5.3 the expression "**1 Gbit/s EAD Service Sub-basket**" shall be construed as including the list below of the following products and/or services, and the following charges imposed by the Dominant Provider of which such products and/or services comprise. The list is subject to such changes, unless Ofcom direct otherwise, following:

- the withdrawal by the Dominant Provider of one or more of the products and/or services, and/or of one or more of the charges; and/or
- the introduction by the Dominant Provider of a new product and/or service, and/or a new charge, wholly or substantially in substitution for an existing product and/or service and/or charge,

in which case this list should shall be construed accordingly.

## Ethernet Access Direct (EAD) including EAD Enable services

EAD circuit connection and rental charges

- EAD 1000 connection
- EAD 1000 annual rental
- EAD 1000 (60 month minimum period) connection
- EAD 1000 (60 month minimum period) annual rental
- EAD 1000 Extended Reach connection
- EAD 1000 Extended Reach annual rental
- EAD 1000 Extended Reach (60 month minimum period) connection
- EAD 1000 Extended Reach (60 month minimum period) annual rental

## EAD Local Access charges

- EAD Local Access 1000 connection
- EAD Local Access 1000 annual rental
- EAD Local Access 1000 (60 month minimum period) connection
- EAD Local Access 1000 (60 month minimum period) annual rental

## EAD Resilience Option 1 (Hot Standby) charges

- EAD 1000 Local Access Resilient Option 1 connection
- EAD 1000 Local Access Resilient Option 1 annual rental
- EAD 1000 Local Access Resilient Option 1 (60 month minimum period) connection
- EAD 1000 Local Access Resilient Option 1 (60 month minimum period) annual rental
- EAD 1000 Resilient Option 1 connection
- EAD 1000 Resilient Option 1 annual rental
- EAD 1000 Resilient Option 1 (60 month minimum period) connection
- EAD 1000 Resilient Option 1 (60 month minimum period) annual rental
- EAD 1000 Extended Reach Resilient Option 1 connection
- EAD 1000 Extended Reach Resilient Option 1 annual rental
- EAD 1000 Extended Reach Resilient Option 1 (60 month minimum period) connection
- EAD 1000 Extended Reach Resilient Option 1 (60 month minimum period) annual rental

EAD Enable charges

• EAD Enable 1000 connection

- EAD Enable 1000 annual rental
- EAD Enable 1000 Resilient Option 1 connection
- EAD Enable 1000 Resilient Option 1 annual rental
- EAD Enable 1000 Local Access connection
- EAD Enable 1000 Local Access annual rental
- EAD Enable 1000 Local Access Resilient Option 1 connection
- EAD Enable 1000 Local Access Resilient Option 1 annual rental
- EAD Enable 1000 Extended Reach connection
- EAD Enable 1000 Extended Reach annual rental
- EAD Enable 1000 Extended Reach Resilient Option 1 connection
- EAD Enable 1000 Extended Reach Resilient Option 1 annual rental
- EAD Enable 1000 (60 month term) connection
- EAD Enable 1000 (60 month term) annual rental
- EAD Enable 1000 Resilient Option 1 (60 month term) connection
- EAD Enable 1000 Resilient Option 1 (60 month term) annual rental
- EAD Enable 1000 Local Access Resilient Option 1 (60 month term) connection
- EAD Enable 1000 Local Access Resilient Option 1 (60 month term) annual rental
- EAD Enable 1000 Local Access (60 month term) connection
- EAD Enable 1000 Local Access (60 month term) annual rental
- EAD Enable 1000 Extended Reach (60 month term) connection
- EAD Enable 1000 Extended Reach (60 month term) annual rental
- EAD Enable 1000 Extended Reach Resilient Option 1 (60 month term) connection
- EAD Enable 1000 Extended Reach Resilient Option 1 (60 month term) annual rental

## Section 3

## Meaning of "Ethernet All Services Sub-basket"

For the purposes of Condition 5.3 the expression "**Ethernet All Services Sub-basket**" shall be construed as including the list below of the following products and/or services, and the following charges imposed by the Dominant Provider of which such products and/or services comprise. The list is subject to such changes, unless Ofcom direct otherwise, following:

- the withdrawal by the Dominant Provider of one or more of the products and/or services, and/or of one or more of the charges; and/or
- the introduction by the Dominant Provider of a new product and/or service, and/or a new charge, wholly or substantially in substitution for an existing product and/or service and/or charge, in which case this list should shall be construed accordingly.

## All services contained within this Annex to conditions 5.3 sections 1 and 2.

# Wholesale Extension Service (WES) & Wholesale End to end Extension Service (WEES)

WES/WEES 100MBit/s circuits and above - Connection charges - Prices are per end

- WES/WEES 2500
- WES/WEES 10000

WES/WEES 100MBit/s circuits and above Annual Rental charges - Prices are per end

- WES/WEES 100
- WES/WEES 155
- WES/WEES 622
- WES/WEES 1000 (LAN /SAN)
- WES/WEES 1000 Extended Reach
- WES/WEES 2500
- WES/WEES 10000

WES/WEES 10Mbit/s Annual Rental charges - Prices are per end

- WES/WEES 10
- WES/WEES 10 (Local Reach)
- WES/WEES 10 Managed

WES/WEES Main Link charge - Prices are per metre of part thereof

- Main link up to and including 1Gb/s
- Main link over 1Gb/s

WES/WEES Circuit Upgrades (pricing includes engineering visit) charges

- WES/WEES 10 to WES/WEES 100
- WES/WEES 10 to WES/WEES 155
- WES/WEES 10 to WES/WEES 622
- WES/WEES 10 to WES/WEES 1000 (LAN or SAN)
- WES/WEES 10 to WES/WEES 1000 Extended Reach
- WES/WEES 100 to WES/WEES 155
- WES/WEES 100 to WES/WEES 622
- WES/WEES 100 to WES/WEES 1000 (LAN or SAN)
- WES/WEES 155 to WES/WEES 622
- WES/WEES 155 to WES/WEES 1000 (LAN or SAN)
- WES/WEES 622 to WES/WEES 1000 (LAN or SAN)

WES LA Circuit Regrade charges

- WES 10 (managed) to WES-LA 10
- WES 100 to WES LA 100

- WES 1000 to WES LA 1000
- WES 1000 (LAN extension) to WES LA 1000 (LAN extension)
- WES 1000 (SAN extension) to WES LA 1000 (SAN extension)

Wholesale Extension Services Local Access Annual Rental charges - Prices are per circuit

- WES Local Access 10 managed
- WES Local Access 100 managed
- WES Local Access 1000 managed

WES LA Circuit Upgrades charges

- WES LA10 to WES LA 100
- WES LA10 to WES LA 1000
- WES LA100 to WES LA 1000
- Upgrade Engineering Visit Per Circuit

Cancellation charges

- CDD 2 days
- CDD 10 days CDD -3 days
- KCI3 CDD minus 11 days

WES / WEES Circuit Shift charges

- Shift Internal. Internal Shift of a WES/WEES local end within the existing building
- Shift External Resite. Resiting of a WES/WEES local end in another building served by the same local serving exchange
- Shift External Rearrange. Rearranging a WES/WEES local end in another building served by a different local serving exchange

WES/WEES Resilience Option 1 (Hot Standby) Connection & Rental charges)

- WES 100 Resilient Option 1 Connection per end (1) annual rental charge
- WES 1000 Resilient Option 1 Connection per end (1) annual rental charge
- WEES 100 Resilient Option 1 Connection per end (1) annual rental charge
- WEES 1000 (LAN/SAN) Resilient Option 1 Connection per end (1) annual rental charge
- Generic Resilience Facility fee per path annual rental charge
- Main link per metre or part thereof up to and including 1Gb/s annual rental charge
- Main link per metre or part thereof over 1Gb/s annual rental charge
- Resilience link per metre or part thereof up to and including 1Gb/s annual rental charge
- Resilience link per metre or part thereof over 1Gb/s annual rental charge

WES Resilience Option 2 - Rental charges

- WES Generic Resilience Facility fee per circuit (all bandwidths) annual rental charge
- Main link per metre or part thereof up to and including 1Gb/s annual rental charge
- Main link per metre or part thereof over 1Gb/s annual rental charge
- Resilience link per metre or part thereof up to and including 1Gb/s annual rental charge
- Resilience link per metre or part thereof over 1Gb/s annual rental charge

WEES Resilience Option 2 - Rental charges

- WEES Generic Resilience Facility fee per circuit (all bandwidths) annual rental charge
- Main link per metre or part thereof up to and including 1Gb/s annual rental charge
- Main link per metre or part thereof over 1Gb/s annual rental charge
- Resilience link per metre or part thereof up to and including 1Gb/s annual rental charge
- Resilience link per metre or part thereof over 1Gb/s annual rental charge

## WES - Aggregation Connection and Rental charges

Connection and annual rental charges for all of the following services:

- WES Aggregation Tail 10Mb managed (up to 25km radial)
- WES Aggregation Tail 100Mb managed (up to 25km radial)
- Distance charge between exchanges metre or part thereof (spoke)
- WES Aggregation Aggregated Link RJ45 Handover
- WES Aggregation Aggregated Link 1Gb optical VLAN Remote Handover
- WES Aggregation Aggregated Link 1Gb optical VLAN Local Handover
- Distance charge between exchanges (Aggregated link) per metre or part thereof ( > 0m )

WES - Aggregation Resilience RO1 Connection & Rental charges

Connection and annual rental charges for all of the following services:

- WES Aggregation Resilient Link 1Gb Remote Handover only (incremental to Aggregated Link charge)
- Distance charge between exchanges (includes charge for both Aggregated link and Resilient link) per metre or part thereof ( > 0m )
- WES Aggregation Resilient Link 1Gb Remote Handover only Monitoring Fee per path (Charged for both Aggregated Link and Resilient Link)

Upgrade charges are available as follows:

• Spoke Upgrades from 10Mb to 100Mb

Circuit Migration charges

- Successful Circuit Migration to WES (LES10 LES1000)
- Failed Circuit Migration to WES (LES10 LES1000)
- Successful Circuit Migration to WES/ WEES (All other LES circuits)
- Failed Circuit Migration to WES/WEES (All other LES circuits)

## **Backhaul Network Services (BNS)**

#### BNS Component Pricing Table

Charges for 1 year, 3 year and 5 year fixed periods (1 to 32 spokes per hub) for the following services:

- 1G Connection
- 1G Rental per Annum
- STM4 Connection
- STM4 Rental per Annum
- 2Gb Connection
- 2Gb Rental per Annum
- Spoke radial distance Rental per Metre, per Annum
- Hub Module 1 Connection
- Hub [Spokes 1-8] Rental per Annum
- Hub Module 2,3,4 Connection
- Hub [Spokes 9-16], [17-24] & [25-32] Rental per Annum
- Main link Connection
- Main link Rental per Annum
- Main link radial distance First Main Link Rental per Metre, per Annum
- Main link radial distance Subsequent Main Link Rental per Metre, per Annum
- PoP Module 1 Connection
- PoP [Spokes 1- 8] Rental per Annum
- PoP Module 2,3,4 Connection
- PoP [Spokes 9-16], [17-24] & [25-32] Rental per Annum

## BNS Circuit Upgrade charges - one off fee

- 1Gb to 2Gb 1 year
- 1Gb to 2Gb 3 year
- 1Gb to 2Gb 5 year

Additional charges: Interfaces

- M Mode 1000 Base SX (850nm Multi Mode) 50mm presentation. Reach approx 300 Metres. Used on DLE sites
- S Mode 1000 Base LX (1310nm Single Mode). Reach approx 10km. Used on customer PoP sites One off additional

Cancellation charges

- 2 or less working days before Contractual Delivery Date
- 3 > 19 or less working days before Contractual Delivery Date
- 20 to 22 or less working days before Contractual Delivery Date
- 23 to 25 or less working days before Contractual Delivery Date
- 26 or more or less working days before Contractual Delivery Date

## **Openreach Network Backhaul Services (ONBS)**

Connection and rental charges

- ONBS 100 per End Connection
- ONBS 100 per End Annual Rental
- ONBS 1000 per End Annual Rental
- ONBS 10000 per End Connection
- ONBS 10000 per End Annual Rental
- Main link per metre or part thereof (> 0m) 1Gb/s service Annual Rental
- Main link per metre or part thereof (> 0m) 100Mb/s service Annual Rental
- Main link per metre or part thereof (> 0m) 10Gb/s service Annual Rental

## **Resilient Option 1 charges**

- Openreach Network Backhaul Services 100M Bandwidths per end Connection
- Openreach Network Backhaul Services 100M Bandwidths per end Annual Rental
- Openreach Network Backhaul Services Generic Resilience option 1 monitoring fee per path Connection
- Openreach Network Backhaul Services Generic Resilience option 1 monitoring fee per path Annual Rental
- Main link per metre or part thereof 100Mb/s service Annual Rental
- Main link per metre or part thereof 10Gb/s service Annual Rental
- Main link per metre or part thereof 1Gb/s service Annual Rental
- Resilience link per metre or part thereof up to 1Gb/s Annual Rental
- Resilience link per metre or part thereof 1Gb/s Annual Rental
- Resilience link per metre or part thereof over 1Gb/s Annual Rental

## Resilient Options 2 & 3 charges

- Openreach Network Backhaul Services All Bandwidths per circuit Connection
- Openreach Network Backhaul Services All Bandwidths per circuit Annual Rental
- Main link per metre or part thereof 100Mb/s service Connection
- Main link per metre or part thereof 100Mb/s service Annual Rental
- Main link per metre or part thereof 10Gb/s service Connection
- Main link per metre or part thereof 10Gb/s service Annual Rental
- Main link per metre or part thereof 1Gb/s service Annual Rental
- Resilience link per metre or part thereof 100Mb/s service Connection
- Resilience link per metre or part thereof 100Mb/s service Annual Rental
- Resilience link per metre or part thereof 1Gb/s service Annual Rental
- Resilience link per metre or part thereof 10Gb/s service Connection
- Resilience link per metre or part thereof 10Gb/s service Annual Rental

#### **Cancellation charges**

- 2 or less working days before Contractual Delivery Date
- 3 > 19 or less working days before Contractual Delivery Date
- 20 to 22 or less working days before Contractual Delivery Date
- 23 to 25 or less working days before Contractual Delivery Date
- 26 or more or less working days before Contractual Delivery Date

## **Ethernet Backhaul Direct services**

Ethernet Backhaul Direct Connection and Rental charges Charges for connection and rental in bands A, B and C for the following services:

- 1Gbps
- 1Gbps Extended Reach
- 10Gbps
- 10Gbps Extended Reach

Migration charges from BES to EBD (1 Gbps Only)

- BES to EBD Migration Connection Charge
- BES to EBD Migration Annual Rental Band A Charge
- BES to EBD Migration Annual Rental Band B Charge
- BES to EBD Migration Annual Rental Band C Charge

Ethernet Backhaul Direct Resilience Option 2 charges

- Generic Facility Fee per Circuit Annual Rental Band A Charge
- Generic Facility Fee per Circuit Annual Rental Band B Charge
- Generic Facility Fee per Circuit Annual Rental Band C Charge

Cancellation charges

- 2 or less working days before Contractual Delivery Date
- 3 > 19 working days before Contractual Delivery Date
- 20 to 22 working days before Contractual Delivery Date
- 23 to 25 working days before Contractual Delivery Date
- 26 or more working days before Contractual Delivery Date

# Ethernet Access Direct (EAD) including EAD Enable services

EAD circuit connection and rental charges

- EAD 10 connection
- EAD 10 annual rental
- EAD 10 Extended Reach connection
- EAD 10 Extended Reach rental
- EAD 100 connection
- EAD 100 annual rental
- EAD 100 Extended Reach connection
- EAD 100 Extended Reach rental

## EAD Modify - Upgrade charges

- EAD Access 10 to 100
- EAD Access 10 to 1000 or 1000 (60 month minimum period)
- EAD Access 100 to 1000 or 1000 (60 month minimum period)
- EAD Access 1000 to 1000 (60 month minimum period)
- EAD 10 Extended Reach to 100 Extended Reach
- EAD 10 Extended reach to 1000 Extended Reach or 1000 Extended reach (60 month minimum period)
- EAD 100 Extended reach to 1000 Extended Reach or 1000 Extended reach (60 month minimum period)
- EAD Local Access 10 LA to 100 LA
- EAD Local Access 10 LA to 1000 LA or 1000 LA (60 month minimum period)
- EAD Local Access 100 LA to 1000 LA or 1000 LA (60 month minimum period)
- EAD Local Access 1000 LA to 1000 LA (60 month minimum period)

# WES/WEES/BES to EAD Transfer Migration charges

- WES/WEES 10 Unmanaged to EAD 100
- WES/WEES 10 Unmanaged to EAD 1000 (standard or 60 month minimum period)
- WES/WEES 10 Managed to EAD 100

- WES/WEES 10 Managed to EAD 1000 (standard or 60 month minimum period)
- WES/WEES 10 LA to EAD 100 LA
- WES/WEES 10 LA to EAD 1000 LA (standard or 60 month minimum period)
- WES/WEES 10 LR to EAD 100
- WES/WEES 10 LR to EAD 100 LA
- WES/WEES 10 LR to EAD 1000 (standard or 60 month minimum period)
- WES/WEES 10 LR to EAD 1000 LA (standard or 60 month minimum period)
- WES/WEES 100 to EAD 1000 (standard or 60 month minimum period)
- WES/WEES 100 Resilience Option 1 to EAD 1000 Resilient Option 1 (Standard or 60 month minimum period)
- WES/WEES 100 LA to EAD 1000 LA (standard or 60 month minimum period)
- WES/WEES 155 to EAD 1000 (standard or 60 month minimum period)
- WES/WEES 622 to EAD 1000 (standard or 60 month minimum period)
- BES/BES Daisy Chain 10 to EAD 100
- BES/BES Daisy Chain 10 to EAD 1000 (standard or 60 month minimum period)
- BES/BES Daisy Chain 100 to EAD 1000 (standard or 60 month minimum period)
- BES/BES Daisy Chain 155 to EAD 1000 (standard or 60 month minimum period)
- BES/BES Daisy Chain 622 to EAD 1000 (standard or 60 month minimum period)

EAD Local Access charges 10 Mbit/s circuits and above

- EAD Local Access 10 connection
- EAD Local Access 10 annual rental
- EAD Local Access 100 connection
- EAD Local Access 100 annual rental

EAD Main Link charge

• Main link per metre or part thereof annual rental

EAD Resilience Option 1 (Hot Standby) charges

- EAD 10 Local Access Resilient Option 1 connection
- EAD 10 Local Access Resilient Option 1 annual rental
- EAD 100 Local Access Resilient Option 1 connection
- EAD 100 Local Access Resilient Option 1 annual rental
- EAD 10 Resilient Option 1 connection
- EAD 10 Resilient Option 1 annual rental
- EAD 100 Resilient Option 1 connection
- EAD 100 Resilient Option 1 annual rental

RO2 Resilience Main Link charges

- Generic Resilience Facility fee per path annual rental
- RO2 Main link per metre or part thereof annual rental
- RO2 Resilience main link per metre or part thereof annual rental

RO1 Resilience Main Link charges

- Generic Resilience Facility fee per path annual rental
- RO1 Resilience main link per metre or part thereof annual rental

EAD Enable charges

- EAD Enable 10 connection
- EAD Enable 10 annual rental
- EAD Enable 10 Resilient Option 1 connection
- EAD Enable 10 Resilient Option 1 annual rental
- EAD Enable 10 Local Access connection
- EAD Enable 10 Local Access annual rental
- EAD Enable 10 Local Access Resilient Option 1 connection
- EAD Enable 10 Local Access Resilient Option 1 annual rental
- EAD Enable 100 connection
- EAD Enable 100 annual rental
- EAD Enable 100 Resilient Option 1 connection
- EAD Enable 100 Resilient Option 1 annual rental
- EAD Enable 100 Local Access connection
- EAD Enable 100 Local Access annual rental
- EAD Enable 100 Local Access Resilient Option 1 connection
- EAD Enable 100 Local Access Resilient Option 1 annual rental

# EAD Enable Main Link charge

• Main link per metre or part thereof annual rental

EAD Enable RO2 Resilience Main Link charge

- Generic Resilience Facility fee per path annual rental
- RO2 Resilience Main link per metre or part thereof annual rental

# EAD Enable RO1 Resilience Main Link charge

- Generic Resilience Facility fee per path annual rental
- RO1 Resilience Main link per metre or part thereof annual rental

Cancellation charges: all bandwidths, except 1Gb/s (60 month minimum period) - before delivery

- CDD minus 2 days Working Days before CDD or on completion of following activities
- CDD minus 10 days to CDD minus 3 days Working Days before CDD or on completion of following activities
- KCI3 to CDD minus 11 days Working Days before CDD or on completion of following
- KCI3 Working Days before CDD or on completion of following activities

Cancellation charges: 1Gb/s (60 month minimum period) - before delivery

- 2 or less working days before Contractual Delivery Date
- 3 to 20 working days before Contractual Delivery Date
- 21 to 29 working days before Contractual Delivery Date
- 30 to 38 working days before Contractual Delivery Date
- 39 or more working days before Contractual Delivery Date

Termination charges: 1Gb/s (60 month minimum period) - after delivery

- <1 Years after Contractual Delivery Date
- <2 Years after Contractual Delivery Date
- <3 Years after Contractual Delivery Date
- <4 Years after Contractual Delivery Date
- <5 Years after Contractual Delivery Date

EAD Modify Circuit Shift charges

- Shift Internal. Internal Shift of an EAD local end within the existing building.
- Shift External Resite. Resiting of an EAD local end in another building served by the same local serving exchange
- Shift External Rearrange. Rearranging an EAD local end in another building served by a different local serving exchange

#### **Backhaul Extension Service (BES) services**

BES/BES Daisy Chain 100MBit/s and above Connection charges - Prices are per end

- BES 2500
- BES 10000

BES 100MBit/s and above Rental charges - Prices are per end

- BES 100
- BES 155
- BES 622
- BES 1000
- BES 2500

- BES 10000
- BES 1000- Extended Reach

BES Daisy Chain 100MBit/s and above Rental charges - Prices are per end

- BES 100
- BES 155
- BES 622
- BES 1000
- BES 2500
- BES 10000

BES 100MBit/s and above Term Rental charges

Charges are per end for 3 year and 5 year minimum annual rental for the following services:

- BES 1000
- BES 2500
- BES 10000
- BES 1000 Extended Reach

BES Daisy Chain 100MBit/s and above Term Rental charges - Prices are per end Charges are per end for 3 year and 5 year minimum annual rental for the following services:

- BES 1000
- BES 2500
- BES 10000

BES/BES Daisy Chain 10MBit/s Connection and Rental charges - Prices are per end

- BES 10 annual rental price per end
- BES 10 daisy chain rental price per end

Main Link charges - Prices are per metre or part thereof

- Main link per metre or part thereof (>0m up to 25,000 metres) up to and including 1Gb/s annual rental
- Main link per metre or part thereof (>0m up to 25,000 metres) over 1Gb/s annual rental
- Main link per metre or part thereof (>0m up to 25,000 metres) over 1Gb/s 3 year minimum annual rental
- Main link per metre or part thereof (>0m up to 25,000 metres) over 1Gb/s 5 year minimum annual rental

Circuit Upgrade charges (pricing includes engineering visit)

• BES 10 to BES 100

- BES 10 to BES 155
- BES 10 to BES 622
- BES 10 to BES 1000
- BES 100 to BES 155
- BES 100 to BES 622
- BES 100 to BES 1000
- BES 100 36 month min period to BES 2500 36 month min period
- BES 100 36 month min period to BES 2500 60 month min period
- BES 100 36 month min period to BES 10000 36 month min period
- BES 100 36 month min period to BES 10000 60 month min period
- BES 100 60 month min period to BES 2500 36 month min period
- BES 100 60 month min period to BES 2500 60 month min period
- BES 100 60 month min period to BES 10000 36 month min period
- BES 100 60 month min period to BES 10000 60 month min period
- BES 155 to BES 622
- BES 155 to BES 1000
- BES 622 to BES 1000
- BES 1000 36 month min period to BES 2500 36 month min period
- BES 1000 36 month min period to BES 2500 60 month min period
- BES 1000 36 month min period to BES 10000 36 month min period
- BES 1000 36 month min period to BES 10000 60 month min period
- BES 1000 60 month min period to BES 2500 36 month min period
- BES 1000 60 month min period to BES 2500 60 month min period
- BES 1000 60 month min period to BES 10000 36 month min period
- BES 1000 60 month min period to BES 10000 60 month min period

**Circuit Migration charges** 

- Successful Circuit Migration to BES (For LES10 LES1000)
- Failed Circuit Migration to BES (For LES10 LES1000
- Successful Circuit Migration to BES (For all other LES circuits)
- Failed Circuit Migration to BES (For all other LES circuits)

**BES Circuit Shift charges** 

- Shift Internal. Internal Shift of a BES local end within the existing building
- Shift External Resite. Resiting of a BES local end in another building served by the same local serving exchange

• Shift - External Rearrange. Rearranging a BES local end in another building served by a different local serving exchange

## Resilient Option 2 charges

Charges for annual rental, 3 year and 5 year minimum annual rentals for the following services:

- Backhaul Extension Services Generic Resilience Facility fee per circuit (all bandwidths)
- Main link per metre or part thereof up to and including 1Gb/s
- Main link per metre or part thereof over 1Gb/s
- Resilience link per metre or part thereof up to and including 1Gb/s
- Resilience link per metre or part thereof over 1Gb/s

Cancellation charges

- CDD 2 days
- CDD 10 days CDD -3 days
- KCI3 CDD minus 11 days

## Bulk Transport Link ('BTL') for 1Gbps services

Charges are for 5 year minimum period option only for the following services:

- Migration from BES to BTL Hub Module 1 Migration
- Migration from BES to BTL Hub Module 1 Rental per Annum
- Migration from BES to BTL Hub Module 2,3,4 Migration
- Migration from BES to BTL Hub Module 2,3,4 Rental per Annum
- Migration Charge from BES to BTL Main Link
- Migration Charge from BES to BTL Main Link Rental per Annum

Point of Presence (PoP) charges for 5 year minimum period option only for the following services:

- Migration from BES to BTL PoP Module 1 Migration
- Migration from BES to BTL PoP Module 1 Rental per Annum
- Migration from BES to BTL PoP Module 2,3,4 Migration
- Migration from BES to BTL PoP Module 2,3,4 Rental per Annum

Additional charges: Interfaces

 S Mode Interface 1000 Base LX (1310nm Single Mode). Reach approx 10km used on customer PoP sites

Cancellation charges

- 2 or less working days before Contractual Delivery Date
- 3 > 19 working days before Contractual Delivery Date

- 20 to 22 working days before Contractual Delivery Date
- 23 to 25 working days before Contractual Delivery Date
- 26 or more working days before Contractual Delivery Date

#### Interpretation

Except insofar as the context otherwise requires, the terms or descriptions of products and/or services, and charges imposed by the Dominant Provider of which such products and/or services comprise, used in this Annex shall be construed as having the same meaning as those provided by the Dominant Provider on its website for definitions and explanations of its products in addition to future updates. These are currently found as follows:

- Products and/or services, and charges of which such productsand/or services comprise, within the "Ethernet Services Basket", being the products and/or services in Sections 1 to 2 of this Annex, please refer to <u>http://www.openreach.co.uk/orpg/home/home.do</u>
- Specifically:
  - For EAD services, please refer to <u>http://www.openreach.co.uk/orpg/home/products/ethernetservices/ethernetac</u> <u>cessdirect/ead.do</u>
  - For EBD sevices, please refer to <u>http://www.openreach.co.uk/orpg/home/products/ethernetservices/ethernetba</u> <u>ckhauldirect/ebd.do</u>
  - For BTL services, please refer to <u>http://www.openreach.co.uk/orpg/home/products/ethernetservices/bulktransportlink.do</u>
  - For WES/WEES services, please refer to <u>http://www.openreach.co.uk/orpg/home/products/ethernetservices/wholesalee</u> <u>xtensionservices/wes.do</u>
  - For BES services, please refer to http://www.openreach.co.uk/orpg/home/products/ethernetservices/backhaulex tensionservices/bes.do
  - For Openreach Network Backhaul Service, please refer to <u>http://www.openreach.co.uk/orpg/home/products/ethernetservices/openreach</u> <u>networkbackhaulservices/onbs.do</u>
  - For Backhaul Network Service, please refer to <u>http://www.openreach.co.uk/orpg/home/products/ethernetservices/backhauln</u> <u>etworkservices/bns.do</u>
  - For Cablelink services, please refer to <u>http://www.openreach.co.uk/orpg/home/products/ethernetservices/cablelink/cablelink.do</u>

## Condition 5.4

#### Controls of Retail Analogue Services Basket

- (a) Subject to paragraph (b), the Dominant Provider shall take all reasonable steps to secure that, at the end of each Relevant Year, the Percentage Change (as determined in accordance with paragraph (c)) in the aggregate of charges for all of the products and services in the Retail Analogue Services Basket is not more than the Controlling Percentage (as determined in accordance with paragraph (d)).
- (b) For the purpose of complying with paragraph (a), the Dominant Provider shall take all reasonable steps to secure that the revenue it accrues as a result of all relevant individual charge changes during any Relevant Year shall be no more than that which it would have accrued had it made a single charge change equal to the Controlling Percentage on the first day of the Relevant Year.

For the avoidance of doubt, this obligation shall be deemed to be satisfied where the following formula is satisfied—

$$\sum_{i=1}^{n} \left[ W_1 R_i \frac{(p_{1,i} - p_{0,i})}{p_{0,i}} + W_t R_i \frac{(p_{t,i} - p_{0,i})}{p_{0,i}} \right] \le TRC$$

where---

*n* is the number of products and services in the specified category (i.e. the basket in question);

p0,i is the published charge made by the Dominant Provider for the specific product or service, *i*, on the day immediately before the beginning of the Relevant Year excluding any discounts offered by the Dominant Provider;

*p1,i* is the published charge after the first change in charge in the Relevant Year excluding any discounts offered by the Dominant Provider;

*pt,i* is the published charge made by the Dominant Provider for the specific product or service, *i*, at time, *t*, during the Relevant Year excluding any discounts offered by the Dominant Provider;

*Ri* is the Accrued Revenue in the Relevant Year in respect of the specific product or service, *i*, including in respect of equivalent products or services provided by the Dominant Provider to itself, calculated to exclude any discounts offered by the Dominant Provider;

*W1* is the proportion of the Relevant Year in which the first charge change applies, calculated by the number of days during which the charge was in effect and dividing by the total number of days in the Relevant Year;

*Wt* is the proportion of the Relevant Year in which each subsequent charge,  $p_t$ , is in effect, calculated by the number of days during which the charge is in effect and dividing by the total number of days in the Relevant Year; and

*TRC* is the target revenue change required in the Relevant Year to achieve compliance with paragraph (a), calculated by the Controlling Percentage multiplied by the Accrued Revenue in the Relevant Year.

(c) The Percentage Change for the purpose of the Retail Analogue Services Basket specified in paragraph (a) shall be calculated by employing the following formula—

$$C_{t} = \frac{\sum_{i=1}^{n} \left[ R_{i} \frac{(p_{t,i} - p_{0,i})}{p_{0,i}} \right]}{\sum_{i=1}^{n} R_{i}}$$

where---

*Ct* is the Percentage Change in the aggregate of charges for the products and/or services in the specified category (i.e. the basket in question) at the end of the Relevant Year;

*n* is as defined in paragraph (b);

*Ri* is as defined in paragraph (b);

*p0,i* is as defined in paragraph (b); and

*pt,i* is as defined in paragraph (b).

(d) Subject to paragraphs (e) and (f), the Controlling Percentage in relation to any Relevant Year means for the Retail Analogue Services Basket specified in paragraph (a), RPI increased by 2.5 percentage points.

## Calculation of Carry Forward Percentage

- (e) Where the Percentage Change in any Relevant Year is less than the Controlling Percentage, then for the purpose of the Retail Analogue Services Basket specified in paragraph (a) the Controlling Percentage for the following Relevant Year shall be determined in accordance with paragraph (d), but increased by the amount of such deficiency.
- (f) Where the Percentage Change in any Relevant Year is more than the Controlling Percentage, then for the purpose the Retail Analogue Services Basket specified in paragraph (a) the Controlling Percentage for the following Relevant Year shall be determined in accordance with paragraph (d), but decreased by the amount of such excess.

## Controls of sub-cap

(g) In the case of the Retail Analogue Sub-cap Services, the Dominant Provider shall also and, in any event, take all reasonable steps to secure that, during each Relevant Year, the Percentage Change in each of the charges for each and every

Retail Analogue Sub-cap Service is not more than RPI increased by 10 percentage points.

For the purpose of this paragraph (g), the Percentage Change shall be calculated by employing the formula set out in paragraph (h).

(h) The Percentage Change for the purpose of the Retail Analogue Sub-cap Services shall be calculated by employing the following formula—

$$C_t = \frac{(p_t - p_0)}{p_0}$$

where---

Ct is the Percentage Change in charges for the products and services in the subbasket in question at a particular time t during the Relevant Year;

p0 is the published charge made by the Dominant Provider for the specific product or service, *i*, on the day immediately before the beginning of the Relevant Year excluding any discounts offered by the Dominant Provider; and

*pt* is the published charge made by the Dominant Provider for the specific product or service at the time, *t*, during the Relevant Year excluding any discounts offered by the Dominant Provider.

## General provisions

(i) Where the Dominant Provider makes a material change (other than to a charge) to any product or service which is subject to this Condition 5.4 or to the date on which its financial year ends or there is a material change in the basis of the Retail Prices Index, paragraphs (a) to (h) shall have effect subject to such reasonable adjustment to take account of the change as Ofcom may direct to be appropriate in the circumstances.

For the purposes of this paragraph, a material change to any product or service which is subject to this Condition 5.4 includes the introduction of a new product or service wholly or substantially in substitution for that existing product or service.

(j) The Dominant Provider shall record, maintain and supply to Ofcom in an electronic format, no later than three months after the end of each Relevant Year, the data necessary for Ofcom to monitor compliance of the Dominant Provider with the price control by performing the calculation of the Percentage Change. The data shall include—

i. pursuant to paragraph (a), the calculated percentage change relating to the aggregate of charges for all of the products and services in the Retail Analogue Services Basket;

ii. pursuant to paragraph (b), calculation of the Accrued Revenue as a result of all relevant individual charge charges during any Relevant Year compared to the TRC;

iii. all relevant data the Dominant Provider used in the calculation of the percentage change, Ct, pursuant to paragraph (c), including for each specific product or service, *i*;

iv. all Accrued Revenue during the Relevant Year in respect of each specific product or service, *i*;

v. published charges made by the Dominant Provider at time, *t*, during the Relevant Year excluding any discounts offered by the Dominant Provider;

vi. the relevant published charges at the start of the Relevant Year;

vii. other data necessary for monitoring compliance with the charge control.

- (k) In this Condition 5.4, "Accrued Revenue" means, in any Relevant Year, the revenue deemed to be accrued in that Relevant Year in respect of a specific product or service calculated: (i) in respect of a rental product, by multiplying the volume of rentals as at 30 September preceding the start of the Relevant Year by the average charge (weighted according to the number of days during the Relevant Year on which that charge applied) exclusive of discounts in the Relevant Year; and (ii) in respect each product or service other than a rental product, by multiplying volumes supplied in the 12 months up to and including 30 September preceding the start of the Relevant Year by average actual charges exclusive of discounts in the Relevant Year.
- (I) For the avoidance of doubt, where the Annex to this Condition 5.4 lists a product or service as being available with more than one minimum contract period, the charge for the purposes of determining compliance with this Condition 5.4 shall be deemed to be the charge for the product or service with the shortest minimum contract period.
- (m) Paragraphs (a) to (I) shall not apply to such extent as Ofcom may direct.
- (n) The Dominant Provider shall comply with any direction Ofcom may make from time to time under this Condition.

# Annex to Condition 5.4

## Products and services subject to charge control pursuant to Condition 5.4

## Section 1

#### Meaning of "Retail Analogue Services Basket" and "Retail Analogue Sub-cap Services"

For the purposes of Condition 5.4 the expressions "**Retail Analogue Services Basket**" and "**Retail Analogue Sub-cap Services**" shall be construed as including the list below of the following products and/or services, and the following charges imposed by the Dominant Provider of which such products and/or services comprise. The list is subject to such changes, unless Ofcom direct otherwise, following:

- the withdrawal by the Dominant Provider of one or more of the products and/or services, and/or of one or more of the charges; and/or
- the introduction by the Dominant Provider of a new product and/or service, and/or a new charge, wholly or substantially in substitution for an existing product and/or service and/or charge, in which case this list should shall be construed accordingly.

## **Inland Private Circuits services**

## BT price list section 12 part 1 – Analogue Private Services

Rental charges for:

- Analogue Standard Data and Speech (EPS21 and EPS1)
- Analogue Premier (EPS25B)
- Analogue Network (EPS3N)
- Baseband Standard and Premier (EPS9 and EPS8)
- Omnibus Standard and Premier (EPS61 and EPS72)
- Multipoint Standard and premier (EPS51 and EPS42)
- Each local end
- Baseband local end
- Main link both ends in central London zone
- Main link one or both ends outside central London zone
  - For first 15km or part
  - Over 15km
  - Per additional km or part up to 180km
  - Per additional km or part over 180km
  - Each branching point

## BT price list section 12 part 2 – DealerStream and DealerInterlink services

Rental charges for:

- dealerstream 1
- dealerstream 2
- dealerstream 3
- dealerstream 4
- dealerstream 5
- dealerstream 6

# **BT Analogue services**

# BT price list section 31 Part 4 – Analogue Private Circuit Products

Rental charges

- BT Prime service premium Prime analogue 1020, 1021, 1022, 1030, 1031, 1040 (a), 1041, 1042, 1043, 1044 and 1045
- BT Prime service standard 3020, 3021, 3022, 3030, 3031, 3040 (a), 3041, 3042, 3043, 3044, 3045

## Interpretation

Except insofar as the context otherwise requires, the terms or descriptions of products and/or services, and charges imposed by the Dominant Provider of which such products and/or services comprise, used in this Annex shall be construed as having the same meaning as those provided by the Dominant Provider on its website for definitions and explanations of its products in addition to future updates. These are currently found as follows:

Products and/or services, and charges of which such productsand/or services comprise, within the "Retail Analogue Services Basket" and within the meaning of "Retail Analogue Sub-cap Services", please refer to <a href="http://btbusiness.custhelp.com/app/answers/detail/a\_id/10970/c/2915,2916,3000">http://btbusiness.custhelp.com/app/answers/detail/a\_id/10970/c/2915,2916,3000</a>, 3006

## Condition 5.5

#### Controls of sub-cap for Accommodation Services

(a) The Dominant Provider shall take all reasonable steps to secure that, during each Relevant Year, the Percentage Change in each of the charges for each and every Accommodation Service is not more than RPI reduced by 0 percentage points.

For the purpose of this paragraph (a), the Percentage Change shall be calculated by employing the formula set out in paragraph (c).

## Controls of sub-cap for Overlapping Accommodation Services

- (b) The Dominant Provider shall take all reasonable steps to secure that, in any Relevant Year, each of the charges for each and every Overlapping Accommodation Service is no more than the amount of such a charge that the Dominant Provider charges for the Overlapping Accommodation Service in question at the relevant time for the purpose of providing co-mingling services for wholesale local access or wholesale exchange line rental.
- (c) The Percentage Change shall be calculated by employing the following formula—

$$C_t = \frac{(p_t - p_0)}{p_0}$$

where---

Ct is the Percentage Change in charges for the products and services in the subbasket in question at a particular time t during the Relevant Year;

p0 is the published charge made by the Dominant Provider for the specific product or service, *i*, on the day immediately before the beginning of the Relevant Year excluding any discounts offered by the Dominant Provider; and

*pt* is the published charge made by the Dominant Provider for the specific product or service at the time, *t*, during the Relevant Year excluding any discounts offered by the Dominant Provider.

## General provisions

(d) Where the Dominant Provider makes a material change (other than to a charge) to any product or service which is subject to this Condition 5.5 or to the date on which its financial year ends or there is a material change in the basis of the Retail Prices Index, paragraphs (a) to (c) shall have effect subject to such reasonable adjustment to take account of the change as Ofcom may direct to be appropriate in the circumstances.

For the purposes of this paragraph, a material change to any product or service

which is subject to this Condition 5.5 includes the introduction of a new product or service wholly or substantially in substitution for that existing product or service.

(e) The Dominant Provider shall record, maintain and supply to Ofcom in an electronic format, no later than three months after the end of each Relevant Year, the data necessary for Ofcom to monitor compliance of the Dominant Provider with the price control. The data shall include—

i. pursuant to paragraph (a), the calculated percentage change relating to each of the charges for each and every Accommodation Service;

ii. pursuant to paragraph (b), all charges made by the Dominant Provider in the Relevant Year for each and every Overlapping Accommodation Service provided—

(1) in the Relevant Markets; and

(2) for the purpose of providing co-mingling services for wholesale local access or wholesale exchange line rental;

iii. all relevant data the Dominant Provider used in the calculation of the percentage change, Ct, pursuant to paragraph (c), including for each specific product or service, *i*;

iv. published charges made by the Dominant Provider at time, *t*, during the Relevant Year excluding any discounts offered by the Dominant Provider;

v. the relevant published charges at the start of the Relevant Year; and

vi. other data necessary for monitoring compliance with the charge control.

- (f) Paragraphs (a) to (e) shall not apply to such extent as Ofcom may direct.
- (g) The Dominant Provider shall comply with any direction Ofcom may make from time to time under this Condition.

# Annex to Condition 5.5

## Products and services subject to charge control pursuant to Condition 5.5

## Section 1

## Meaning of "Accommodation Services"

For the purposes of Condition 5.5 the expression "**Accommodation Services**" shall be construed as including the list below of the following products and/or services, and the following charges imposed by the Dominant Provider of which such products and/or services comprise. The list is subject to such changes, unless Ofcom direct otherwise, following:

- the withdrawal by the Dominant Provider of one or more of the products and/or services, and/or of one or more of the charges; and/or
- the introduction by the Dominant Provider of a new product and/or service, and/or a new charge, wholly or substantially in substitution for an existing product and/or service and/or charge, in which case this list should shall be construed accordingly.

## Access Locate and Access Locate Plus services

Access Locate charges

• Contract conversion From RANF to Access Locate. Administration charge (3)

## **Cablelink services**

- External connection charge (pull in external cable up to 24 fibres and provide internal)
- External connection charge (pull in external cable up to 48 fibre and provide internal)
- Internal cable connection charge variant 1 (room to room)
- Internal cable connection charge variant 2 (room to optical frame)
- Internal cable connection charge variant 3 (room to cable chamber splice)
- NGN Cablelink internal and external variants
- BT Cablelink (Backhaul) Link rental charge per annum
- Cancellation charge (external)
- Cancellation charge (internal)
- Optional optical patching shelf for 12 fibres

## Section 2

## Meaning of "Overlapping Accommodation Services"

For the purposes of Condition 5.5 the expression "**Overlapping Accommodation Services**" shall be construed as including the list below of the following products and/or services, and the following charges imposed by the Dominant Provider of which such products and/or services comprise. The list is subject to such changes, unless Ofcom direct otherwise, following:

• the withdrawal by the Dominant Provider of one or more of the products and/or services, and/or of one or more of the charges; and/or

• the introduction by the Dominant Provider of a new product and/or service, and/or a new charge, wholly or substantially in substitution for an existing product and/or service and/or charge, in which case this list should shall be construed accordingly.

## Local Loop Unbundling Plan and build services

Accommodation charges

- Distant location full survey
- Missed joint survey or testing appointment

## **Operator Equipment Room charges**

- Co-location order rejection no space available
- Co-location full survey

## Flexible Comingling charges

- Site visit charge to be allocated to all orders not in conjunction with the installation of a base product
- Co-Mingling order rejection no space or insufficient space available
- APO Cancellation charge
- Co-Mingling set up fee (per sq metre)
- Comingling Shared Point of Presence Administration Fee
- AC Final Distribution Rental per 10kw increment per annum (Charges will appear in billed units of decawatts (10W))
- Cooling per kw

## Comingling Racks that are No Longer Available for New Supply - Upgrade Option charges

- Ancillary Service Structure upgrade from 1-3 Rack Space Units to 4-6 Rack Space Units
- Ancillary Service Structure downgrade from 4-6 Rack Space Units to 1-3 Rack Space Units
- Upgrade of existing MCU1 product to MCU2
- Upgrade of existing BBUSS3 Point Of Presence to BBUSS7 (power and space)
- Upgrade of existing BBUSS 3 Point Of Presence to B-BUSS 7 (space only)
- Downgrade of existing BBUSS 7 Point Of Presence to B-BUSS 3 (space only)
- Upgrade of existing MCU1 / MCU2 to MCU1Max / MCU2Max
- Out of Hours Connection Fee for upgrade of existing MCU1 / MCU2 to MCU1Max / MCU2Max
- Upgrade of existing MCU1 / MCU2 to MCU1MaxAux / MCU2MaxAux
- Out of Hours Connection Fee for upgrade of existing MCU1 / MCU2 to MCU1MaxAux / MCU2MaxAux

Comingling Racks (No Longer Available for New Supply) charges

- Ancillary Service Structure Fixed price to service 1-3 Rack Space Units Product Withdrawn
- Ancillary Service Structure Fixed price to service 4-6 Rack Space Units Product Withdrawn
- Ancillary Service Structure Fixed price to service 7-9 Rack Space Units Product Withdrawn
- Low Capacity Unit (LCU) Product Withdrawn
- Medium Capacity Unit 1 (MCU with 1 customer rack space unit) Product Withdrawn
- Medium Capacity Unit 2 (MCU with 2 customer rack space units) Product Withdrawn
- B-BUSS3 (Broadband Britain Umbilical Services Structure with 3 customer rack space units) Product Withdrawn
- B-BUSS7 (Broadband Britain Umbilical Services Structure with 7 customer rack space units) Product Withdrawn
- MCU1 Max or MCU2 Max initial build Product Withdrawn
- Basic Single Rack Product Withdrawn
- Complete Single Rack Product Withdrawn

Security and Services charges

- Security rental per sq. Metre annual rental
- Service charge per square metre annual rental

## **MDF Site Access services**

Escorted and Unplanned Assisted Access

- BT's Normal Working Hours, planned minimum and hourly charges
- BT's Normal Working Hours, unplanned minimum and hourly charges

MDF Site Access - miscellaneous charges

- Security & Working Practices Audit Note
- BASIS (BT Assisted Site Delivery Service) fixed charge
- Site Access
- Handover
- Security partitioning per site annual rental

## **Power services**

Electricity Supply charges

• Provision of sub meter

## Provision of Standby Epower (ESS) charges

- Survey for capacity upgrade
- Rental of existing capacity per kW per annum (charges will appear in billed units of decawatts (10W)) annual rental
- Provision of sub meter

#### Interpretation

Except insofar as the context otherwise requires, the terms or descriptions of products and/or services, and charges imposed by the Dominant Provider of which such products and/or services comprise, used in this Annex shall be construed as having the same meaning as those provided by the Dominant Provider on its website for definitions and explanations of its products in addition to future updates. These are currently found as follows:

- Products and/or services, and charges of which such productsand/or services comprise, within the meaning of "Accommodation Services" and "Overlapping Accommodation Services", please refer to http://www.openreach.co.uk/orpg/home/products/llu/llu.do
- Specifically:
  - For Access Locate services, please refer to <u>http://www.openreach.co.uk/orpg/home/products/llu/accesslocate/accesslocate</u> <u>e.do</u>
  - For Accommodation services, please refer to <u>http://www.openreach.co.uk/orpg/home/products/llu/comingling/comingling.do</u>

# **Condition 5.6**

#### Controls of the ECC Services

- (a) Subject to paragraph (b), the Dominant Provider shall take all reasonable steps to secure that, during each Relevant Year, the Percentage Change in each of the charges for each of the ECC Services is not more than GBCI reduced by 0 percentage points.
- (b) The Percentage Change shall be calculated by employing the following formula—

$$C_t = \frac{(p_t - p_0)}{p_0}$$

where---

Ct is the Percentage Change in charges for the products and services in the subbasket in question at a particular time, t, during the Relevant Year;

*p0* save for the First Relevant Year, is the published charge made by the Dominant Provider for the specific product or service, *i*, <u>on the day immediately before</u> the beginning of the Relevant Year excluding any discounts offered by the Dominant Provider.

In the First Relevant Year, *p0* for a specific product or service shall be the "Starting Charge Adjustment Value" as specified in Annex B to this Condition 5.6; and

*pt* is the published charge made by the Dominant Provider for the specific product or service prevailing at the time, *t*, during the Relevant Year excluding any discounts offered by the Dominant Provider.

## General provisions

(c) Where the Dominant Provider makes a material change (other than to a charge) to any product or service which is subject to this Condition 5.6 or to the date on which its financial year ends, paragraphs (a) and (b) shall have effect subject to such reasonable adjustment to take account of the change as Ofcom may direct to be appropriate in the circumstances.

For the purposes of this paragraph, a material change to any product or service which is subject to this Condition 5.6 includes the introduction of a new product or service wholly or substantially in substitution for that existing product or service.

(d) The Dominant Provider shall record, maintain and supply to Ofcom in an electronic format, no later than three months after the end of each Relevant Year, the data necessary for Ofcom to monitor compliance of the Dominant Provider with the price control by performing the calculation of the Percentage Change. The data shall includei. pursuant to paragraph (a), the calculated percentage change relating to each of the charges for each and every ECC Service;

ii. all relevant data the Dominant Provider used in the calculation of the percentage change, Ct, pursuant to paragraph (b), including for each specific product or service, *i*;

iii. published charges made by the Dominant Provider at time, *t*, during the Relevant Year excluding any discounts offered by the Dominant Provider;

iv. the relevant published charges at the start of the Relevant Year;

v. other data necessary for monitoring compliance with the charge control.

- (e) Paragraphs (a) to (d) shall not apply to such extent as Ofcom may direct.
- (f) The Dominant Provider shall comply with any direction Ofcom may make from time to time under the Condition 5.6.
## Annex A to Condition 5.6

## Products and services subject to charge control pursuant to Condition 5.6

## Section 1

## Meaning of "ECC Services"

For the purposes of Condition 5.6 the expression "**ECC Services**" shall be construed as including the list below of the following products and/or services, and the following charges imposed by the Dominant Provider of which such products and/or services comprise. The list is subject to such changes, unless Ofcom direct otherwise, following:

- the withdrawal by the Dominant Provider of one or more of the products and/or services, and/or of one or more of the charges; and/or
- the introduction by the Dominant Provider of a new product and/or service, and/or a new charge, wholly or substantially in substitution for an existing product and/or service and/or charge, in which case this list should shall be construed accordingly.

## **Openreach ECC services - Openreach Price List section 4**

Single charges

- Survey Fee/ Planning Charge. This item will only be charged if ECCs are accepted by a customer.
- Resurvey charge (additional to the first survey)
- Breaking/Drilling through each external wall
- Breaking/Drilling through each internal concrete wall
- Breaking/Drilling through each internal non-concrete wall
- Provision of a new footway box (Surface area up to 0.5 sqm)
- Provision of a new medium size footway box (Surface area between 0.5 sqm and 1 sqm)
- Provision of a new large size footway box (Surface area greater than 1 sqm)
- Provision of a new small carriageway box (Surface area up to 1 sqm)
- Provision of a new medium size carriageway box (Surface area between 1 sqm and 1.25 sqm)
- Provision of a new large size carriageway box (Surface area greater than 1.25 sqm)
- Cable (fibre) including any jointing required

## Per meter or part thereof charges

- Blown Fibre
- Blown Fibre Tubing in Duct
- Internal cabling (including Internal Blown Fibre Tubing)
- New Ductwork Soft surface (includes wayleave costs)
- New Ductwork Footway (includes wayleave costs)
- New Ductwork Carriageway (includes wayleave costs)
- Trunking and tray work within end user's cartilage

#### Interpretation

Except insofar as the context otherwise requires, the terms or descriptions of products and/or services, and charges imposed by the Dominant Provider of which such products and/or services comprise, used in this Annex A and Annex B shall be construed as having the same meaning as those provided by the Dominant Provider on its website for definitions and explanations of its products in addition to future updates. These are currently found as follows:

• Products and/or services, and charges of which such productsand/or services comprise, within the meaning of "ECC Services", please refer to <a href="http://www.openreach.co.uk/orpg/home/products/serviceproducts/excessconstruction-charges/excessconstructioncharges.do">http://www.openreach.co.uk/orpg/home/products/serviceproducts/excessconstruction-charges/excessconstructioncharges.do</a>

## Annex B to Condition 5.6

# Starting Charge Adjustment Values pursuant to conditions 5.6

Product and/or service	Proposed start
	charge (£)
Survey Fee	252
Drilling each external wall	235
Drilling each internal wall non concrete	43
Drilling each internal wall concrete	140
Cable installed into duct, buried or installed on poles including any jointing required per metre	4.40
Blown Fibre per metre	3.10
Blown fibre tubing in duct per metre	2.80
Internal cabling (including internal blown fibre tubing) per metre	5.00
New ductwork (including wayleave costs)	
- under soft surface per metre	20
- under foot way per metre	40
- under carriage way or roads per metre	80
Trunking & traywork within customer's curtilage per metre	29
New footway box small (surface area up to 0.5 sqm)	695
New footway box medium (surface area between 0.5 and 1sqm)	1,530
New footway box large (surface area greater than 1sqm)	2,650
Provision of a Small carriageway box (surface area up to 1sqm)	2,450
Provision of a medium carriageway box (surface area between 1and 1.25 sqm)	3,000
Provision of a small carriageway box (surface area above 1.25 sqm)	3,430

## Condition 5.7

## Definitions

In this Condition 5—

- (a) "EAD 1Gbit/s Services Sub-basket" means the products and services listed in Section 2 of the Annex to Condition 5.3;
- (b) "Accommodation Services" means the products and services listed in Section 1 of the Annex to Condition 5.5;
- (c) "AI WECLA Services" means the products and services listed in Section 1 of the Annex to Condition 5.2;
- (d) "BT" means British Telecommunications plc, whose registered company number is 1800000 and any British Telecommunications plc subsidiary or holding company, or any subsidiary of that holding company, all as defined in section 1159 of the Companies Act 2006;
- (e) "Carry Forward Percentage" is to be determined—

(a) for the purposes of Condition 5.1, in accordance with paragraphs 5.1(e) and (f);

(b) for the purposes of Condition 5.3, in accordance with paragraphs 5.3(g) and (h); and

(c) for the purposes of Condition 5.4, in accordance with paragraphs 5.4(e) and (f);

- (f) "Controlling Percentage" is to be determined—
  - (a) for the purposes of Condition 5.1, in accordance with paragraph 5.1(d);
  - (b) for the purposes of Condition 5.3, in accordance with paragraph 5.3(d); and
  - (c) for the purposes of Condition 5.4, in accordance with paragraph 5.4(d);
- (g) "ECC Services" means the products and services listed in Section 1 of Annex A to Condition 5.6;
- (h) "Ethernet All Sub-cap Services" means the products and services listed in Section 3 of the Annex to Condition 5.3;
- (i) "Ethernet Interconnection Services Sub-basket" means the products and services listed in Section 1 of the Annex to Condition 5.3;
- (j) "Ethernet Services Basket" means the products and services listed in Sections 1 to 3 of the Annex to Condition 5.3;
- (k) "First Relevant Year" means a period beginning on 1 April 2013 and ending on 31 March 2014. For the avoidance of doubt, any reference to a Relevant Year includes the First Relevant Year unless the context otherwise requires;
- (I) "GBCI" means the amount of the change in the General Building Cost Index (GBCI) in the period of twelve months ending in the September immediately before the beginning of a Relevant Year, expressed as a percentage (rounded to two decimal

places) of GBCI as at the beginning of that first mentioned period. The GBCI is published by the Building Cost Information Service (BCIS), a service of the Royal Institute of Chartered Surveyors;

- (m) "Overlapping Accommodation Services" means the products and services listed in Section 2 of the Annex to Condition 5.5;
- (n) "Relevant Markets" means the seven wholesale markets set out in Column 1 of Table 1 of Part 1 to this Schedule;
- (o) "Relevant Year" means any of the following three periods: (i) the period beginning on 1 April 2013 and ending on 31 March 2014; (ii) the period beginning on 1 April 2014 and ending on 31 March 2015; or (iii) the period beginning on 1 April 2015 and ending on 31 March 2016;
- (p) "Retail Analogue Services Basket" means the products and services listed in Section 1 of the Annex to Condition 5.4;
- (q) "Retail Analogue Sub-cap Services" means the products and services listed in Section 1 of the Annex to Condition 5.4;
- (r) "Retail Prices Index" means the index of retail prices compiled by an agency or a public body on behalf of Her Majesty's Government or a governmental department (which is the Office for National Statistics at the time of publication of this Notification) from time to time in respect of all items;
- (s) "RPI" means the amount of the change in the Retail Prices Index (All Items) in the period of twelve months ending in the September immediately before the beginning of a Relevant Year, expressed as a percentage (rounded to two decimal places) of that Retail Prices Index as at the beginning of that first mentioned period;
- (t) "Starting Charge Adjustment Value" means for the purposes of Condition 5.6 the relevant value for specific product or service, *i*, as specified in Annex B to Condition 5.6;
- (u) "TI All Sub-cap Services" means the products and services listed in Section 4 of the Annex to Condition 5.1;
- (v) "TI Ancillary, Equipment and Infrastructure Sub-cap Services" means the products and services listed in Section 3 of the Annex to Condition 5.1;
- (w) "TI Basket" means the products and services listed in Sections 1 to 4 of the Annex to Condition 5.1;
- (x) "TI Mobile Services Sub-basket" means the products and services listed in Section 1 of the Annex to Condition 5.1; and
- (y) "TI POH Sub-basket" means the products and services listed in Section 2 of the Annex to Condition 5.1.

## Condition 6 – Publication of a Reference Offer (wholesale)

- 6.1 Except in so far as Ofcom may from time to time otherwise consent in writing, the Dominant Provider shall publish a Reference Offer.
- 6.2 Subject to Condition 6.8, the Dominant Provider shall ensure that a Reference Offer in relation to the provision of network access includes, where applicable, at least the following—

(a) a description of the network access to be provided, including technical characteristics (which shall include information on network configuration where necessary to make effective use of network access);

(b) the locations at which network access will be provided;

(c) any relevant technical standards for network access (including any usage restrictions and other security issues);

(d) the conditions for access to ancillary, supplementary and advanced services (including operational support systems, information systems or databases for preordering, provisioning, ordering, maintenance and repair requests and billing);

- (e) any ordering and provisioning procedures;
- (f) relevant charges, terms of payment and billing procedures;
- (g) details of interoperability tests;
- (h) details of maintenance and quality as follows-

(i) specific time scales for the acceptance or refusal of a request for supply and for completion, testing and hand-over or delivery of services and facilities, for provision of support services (such as fault handling and repair);

(ii) service level commitments, namely the quality standards that each party must meet when performing its contractual obligations;

(iii) the amount of compensation payable by one party to another for failure to perform contractual commitments;

(iv) a definition and limitation of liability and indemnity; and

(v) procedures in the event of alterations being proposed to the service offerings, for example, launch of new services, changes to existing services or change to prices;

(i) details of any relevant intellectual property rights;

(j) a dispute resolution procedure to be used between the parties;

(k) details of duration and renegotiation of agreements;

(I) provisions regarding confidentiality of the agreements;

(m) rules of allocation between the parties when supply is limited (for example, for the purpose of co-location or location of masts);

(n) the standard terms and conditions for the provision of network access;

(o) the amount applied to—

(i) each Network Component used in providing network access with the relevant Usage Factors;

(ii) the Transfer Charge for each Network Component or combination of Network Components described above;

reconciled in each case to the charge payable by a Communications Provider other than the Dominant Provider.

6.3 To the extent that the Dominant Provider provides to itself network access that—

(a) is the same, similar or equivalent to that provided to any other person; or

(b) may be used for a purpose that is the same, similar or equivalent to that provided to any other person;

in a manner that differs from that detailed in a Reference Offer in relation to network access provided to any other person, the Dominant Provider shall ensure that it publishes a Reference Offer in relation to the network access that it provides to itself which includes, where relevant, at least those matters detailed in Condition 6.2(a) to (0).

- 6.4 The Dominant Provider shall, within one month of the date that this Condition enters into force, publish a Reference Offer in relation to any network access that it is providing as at the date that this Condition enters into force.
- 6.5 The Dominant Provider shall update and publish the Reference Offer in relation to any amendments or in relation to any further network access provided after the date that this Condition enters into force.
- 6.6 Publication referred to above shall be effected by the Dominant Provider—

(a) placing a copy of the Reference Offer on any relevant website operated or controlled by the Dominant Provider; and

- (b) sending a copy of the Reference Offer to Ofcom.
- 6.7 The Dominant Provider shall send a copy of the current version of the Reference Offer to any person at that person's written request (or such parts as have been requested).
- 6.8 The Dominant Provider shall make such modifications to the Reference Offer as

Ofcom may direct from time to time.

- 6.9 The Dominant Provider shall provide network access at the charges, terms and conditions in the relevant Reference Offer and shall not depart therefrom either directly or indirectly.
- 6.10 The Dominant Provider shall comply with any direction Ofcom may make from time to time under this Condition.

#### Condition 7 – Notification of charges and terms and conditions

- 7.1 Except in so far as Ofcom may from time to time otherwise consent in writing, the Dominant Provider shall publish charges, terms and conditions and act in the manner set out in this Condition.
- 7.2 Where it proposes an Access Charge Change, the Dominant Provider shall send to Ofcom, and to every person with which it has entered into an Access Agreement pursuant to Conditions 1 and/or 2, an Access Charge Change Notice.
- 7.3 The obligation in Condition 7.2 shall not apply where the Access Charge Change is directed or determined by Ofcom or required by a notification or enforcement notification issued by Ofcom under sections 96A or 96C of the Act.
- 7.4 An Access Charge Change Notice must—
  - (a) in the case of an Access Charge Change involving new network access, be sent not less than 28 days before any such amendment comes into effect;
  - (b) in the case of an Access Charge Change relating solely to a reduction in the price of existing network access (including, for the avoidance of doubt, a Special Offer), be sent not less than 28 days before any such amendment comes into effect; and
  - (c) in the case of any other Access Charge Change involving existing network access, be sent not less than 90 days before any such amendment comes into effect.

For the avoidance of doubt, where the Dominant Provider provides network access under a Special Offer, the Dominant Provider is not required to give an Access Charge Change Notice when the price is increased in accordance with the stated terms of the Special Offer.

- 7.5 The Dominant Provider shall ensure that an Access Charge Change Notice includes—
  - (a) a description of the network access in question;

(b) a reference to the location in the Dominant Provider's current Reference Offer of the terms and conditions associated with the provision of that network access;

(c) the date on which, or the period for which, the Access Charge Change will take effect (the "effective date"); and

(d) the current and proposed new charge and the relevant Usage Factors applied to each Network Component comprised in that network access, reconciled in each case with the current or proposed new charge.

7.6 The Dominant Provider shall not apply any Access Charge Change identified in an

Access Charge Change Notice before the effective date.

7.7 To the extent that the Dominant Provider provides to itself network access that—

(a) is the same, similar or equivalent to that provided to any other person; or

(b) may be used for a purpose that is the same, similar or equivalent to that provided to any other person, in a manner that differs from that detailed in an Access Charge Change Notice in relation to network access provided to any other person,

the Dominant Provider shall ensure that it sends to Ofcom a notice in relation to the network access that it provides to itself which includes, where relevant, at least those matters detailed in Conditions 7.5(a) to (d) and, where the Dominant Provider amends the charges, terms and conditions on which it provides itself with provides network access, it shall ensure it sends to Ofcom a notice equivalent to an Access Charge Change Notice.

## Condition 8 – Quality of service

8.1 The Dominant provider shall publish all such information as to the quality of service in relation to network access provided by the Dominant Provider pursuant to Conditions 1 and/or 2 in such manner and form, and including such content, as Ofcom may from time to time direct.

#### **Condition 9 – Notification of technical information**

9.1 Except in so far as Ofcom may from time to time otherwise consent in writing, where the Dominant Provider provides network access pursuant to Conditions 1 and/or 2 and proposes new or amended terms and conditions relating to the following—

(a) technical characteristics (including information on network configuration, where necessary, to make effective use of the network access provided);

- (b) the locations at which network access will be provided; or
- (c) technical standards (including any usage restrictions and other security issues),

the Dominant Provider shall publish a written notice (the "Notice") of the new or amended terms and conditions within a reasonable time period but not less than 90 days before either the Dominant Provider enters into an Access Agreement to provide the new network access or the amended terms and conditions of the existing Access Agreement come into effect.

9.2 The obligation in Condition 9.1 shall not apply—

(a) where the new or amended charges or terms and conditions are directed or determined by Ofcom or are required by a notification or enforcement notification issued by Ofcom under sections 96A or 96C of the Act; or

(b) in relation to new or amended technical specifications determined by NICC Standards Limited, whose registered company number is 6613589.

9.3 The Dominant Provider shall ensure that the Notice includes—

(a) a description of the network access in question;

(b) a reference to the location in the Dominant Provider's Reference Offer of the relevant terms and conditions;

(c) the date on which or the period for which the Dominant Provider may enter into an Access Agreement to provide the new network access or any amendments to the relevant terms and conditions will take effect (the "effective date").

- 9.4 The Dominant Provider shall not enter into an Access Agreement containing the terms and conditions identified in the Notice or apply any new relevant terms and conditions identified in the Notice before the effective date.
- 9.5 Publication referred to in Condition 9.1 shall be effected by the Dominant Provider—

(a) placing a copy of the Notice on any relevant website operated or controlled by the Dominant Provider;

#### (b) sending a copy of the Notice to Ofcom; and

(c) sending a copy of the Notice to any person at that person's written request, and where the Notice identifies a modification to existing relevant terms and conditions, to every person with which the Dominant Provider has entered into an Access Agreement pursuant to Conditions 1 and/or 2. The provision of such a copy of the Notice by the Dominant Provider may be subject to a reasonable charge.

#### Condition 10 – Requests for new forms of network access

- 10.1 The Dominant Provider shall, for the purposes of transparency, publish guidelines in relation to requests for new forms of network access made to it. Such guidelines shall detail—
  - (a) the form in which such a request should be made;

(b) the information that the Dominant Provider requires in order to consider a request for a new form of network access; and

(c) the timescales in which such requests will be handled by the Dominant Provider in accordance with this Condition.

- 10.2 Such guidelines shall be published within two months of the date that this Condition enters into force following a consultation with Ofcom and Third Parties. The Dominant Provider shall keep the guidelines under review and consult with relevant Third Parties and Ofcom before making any amendments to the guidelines. The Dominant Provider shall make such amendments to the guidelines as Ofcom may direct from time to time.
- 10.3 The Dominant Provider shall, upon a reasonable request from a Third Party considering making a request for a new form of network access, provide that Third Party with information so as to enable that Third Party to make a request for a new form of network access. Such information shall be provided within a reasonable period.
- 10.4 On receipt of a written request for a new form of network access, the Dominant Provider shall ensure that the requirements of this Condition are met. A modification of a request for a new form of network access which has previously been submitted to the Dominant Provider, and rejected by the Dominant Provider, shall be considered as a new request.
- 10.5 Within five working days of receipt of a request under Condition 10.4, the Dominant Provider shall acknowledge that request in writing.
- 10.6 Within fifteen working days of receipt of a request under Condition 10.4 the Dominant Provider shall respond in writing to the requesting Third Party in one of the following ways—

(a) the Dominant Provider shall confirm that the request will be met and shall confirm that the following will be prepared—

- (i) the timetable for the provision of network access;
- (ii) an initial offer of terms and conditions for the provision of network access; and
- (iii) the timetable for the agreement of technical issues;

(b) the Dominant Provider shall confirm that a feasibility study is reasonably required in order to determine whether the request made is reasonable and the Dominant Provider shall set out its objective reasons for the need for such a study;

(c) the Dominant Provider shall confirm that the request is not sufficiently well formulated and, where it does so, the Dominant Provider shall detail all of the defects in the request which has been made; or

(d) the Dominant Provider shall confirm that the request is refused on the basis that it is not reasonable and, where it does so, the Dominant Provider shall detail its reasons for refusal.

10.7 Where the Dominant Provider responds to a request under Condition 10.4 in accordance with Condition 10.6(a) it shall, within thirty five working days of receipt of a request under Condition 10.4, respond further to the requesting Third Party in writing and—

(a) confirm the timetable for the provision of network access;

(b) provide an initial offer of terms and conditions for the provision of network access; and

(c) confirm the timetable for the agreement of technical issues.

- 10.8 Where the Dominant Provider responds to a request under Condition 10.4 in accordance with Condition 10.6(a) and determines, due to a genuine error of fact, that it reasonably needs to complete a feasibility study, it may, as soon as practicable and in any event, within thirty five working days of receipt of a request under Condition 10.4, inform the requesting Third Party that a feasibility study is reasonably required and set out its objective reasons for such a study.
- 10.9 Where Condition 10.8 applies the Dominant Provider shall, within forty five working days from the date that the Dominant Provider informs the requesting Third Party that a feasibility study is reasonably required, respond further to the requesting Third Party, in writing, in one of the following ways—

(a) the Dominant Provider shall confirm that the request will be met and shall—

(i) confirm the timetable for the provision of network access;

(ii) provide an initial offer of terms and conditions for the provision of network access; and

(iii) confirm the timetable for the agreement of technical issues.

(b) the Dominant Provider shall confirm that the request is refused on the basis that it is not reasonable and, where it does so, the Dominant Provider shall detail its reasons for refusal. The Dominant Provider shall provide to Ofcom a copy of the feasibility study and shall provide to the requesting Third Party a non-confidential copy of the feasibility study. 10.10 The time limit set out in Condition 10.9 above shall be extended up to seventy working days from the date that the Dominant Provider informs the requesting Third Party that a feasibility study is reasonably required pursuant to Condition 10.8, if—

(a) circumstances have arisen which, despite the Dominant Provider using its best endeavours, prevent it from completing the feasibility study within forty five working days of the date that the requesting Third Party was informed of the need for a feasibility study pursuant to Condition 10.8; or

(b) the Third Party and the Dominant Provider agree to extend the time limit up to seventy working days.

10.11 The time limit set out in Condition 10.9 above shall be extended beyond seventy working days from the date that the Dominant Provider informs the requesting Third Party that a feasibility study is reasonably required pursuant to Condition 10.8, if—

(a) Ofcom agrees; or

(b) the Third Party and the Dominant Provider agree to extend the time limit beyond seventy working days.

10.12 Where the Dominant Provider responds to a request under Condition 10.4 in accordance with Condition 10.6(b), the Dominant Provider shall, within sixty working days of receipt of a request under Condition 10.4, respond further to the requesting Third Party, in writing, in one of the following ways—

(a) the Dominant Provider shall confirm that the request will be met and shall—

(i) confirm the timetable for the provision of network access;

(ii) provide an initial offer of terms and conditions for the provision of network access; and

(iii) confirm the timetable for the agreement of technical issues.

(b) the Dominant Provider shall confirm that the request is refused on the basis that it is not reasonable and, where it does so, the Dominant Provider shall detail its reasons for refusal. The Dominant Provider shall provide to Ofcom a copy of the feasibility study and shall provide to the requesting Third Party a non-confidential copy of the feasibility study.

10.13 The time limit set out in Condition 10.12 above shall be extended up to eighty five working days of receipt of a request under Condition 10.4, if—

(a) circumstances have arisen which, despite the Dominant Provider using its best endeavours, prevent it from completing the feasibility study within sixty working days of receipt of a request under Condition 10.4; or

(b) the Third Party and the Dominant Provider agree to extend the time limit up to eighty five working days.

10.14 The time limit set out in Condition 10.12 above shall be extended beyond eighty five working days of receipt of a request under Condition 10.4, if—

(a) Ofcom agrees; or

(b) the Third Party and the Dominant Provider agree to extend the time limit beyond eighty five working days.

- 10.15 The Dominant Provider shall keep the processes it has put in place to ensure compliance with this Condition (a description of which has been provided to Ofcom) under review to ensure that they remain adequate for that purpose.
- 10.16 The Dominant Provider shall comply with any direction Ofcom may make from time to time under this Condition.

#### Condition 11 – Provision of retail leased lines

- 11.1 Except where it has withdrawn supply in accordance with Condition 11.2, the Dominant Provider shall continue to supply a retail leased line where the Dominant Provider was supplying that leased line on the date that this Condition enters into force.
- 11.2 If the Dominant Provider proposes to withdraw the supply of a retail leased line, it must send to Ofcom, and to every person to whom it supplies such services, a notice, not less than one year before such withdrawal comes into effect.
- 11.3 The provision of retail leased lines under Condition 11.1 shall be provided on fair and reasonable terms, conditions and charges, and on such terms, conditions and charges as Ofcom may from time to time direct.
- 11.4 The Dominant Provider shall comply with any direction Ofcom may make from time to time under this Condition.

## Condition 12 – No undue discrimination (retail)

- 12.1 The Dominant Provider shall not unduly discriminate against particular persons or against a particular description of persons, in relation to matters connected with the supply of a retail leased line.
- 12.2 In this Condition, the Dominant Provider may be deemed to have shown undue discrimination if it unfairly favours to a material extent an activity carried on by it so as to place at a competitive disadvantage persons competing with the Dominant Provider.

#### Condition 13 – Publication of a Reference Offer (retail)

- 13.1 Except in so far as Ofcom may from time to time otherwise consent in writing, the Dominant Provider shall publish a Reference Offer in relation to the provision of retail leased lines
- 13.2 Subject to Condition 13.7, the Dominant Provider shall ensure that a Retail Reference Offer under Condition 13.1 includes at least the following—

(a) the technical characteristics, including the physical and electrical characteristics as well as the detailed technical and performance specifications which apply at the Network Termination Point;

(b) charges, including the initial connection charges, the periodic rental charges, other charges and discounts (where available);

(c) information concerning the ordering procedure;

(d) the contractual period, which includes the period which is in general laid down in the contract and the minimum contractual period which the user is obliged to accept; and

(e) any refund procedure.

- 13.3 The Dominant Provider shall, within one month of the date that this Condition enters into force, publish a Retail Reference Offer in relation to retail leased lines that it is providing as at the date that this Condition enters into force.
- 13.4 The Dominant Provider shall update and publish the Retail Reference Offer, in relation to any amendments, or in relation to any further retail leased lines provided after the date that this Condition enters into force, on the same day as such amendments take effect or further retail leased lines are offered.
- 13.5 Publication referred to above shall be effected by the Dominant Provider—

(a) placing a copy of the Retail Reference Offer on any relevant website operated or controlled by the Dominant Provider; and

- (b) sending a copy of the Retail Reference Offer to Ofcom.
- 13.6 The Dominant Provider shall send a copy of the current version of the Retail Reference Offer to any person at that person's written request (or such parts which have been requested).
- 13.7 The Dominant Provider shall make such modifications to the Retail Reference Offer as Ofcom may direct from time to time.

- 13.8 The Dominant Provider shall provide retail leased lines at the charges, terms and conditions in the relevant Reference Offer and shall not depart therefrom either directly or indirectly, unless Ofcom otherwise directs.
- 13.9 The Dominant Provider shall comply with any direction Ofcom may make from time to time under this Condition.

# Schedule 3: SMP conditions (KCOM)

## Part 1: Application

1. The SMP conditions in Part 3 of this Schedule 3 shall, except where specified otherwise, apply to the Dominant Provider in each of the relevant markets listed in Column 1 of **Table 1** to the extent specified in Column 2 of **Table 1**.

## Table 1: Relevant markets for the purposes of this Schedule

Column 1: Relevant market	Column 2: Applicable SMP conditions as set out in Part 3 of this Schedule 3
Wholesale market for low bandwidth traditional interface symmetric broadband origination in the Hull Area, at bandwidths up to and including 8Mbit/s	Conditions 1 to 5 inclusive
Wholesale market for medium bandwidth traditional interface symmetric broadband origination in the Hull Area, at bandwidths above 8Mbit/s and up to and including 45Mbit/s	Conditions 1 to 5 inclusive
Wholesale market for high bandwidth traditional interface symmetric broadband origination in the Hull Area, at bandwidths above 45Mbit/s and up to and including 155Mbit/s	Conditions 1 to 5 inclusive
Wholesale market for very high bandwidth traditional interface symmetric broadband origination in the Hull Area, at bandwidths of 622Mbit/s	Conditions 1 to 5 inclusive
Wholesale market for low bandwidth alternative interface symmetric broadband origination in the Hull Area, at bandwidths up to and including 1Gbit/s	Conditions 1 to 5 inclusive
Retail market for low bandwidth traditional interface leased lines in the Hull Area, at bandwidths up to and including 8Mbit/s	Conditions 6 to 8 inclusive
Retail market for low bandwidth alternative interface leased lines in the Hull Area, at bandwidths up to and including 1Gbit/s	Conditions 6 to 8 inclusive

The Conditions referred to in Column 2 of Table 1 are entitled as follows-

Condition 1	Network access on reasonable request
Condition 2	No undue discrimination (wholesale)
Condition 3	Publication of a Reference Offer (wholesale)
Condition 4	Notification of charges and terms and conditions
Condition 5	Notification of technical information
Condition 6	Provision of retail leased lines
Condition 7	No undue discrimination (retail)
Condition 8	Publication of a Reference Offer (retail)

## Part 2: Definitions and interpretation

- 1. In this Schedule 3—
- (a) "Access Charge Change" means any amendment to the maximum charges, terms and conditions on which the Dominant Provider provides network access or in relation to any charges for new network access;
- (b) "Access Charge Change Notice" means a notice given by the Dominant Provider of an Access Charge Change;
- (c) "Access Agreement" means an agreement entered into between the Dominant Provider and a Third Party for the provision of network access in accordance with Condition 1;
- (d) "Act" means the Communications Act 2003 (c. 21);
- (e) "Dominant Provider" means KCOM Group plc, whose registered company number is 2150618, and any of its subsidiaries or holding companies, or any subsidiary of such holding companies, all as defined in section 1159 of the Companies Act 2006;
- (f) "Hull Area" means the area defined as the 'Licensed Area' in the licence granted on November 1987 by the Secretary of State under section 7 of the Telecommunications Act 1984 to Kingston upon Hull City Council and KCOM Group plc;
- (g) "Network Component" means to the extent they are used in the relevant market listed in Column 1 of Table 1 in Part 1 of this Schedule, the network components specified in a direction given by Ofcom from time to time for the purpose of these Conditions;
- (h) "Network Termination Point" means the physical point at which a customer is provided with access to an electronic communications network;

- (i) "Reference Offer" means the terms and conditions on which the Dominant Provider is willing to enter into an Access Agreement;
- (j) "Retail Reference Offer" means the terms and conditions on which the Dominant Provider is willing to enter an agreement for the provision of a retail leased line;
- (k) "Third Party" means a person providing a public electronic communications service or a person providing a public electronic communications network;
- (I) "Transfer Charge" means the charge or price that is applied, or deemed to be applied, by the Dominant Provider to itself for the use or provision of an activity or group of activities. For the avoidance of doubt such activities or group of activities include, amongst other things, products and services provided from, to or within a relevant market listed in Column 1 of Table 1 in Part 1 of this Schedule and the use of Network Components in that market; and
- (m) "Usage Factor" means the average usage by any Communications Provider (including the Dominant Provider itself) of each Network Component in using or providing a particular product or service or carrying out a particular activity.
- 2. For the purpose of interpreting this Schedule—
- (a) except in so far as the context otherwise requires, words or expressions shall have the meaning assigned to them in paragraph 1. of this Part 2, and otherwise any word or expression shall have the same meaning as it has in the Act;
- (b) headings and titles shall be disregarded;
- (c) expressions cognate with those referred to in this Schedule shall be construed accordingly; and
- (d) the Interpretation Act 1978 (c. 30) shall apply as if this Schedule were an Act of Parliament.

#### Part 3: SMP conditions

#### Condition 1 – Network access on reasonable request

- 1.1 The Dominant Provider must provide network access to a Third Party where that Third Party, in writing, reasonably requests it.
- 1.2 The provision of network access by the Dominant Provider in accordance with this Condition must—

(a) take place as soon as reasonably practicable after receiving the request from a Third Party;

(b) be on fair and reasonable terms, conditions and charges; and

(c) be on such terms, conditions and charges as Ofcom may from time to time direct.

- 1.3 The provision of network access by the Dominant Provider in accordance with this Condition shall also include such associated facilities as are reasonably necessary for the provision of network access and such other entitlements as Ofcom may from time to time direct.
- 1.4 The Dominant Provider must comply with any direction Ofcom may make from time to time under this Condition.

#### Condition 2 – No undue discrimination (wholesale)

- 2.1 The Dominant Provider must not unduly discriminate against particular persons or against a particular description of persons, in relation to the provision of network access in accordance with Condition 1.
- 2.2 In this Condition, the Dominant Provider may be deemed to have shown undue discrimination if it unfairly favours to a material extent an activity carried on by it so as to place one or more Third Parties at a competitive disadvantage in relation to activities carried on by the Dominant Provider.

## Condition 3 – Publication of a Reference Offer (wholesale)

- 3.1 Except in so far as Ofcom may from time to time otherwise consent in writing, the Dominant Provider shall publish a Reference Offer.
- 3.2 Subject to Condition 3.8 below, the Dominant Provider shall ensure that a Reference Offer in relation to the provision of network access includes, where applicable, at least the following—

(a) a description of the network access to be provided, including technical characteristics (which shall include information on network configuration where necessary to make effective use of network access);

(b) the locations at which network access will be provided;

(c) any relevant technical standards for network access (including any usage restrictions and other security issues);

(d) the conditions for access to ancillary, supplementary and advanced services (including operational support systems, information systems or databases for preordering, provisioning, ordering, maintenance and repair requests and billing);

- (e) any ordering and provisioning procedures;
- (f) relevant maximum charges, terms of payment and billing procedures;
- (g) details of interoperability tests;
- (h) details of maintenance and quality as follows-

(i) specific time scales for the acceptance or refusal of a request for supply and for completion, testing and hand-over or delivery of services and facilities, for provision of support services (such as fault handling and repair);

(ii) service level commitments, namely the quality standards that each party must meet when performing its contractual obligations;

(iii) the amount of compensation payable by one party to another for failure to perform contractual commitments;

(iv) a definition and limitation of liability and indemnity; and

(v) procedures in the event of alterations being proposed to the service offerings, for example, launch of new services, changes to existing services or change to prices;

(i) details of any relevant intellectual property rights;

(j) a dispute resolution procedure to be used between the parties;

(k) details of duration and renegotiation of agreements;

(I) provisions regarding confidentiality of the agreements;

(m) rules of allocation between the parties when supply is limited (for example, for the purpose of co-location or location of masts);

(n) the standard terms and conditions for the provision of network access;

(o) the maximum amount applied to-

(i) each Network Component used in providing network access with the relevant Usage Factors;

(ii) the Transfer Charge for each Network Component or combination of Network Components described above;

reconciled in each case to the charge payable by a Communications Provider other than the Dominant Provider.

3.3 To the extent that the Dominant Provider provides to itself network access that—

(a) is the same, similar or equivalent to that provided to any other person; or

(b) may be used for a purpose that is the same, similar or equivalent to that provided to any other person;

in a manner that differs from that detailed in a Reference Offer in relation to network access provided to any other person, the Dominant Provider shall ensure that it publishes a Reference Offer in relation to the network access that it provides to itself which includes, where relevant, at least those matters detailed in Conditions 3.2(a)-(o).

- 3.4 The Dominant Provider shall, within one month of the date that this Condition enters into force, publish a Reference Offer in relation to any network access that it is providing as at the date that this Condition enters into force.
- 3.5 The Dominant Provider shall update and publish the Reference Offer in relation to any amendments or in relation to any further network access provided after the date that this Condition enters into force.
- 3.6 Publication referred to above shall be effected by the Dominant Provider—

(a) placing a copy of the Reference Offer on any relevant website operated or controlled by the Dominant Provider; and

(b) sending a copy of the Reference Offer to Ofcom.

- 3.7 The Dominant Provider shall send a copy of the current version of the Reference Offer to any person at that person's written request (or such parts as have been requested).
- 3.8 The Dominant Provider shall make such modifications to the Reference Offer as Ofcom may direct from time to time.

- 3.9 The Dominant Provider shall provide network access at the charges, terms and conditions in the relevant Reference Offer and shall not depart therefrom either directly or indirectly.
- 3.10 The Dominant Provider shall comply with any direction Ofcom may make from time to time under this Condition.

#### Condition 4 – Notification of charges and terms and conditions

- 4.1 Except in so far as Ofcom may from time to time otherwise consent in writing, the Dominant Provider shall publish maximum charges, terms and conditions and act in the manner set out in this Condition.
- 4.2 Where it proposes an Access Charge Change, the Dominant Provider shall send to Ofcom, and to every person with which it has entered into an Access Agreement pursuant to Condition 1, an Access Charge Change Notice.
- 4.3 The obligation in Condition 4.2 shall not apply where the Access Charge Change is directed or determined by Ofcom or required by a notification or enforcement notification issued by Ofcom under sections 96A or 96C of the Act.
- 4.4 An Access Charge Change Notice must—

(a) in the case of an Access Charge Change involving existing network access, be sent not less than 90 days before any such amendment comes into effect (except where the Access Charge Change relates solely to a reduction in the maximum price of network access in which case it must be sent not less than 28 days before any such amendment comes into effect);

(b) in the case of an Access Charge Change involving new network access, be sent not less than 28 days before any such amendment comes into effect.

- 4.5 The Dominant Provider shall ensure that an Access Charge Change Notice includes—
  - (a) a description of the network access in question;

(b) a reference to the location in the Dominant Provider's current Reference Offer of the terms and conditions associated with the provision of that network access;

(c) the date on which, or the period for which, the Access Charge Change will take effect (the "effective date"); and

(d) the current and proposed new charge and the relevant Usage Factors applied to each Network Component comprised in that network access, reconciled in each case with the current or proposed new charge.

- 4.6 The Dominant Provider shall not apply any Access Charge Change identified in an Access Charge Change Notice before the effective date.
- 4.7 To the extent that the Dominant Provider provides to itself network access that—

(a) is the same, similar or equivalent to that provided to any other person; or

(b) may be used for a purpose that is the same, similar or equivalent to that provided to any other person, in a manner that differs from that detailed in an Access Charge Change Notice in relation to network access provided to any other person,

the Dominant Provider shall ensure that it sends to Ofcom a notice in relation to the network access that it provides to itself which includes, where relevant, at least those matters detailed in Conditions 4.5(a) to (d) and, where the Dominant Provider amends the charges, terms and conditions on which it provides itself with provides network access, it shall ensure it sends to Ofcom a notice equivalent to an Access Charge Change Notice.

#### **Condition 5 – Notification of technical information**

5.1 Except in so far as Ofcom may from time to time otherwise consent in writing, where the Dominant Provider provides network access pursuant to Condition 1 and proposes new or amended terms and conditions relating to the following—

(a) technical characteristics (including information on network configuration, where necessary, to make effective use of the network access provided);

(b) the locations at which network access will be provided; or

(c) technical standards (including any usage restrictions and other security issues),

the Dominant Provider shall publish a written notice (the "Notice") of the new or amended terms and conditions within a reasonable time period but not less than 90 days before either the Dominant Provider enters into an Access Agreement to provide the new network access or the amended terms and conditions of the existing Access Agreement come into effect.

5.2 The obligation in Condition 9.1 shall not apply—

(a) where the new or amended charges or terms and conditions are directed or determined by Ofcom or are required by a notification or enforcement notification issued by Ofcom under sections 96A or 96C of the Act; or

(b) in relation to new or amended technical specifications determined by NICC Standards Limited, whose registered company number is 6613589.

5.3 The Dominant Provider shall ensure that the Notice includes—

(a) a description of the network access in question;

(b) a reference to the location in the Dominant Provider's Reference Offer of the relevant terms and conditions;

(c) the date on which or the period for which the Dominant Provider may enter into an Access Agreement to provide the new network access or any amendments to the relevant terms and conditions will take effect (the "effective date").

- 5.4 The Dominant Provider shall not enter into an Access Agreement containing the terms and conditions identified in the Notice or apply any new relevant terms and conditions identified in the Notice before the effective date.
- 5.5 Publication referred to in Condition 5.1 shall be effected by the Dominant Provider—

(a) placing a copy of the Notice on any relevant website operated or controlled by the Dominant Provider;

#### (b) sending a copy of the Notice to Ofcom; and

(c) sending a copy of the Notice to any person at that person's written request, and where the Notice identifies a modification to existing relevant terms and conditions, to every person with which the Dominant Provider has entered into an Access Agreement pursuant to Condition 1. The provision of such a copy of the Notice by the Dominant Provider may be subject to a reasonable charge.

## Condition 6 – Provision of retail leased lines

- 6.1 The Dominant Provider shall supply a retail leased line where the Dominant Provider was supplying that retail leased line on the date that this Condition enters into force or where a new retail leased line is reasonably requested in writing.
- 6.2 The provision of retail leased lines under Condition 6.1 shall be provided on fair and reasonable terms, conditions and charges, and on such terms, conditions and charges as Ofcom may from time to time direct.
- 6.3 The Dominant Provider shall comply with any direction Ofcom may make from time to time under this Condition.

## Condition 7 – No undue discrimination (retail)

- 7.1 The Dominant Provider shall not unduly discriminate against particular persons or against a particular description of persons, in relation to matters connected with the supply of a retail leased line.
- 7.2 In this Condition, the Dominant Provider may be deemed to have shown undue discrimination if it unfairly favours to a material extent an activity carried on by it so as to place at a competitive disadvantage persons competing with the Dominant Provider.

#### Condition 8 – Publication of a Reference Offer (retail)

- 8.1 Except in so far as Ofcom may from time to time otherwise consent in writing, the Dominant Provider shall publish a Retail Reference Offer in relation to the provision of retail leased lines.
- 8.2 Subject to Condition 8.7, the Dominant Provider shall ensure that a Retail Reference Offer under Condition 8.1 includes at least the following—

(a) the technical characteristics, including the physical and electrical characteristics as well as the detailed technical and performance specifications which apply at the Network Termination Point;

(b) maximum charges, including the initial maximum connection charges, the periodic rental charges and other charges;

(c) information concerning the ordering procedure;

(d) the contractual period, which includes the period which is in general laid down in the contract and the minimum contractual period which the user is obliged to accept; and

(e) any refund procedure.

- 8.3 The Dominant Provider shall, within six months of the date that this Condition enters into force, publish a Retail Reference Offer in relation to retail leased lines that it is providing as at the date that this Condition enters into force.
- 8.4 The Dominant Provider shall update and publish the Retail Reference Offer, in relation to any amendments, or in relation to any further retail leased lines provided after the date that this Condition enters into force, on the same day as such amendments take effect or further retail leased lines are offered.
- 8.5 Publication referred to above shall be effected by the Dominant Provider—

(a) placing a copy of the Retail Reference Offer on any relevant website operated or controlled by the Dominant Provider; and

- (b) sending a copy of the Retail Reference Offer to Ofcom.
- 8.6 The Dominant Provider shall send a copy of the current version of the Retail Reference Offer to any person at that person's written request (or such parts which have been requested).
- 8.7 The Dominant Provider shall make such modifications to the Retail Reference Offer as Ofcom may direct from time to time.
- 8.8 The Dominant Provider shall provide retail leased lines at the charges, terms and conditions in the relevant Reference Offer and shall not depart therefrom either directly or indirectly, unless Ofcom otherwise directs.
- 8.9 The Dominant Provider shall comply with any direction Ofcom may make from time to time under this Condition.

#### Annex 8

# **Directions (draft)**

# Schedule 1

[Proposed] Direction under sections 49 and 49A of the Communications Act 2003 and SMP services Condition 1, proposed as a result of the analysis of the wholesale market for low bandwidth traditional interface symmetric broadband origination in the UK excluding the Hull Area, at bandwidths up to and including 8Mbit/s

#### Background

- On [date of final statement] Ofcom concluded its review of the business connectivity markets (BCMR) in which it identified markets, made market power determinations and set appropriate SMP conditions as set out in the Notification at Annex [X] to the BCMR, and explained in the accompanying explanatory statement.
- 2. Ofcom determined in the BCMR that BT, as a Dominant Provider, has significant market power in, amongst others, the wholesale market for low bandwidth traditional interface symmetric broadband origination in the UK excluding the Hull area, at bandwidths up to and including 8Mbit/s.
- 3. SMP services Condition 1 was set in relation to, amongst others, the market referred to in paragraph 2.
- 4. This Direction concerns matters to which SMP services Condition 1 relates.
- 5. For the reasons set out in the explanatory statement accompanying this Direction, Ofcom is satisfied that, in accordance with section 49(2) of the Act, this Direction is:
  - i. objectively justifiable in relation to the networks, services, facilities, apparatus or directories to which it relates;
  - ii. not such as to discriminate unduly against particular persons or against a particular description of persons;
  - iii. proportionate to what it is intended to achieve; and
  - iv. in relation to what it is intended to achieve, transparent.
- 6. For the reasons set out in the explanatory statement accompanying this Direction, Ofcom is satisfied that it has acted in accordance with the relevant duties set out in sections 3 and 4 of the Act.
- 7. Ofcom has considered every representation about the proposed Direction duly made to it and the Secretary of State has not notified Ofcom of any international obligation of the United Kingdom for the purposes of section 49A(6) of the Act.

# NOW, therefore, pursuant to SMP services Condition 1, Ofcom makes the following Direction:

#### Definitions

For the purpose of interpreting this Direction the following definitions shall apply:

"Act" means the Communications Act 2003;

"**Dominant Provider**" means British Telecommunications plc, whose registered company number is 1800000 and any British Telecommunications plc subsidiary or holding company, or any subsidiary of that holding company, all as defined in section 1159 of the Companies Act 2006;

"**Hull Area**" means the area defined as the 'Licensed Area' in the licence granted on 30 November 1987 by the Secretary of State under section 7 of the Telecommunications Act 1984 to Kingston upon Hull City Council and KCOM Group plc;

"**Point of Connection**" means a point at which the Dominant Provider's electronic communications network and another person's electronic communications network are connected;

"**Third Party**" means a person providing a public electronic communications service or a person providing a public electronic communications network.

For the purpose of this Direction the following terms shall have the meaning as set out in the Dominant Provider's Standard PPC Handover Agreement, as at the date of publication of this Direction, but with the necessary changes in order to ensure compliance with the Direction:

- Advance Capacity Order
- Advance Order Commitment
- BT Retail Private Circuit
- BT Serving Node
- Capacity Order
- Capacity Profile
- Customer Sited Handover ("CSH")
- Forecast Profile
- In-Span Handover ("ISH")
- Re-Designation
- Qualifying BT Retail Private Circuit

The following definitions shall also apply for the purpose of this Direction:

Term	Definition
Acceptance of Terms	Date on which a Third Party confirms acceptance of delivery conditions and is committed to the order.
Civil Works	Works that necessitate the digging up of a street for the installation of ducts.
Committed Delivery Date	The date confirmed by the Dominant Provider as the delivery date.
Firm Offer Confirmation ("FOC")	Confirmation by the Dominant Provider in writing (by fax or e-mail) to a Third Party of the delivery conditions including price and Committed Delivery Date, after acknowledging receipt of an order for a Partial Private Circuit or Network Infrastructure from a Third Party.
FOC Acceptance Interval	The number of working days from the FOC Date until the Acceptance of Terms.
FOC Date	The date on which the Dominant Provider makes a Firm Offer Confirmation.
FOC Receipt Interval	The number of working days from the Order Request Date until the FOC Date.
Installation Date	Date of installation of a Partial Private Circuit or Network Infrastructure.
Network Infrastructure	The categories of products listed in the table contained in paragraph 51 of this Direction.
Order Request Date	Date on which a Third Party dispatches a valid Partial Private Circuit order, or Network Infrastructure order, to the Dominant Provider.
Partial Private Circuit ("PPC")	A circuit provided pursuant to the PPC Contract and in accordance with the Directions.
PPC Contract	The Dominant Provider's Standard PPC Handover Agreement as at the date of publication of this Direction.
Provisioning Interval	The number of working days from the Order Request Date until the Installation Date.
Requisite Period	The period commencing on the Order Request Date and ending on the applicable

	working day as set out in the tables in paragraphs 41 and 51 of this Direction.
Reduced Requisite Period	The period commencing on the Order Request Date and ending on the applicable working day as set out in the tables in paragraphs 44 and 54 of this Direction.
Subsequent Partial Private Circuit	A Partial Private Circuit which can be delivered on dedicated pre-provided Network Infrastructure where spare capacity exists.

Except as otherwise defined and/or as the context otherwise requires, words or expressions shall have the same meaning as in the Act.

The Interpretation Act 1978 shall apply as if this Direction was an Act of Parliament.

Headings and titles shall be disregarded.

# The Dominant Provider shall provide Partial Private Circuits and shall do so in accordance with this Direction.

#### Migration

1. The 12 month contractual minimum term placed upon a Third Party, for the provision of a Partial Private Circuit which has been migrated pursuant to the PPC Contract, shall be measured from the date that the original BT Retail Private Circuit was brought into service.

2. The Dominant Provider shall not impose any deadline before which a Third Party must inform the Dominant Provider that it requires a BT Retail Private Circuit to be migrated to an equivalent Partial Private Circuit status under the PPC Contract.

3. The Dominant Provider shall allow a BT Retail Private Circuit, which fell within paragraph 1.3 of the Phase 1 PPC Direction published on 14 June 2002, to be considered under the PPC Contract as a Qualifying BT Retail Private Circuit.

4. A circuit deemed to be a Qualifying BT Retail Private Circuit under paragraphs 20 or 21 of the Phase 2 PPC Direction published on 23 December 2002 shall continue to be a Qualifying BT Retail Private Circuit.

5. Where a Third Party was not previously eligible to migrate a BT Retail Private Circuit to a Qualifying BT Retail Private Circuit, but subsequently becomes eligible to do so, the Dominant Provider shall, for 60 working days following the date on which the Third Party's circuits become eligible for migration, allow migration without the Third Party incurring any penalty (including any default or early termination charge) under its agreement with the Dominant Provider for the provision of BT Retail Private Circuits.

6. Where, at the date of publication of this Direction, the Dominant Provider offers a BT Retail Private Circuit product and does not offer an equivalent Partial Private Circuit product, but subsequently offers to provide an equivalent Partial Private Circuit product, it shall allow a Third Party to migrate to the equivalent Partial Private Circuit product without it incurring any penalty (including any default or early termination charge) under its agreement with the Dominant Provider for the provision of BT Retail Private Circuits, for a period of 60 working days following the date on which the equivalent Partial Private Circuit product is first offered by the Dominant Provider.

7. Where the Dominant Provider has taken, or will take, longer than five working days from receiving a request from a Third Party to migrate a Qualifying BT Retail Private Circuit to a Partial Private Circuit, it shall give to the Third Party a refund as set out in paragraphs 8 and 9 of this Direction.

8. Where paragraph 7 of this Direction applies, the Dominant Provider shall refund to the Third Party a sum of money equal to the difference between:

- the charge levied by the Dominant Provider for the BT Retail Private Circuit to which the request for migration relates; and
- the charge levied by the Dominant Provider for the Partial Private Circuit to which the request for migration relates.

9. The refund set out in paragraph 8 of this Direction shall cover the period from the date the Dominant Provider receives the request to migrate until the date the Dominant Provider completes the migration.

10. The Dominant Provider shall, upon a Third Party's written request, provide to the Third Party a map of its network within the United Kingdom which clearly illustrates and labels the geographic location of each Dominant Provider tier 1, tier 1.5, tier 2, and tier 3 nodes.

#### Forecasts

11. The Dominant Provider shall only require a Third Party to provide a profile of future Partial Private Circuit capacity ordering intentions over a 12 month period, on a national aggregate basis for groupings of bandwidths no narrower than the following:

- less than 1Mbit/s; and
- 1Mbit/s through to 2Mbit/s.

12. The Dominant Provider shall allow a Third Party to set its Advance Capacity Order and Advance Order Commitment without any penalty by up to, 10% (by volume) below, or 20% (by volume) above, the amount stated in the Third Party's previous Capacity Profile or Forecast Profile for the period covered by the Advance Capacity Order or Advance Order Commitment.

13. The Dominant Provider shall allow a Third Party to revise periods covered by its previously stated Capacity Profile and Forecast Profile without any penalty by up to, 30% (by volume) below, or 30% (by volume) above, the amount stated in the Third Party's previous Capacity Profile or Forecast Profile, provided that paragraph 12 of this Direction does not apply.

14. In calculating any increase to an Advance Capacity Order, Advance Order Commitment, Capacity Profile or Forecast Profile pursuant to paragraphs 12 and 13 of this Direction, the outcome of the revision shall, if not an integer, be rounded up to the nearest integer.

15. In calculating any decrease to an Advance Capacity Order, Advance Order Commitment, Capacity Profile or Forecast Profile pursuant to paragraphs 12 and 13 of this Direction, the outcome of the revision shall, if not an integer, be rounded down to the nearest integer.

16. Where a Third Party places a Capacity Order at a Point of Connection for the period corresponding to that of the Advance Capacity Order, which total less than its Advance

Capacity Order for the Point of Connection, the Dominant Provider may levy a charge no more than a sum equal to:

 $[(80\% \text{ of B}) - C] \times \pounds 2,490$ 

Where B is the total capacity provision by number of VC4-equivalent units specified in the relevant Advance Capacity Order in respect of each Point of Connection; and

Where C is the number of VC4-equivalents ordered during the period to which the relevant Advance Capacity Order relates in respect of each Point of Connection, but does not include cancellations of Capacity Orders made during or after the relevant Advanced Capacity Order period, but does include any Capacity Order cancelled as a result of the inability of the Dominant Provider to secure consents for CSH links.

17. Where a Third Party places orders for Partial Private Circuits below 1 Mbit for the period corresponding to that of the Advanced Order Commitment, which total less than its Advance Order Commitment for the Partial Private Circuits below 1 Mbit, the Dominant Provider may levy a charge no more than a sum equal to:

[(80% of B) – C] x £52

Where B is the total Advance Order Commitment for Private Partial Circuits below 1 Mbit; and

Where C is the number of Partial Private Circuits below 1 Mbit ordered during the period to which the Advance Order Commitment relates, but does not include cancellations of orders for Partial Private Circuits made during or after the relevant Advanced Order Commitment period, but does include any order for a Partial Private Circuit cancelled as a result of the inability of the Dominant Provider to secure consents for Partial Private Circuits.

18. Where a Third Party places orders for Partial Private Circuits from 1 Mbit through to 2 Mbit/s for the period corresponding to that of the Advanced Order Commitment, which total less than its Advance Order Commitment for Partial Private Circuits from 1 Mbit through to 2 Mbit/s, the Dominant Provider may levy a charge no more than a sum equal to:

[(80% of B) – C] x £143

Where B is the total Advance Order Commitment for Private Partial Circuits from 1 Mbit through to 2 Mbit/s; and

Where C is the number of Partial Private Circuits from 1 Mbit through to 2 Mbit/s ordered during the period to which the Advance Order Commitment relates, but does not include cancellations of orders for Partial Private Circuits made during or after the relevant Advanced Order Commitment period, but does include any order for a Partial Private Circuit cancelled as a result of the inability of Dominant Provider to secure consents for Partial Private Circuits.

19. [Paragraph not used].

20. In calculating (80% of B) in paragraphs 16 to 18 inclusive of this Direction the outcome shall, if not an integer, be rounded down to the nearest integer.

### Service level agreements (SLAs)

#### General

21. The Dominant Provider shall set a Committed Delivery Date for each Partial Private Circuit or Network Infrastructure ordered from it by a Third Party and shall be required to provide reasons to justify a Committed Delivery Date which is set beyond the relevant Requisite Period (RP) and that any extension of the Committed Delivery Date beyond the relevant Requisite Period (RP) shall be made subject to the consent of the Third Party concerned whose consent shall not be unreasonably withheld.

22. For each Partial Private Circuit or Network Infrastructure ordered from the Dominant Provider by a Third Party, the Dominant Provider shall provide to a Third Party Firm Offer Confirmation in the manner set out in the definition section of this Direction.

23. The time scales and levels of fixed individual compensation payments to be payable under the service level agreement shall be those set out in paragraph 34 of this Direction, unless otherwise agreed between the Dominant Provider and a Third Party, or except to the extent that Ofcom otherwise consents.

24. Unless otherwise agreed between the Dominant Provider and a Third Party, any fixed individual compensation payment, or reimbursement pursuant to paragraph 28 of this Direction, payable by the Dominant Provider to a Third Party pursuant to the Directions shall be offset by the Dominant Provider against the money owed to it by the Third Party, on a quarterly basis. The Dominant Provider shall keep complete and accurate records of the amounts it has offset in accordance with this paragraph. Such records shall be made available by the Dominant Provider following a request by a Third Party.

25. The Dominant Provider shall not be liable to pay fixed individual compensation payments pursuant to the Directions for periods of delay which arise due to circumstances beyond its reasonable control. The Dominant Provider shall notify a Third Party as soon as reasonably practicable when such circumstances arise. All contractors or sub-contractors of whatever level, and their respective employees, servants and agents, shall for the purpose of this paragraph be treated as employees of the Dominant Provider. Major construction works shall not be considered circumstances beyond the Dominant Provider's reasonable control.

26. The Dominant Provider shall ensure that any time limits set out in this Direction shall not apply to a Third Party to the extent that periods of delay arise due to circumstances beyond its reasonable control. The Third Party shall notify the Dominant Provider as soon as reasonably practicable when such circumstances arise. All contractors or sub-contractors of whatever level, and their respective employees, servants and agents, shall for the purpose of this paragraph be treated as employees of the relevant Third Party.

27. The Dominant Provider shall, at the reasonable request of a Third Party, postpone the Committed Delivery Date of a Partial Private Circuit or Network Infrastructure if such postponement is technically and organisationally reasonable. In agreeing to such a postponement the Dominant Provider shall only charge for reasonable additional expenses it has directly incurred as a result of the postponement.

28. The Dominant Provider shall only postpone the Committed Delivery Date of a Partial Private Circuit or Network Infrastructure with the written agreement of the Third Party. The Dominant Provider shall inform the Third Party as soon as reasonably possible of any proposed postponement of the Committed Delivery Date. Where such a postponement takes place the Dominant Provider shall reimburse the Third Party for any reasonable additional cost incurred by the Third Party as a direct result of the postponement.

29. The FOC Receipt Interval shall be a maximum of:

- five working days for Partial Private Circuits of less than 2 Mbit/s; and
- eight working days for Partial Private Circuits of 2 Mbit/s and Network Infrastructure;

regardless of how many Partial Private Circuits are, or the amount of Network Infrastructure is, ordered at a particular site.

30. The Dominant Provider shall ensure that the FOC Acceptance Interval is a maximum of one working day for Partial Private Circuits of 2 Mbit/s or below and two working days for Network Infrastructure. Where a Third Party has not informed the Dominant Provider of its Acceptance of Terms or rejection of the order within five working days of the FOC Date, the Dominant Provider may cancel the Third Party's order.

31. The Dominant Provider shall keep complete and accurate records of the ordering, provision and repair of Partial Private Circuits and Network Infrastructure it provides to a Third Party.

32. Where any Partial Private Circuit or Network Infrastructure which is ordered by a Third Party is in excess of 110% (by volume), rounded up to the nearest integer where necessary, of its Advance Order Commitment or Advance Capacity Order, the applicable Requisite Period set out in the tables in paragraphs 41 and 51 of this Direction shall be extended by 50% and rounded up to the nearest working day, where necessary, for the purposes of calculating fixed individual compensation payments.

#### Unliquidated damages

33. Nothing in the PPC Contract, as amended by the Direction, shall prevent a Third Party from bringing a claim against the Dominant Provider for unliquidated damages over and above the fixed individual compensation payments set out in the Direction.

#### Service level guarantees (SLGs)

34. The Dominant Provider shall ensure the terms and conditions which govern the supply of Partial Private Circuits set out in the PPC Contract continue to provide the following:

#### Compensation per event and value of compensation

a) The Dominant Provider shall pay the Third Party compensation for each day or part day of delay in delivery of service beyond the Committed Delivery Date or the Third Party's Requirement Date (whichever is later).

b) The Dominant Provider shall pay the Third Party compensation for each and every fault which has not been restored:

- for Regular Care customers, in the first two days on a per day basis thereafter; and
- for Enhanced Care customers, in the first five hours on a per hour basis thereafter.

c) The compensation payable in event of the each late provision of the required Partial Private Circuit or Network Infrastructure service shall be set at 100% of one month's line rental (or Network Infrastructure rental) for every day or part day of delay beyond the Committed Delivery Date or Requirement Date (whichever is later), up to a maximum of 60 days.

d) The compensation payable in the event of each late fault repair in relation to a Partial Private Circuit or Network Infrastructure shall be:

- for Regular Care customers, 100% of one month's line rental for every fault which has not been restored in the first two days for every day thereafter until service is restored, up to a maximum of 30 days; and

- for Enhanced Care customers, 15% of one month's line rental for every fault which has not been restored in the first five hours for every hour thereafter until service is restored, up to a maximum of 200 hours.

e) Any limits on compensation payable as a result of a failure to satisfy the service guarantees shall be removed other than those set out in (c) and (d) above.

#### Additional losses

f) Any compensation payable under the contract shall be without prejudice to any right of either party to claim for additional loss.

#### Proactive payments

g) The Dominant Provider shall monitor its performance against the service guarantees for fault repair and provision and compensate Third Parties proactively should it fail to satisfy the service guarantees. Compensation payments shall be made as soon as possible after the event and not later than the billing cycle following the billing cycle after the event unless not practicable. For the avoidance of doubt, compensation shall be payable without the need for a Third Party to make a claim.

35. The terms and conditions amended as set out in paragraph 34 above shall take effect from the 90<sup>th</sup> day after publication of the Final Statement.

#### Partial Private Circuits

#### Quick quote and very high bandwidth quote on line

36. The Dominant Provider shall provide to a Third Party, upon written request, the necessary wholesale network and pricing information to enable the Third Party to obtain the same information for Partial Private Circuits that is available to the Dominant Provider's retail arm, for its "Quick Quote" quote facilities.

#### Concurrency of Partial Private Circuit and ISH link and CSH link delivery times

37. Where a Third Party has ordered a Partial Private Circuit, and the operation of the circuit requires the provision of an ISH link or CSH link, the Dominant Provider shall ensure that the delivery dates of the Partial Private Circuit and the CSH link or ISH link are the same.

#### Expedited orders

38. Upon a Third Party's written request, the Dominant Provider shall make reasonable endeavours to set a Committed Delivery Date for Partial Private Circuits within 50% of the relevant Requisite Period set out in the table in paragraph 41 of this Direction, rounded up to the nearest working day where necessary, for at least 15% (by volume) of a Third Party's previous month's order. The Third Party shall inform the Dominant Provider which particular Partial Private Circuits it shall endeavour to be expedited pursuant to this paragraph. This paragraph shall only apply to the delivery of Partial Private Circuits of 2 Mbit/s or less. This paragraph shall not apply to Partial Private Circuits which exceed 110% (by volume),

rounded up to the nearest integer where necessary, of a Third Party's Advance Order Commitment.

39. Paragraph 48 of this Direction does not apply to orders of Partial Private Circuits made pursuant to paragraph 38 of this Direction.

#### Time scales for fixed individual compensation

40. Where the Committed Delivery Date for Partial Private Circuits is set by the Dominant Provider later than the relevant Requisite Period (as set out in the table in paragraph 41 of this Direction) without the agreement of a Third Party, the Dominant Provider shall be liable to pay the Third Party a fixed individual compensation payment in accordance with paragraph 34 of this Direction.

41. Where the Committed Delivery Date for Partial Private Circuits is set by the Dominant Provider either, later than the relevant Requisite Period (as set out in the table below) but with the agreement of a Third Party, or within the Requisite Period, the Dominant Provider shall be liable to pay the Third Party a fixed individual compensation payment in accordance with paragraph 34 of this Direction.

Bandwidth of Partial Private Circuit	Requisite Period
64 kbit/s	10 working days
128 kbit/s to 256 kbit/s delivered over copper	10 working days
128 kbit/s to 256 kbit/s delivered over fibre	30 working days
320 kbit/s to 960 kbit/s	30 working days
1 Mbit/s	30 working days
2 Mbit/s	30 working days
Subsequent Partial Private Circuit of 2 Mbit/s	10 working days

Third Party's ability to cancel order

42. Where the Provisioning Interval exceeds the relevant Requisite Period set out in the table in paragraph 41 of this Direction, a Third Party shall be allowed to cancel its order for a Partial Private Circuit after the Cancellation Threshold (as set out in the table below) has expired. The Cancellation Threshold shall commence upon the expiry of the relevant Requisite Period set out in the table in paragraph 41 of this Direction. The Requisite Periods in the table in paragraph 41 shall apply, for the purposes of this paragraph, regardless of whether there is a delay in delivery of a Partial Private Circuit which is due to circumstances beyond the Dominant Provider's reasonable control but not including delay by a Third Party.

Requisite Period set out in the table in paragraph 41 of this Direction	Cancellation Threshold
10 working days	10 working days
30 working days	20 working days

43. Where a Third Party cancels a Partial Private Circuit pursuant to paragraph 42 of this Direction, the Dominant Provider shall not charge the Third Party for the circuit and shall not charge for cancelling the circuit. The Dominant Provider shall also be liable to pay the Third

Party any fixed individual compensation payments accumulated pursuant to the PPC Contract as amended by the Directions.

#### Reduced Requisite Periods for Partial Private Circuits

44. The Dominant Provider shall ensure that for at least 70% (by volume) of Partial Private Circuits of a particular bandwidth delivered by the Dominant Party to a Third Party within a three month period (such period not to be calculated on a rolling basis) the Committed Delivery Date is set within the relevant Reduced Requisite Period (as set out in the table below).

Bandwidth of Partial Private Circuit	Reduced Requisite Period	
128 kbit/s to 256 kbit/s delivered over fibre	20 working days	
320 kbit/s to 960 kbit/s	20 working days	
1 Mbit/s	20 working days	
2 Mbit/s	20 working days	

45. In calculating the 70% (by volume) of Partial Private Circuits to which paragraph 44 of this Direction applies the following shall not be included:

- Partial Private Circuits of 64 kbit/s;
- Partial Private Circuits of 128 kbit/s to 256 kbit/s delivered over copper;
- Subsequent Private Partial Circuits of 2Mbit/s;
- Partial Private Circuit orders to which paragraph 38 of this Direction applies; and
- Partial Private Circuits which exceed 110% (by volume), rounded up to the nearest integer where necessary, of a Third Party's Advance Order Commitment.

46. The Reduced Requisite Periods set out in the table in paragraph 44 of this Direction apply only if, in the previous three month reporting period (such period not to be calculated on a rolling basis), a Third Party has ordered from the Dominant Provider at least ten Partial Private Circuits of the same bandwidth where such Partial Private Circuits are 2 Mbit/s or less.

47. For the purposes of this Direction, in determining whether 110% (by volume), rounded up to the nearest integer where necessary, of a Third Party's Advance Order Commitment has been exceeded, the calculation shall be at a national level for each individual Partial Private Circuit bandwidth category and applied in the order in which the Partial Private Circuits were ordered by the Third Party.

#### Multiple orders

48. Where the Dominant Provider receives an order for more than 10 Partial Private Circuits at one site from a Third Party, the relevant Requisite Period applicable to determine whether the Dominant Provider shall pay fixed individual compensation as set out in paragraphs 40 and 41 of this Direction, shall be the relevant Requisite Period set out in the table in

paragraph 41 of this Direction increased by a maximum of 50%. The Dominant Provider shall inform the Third Party of the revised time scales as soon as reasonably practicable.

#### Availability of service

49. When total loss of service (i.e. total loss of service for one minute or longer) occurs three or more times, within a 12 month period, to a Partial Private Circuit, the Third Party shall not be liable to the Dominant Provider for the monthly rental in any subsequent month where total loss of failure occurs to the Partial Private Circuit, until such time as 12 months have passed and the Partial Private Circuit has not suffered total loss of service. Occurrences of total loss of service which result in the Dominant Provider being liable to pay fixed individual compensation pursuant to paragraphs 62, 63 and 64 of this Direction, shall not be considered as an occurrence of a total loss of service for the purposes of this paragraph.

#### Network Infrastructure

#### Time scales for fixed individual compensation

50. Where the Committed Delivery Date for Network Infrastructure is set by the Dominant Provider later than the relevant Requisite Period (as set out in the table in paragraph 51 of this Direction) without the agreement of a Third Party, the Dominant Provider shall be liable to pay the Third Party a fixed individual compensation payment in accordance with paragraph 34 of this Direction.

51. Where the Committed Delivery Date for Network Infrastructure is set by the Dominant Provider either, later than the relevant Requisite Period (as set out in the table below) but with the agreement of a Third Party, or within the Requisite Period, the Dominant Provider shall be liable to pay the Third Party a fixed individual compensation payment in accordance with paragraph 34 of this Direction.

Network Infrastructure	Requisite Period (where the Dominant Provider needs to carry out Civil Works)	Requisite Period (where the Dominant Provider does not need to carry out Civil Works)	
ISH links	110 working days	85 working days	
CSH links	110 working days	85 working days	
ISH links – provision of new multiplexor on an existing Point of Connection	Not applicable	60 working days	
ISH links - provision of extra STM-1 interface on existing STM-1 ISH SMA4 multiplexor	Not applicable	60 working Days	
CSH links - provision of new multiplexor on existing Point of Connection	Not applicable	60 working Days	

CSH links requiring only provision of new tributary card on existing multiplexor

Not applicable

25 working Days

#### Third Party's ability to cancel order

52. Where the Provisioning Interval exceeds the relevant Requisite Period set out in the table in paragraph 51 of this Direction, a Third Party shall be allowed to cancel its order for Network Infrastructure after the Cancellation Threshold (as set out in the table below) has expired. The Cancellation Threshold shall commence upon the expiry of the relevant Requisite Period set out in the table in paragraph 51 of this Direction. The Requisite Periods in the table in paragraph 51 shall apply, for the purposes of this paragraph, regardless of whether there is a delay in delivery of Network Infrastructure which is due to circumstances beyond the Dominant Provider's reasonable control but not including delay by a Third Party.

Requisite Period set out in the table in paragraph 51 of this Direction	Cancellation Threshold
21 to 40 working days	20 working days
41 to 60 working days	25 working days
61 to 90 working days	30 working days
Over 90 working days	40 working days

53. Where a Third Party cancels Network Infrastructure pursuant to paragraph 52 of this Direction, the Dominant Provider shall not charge the Third Party for the Network Infrastructure and shall not charge for cancelling the Network Infrastructure. The Dominant Provider shall also be liable to pay the Third Party any fixed compensation payments accumulated pursuant to the PPC Contract as amended by the Directions.

#### Reduced Requisite periods for Network Infrastructure

54. The Dominant Provider shall ensure that for at least 70% (by volume) of the total VC4equivalents of Network Infrastructure delivered by it to a Third Party during a three month period (such period not to be calculated on a rolling basis) the Committed Delivery Date is set within the relevant Reduced Requisite Period (as set out in the table below).

Network Infrastructure	Reduced Requisite Period (where the Dominant Provider needs to carry out Civil Works)	Reduced Requisite Period where the Dominant Provider does not need to carry out Civil Works)	
ISH links	75 working days	60 working days	
CSH links	75 working days	60 working days	
ISH links - provision of new multiplexor on an existing Point of Connection	Not applicable	40 working days	
ISH links - provision of extra STM-1 interface on			

existing STM-1 ISH SMA4 multiplexor	Not applicable	40 working days
CSH links - provision of new multiplexor on existing Point of Connection	Not applicable	40 working days
CSH links requiring only provision of new tributary card on existing multiplexor	Not applicable	20 working days

55. In calculating the 70% (by volume) of the total VC4-equivalents of Network Infrastructure to which paragraph 54 of this Direction applies the following shall not be included:

- Network Infrastructure which exceeds 110% (by volume), rounded up to the nearest integer where necessary, of a Third Party's Advance Capacity Order.

56. The Reduced Requisite Periods set out in the table in paragraph 54 of this Direction only apply if, in the previous three month reporting period (such period not to be calculated on a rolling basis) a Third Party has ordered from the Dominant Provider at least 2 VC4-equivalents of Network Infrastructure. For the purposes of this paragraph the first reporting period of three months shall be the first such reporting period falling after 30 working days following the date of publication of this Direction.

57. For the purposes of this Direction, in determining whether 110% (by volume), rounded up to the nearest integer where necessary, of a Third Party's Advance Capacity Order has been exceeded, the calculation shall be made using VC4-equivalents at each Point of Connection applied in the order in which the Network Infrastructure was ordered by the Third Party.

#### Repair of Partial Private Circuits and Network Infrastructure

58. Where the Dominant Provider offers to a Third Party Regular Care and Enhanced Care for Partial Private Circuits and Network Infrastructure it shall do so at a cost orientated price and as set out in the table below:

	Operational hours	Repair/response time	Extras
Regular Care	Normal working hours	Response within one working day of receipt of a fault report by a Third Party. Repair within two working days of receipt of a fault report by a Third Party.	If a fault is not remedied within two working days of receipt of a fault report by a Third Party, the Dominant Provider shall call the Third Party to report progress being made to remedy the fault.
Enhanced Care	24 hours per day, 7 days per week (including public and bank holidays).	Response within four hours of receipt of a fault report from a Third Party.	If a fault is not remedied within five hours of receipt of a fault report by a Third Party, the

Repair within five hours of receipt of a fault report by a Third Party.	Dominant Provider shall contact the Third Party to report progress being made to remedy the
	fault.

59. Receipt by the Dominant Provider from a Third Party of a report of a fault concerning a Partial Private Circuit or Network Infrastructure, shall be acknowledged by the Dominant Provider to the Third Party within one hour.

60. Where the Dominant Provider fails to repair a Partial Private Circuit within the time limits set out in the table in paragraph 58 of this Direction it shall pay to the Third Party a fixed individual compensation payment as set out in paragraphs 61 to 65 inclusive of this Direction in respect of the period commencing on the expiry of the applicable repair time set out in the table in paragraph 58 and expiring at the time the Partial Private Circuit or Network Infrastructure is repaired.

61. Where the Third Party has ordered the Dominant Provider's Regular Care for Partial Private Circuits, the Dominant Provider shall pay the Third Party an amount set in accordance with paragraph 34 of this Direction.

62. Where the Third Party has ordered the Dominant Provider's Regular Care for Network Infrastructure, the Dominant Provider shall pay the Third Party an amount set in accordance with paragraph 34 of this Direction.

63. Where the Third Party has ordered the Dominant Provider's Enhanced Care for Partial Private Circuits, the Dominant Provider shall pay the Third Party an amount set in accordance with paragraph 34 of this Direction.

64. Where the Third Party has ordered the Dominant Provider's Enhanced Care for Network Infrastructure, the Dominant Provider shall pay the Third Party an amount set in accordance with paragraph 34 of this Direction.

65. The Dominant Provider shall not be liable to pay fixed individual compensation pursuant to paragraphs 62 and 64 of this Direction where it is also liable for fixed individual compensation pursuant to paragraphs 61 and 63 of this Direction where the Partial Private Circuit is being provided using the Network Infrastructure which is being repaired.

66. The Dominant Provider shall attend, and invite Third Parties to regular meetings to review the level of service provided by it in relation to Partial Private Circuits and related Network Infrastructure.

### Change of speed or interface

67. The Dominant Provider shall offer to provide within a reasonable period of a Third Party's written request, the ability to alter the speed or interface of a Partial Private Circuit.

68. The Dominant Provider shall ensure that it provides to a Third Party a Partial Private Circuit variant for the services to which paragraph 67 of this Direction applies, which are equivalent to the services it currently provides on a retail basis for retail leased lines.

#### STM-1, ISH and CSH handover

69. The Dominant Provider shall offer to provide within a reasonable period of a Third Party's written request for a Synchronous Transfer Mode–1 ("STM-1"), an interface using an ISH link or CSH link; and handover pursuant to paragraph 70 of this Direction. Such link or handover shall be provided by way of network connecting apparatus capable of providing no more than the STM-1 capacity ordered by the Third Party.

70. The Dominant Provider shall within a reasonable period of a Third Party's written request, handover in a footway jointing chamber for Partial Private Circuits at a reasonable point nominated by the Third Party. The footway jointing chamber shall be located in the same Dominant Provider local serving exchange area as the Dominant Provider Serving Node to which the Partial Private Circuits being handed over are connected.

### **Equipment re-use**

71. Paragraph 72 of this Direction shall only apply to the re-use of Plesiochronous Digital Hierarchy ("PDH") and Synchronous Digital Hierarchy ("SDH") equipment situated at a third party site ("Equipment").

72. The Dominant Provider may reject a request by a Third Party for re-use of PDH Equipment **if such re-use would be incompatible with its network.** Any such rejection by the Dominant Provider shall be made within 10 working days of a request by the Third Party and fully justified in writing to the requesting Third Party at the same time as the request is rejected.

#### **Other Circuits**

73. Unless Ofcom otherwise agrees, the Dominant Provider shall offer to provide Partial Private Circuit with no single point of failure, within a reasonable period of a Third Party's request.

74. The Dominant Provider shall offer to provide, within a reasonable period of a Third Party's written request, a Partial Private Circuit which is dual pathed and diversely routed from a third party customer's premises to a Third Party's single Point of Connection.

### **RBS Backhaul**

75. The Dominant Provider shall offer to provide to a Third Party, within a reasonable period of the Third Party's written request, transparent transmission capacity at all bandwidths up to and including a bandwidth capacity of two megabits per second between a radio base station and a Point of Connection with a Third Party's electronic communications network connected to the nearest appropriate digital cross connection node.

#### General

76. The Dominant Provider shall implement this Direction within 10 working days of its publication.

77. This Direction shall take effect on the day it is published.

### [...]

### **Competition Policy Director, Ofcom**

A person duly authorised in accordance with paragraph 18 of the Schedule to the Office of Communications Act 2002

[DATE]

# Schedule 2

Pursuant to SMP services condition 1, Ofcom makes the following direction:

# The Dominant Provider shall provide Ethernet Services and shall do so in accordance with this direction.

#### Service level guarantees (SLGs)

 The Dominant Provider shall ensure the terms and conditions which govern the supply of Ethernet Services in the wholesale markets of the provision of low bandwidth alternative interface symmetric broadband origination at bandwidths up to and including 1Gbit/s in: (i) the UK excluding the Hull Area and the WECLA: and (ii) the WECLA, provide the following<sup>203</sup>:

#### Compensation per event and value of compensation

- a) The definition of "Contractual Delivery Date" as set out in the Dominant Provider's terms and conditions shall be amended to require BT to provide reasons to justify a Contractual Delivery Date which is set beyond the 57<sup>th</sup> day and that any extension of the Contractual Delivery Date beyond the 57<sup>th</sup> shall be made subject to the consent of the Third Party concerned whose consent shall not be unreasonably withheld;
- b) BT shall pay the Third Party compensation for each day or part day of delay in delivery of service beyond the Contractual Delivery Date or the "CP Requirement Date" (as set out in the Dominant Provider's terms and conditions), whichever is later;
- c) BT shall pay the Third Party compensation for each and every fault which has not been restored in the first five hours on a per hour basis thereafter;
- d) The compensation payable in event of the each late provision of the required Backhaul Extension Services, Wholesale Extension Services or Wholesale End-to-End Segments shall be set at 100% of one month's line rental for every day or part day of delay beyond the Contractual Delivery Date or CP Requirement Date (whichever is later), up to a maximum of 60 days;
- e) The compensation payable in the event of each late fault repair in relation to Backhaul Extension Services, Wholesale Extension Services or Wholesale End-to-End Segments shall be 15% of one month's line rental for every fault which has not been restored in the first five hours for every hour thereafter until service is restored. <u>up to a maximum of 200 hours;</u>

Limitations on compensation- removal of caps

- f) Any limits on compensation payable as a result of a failure to satisfy the service guarantees shall be removed <u>other than those set out in d) and e</u>; and Additional losses
- g) Any compensation payable under the contract shall be without prejudice to any right of either party to claim for additional loss.

#### Proactive payments

 b) BT shall monitor its performance against the service guarantees for fault repair and compensate Third Parties proactively should it fail to satisfy the service guarantees. Compensation payments shall be made on a monthly basis. For the avoidance of

<sup>&</sup>lt;sup>203</sup> In particular, the following contracts will require modification to reflect the requirements set out in the direction:(i) the Conditions for Backhaul Extensions Services; and (ii) the Conditions for Wholesale Extension Services.

doubt, compensation shall be payable without the need for a Third Party to make a claim.

#### General

- 2. The Dominant Provider shall implement the direction within 10 working days of its publication.
- 3. This direction shall take effect on the day it is published

[...]

#### **Competition Policy Director**

A person duly authorised in accordance with paragraph 18 of the Schedule to the Office of Communications Act 2002

[DATE]

## Annex 9

# Inclusion of some postcode sectors in Slough in the proposed WECLA geographic market

## Introduction

- A9.1 In the June BCMR Consultation, we proposed to define a separate geographic market in the London area for some of the proposed wholesale product markets. As explained in Section 1, we called this area WECLA it is illustrated in Figure A9.1 below. It represents an expanded area relative to the area we called Central and Eastern London Area (CELA), which area we defined as a separate geographic market for some wholesale products in our previous review of the business connectivity markets (2007/8 Review).
- A9.2 In light of stakeholders' comments and our subsequent market analysis, in the November BCMR Consultation we consulted on whether our proposed definition of the WECLA should also include some postcode sectors in Slough<sup>204</sup> (Slough sectors).
- A9.3 In this section we reproduce the relevant section from the November BCMR Consultation. We discuss stakeholders' comments on this analysis in Section 5.

## Summary

A9.4 For the reasons set out below, in the November BCMR Consultation we proposed to include the Slough sectors in the geographic market to be defined as the WECLA.<sup>205</sup> The Slough sectors and the WECLA as proposed in the June BCMR Consultation are illustrated below.

<sup>&</sup>lt;sup>204</sup> The postcode sectors are: SL1 0, SL1 1, SL1 2, SL1 3, SL1 4, SL1 5, SL1 6, SL2 5, SL3 9, SL6 0, SL6 1, SL6 2, SL6 4 and SL6 8.

<sup>&</sup>lt;sup>205</sup> This proposal is without prejudice to any other decision regarding the WECLA in the forthcoming statement. We are proposing to treat the Slough sectors in the same way as the WECLA, and thus any decisions about how to treat the WECLA in the final statement will similarly apply to the Slough sectors.



#### Figure A9.1: The WECLA and the Slough sectors

- A9.5 Following our further analysis, we now consider that the competitive conditions in this extended geographic area are sufficiently homogeneous such that it should be considered to be one geographic market. This view is based on the application of the criteria we applied to carry out our geographic market definition assessment in the June BCMR Consultation.
- A9.6 For the avoidance of doubt, we do not propose to include postcode sector SL3 0 in the proposed geographic market to be defined as the WECLA.

## How we proposed to define the WECLA geographic market

- A9.7 Our approach to defining the geographic markets is set out at length in the June BCMR Consultation.<sup>206</sup> In short, we defined the proposed geographic markets on the basis of sufficiently homogeneous competitive conditions. The first step was to identify an appropriate geographic unit, which we identified as the postcode sector. <sup>207</sup> The second step was to aggregate postcode sectors into geographic markets where, according to our assessment, the competitive conditions within the area were sufficiently homogeneous and could be distinguished from neighbouring areas where the competitive conditions were appreciably different. To carry out this assessment, we applied the following three cumulative criteria:
  - i) an assessment of the impact of alternative infrastructure;
  - ii) an analysis of wholesale service shares; and

<sup>&</sup>lt;sup>206</sup> See, in particular, Section 5 and Annex 7 of the June BCMR Consultation.

<sup>&</sup>lt;sup>207</sup> The reasoning behind choosing postcode sectors as the geographic unit is provided in paragraphs 5.28 to 5.32 of the June BCMR Consultation. The postcode sector boundary does not have any intrinsic economic significance for the provision of business connectivity services.

- iii) a review of BT's pricing policies.
- A9.8 The application of the first criterion produced geographic reference areas. We then assessed BT's service shares and its pricing policies in those geographic areas.
- A9.9 Regarding the first criterion, in order to measure the presence of alternative infrastructure, we performed what we referred to in the June BCMR Consultation as a 'network reach' analysis. The network reach analysis identified the average number of operators in a postcode sector that have network in proximity to business customers.
- A9.10 The methodology underpinning the network reach analysis is set out in detail in the June BCMR Consultation.<sup>208</sup> We outline the steps below:
  - we identified the network flexibility points<sup>209</sup> of each OCP's<sup>210</sup> network in the UK;
  - we identified the location of each large business site in the UK;
  - a buffer area of 200m was drawn around the location of each business; and
  - the number of different OCPs' networks having network flexibility points within the 200m buffer area around each business site (counting each OCP only once) was calculated.<sup>211</sup>
- A9.11 A postcode sector was deemed to be of high network reach (HNR) where, on average, there were two or more OCPs' networks within the buffer area of the large business sites in the sector.
- A9.12 Having identified postcode sectors with HNR, we applied the requirement of contiguity.<sup>212</sup>
- A9.13 On the basis of this analysis, we considered the contiguous postcode sectors making up the WECLA as a reference area for the purpose of identifying separate geographic markets.
- A9.14 The network reach analysis did identify a number of HNR postcode sectors in Slough (coloured pink in Figure A9.1), however, these were not included in the definition of the WECLA which we proposed in the June BCMR Consultation because they were not strictly contiguous to it (we discuss this further below).
- A9.15 We then took the six proposed wholesale product markets<sup>213</sup> and, for each market, considered whether it was appropriate to define a separate WECLA geographic market. To do this, we applied the second and third criteria above i.e. looking at BT's pricing and wholesale service shares. In particular, for each services market, we considered whether BT's service share in the WECLA looked sufficiently

<sup>&</sup>lt;sup>208</sup> See paragraphs 5.83 to 5.121 of the June BCMR Consultation.

<sup>&</sup>lt;sup>209</sup> A flexibility point is a point on an existing network where a CP, in accordance with its current network planning practice, can add new fibre in order to connect it to end-users. See paragraph 5.88 of the June BCMR Consultation.

<sup>&</sup>lt;sup>210</sup> Defined as "other communications provider" – i.e. a communications provider other than BT.

<sup>&</sup>lt;sup>211</sup> See paragraph 5.90 of the June BCMR Consultation.

<sup>&</sup>lt;sup>212</sup> For a discussion of contiguity refer to paragraphs 5.116 to 5.121 of the June BCMR Consultation.

<sup>&</sup>lt;sup>213</sup> For a discussion of the wholesale product market definition refer to section 4 of the June BCMR Consultation.

different compared to the rest of the country (excluding Hull).<sup>214</sup> Based on the cumulative application of these criteria, we proposed to define a separate WECLA geographic market for four of the six wholesale product markets, in which we considered the competitive conditions in the WECLA differed sufficiently from those in the rest of the UK (excluding Hull). The product markets in which we proposed a separate WECLA market are<sup>215</sup>:

- Medium bandwidth (MB) traditional interface symmetric broadband origination (TISBO), at bandwidths above 8Mbit/s and up to and including 45Mbit/s;
- High bandwidth (HB) TISBO, at bandwidths above 45Mbit/s and up to and including 155Mbit/s;
- Low bandwidth alternative interface symmetric broadband origination (AISBO), at bandwidths up to and including 1Gbit/s; and
- MISBO.
- A9.16 We proposed that the Low bandwidth (LB) TISBO and Very high bandwidth (VHB) TISBO product markets were national in geographic scope (excluding Hull).
- A9.17 Stakeholders have raised a number of comments regarding the geographic market analysis. We do not intend to address all issues raised in this document, but our forthcoming statement will set out our reasoning for the decisions we eventually make, including our response to consultation responses as appropriate. In this document, we are only inviting comments on our proposal to include the Slough sectors in the proposed WECLA geographic market.

## Stakeholders' comments on extending the WECLA to Slough

- A9.18 In response to the June BCMR Consultation, BT argued that the WECLA should be extended to other postcode sectors where there is evidence of competition. In particular, BT commented that postcode sectors in Slough should be included in the WECLA because the same CPs are present in Slough and the WECLA, and OCP networks extend westwards from the WECLA to Slough in a more or less seamless fashion. It noted that the reason why Slough was not included in the WECLA was a single postcode sector (SL3 0) with low network reach<sup>216</sup> between the WECLA and Slough. It noted that several OCPs' networks run through this postcode sector was correct. BT considered that the intense competition observed in Slough should be sufficient to warrant its inclusion in the WECLA even if there was low network reach in the postcode sector SL3 0.
- A9.19 A report from DotEcon attached to BT's response noted that geographical features around postcode sector SL3 0, including the Heathrow Airport site, the M25 motorway and reservoirs around Heathrow, would make it difficult for CPs' networks

<sup>&</sup>lt;sup>214</sup> The Hull area was excluded because BT is not the incumbent operator. The Hull area (where KCOM is the incumbent operator) has been defined as a separate geographic market (see paragraphs 5.46 to 5.48 of the June BCMR Consultation).

<sup>&</sup>lt;sup>215</sup> See section 5 of the BCMR Consultation.

<sup>&</sup>lt;sup>216</sup> Low network reach means a postcode sectors has, on average, less than two OCPs within reach of the large business sites. See paragraph 5.102 of the June BCMR Consultation.

to meet the network reach test. DotEcon said that it was not possible for customer sites or network flexibility points to be located in these areas.

## **Our further analysis**

### Contiguity between the WECLA and the Slough sectors

- A9.20 The Slough sectors are in close geographic proximity to the WECLA, and our analysis classifies them as HNR. However, the Slough sectors are separated from the WECLA by a single postcode sector (SL3 0) where there is low network reach. In light of stakeholders' comments, we have looked specifically at whether the application of strict contiguity might be creating an artificial geographic market distinction to be drawn between the Slough sectors and the WECLA. For the reasons set out below, we now consider that the lack of strict contiguity is not sufficient reason to separate the Slough sectors from the WECLA.
- A9.21 As explained in the June BCMR Consultation, we do not regard it as appropriate to consider individual postcode sectors or small groups of postcode sectors as separate markets, where these are surrounded by areas where there is low network reach.<sup>217</sup> Rather, we are looking for sufficiently sizeable clusters of contiguous postcode sectors in which an assessment of competitive conditions can be carried out which reflects the economic characteristics of the wholesale provision of leased line services within that area and in which the competitive conditions can be distinguished from those of neighbouring areas which are appreciably different. In this context, a general contiguity requirement is a sensible approach to defining geographic markets.
- A9.22 However, the case of Slough is unusual in that there is only a single postcode sector separating the Slough sectors from the WECLA and linkages between the Slough sectors and the WECLA appear to be strong. In this situation, our present view is that, if other evidence suggests that competitive conditions across the Slough sectors and the WECLA are broadly similar, applying strict contiguity as the only reason for not combining the two would result in placing too much weight on this requirement.

# The lack of HNR for postcode sector SL3 0 masks a high degree of connectivity running between Slough and the WECLA

A9.23 The reason why postcode sector SL3 0 is classified as having low network reach relates partly to specific geographic features. Our further analysis shows that SL3 0 is less built-up than most of the postcode sectors in the WECLA and the Slough sectors<sup>218</sup> and most of the large business sites in it are in the small town of Poyle between Heathrow airport and the Queen Mother reservoir (see Figure A9.2 below). Most OCPs have tended to build their network by taking a fairly direct route from the edge of the WECLA towards Slough - which we would expect if their objective was to link sites in Slough to sites in the WECLA.

<sup>&</sup>lt;sup>217</sup> See paragraphs 5.116 to 5.121 and 5.303 to 5.315 of the June BCMR Consultation.

<sup>&</sup>lt;sup>218</sup> The parish of Colnbrook and Poyle which represents the urban area in the sector had a population of 5,408 in the 2001 census, source http://www.ons.gov.uk/ons/rel/census/census-2001-key-statistics/urban-areas-in-england-and-wales-ks01-usual-resident-population.xls

### Figure A9.2 – Postcode sector SL3 0 and surrounding area

Key:



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A9.24 Our information shows that there are four OCPs with network flexibility points running through the sector which suggests that there are alternative providers to BT with continuous connectivity between the WECLA and the Slough sectors. While our analysis does not classify postcode sector SL3 0 as HNR overall, <sup>219</sup> there clearly is a high degree of connectivity between the WECLA and the Slough sectors.

#### There are economic linkages between the Slough sectors and the WECLA

A9.25 We have considered whether there are economic linkages between the WECLA and the Slough sectors which might suggest a single geographic market. To provide

<sup>&</sup>lt;sup>219</sup> The flexibility points are not sufficiently close to the business sites to make the sector HNR.

an indication of the level of economic interaction between the WECLA and the Slough sectors, we have particularly looked at the proportion of retail leased lines provided by OCPs that connect the two areas. We used retail circuit information because we were specifically interested in the end-to-end connectivity required by end-users. <sup>220</sup> Using information provided by OCPs, we have looked at the number of OCP retail AISBO circuits and Wavelength Division Multiplexing (WDM) wavelengths with at least one end in the Slough sectors<sup>221</sup> and worked out the proportion that have the other end in the WECLA. Of the circuits with at least one end in the Slough sectors, we have found that 36 per cent connected to the WECLA.<sup>222</sup> (As a comparison, we calculated the equivalent proportion for Manchester and Birmingham where the results were 7 and 9 per cent respectively.<sup>223</sup>) This level of connectivity is consistent with there being a relatively high degree of economic interaction between the WECLA and the Slough sectors.

A9.26 We have also looked at the limited information provided by OCPs on the retail customers purchasing AISBO circuits and WDM wavelengths in the Slough sectors and the WECLA. We have found that around 40 per cent of the retail customers for which we had information and which were purchasing AISBO/WDM circuits/wavelengths in the Slough sectors also purchased circuits/wavelengths in the WECLA. We consider that this information provides some evidence that leased line customers purchase services across a wider market, including the Slough sectors and the WECLA. However, due to the limited information available, we do not consider that it is conclusive.

### **Conclusion**

- A9.27 Overall, our further analysis shows that:
  - there is close geographic proximity between the Slough sectors and the WECLA;<sup>224</sup>
  - there is a number of competing networks with their own connectivity running through SL3 0 between the Slough sectors and the WECLA;
  - there are economic linkages across the Slough sectors and the WECLA;
  - there are specific geographic features of the postcode sector SL3 0 which contribute towards it being low network reach;
  - there is a lack of any intrinsic economic significance that the postcode sector boundary *per se* has for the provision of business connectivity<sup>225</sup>;
  - there is a HNR observed in the Slough sectors; and

<sup>&</sup>lt;sup>220</sup> Due to equivalence of inputs reporting, in estimating wholesale service shares in the June BCMR Consultation, we did not need to obtain retail circuit information for AISBO products for BT. Therefore BT's retail AISBO circuits are not included in this analysis

<sup>&</sup>lt;sup>221</sup> Some of these circuits have both ends in the Slough sectors.

<sup>&</sup>lt;sup>222</sup> In addition, 13 per cent of the AISBO and WDM circuits had both ends in the Slough sectors.

<sup>&</sup>lt;sup>223</sup> For this exercise, we defined Manchester and Birmingham as the contiguous postcode sectors with HNR in the city centres.

 $<sup>^{224}</sup>$  i.e. the sectors with HNR in the Slough sectors are separated from the WECLA by a single postcode sector (SL3 0).

<sup>&</sup>lt;sup>225</sup> See paragraph 5.118 of the June BCMR Consultation.

- there is scale of leased line provision in the area.
- A9.28 We therefore now consider that the absence of strict contiguity in and of itself should not prevent us from assessing whether the competitive conditions in the Slough sectors and the WECLA are sufficiently homogeneous, such that they may be considered to be in the same geographic market.

#### Assessment of competitive conditions in the Slough sectors and the WECLA

A9.29 Our analysis of the competitive conditions in the Slough sectors focuses on the 14 contiguous sectors with HNR (coloured pink in Figure A9.1). For the cumulative reasons summarised in paragraph A9.26 above, we now consider that these are candidate sectors for inclusion in the WECLA. Our assessment covers the three criteria used in the June BCMR Consultation (set out in paragraph A9.6 above), i.e. the impact of alternative infrastructure, wholesale service shares and BT's pricing. Consistent with the June BCMR Consultation, we have also looked at barriers to effective competition – including limits to OCPs' network coverage and merchant market transactions.

#### Impact of alternative infrastructure

A9.30 We have already identified that the Slough sectors are potentially competitive because our analysis classifies them as HNR. However, this does not tell us about the extent of coverage of each OCP's network across the area. Figure A9.3 below shows the coverage of each OCP's network in terms of; i) the percentage of large businesses within reach<sup>226</sup> and ii) the percentage of sectors where the OCP has network for the WECLA and the Slough sectors. This allows us to assess whether OCPs' networks have sufficient presence across the geographic area to be a credible alternative to BT in the absence of wholesale regulated products.

	WECLA		Slough sectors	
Operator	Businesses	Sectors	Businesses	Sectors
$\times$	90%	99%	80%	87%
$\times$	80%	96%	1%	13%
$\times$	47%	74%	27%	87%
$\times$	44%	76%	29%	73%
$\times$	31%	50%	97%	93%
$\times$	13%	32%	5%	7%
$\times$	13%	37%	13%	85%
$\times$	4%	7%	72%	80%
$\times$	3%	10%	10%	73%
$\times$	2%	8%	2%	7%
$\times$	2%	5%	0%	0%
$\times$	0%	1%	0%	0%
$\times$	0%	2%	0%	0%
$\times$	0%	1%	0%	0%

#### Figure A9.3: OCP coverage – WECLA and Slough sectors

<sup>&</sup>lt;sup>226</sup> By 'within reach', we mean the OCP has a flexibility point within a 200m buffer of the business site.

- A9.31 In other words, the information in Figure A9.3 shows that two OCPs' networks have very significant coverage of the Slough sectors (over 80 per cent of businesses within reach), while a third OCP has good coverage (72 per cent of businesses within reach). Coverage in the Slough sectors compares favourably to that in the WECLA (where two OCPs' networks cover over 80 per cent of businesses and a third OCP covered around half). Overall, the coverage information indicates that most large business sites in the Slough sectors have three possible suppliers of leased lines (in addition to BT).
- A9.32 Considering the WECLA and the Slough sectors together reveals that one OCP's network has extensive coverage over both areas. However, it is notable that the other two OCPs' networks that have good coverage in the Slough sectors have less coverage in the WECLA. These CPs might therefore need to rely on a merchant market to achieve full coverage of both areas, and possibly also for links between them through the SL3 0 postcode sector. One of these two OCPs has its own connectivity between the Slough sectors and the WECLA whilst, as noted above, three other OCPs also have such capacity. We do not therefore think that the need for such capacity would be an obstacle to an operator wishing to compete across both areas. We have investigated this further by looking at OCP wholesale provisions (i.e. excluding use of BT's network) of AISBO circuits and WDM wavelengths that have one end in the Slough sectors. Using data provided by OCPs, we have found that, of the total wholesale AISBO circuits and WDM wavelengths that had at least one end in the Slough sectors, 34 per cent had the other end in the WECLA.<sup>227</sup> This is consistent with OCPs being able to provide circuits/wavelengths between the two areas using their own networks.
- A9.33 We have also looked at the number of OCPs within reach of each individual large business site. This helps us to identify whether there are large businesses who lack alternative suppliers to BT (e.g. while OCP coverage across the area might be good as a whole, there could be pockets of businesses which have poor OCP coverage). The results are presented in Figure A9.4 below.

OCPs within 200m cumulative	Percentage of business sites - WECLA	Percentage of business sites - Slough sectors	
0+	100%	100%	
1+	99%	100%	
2+	96%	95%	
3+	78%	86%	
4+	42%	53%	
5+	18%	11%	
6+	5%	5%	
7+	2%	5%	
8+	1%	0%	
9+	0%	0%	
10+	0%	0%	

# Figure A9.4: Cumulative distribution of OCPs within reach of large businesses – the WECLA and the Slough sectors

<sup>&</sup>lt;sup>227</sup> In paragraph A9.24 we noted that, for OCP retail AISBO circuits and WDM wavelengths with at least one end in the Slough sectors, 36 per cent connected to the WECLA.

A9.34 The results show that across both the WECLA and the Slough sectors the vast majority of large businesses have at least two OCPs' networks within reach. Across the WECLA only 4 per cent of large businesses have less than two OCPs' networks within reach, for the Slough sectors the figure is 5 per cent.

#### LLU/MDF, data centre and MNO sites<sup>228</sup>

- A9.35 In the June BCMR Consultation, we checked alternative operators' infrastructure coverage of the MDF (main distribution frame) sites used by LLU (local loop unbundling) operators, data centre sites and MNO sites across the WECLA on the basis that such sites might require leased line connectivity but might not be included in the dataset of large businesses used in the network reach assessment.<sup>229</sup> We have performed a similar analysis for the Slough sectors. In relation to MDF and data centre sites:
  - we have identified three MDF sites in the Slough sectors. All are within reach of two or more OCPs' networks.
  - we have identified eight data centres in the Slough sectors. Seven of these data centres are connected to two or more OCPs' networks. The remaining data centre is connected to one OCP's network and has flexibility points for three others within 500m reach.
- A9.36 We consider that this information suggests that the alternative infrastructure coverage of MPF and data centre sites across the WECLA and the Slough sectors is similar: nearly all such sites in both areas are within reach of two or more OCPs.
- A9.37 In relation to MNO sites, Figure A9.5 below shows the cumulative distribution for the number of OCPs within reach of mobile sites in the WECLA and the Slough sectors.

Number of OCPs 200m cumulative	Percentage of MNO sites - WECLA	Percentage of MNO sites - Slough sectors		
0+	100%	100%		
1+	98%	82%		
2+	94%	64%		
3+	77%	56%		
4+	47%	26%		
5+	23%	7%		
6+	8%	3%		
7+	4%	1%		

# Figure A9.5: Cumulative distribution of OCPs within reach of mobile sites in the WECLA and the Slough sectors

<sup>&</sup>lt;sup>228</sup> See paragraph 5.147 of the June BCMR Consultation.

<sup>&</sup>lt;sup>229</sup> See paragraphs 5.146 to 5.160 of the June BCMR Consultation.

8+	2%	0%
9+	1%	0%
10+	1%	0%

- A9.38 The majority of mobile sites across both the WECLA and the Slough sectors are within reach of at least two OCPs. However, the information shows that OCP coverage across the Slough sectors and the WECLA is somewhat different. In the WECLA, we have found that 94 per cent of mobile sites have two or more OCPs within reach. For the Slough sectors, the equivalent figure is 64 per cent. Furthermore, a proportion of MNO sites in the Slough sectors (18 per cent) may lack an alternative supplier to BT. However:
  - most mobile sites are currently served by LB TISBO where we are proposing to define a national market (excluding Hull), i.e. this product market is unaffected by the inclusion of the Slough sectors in the WECLA or otherwise;
  - whilst we expect mobile operators to migrate to AISBO for backhaul from base station sites over the course of this forward-looking review<sup>230</sup>, we proposed in the June BCMR Consultation that BT has SMP for AISBO both in the proposed WECLA and the rest of the UK (excluding Hull) markets; and
  - as noted in the June BCMR Consultation, some variation in competitive conditions is to be expected in any geographic market.<sup>231</sup>
- A9.39 In the light of the above information, we do not consider the scale of the apparent differences in network reach affecting MNO sites, in and of itself, to be inconsistent with the definition of a single geographic market.

### Wholesale service shares

A9.40 While our network reach assessment provides an indication of potential competition, we have also looked at evidence on the extent to which OCPs are actually successfully competing with BT. To assess this, we have particularly looked at BT's wholesale service share across the UK (excluding the WECLA and Hull), the WECLA, the Slough sectors and a combined WECLA and Slough sectors area (see Figure A9.6 below).

	UK exc WECLA a	luding and Hull	ding WECLA d Hull		Slough sectors		WECLA and Slough sectors combined	
	Circuit	BT	Circuit	BT	Circuit	BT	Circuit	BT share
	ends	share	ends	share	ends	share	ends	
MB TISBO	7,455	74%	2,772	17%	142	63%	2,914	19%
HB TISBO	4,017	49%	1,510	12%	70	34%	1,580	13%
AISBO	238,207	67%	48,333	41%	2,837	45%	51,170	42%

# Figure A9.6: BT service share – UK, the WECLA, the Slough sectors and WECLA/Slough sectors combined

<sup>&</sup>lt;sup>230</sup> As set out in the June BCMR Consultation, the forward-looking period taken into account for the purposes of this review is three years.

<sup>&</sup>lt;sup>231</sup> See paragraphs 5.21 to 5.42, in particular paragraph 5.22 of the June BCMR Consultation.

MISBO	7,769	59%	2,937	15%	74	7%	3,011	15%
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A9.41 In the Slough sectors, the number of circuit ends for MB TISBO, HB TISBO and MISBO services respectively are very small, both in relation to the proposed UK geographic markets<sup>232</sup> and the WECLA geographic market. For the reasons set out in the June BCMR Consultation<sup>233</sup>, we do not place significant weight on these service share values. However, BT's share in the Slough sectors for the provision of AISBO services, which is by far the largest of these markets, and therefore less susceptible to measurement error, is very similar to that in the WECLA.

#### BT's pricing policies

A9.42 In the June BCMR Consultation, we discussed BT's geographic pricing discounts, concluding that they did not provide strong evidence to assist our assessment of competitive conditions.<sup>234</sup> For completeness, we note that the geographic scope of BT's discounts do not map precisely onto our specification of the WECLA, whether or not the Slough sectors are included as part of the WECLA.

#### Barriers to competition

- A9.43 In the June BCMR Consultation, we considered whether the following were barriers to effective competition in the WECLA:
  - limits to individual operators' coverage in the proposed local geographic market; and
  - limits to merchant market transactions<sup>235</sup> between OCPs (e.g. driven by barriers to interconnection).
- A9.44 We have discussed individual OCPs' networks' coverage above (see paragraphs A1.28 to A1.30).
- A9.45 Merchant market transactions are informative because, absent regulation, the only way an OCP can provide a service in an area where it does not have network is by purchasing wholesale services from other CPs on commercial terms. If there were no or very limited merchant market transactions which involve circuits delivered in the WECLA or the Slough sectors, this information might suggest that only operators with more or less complete coverage of these areas would be able to compete everywhere in it. Figure A9.7 below shows the merchant market ends as a percentage of total circuit ends in the WECLA and the Slough sectors to provide an indication of wholesale activity between OCPs.

#### Figure A9.7: Merchant market circuit ends – the WECLA and the Slough sectors

WE	CLA	Slough sectors		
Merchant	% of total	Merchant	% of total	
ends ends		ends	ends	

<sup>&</sup>lt;sup>232</sup> i.e. the UK market excluding Hull and the WECLA as defined in the June BCMR Consultation, which included the Slough sectors.

<sup>&</sup>lt;sup>233</sup> See, for example, paragraph 5.64 and footnote 37, paragraphs 5.172 and 5.175 of the June BCMR Consultation.

<sup>&</sup>lt;sup>234</sup> See paragraphs 5.162 to 5.166 of the June BCMR Consultation.

<sup>&</sup>lt;sup>235</sup> By merchant market we mean sales by an OCP of leased line capacity on its network to another CP.

MB TISBO	1,299	47%	32	22%
HB TISBO	783	52%	36	51%
AISBO	7,519	16%	508	18%
MISBO	411	14%	11	14%

A9.46 The volume of merchant sales, as a percentage of total ends, in each of the AISBO, HB TISBO and MISBO markets in the Slough sectors is very similar to the equivalent figure for the WECLA. The AISBO market is by far the largest of the product markets (by volume), and so is less likely to be affected by small sample measurement issues. Taking all these SBO products together, the volume of merchant sales, as a percentage of total ends, in the WECLA and the Slough sectors is also very similar. In the June BCMR Consultation, we concluded that the extent of merchant market activity in the WECLA was such that limitations on individual operators' coverage would not warrant a revision of the proposed definition of the WECLA geographic market.<sup>236</sup> We consider this conclusion is also appropriate to the Slough sectors.

# Conclusion

- A9.47 We have considered whether the lack of strict contiguity between the WECLA and the Slough sectors is a barrier, in and of itself, to defining both areas in a single geographic market. Our further analysis shows that this is not a barrier in these specific circumstances due to:
  - the close geographic proximity between the Slough sectors and the WECLA;
  - the number of competing networks with their own connectivity running through SL3 0 between the Slough sectors and the WECLA;
  - the economic linkages across the Slough sectors and the WECLA;
  - the specific geographic features of the postcode sector SL3 0 which contribute towards it being low network reach;
  - the lack of any intrinsic economic significance that the postcode sector boundary *per se* has for the provision of business connectivity;
  - the HNR observed in the Slough sectors; and
  - the scale of leased line provision in the area.
- A9.48 We now consider that the significant connectivity and economic linkages between the Slough sectors and the WECLA (illustrated through OCP AISBO and WDM wholesale and retail circuits running between the WECLA and the Slough sectors) supports the existence of a single economic market.
- A9.49 Our further analysis also shows that the competitive conditions in the WECLA and the Slough sectors are sufficiently similar to include in the same geographic market. In particular:

<sup>&</sup>lt;sup>236</sup> That is, the definition proposed on the basis of the network reach analysis and other criteria. For further discussion see paragraphs 5.200 to 5.209, 5.224 to 5.228, 5.254 to 5.258 and 5.284 to 5.289 of the June BCMR Consultation.

- OCP coverage is extensive in the WECLA and the Slough sectors;
- for the only product market with a substantial number of circuit ends in the Slough sectors (AISBO) BT's service share is similar to the WECLA; and
- the scale of merchant market activity, as a percentage of the total number of circuit ends, is very similar in the WECLA and in the Slough sectors.
- A9.50 In light of our further analysis, we are now proposing that the Slough sectors should be included in the WECLA. The extent of the revised WECLA geographic market is illustrated in Figure A9.1 above (i.e. the blue and pink coloured sectors combined). However, we do not propose to include postcode sector SL3 0 in the WECLA because it is low network reach.<sup>237</sup>

<sup>&</sup>lt;sup>237</sup> In the June BCMR Consultation we did include three sectors in the WECLA which were low network reach but entirely surrounded by HNR sectors. We explained that these sectors had, on average, more than 1.6 OCPs within reach of the business sites, a relatively small number of business sites and a pattern of fibre flexibility points similar to those in HNR sectors (see footnote 55 of the June BCMR Consultation). We do not consider that postcode sector SL3 0 meets these criteria because it is not entirely surrounded by HNR sectors and has a significantly greater number of large business sites (49) relative to the other sectors (that have a maximum of 8 business sites).

## Annex 10

# Equality impact assessment

## Introduction

- A10.1 Ofcom is required by statute to assess the potential impact of all our functions, policies, projects and practices on race, disability and gender equality. Equality impact assessments (EIAs) also assist us in making sure that we are meeting our principal duty of furthering the interests of citizens and consumers regardless of their background or identity.
- A10.2 Unless we otherwise state in this document, it is not apparent to us that the outcome of our review is likely to have any particular impact on race, disability and gender equality. Specifically, we do not envisage the impact of any outcome to be to the detriment of any group of society.
- A10.3 Nor are we envisaging any need to carry out separate EIAs in relation to race or gender equality or equality schemes under the Northern Ireland and Disability Equality Schemes. This is because we anticipate that our regulatory intervention will not have a differential impact in relation to people of different gender or ethnicity, on consumers in Northern Ireland or on disabled consumers compared to consumers in general. Similarly, we are not envisaging making a distinction between consumers in different parts of the UK or between consumers on low incomes. Again, we believe that our intervention will not have a particular effect on one group of consumers over another.

## The business connectivity market review

- A10.4 The aim of the business connectivity market review is to assess the state of competition in the retail and wholesale business connectivity markets and if any operator is found to have SMP to impose regulatory obligations designed to promote competition and to protect consumers.
- A10.5 The main stages in developing the regulatory obligations were:
  - a programme of extensive research and data collection to inform our analysis;
  - definition of the retail business connectivity markets;
  - definition of the wholesale business connectivity markets;
  - assessment of Significant Market Power; and
  - determination of the appropriate remedies for the operators found to have SMP (BT and KCOM).

## Equality impact assessment

A10.6 We have considered whether the remedies we are implementing in the business connectivity markets will have an adverse impact on promoting equality. In particular we have considered whether the remedies will have a different or adverse effect on UK consumers and citizens with respect to: age, disability, gender

reassignment, pregnancy and maternity, race, religion, sex and sexual orientation, and, in Northern Ireland, religious belief and dependents.

- A10.7 The intention behind our approach to regulating the business connectivity markets is to impose a set of regulatory obligations on CPs with SMP that will promote competition by requiring them to provide other CPs with access to their networks on regulated terms, and to protect consumers by preventing abusive conduct such as over-charging.
- A10.8 We do not have detailed sectoral information on the businesses that purchase wholesale business connectivity services or whether there is a correlation between the customers of their products or services and the defined equality groups. We also do not have information any correlation between retail business connectivity services and the defined equality groups.
- A10.9 However, we do not have any reason to suspect that the benefit of remedies we are implementing would not be the same for all consumers and business, nor that there would be a correlation between the affected consumers and businesses and any of the above defined equality groups. On that basis we believed that it would be disproportionate to commission relevant research.
- A10.10 We also did not find any reason to suspect that there would be potential for negative impacts against the defined equality groups.
### Annex 11

# Voluntary undertakings

A11.1 In this annex we reproduce the undertakings given to Ofcom by KCOM about wholesale leased line prices in Hull.



KCOM Group PLC

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Marina Gibbs Ofcom Riverside House 2A Southwark Bridge Road London SE1 9HA

5 February 2013

Desimarina,

#### KCOM wholesale leased line pricing - voluntary undertakings

Further to our recent discussions, I am writing to set out voluntary undertakings with respect to the provision of wholesale leased line services in the Hull area.

KCOM commits to annual reductions for wholesale leased line pricing over a 3 year term commencing 1 April 2013, with subsequent price changes taking place on 1 April 2014 and 1 April 2015. The services to which these reductions will apply and the level of the reductions are as follows:

		Connection RPI -	Rental RPI -
	2Mb	0%	8%
Inter -	10Mb	0%	9%
connect	100Mb	0%	11%
	1000Mb	15%	20%
	2Mb	0%	8%
2 Ends	10Mb	0%	21%
Exchange	100Mb	0%	29%
Exenange	1000Mb	15%	28%
1.2.1	2Mb	0%	15%
2 Ends	10Mb	0%	15%
Exchange	100Mb	0%	23%
-nonango	1000Mb	15%	24%

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KCOM Group PLC

We note the following:

- In setting prices we will apply an RPI- calculation using the RPI figure published for the period ending 31 December each year, which will be applied in calculating pricing to take effect from the immediately following April.
- With respect to Kiloine, Kiloline N products (bandwidth below 1Mb) and 34Mbit/s and 155Mbit/s services in our proposals we intend to maintain the pricing of these services at current levels for the period until 31 March 2016.

We note that these commitments are voluntary and that we reserve the right to vary or terminate them. In particular, given the significant investment in and transformation of our network in the Hull area over the next few years it is likely we will undertake a review of our network costing methodology prior to the next market review. If we do so and believe that adjustments are necessary to the commitments set out in this letter, we undertake to discuss any changes we believe necessary with Ofcom with a view to agreeing mutually acceptable adjustments to these undertakings.

Yours sincerely

Sean Royo **Commercial and Finance Director** 



ered Office: 37 Cam Lane Hull HU1 3RE Registered Number 2150618 England and Wales.

### Annex 12

# Ofcom's forecasting model

### Introduction

- A12.1 We have developed a cost forecasting model (the 'LLCC model') in order to calculate a value of X for the main baskets in the charge control. For each basket, we have decided that BT will be required to ensure that its charges for the services in question do not increase by more than RPI plus or minus the value of X.
- A12.2 This annex:
  - provides an overview of the LLCC model;
  - details our base case cost adjustments;
  - shows our volume forecasts;
  - explains how we have applied the MEA approach;
  - explains our cost forecasting approach;
  - explains how we calculated the reallocation between the TI and Ethernet baskets; and
  - shows our values of X.

### **Overview of model structure**

A12.3 The objective of the LLCC model is to estimate how the costs of providing the relevant services will change over the period of the proposed charge control. In so doing, we have structured the LLCC model as illustrated in Figure A12.1.



#### Figure A12.1: The LLCC model structure

- A12.4 In summary, according to the structure illustrated by Figure A12.1 we firstly calculate the respective base year costs for the TI and Ethernet baskets. The base year cost data comes from BT's RFS, as well as data supplied by BT in response to the information requests. We make adjustments to such data to reflect our proposed structure of the baskets, as well as to reflect forward looking efficient costs.
- A12.5 Secondly, we forecast the costs in the final year of the charge control. Total costs are forecast based on how different types of costs vary with respect to the underlying volume changes, subject to assumptions such as efficiency, asset price changes and the WACC.
- A12.6 Thirdly, we determine what the revenues would be at the end of the charge control by multiplying service volumes by their respective prices. In effect, this is what revenues would be in the absence of any price changes from current levels.
- A12.7 Finally, we calculate the value of X for the basket in question such that forecast total revenues within each basket are equal to forecast total costs in the final year of the charge control. We calculate the value of X as follows:

 $X = (Costs_T / [Price_0 * Volumes_T])^{1/3} - 1$ 

Where:

 $Costs_T$  = Forecast costs at the end of the charge control (2015/16)

 $Price_0 = Service prices at the start of the charge control (2012/13)$ 

Volumes<sub>T</sub> = Service volumes at the end of the charge control.

A12.8 In the sections below, we further describe in detail how we adjust base year cost data.

# Main adjustments to BT's base year costs in 2011/12

- A12.9 The starting point for the base year costs data is BT's RFS for 2011/12. The data supplied both by BT Wholesale and Openreach in response to our information requests have provided us with detailed disaggregation of costs that have been prepared on the same basis as those in the RFS. The 2011/12 RFS are the latest fully audited set of regulatory accounts that we had at our disposal for the purpose of carrying out the charge control modelling.
- A12.10 BT has provided disaggregated financial data for 2011/12 on a component basis for the leased line services at the same level of aggregation as those reported in the RFS.<sup>238</sup> For example, costs for WES services are available for some bandwidths (10Mbit/s, 100Mbit/s and 1Gbit/s) but aggregated across others (2Mbit/s, 155Mbit/s and 622Mbit/s).<sup>239</sup>
- A12.11 We adjust the cost data to ensure that these are representative of the relevant level of costs for the respective baskets on a forward looking basis for setting this charge control. We also consider whether to make one-off adjustments to starting charges, which requires reliable cost data matched to revenues.
- A12.12 We implement two main types of adjustments, described in detail in Figure A12.2 below, namely:
  - adjustments to reflect the composition of the basket; and
  - adjustments to base year costs to reflect forward looking efficient costs for the purposes of forecasting costs to 2015/16.
- A12.13 In their response to the LLCC Consultation, one stakeholder referred to a decision by the Valuation Office Agency [**X**].<sup>240</sup>
- A12.14 The stakeholder referred to Ofcom's assessment of BT's cumulo bill in the context of Ofcom's Statement on the WLR LLU CC<sup>241</sup> and submitted that by the same or similar method Ofcom has to calculate the cumulo charge on fibre and its movement as a component of the LRIC as part of determining costs. Cumulo is included as a part of BT's land and building costs, an input to our model.
- A12.15 In the light of these submissions, we have considered whether this approach remains appropriate. For the purposes of this charge control we are seeking to constrain BT's pricing in a way which appropriately addresses (alongside other remedies being imposed) the competition concerns we have identified in areas we

http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2012/DAM 2012.pdf

<sup>239</sup> See the RFS for more details of the services reported: p.42 to p.50 for PPC terminating segments, p.51 to p.54 for Ethernet services, and p.71 to p.72 for PPC trunk segments: http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2012/RFS\_2012.pdf

<sup>&</sup>lt;sup>238</sup> Network components are the underlying pieces of infrastructure / activities that make up each service. Every service reported by BT uses one or more components. For example, PPC 64kbit/s - link uses the following components: PC rental 64kbit link, SG & A partial private circuits and SG & A private circuits. Network access provided by BT Wholesale for downstream services was based on components that were common to PPCs sold externally. BT's total network costs were disaggregated into these network components. Costs of a service is then dependent on the amount of costs attributed to these components, which are described in BT's Detailed Attribution Methodology document:

<sup>&</sup>lt;sup>240</sup> [**×**]

<sup>&</sup>lt;sup>241</sup> See WLR LLU CC Statement

have found SMP. As part of this process Ofcom is not seeking to replicate or question the Valuation Office Agency's ratings process. We do not therefore think it would be appropriate to make an adjustment to our approach to BT's land and building costs to take account of the cumulo bill of a third party.

#	Question	Type of adjustment	Examples
1	Do BT's reported figures reflect the composition of our basket?	Inclusion or exclusion of service data to reflect composition of the basket	Exclusion of SDSL, POH, protected paths, resilience and other ancillary services
			Geographic adjustment
2	Are any adjustments needed to provide a more	Amendments to base year data	Mismatch of revenues and costs such as:
	profitability for 2011/12?		• transmission equipment costs
			• payment terms
3	Does our adjusted accounti	ng view provide a suitable basi	s for price controls in terms of:
а	Reflecting one-off events or abnormal levels of cost	Smoothing of costs & revenues	Normalisation of current cost holding gains/losses
	or revenue?	i.e. adjustment to reflect expected levels of future costs or revenues	
b	How we expected BT to recover particular items of cost in future?	Implementation of our cost recovery methodologies through adjustments to costs and revenues	Adjustment to make cost recovery profile for duct consistent with BT's RAV

#### Figure A12.2: Types of adjustments made to base year costs

### TI basket

A12.16 In Figure A12.3 below we set out the different types of adjustments we make to the 2011/12 data for the TI basket, our reasoning and the data used for each of these adjustments. In some cases our approach to cost adjustments has changed compared to the LLCC Consultation. Details on such changes and their rationale are provided in Section 19.

# Figure A12.3: Adjustments to reported 2011/12 costs, revenues & volumes for the traditional interface (TI) basket

#### # Description of adjustment

Mechanics / source data used

#### Non-core services

#### 1 Ancillary services and Points of Handover

We model only core services for determining the X to be applied to the TI basket. BT charges customers for other services used in the provision of the core TI services, known as 'ancillary services'. We do not model these services because there would be a significant amount of data and assumptions required in order to forecast the volume of ancillary services. Figure A12.4 shows that, in terms of revenues, these account for around 5% of all TI services and therefore would only have a small impact on the value of X if there were included in the modelling analysis.

For POH services we analysed these charges on a different basis.

# 2 Protected paths and separation & diversity costs

BT's RFS separately identify the revenues and an estimate of the costs for protected path variants and separation and diversity circuits. We eliminate these from our modelling analysis since our X is based on the costs and revenues of the core TI services.

Our forecasts assume that the volumes for the core TI basket services do not include protected path variant or separation and diversity circuit volumes.

#### Services out of scope of TI basket

#### 3 SDSL

BT includes SDSL within the reporting for TI services. SDSL is a legacy product that BT Wholesale does not intend to support beyond spring 2014. We exclude SDSL from the basket.

We have excluded POH services and ancillary services from our modelling. Ancillary services data is not included in the RFS.

POH revenues and costs are separately identified in the RFS and we have excluded revenues and costs consistent with these services from our modelling analysis for setting the overall basket cap.

BT's estimate of costs in the RFS does not include all resilience and separation costs, as some of the costs have been included within other services.

BT has provided an estimate of additional resilience and protected path costs that are included within other services in the RFS. We have eliminated these additional costs against reported services. We have excluded the impact on holding gains and other CCA adjustments as we model those separately.

We have eliminated SDSL costs and revenues from our analysis based on the reporting in the RFS.

#	Description of adjustment	Mechanics / source data	a used		
4	<b>Geographic disaggregation</b> We state in Section 7 that no operator has SMP in medium and high bandwidth TI services in the WECLA. <sup>242</sup> We therefore exclude the costs and revenues associated with the WECLA from	BT has analysed the costs for TI services t vary by geography and has provided calcu of the extent of the difference between the WECLA and the rest of the UK. BT Wholes methodology <sup>243</sup> can be summarised as follow			
	our modelling.	BT Wholesale categorise related costs, equipment costs. It then calculated h equipment related costs Based on these estimates differentials to the overall categories on a per circuit	d costs into related cos low costs of varied by ge s, it applied share of th t basis.	access ts and other access and eography. the unit cost ese costs	
		BT Wholesale's analysis unit costs for main links in than the national average	found that a the WECL as follows:	aggregate A were lower	
		Links	WECLA % of na	unit cost as tional	
		34/45Mbit/s 140/155Mbit/s	average	[╳] [╳]	
		For local ends, BT found that aggregate unit costs were lower than the national average as follows:			
		Local ends	WECL as % c average	A unit cost of national ae	
		34/45Mbit/s	avorag	ຶ້ເ×າ	
		140/155Mbit/s		[×]	
		We have also adjusted the total TI trunk volumes and costs to include only regional trunk, consistent with our position in Section 7. Trunk charges are applied on a per kilometre basis, and we do not believe that there should be differences in unit costs between regional and national trunk. We have estimated the proportion of regional and national trunk as follows:			
		Trunk volumes at all	Regional 24 %	National 76%	
		bandwidths Trunk costs at all bandwidths	24%	76%	
		Unit cost differential	100%	100%	
		We have adjusted the nationally averaged cost data based on this geographic analysis when modelling TI services, as we consider that this adjusted data provides a more accurate reflection of the costs in the charge controlled area than nationally averaged data			
		Our analysis suggested the	hat, in 2011	/12, the	

Our analysis suggested that, in 2011/12, the costs for medium and high bandwidth circuits were approximately 20-30% higher in the charge controlled area compared to the national average.

#### # Description of adjustment

Mechanics / source data used

#### Adjustments to reflect forward looking efficient costs

#### 5 Current cost normalisation

BT prepares its RFS using CCA principles. These costs reflect the actual level of asset prices changes experienced and the impact of any changes to the methodologies used to value assets. Therefore, one period's CCA adjustments are unlikely to provide a robust forecast for future years.

We therefore substituted BT's numbers with our own estimate of future asset price changes and eliminated the impact of any one off methodology changes. We have adjusted asset price change forecast assumptions in our model, substituting the values provided by BT for 'holding (gain)/loss' and 'other CCA adjustments' with our own forecasts.

We have calculated our forecast holding gain by multiplying asset values by the geometric mean of the past five years' asset price change figures as supplied by BT excluding one off changes. We have assumed that forecast price changes for duct will be equal to RPI. This is consistent with our approach to RAV.

The explanation of the source of our asset inflation assumptions is in A12.132 – A12.137.

#### 6 21CN

TI basket services include an element of the cost of BT's investment in its 21CN network, which are allocated on a future benefit basis to TI services. We consider that these costs should be recovered against services delivered over the 21CN network, and not against current services which do not use this network.

However, BT uses 21CN costs to repair the current network that is used to deliver TI services. We consider that BT is allowed to recover this element of 21CN costs.

We therefore eliminated an estimate of 21CN costs allocated on a future benefit basis and allowed an estimate of 21CN costs that is reflective of the current use of 21CN for TI services.

BT's use of the term '21CN' in the RFS includes its next generation backhaul network as well as its core.

In 2011/12, BT identified components which it attributed to certain services in the TI basket.

Components, in the same way as BT's plant groups, comprise not just direct costs such as for equipment but also indirect costs such as accommodation & security as well as corporate costs.

#### Avoidable versus unavoidable element

We asked BT to provide us with an analysis for 2011/12 of the 21CN costs identifying which costs were truly specific to 21CN (e.g. equipment and software) including overheads that would not have been included in the service costs had the MCE of 21CN components been excluded from the services.

BT provided us with the analysis of these costs allocated on a future benefit basis.

Based on this analysis, we have eliminated costs and MCE specific to 21CN network.

We have also asked BT to estimate 21CN costs that are currently utilised by the TI network. We allowed these costs in the base year calculations. The allowed costs are  $[\%]^{244}$  of the total 21CN cost allocated to TI as identified by BT.

<sup>&</sup>lt;sup>242</sup> See Section 7 of this Statement.

<sup>&</sup>lt;sup>243</sup> BT Wholesale response to S135 Notice of 26 March 2012 [X]

<sup>&</sup>lt;sup>244</sup> BT Wholesale response to S135 Notice of 28 September 2012 [X]

#### **#** Description of adjustment

#### Mechanics / source data used

#### 7 Payment terms

Part of the relevant capital employed includes the cost to BT of financing the payment terms it offers. BT reflects this cost as notional debtors.

We have calculated its value using the number of days between when BT (on average) provides the service and when it expects to be paid. We have then multiplied this number of days over 365 days by its annual revenues to arrive at the value to include in MCE.

BT's value for notional debtors reflects 33 days of revenues across all services, which differs from the terms actually offered on individual services.

We have therefore adjusted notional debtors to reflect BT's actual payment terms for each service.

We have also identified in 2011/12 that some cash items have been recorded in the external debtors and creditors categories. We have removed the cash and short-term investments elements from our modelling. We have substituted the internal and external debtor figures, which reflect 33/365'ths of internal and external revenues, with a revised calculation based on 16/365 days and 47/365 days for rental and connection services respectively.

#### Rentals

16 days represents the average interval for services billed monthly in advance. This includes a day for bill preparation.

#### Connections

47 days represents the average interval between a new connection and when payment falls due. BT invoices connections on a monthly billing cycle, rather than billing for the service the day after connection. This period includes two days for bill preparation.

BT has provided a breakdown of data that showed that both internal and external notional debtors are recorded in the 'internal debtors' category in the accounts. We have therefore only removed that category for the adjustment.

We have removed cash, short-term investments and short-term borrowings recorded in the external debtors and creditors categories.

#	Description of adjustment	Mechanics / source data used
8	Regulatory asset value (RAV)	The RAV adjustment is made of two parts.
	We have adjusted BT's current cost depreciation and asset values for access duct. This is to ensure full and fair cost recovery over the life of these assets across all the services that use these assets.	<ol> <li>We have adjusted pre 1997 access duct in 2011/12 in accordance with the 2005 copper statement. The adjustment only applies to local ends, both copper and fibre. Because copper is nearing the end of its book life, the adjustment to copper is immaterial.</li> </ol>
		We have calculated the adjustment for duct by taking the difference between pre 97 duct depreciation and MCE based on CCA and RAV valuations and multiplying the difference by the percentage of duct that is used by TI local ends. The relevant percentage was identified by BT as 1.8%. <sup>245</sup>
		<ol> <li>We have also adjusted post 1997 duct from the absolute valuation to indexed capital expenditure consistent with the WLR LLU CC.<sup>246</sup></li> </ol>
		We have calculated the adjustment by taking the difference between post 97 absolute valuation and indexed capex valuations and multiplying it by the percentage of duct used by TI services. The relevant percentage was identified by BT as approximately 8%. <sup>247</sup>

- A12.17 We no longer make an adjustment to remove ECC costs and MCE from the modelling base. We originally made the adjustment in the LLCC Consultation because BT included the cost of providing ECCs within the base data for TI basket services. ECCs did not however fall within our proposed TI basket and we therefore eliminated an estimate of the cost and MCE of those services.
- A12.18 BT has now made an adjustment that removes an estimate of MCE and depreciation associated with ECCs for the last 10 years from the 2011/12 cost base and we do not consider that a further adjustment is necessary.
- A12.19 Figure A12.4 below shows the impact of the described adjustments on the reported 2011/12 data. We note, in particular, that:
  - for the adjustments made in order to reflect forward-looking efficient costs, the figures shown in Figure A12.4 below reflect the impact to the basket only, rather than to the TI market as a whole;
  - these adjustments are made in the base year and rolled forward using the same assumptions as applied to the base year costs. As such, the ROCE figures shown are for illustrative purposes only and do not reflect actual profitability achieved in 2011/12; and

<sup>&</sup>lt;sup>245</sup> BT Group response to S135 Notice of 28 September 2012 [X]

<sup>&</sup>lt;sup>246</sup> http://stakeholders.ofcom.org.uk/consultations/llu-wlr-further-consultation/statement

<sup>&</sup>lt;sup>247</sup> See BT response to the LLCC Consultation, paragraphs 10-12, pp. 16-17.

 the figures shown in Figure A12.4 reproduce RFS data with a 99.5% accuracy. Where limited discrepancies arise they are due to cross effect of rounding and adjustments.

Adjustment	Revenues (£m)	Operating costs (£m)	Capital costs <sup>249</sup> (£m)	Mean capital employed (£m)	ROCE (%)
RFS 2011/12 All TISBO and TI trunk markets	738	278	201	1231	21.0%
Ancillary services					
Points of handover <sup>250</sup>	-6	-4	-3	-11	
Resilience circuits, separation & diversity, ECCs and third party infrastructure costs	-32	-3	-35	-59	
Additional protected paths costs	-	-1	-1	-4	
Additional separation & diversity costs	-	-2	-1	-5	
Exclusion of ECC assets <sup>251</sup>	-5	n.a.	n.a.	n.a.	
TISBO and TI trunk core services	695	269	162	1,152	23.0%
SDSL	-8	-1	-1	-4	
TISBO and TI trunk core services excluding SDSL	687	268	160	1,147	22.5%
Geographic disaggregation					
Exclude services delivered within the WECLA	-25	-5	-4	-43	
TISBO and TI trunk core services outside the WECLA	662	263	156	1,104	21.9%
Ofcom cost adjustments					
Current cost normalisation	-	-	13	-	
Exclusion of 21CN costs	-	-0	-14	-42	
Payment terms	-	-	-	-30	
Regulatory asset value (RAV) adjustment to duct assets	-	-	-2	-25	
Total TI basket in 2011/12	662	263	153	1,007	23.1%

#### Figure A12.4: Impact of adjustments on the TI basket<sup>248</sup>

Source: Ofcom modelling.

#### **Ethernet basket**

A12.20 In Figure A12.5 below we set out the different types of adjustments we make to the 2011/12 data for the Ethernet basket, our reasoning and the data used for each of these adjustments. In some cases our approach to cost adjustments has changed

<sup>&</sup>lt;sup>248</sup> Not all columns may total correctly as numbers have been rounded. Furthermore there are differences between the size of adjustments presented in the table and the size of the adjustment discussed in this Annex and Sections 19 and 20 due to the geographic disaggregation and the scope of the basket that reduce the size of the initial adjustment.

<sup>&</sup>lt;sup>249</sup> Capital costs include depreciation and holding losses (gains).

<sup>&</sup>lt;sup>250</sup> The amount of POH costs excluded from the TI basket is equal to the amount of POH revenues, as POH charges are assumed to be set at the LRIC level.

<sup>&</sup>lt;sup>251</sup> The adjustment for ECC relates only to Revenues as BT submitted costs data that do not include ECC costs.

compared to the LLCC Consultation. Details on such changes and their rationale are provided in Section 20.

# Figure A12.5: Adjustments to reported 2011/12 costs and revenues for the Ethernet basket

#### # Adjustment Mechanics / source data used Services in and out of scope of the basket 1 Non-core ancillary services We have excluded revenues and costs Similar to the approach adopted for the TI associated with ancillary services from base services, we model only core services. There would be a significant amount of additional data year costs. and assumptions required in order to forecast the volume of ancillary services. As illustrated by Figure A12.6 they make up a small proportion of the Ethernet market. 2 Services not reported in RFS BT does not report volumes, revenues and costs We have included Ethernet services that are of these services in its RFS and this information part of the main Ethernet services we model was provided by BT. We have included this data (internal ONBS and EBD up to 1Gbit/s and their in our modelling. associated main link distances and above 1Gbit/s Ethernet services and their associated main link distances). 3 **Other services** We have excluded costs, revenues and volumes We have excluded Cablelink, Broadcast of these services from base year data. Access, CCTV access, Street Access to reflect our decision in Section 4 of this Statement.

4 Geographic disaggregation

A finding in Section 7 of this statement is that the competitive conditions in the market for low bandwidth Ethernet services in the WECLA are different to those outside the WECLA and accordingly these areas are regulated differently.

We have excluded the costs and revenues associated with the WECLA from our modelling. We set a separate charge control outside the WECLA. If costs differ between the two areas, then in order to accurately model the costs outside the WECLA, we should use geographically disaggregated costs.

#### Mechanics / source data used

Openreach has provided data on the proportion of Ethernet circuits in the WECLA, and the cost differential with respect to the rest of the UK (excluding Hull). Openreach's methodology can be summarised as follows:

First, Openreach categorised the costs for low bandwidth AISBO services into fibre cable, backhaul cable and duct. It then calculated how costs of access and duct related costs varied by geography.<sup>252</sup> Based on these estimates, it applied the unit cost differentials to the overall share of these cost categories on a per circuit basis.

Openreach's analysis found that the unit costs for the main service types in the Ethernet basket were lower than the national average as follows:

WECLA unit cost
as % of national
average
[⊁]
[⊁]
[≫]
[≫]
[×]
[×]

We have adjusted the nationally averaged cost data based on this geographic analysis when modelling low bandwidth AISBO services. We consider that this adjusted data provides a more accurate reflection of the costs we model than nationally averaged data.

<sup>&</sup>lt;sup>252</sup> For a description of the methodology Openreach used to estimate how the costs of fibre cable, backhaul cable and duct vary by geography see Section 20.

#### Mechanics / source data used

#### Adjustments to reflect forward looking efficient costs

#### 5 Current cost normalisation

As already noted, BT prepares its statements using CCA principles. These costs reflect the actual level of asset price changes experienced and the impact of any changes to the methodologies used to value assets. Therefore, one period's CCA adjustments are unlikely to provide a robust forecast for future years.

We have therefore substituted our own estimate of future asset price changes and eliminated the impact of any methodology changes. We have adjusted asset price change forecast assumptions in our model, substituting the values provided by BT for 'holding (gain)/loss' and 'other CCA adjustments' with our own forecasts.

We have calculated our forecast holding gain by multiplying asset values by the geometric mean of the past five years' asset price change figures as supplied by BT excluding one-off changes.

#### 6 Transmission equipment costs

Up to 2010/11, BT recovered the cost of the transmission equipment deployed at either end of an Ethernet circuit and which is wholly dedicated to that service, through the local end connection charges. BT also capitalised and depreciated this equipment over its useful economic life.

In the LLCC 2009 we made an adjustment to match costs and revenues by eliminating MCE and depreciation of the assets and replacing them with a measure of fully expensed cost of the equipment on connection.

In 2010/11, BT changed the accounting policy to recover the cost of transmission equipment through rentals. We therefore need to remove the costs associated with transmission equipment assets capitalised before 2010/11. Since BT's policy change occurred in 2010 the adjustment correctly relates only to assets capitalised prior to 2010/11 and not 2011/12. BT provided a breakdown of transmission equipment capitalised before and after 2010/11.

We have eliminated HCA and MCE related to transmission equipment capitalised before 2010/11 from our cost base.

### 7 21CN costs

Some 21CN costs are allocated to Ethernet services on a future benefit basis. We do not consider that these costs should be recovered from existing customers. This is because the costs are going to either enable provision of a future service that is outside the charge control or a more efficient delivery of an existing service in the future.

#### Mechanics / source data used

In 2011/12, BT identified components which it attributed to certain services in the Ethernet basket.

Components, in the same way as BT's plant groups, comprise not just direct costs such as for equipment but also indirect costs such as accommodation & security as well as corporate costs.

Avoidable versus unavoidable elements

We asked BT to provide us with an analysis for 2011/12 of the 21CN costs identifying which costs were truly specific to 21CN (e.g. equipment and software) including overheads that would not have been included in the service costs had the MCE of 21CN components been excluded from the services.

Based on this analysis, we removed the costs associated with two components that are allocated on a future benefit basis – namely high bandwidth data cards and Ethernet switches.<sup>253</sup>

#### 7 Payment terms

Part of the relevant capital employed includes the cost to BT of financing the payment terms it offers. BT reflects this cost as notional debtors.

We have calculated its value using the number of days between when BT (on average) provides the service and when it expects to be paid. We have then multiplied this number of days over 365 days by its annual revenues to arrive at the value to include in MCE.

BT's value for notional debtors reflects 33 days of revenues across all services, which differs from the terms actually offered on individual services.

We have therefore adjusted notional debtors to reflect BT's actual payment terms for each service.

We have also identified in 2011/12 that some cash items have been recorded in the external debtors and creditors categories. We have removed the cash and short-term investments elements from our modelling. We have substituted the internal and external debtor figures, which reflect 33/365'ths of internal and external revenues, with a revised calculation based on 16/365 days and 47/365 days for rental and connection services respectively.

#### Rentals

16 days represent the average interval for services billed monthly in advance. This includes a day for bill preparation.

#### Connections

47 days represent the average interval between a new connection and when payment falls due. BT invoices connections on a monthly billing cycle, rather than billing for the service the day after connection. This period includes two days for bill preparation.

BT has provided a breakdown of data that showed that both internal and external notional debtors are recorded in the 'internal debtors' category in the accounts. We have therefore only removed that category for the adjustment.

We have removed cash, short-term investments and short-term borrowings recorded in the external debtors and creditors categories.

<sup>&</sup>lt;sup>253</sup> Openreach response to S135 of 28 September 2012 [X]

#### 8 Regulatory asset value (RAV)

We have adjusted BT's current cost depreciation and asset values for access duct. This is to ensure full and fair cost recovery over the life of these assets across all the services that use these assets.

#### Mechanics / source data used

The RAV adjustment is made of two parts.

1. Our intention is to apply the RAV adjustment to pre 1997 access duct and copper in accordance with the 2005 Copper Statement. This adjustment applies to local ends only.

We have asked BT to estimate the percentage of duct that is used by Ethernet local ends. The relevant percentage was identified by BT as approximately 4%.<sup>254</sup>

We have calculated the adjustment by taking the difference between pre 1997 duct depreciation and MCE based on CCA and RAV valuations and multiplying the difference by the percentage of duct stated above.

 The second part of the adjustment is based on the value of duct calculated in accordance with the methodology described in the February 2012 WLR LLU CC Statement.<sup>255</sup> This reduces post 97 value of duct from the absolute valuation to a valuation based on indexed capital expenditure.

We have calculated the adjustment for duct by taking the difference between post 1997 duct depreciation and MCE based on absolute valuation and indexed capex and multiplying the difference by the relevant percentage of duct identified by BT. BT identified the relevant percentage to be approximately 8%.<sup>256</sup>

- A12.21 As with the TI basket, we no longer apply an adjustment for Excess Construction Charges costs and MCE. This is because BT made an equivalent adjustment in its 11/12 accounts, removing the need for our adjustment.
- A12.22 As with the TI basket, Figure A12.6 below shows the impact of the described adjustments on the reported 2011/12 data for the Ethernet basket.

<sup>&</sup>lt;sup>254</sup> Openreach response to S135 Notice of 14 February 2013 [X]

<sup>&</sup>lt;sup>255</sup> http://stakeholders.ofcom.org.uk/consultations/llu-wlr-further-consultation/statement

<sup>&</sup>lt;sup>256</sup> See BT response to the LLCC Consultation, paragraphs 10-12, pages 16-17.

Adjustment	Revenues (£m)	Operating costs (£m)	Capital costs <sup>258</sup> (£m)	Mean capital employed (£m)	ROCE (%)
RFS 2011/12 All Ethernet market (i.e. Ethernet services up to 1Gbit/s)	725	246	284	1,357	14.4%
Adjustments to the scope of the basket					
All services above 1Gbit/s	[≻]	[×]	[≻]	[≻]	
Exclusion of Cablelink, Street Access, CCTV Access, Broadcast Access and ancillary services	[⊁]	[⊁]	[⊁]	[⊁]	
Adjustments to costs and revenues					
Inclusion of internal EBD, ONBS and associated Mainlink services	[⊁]	[⊁]	[×]	[⊁]	
Adjustments to RFS costs to reflect the scope of the basket	[⊁]	[⊁]	[⊁]	[⊁]	
Exclusion of ECC assets <sup>259</sup>	-57	n.a.	n.a.	n.a.	
Ethernet basket	733	252	299	1,365	1 <b>3.4</b> %
Geographic disaggregation					
Exclude services delivered within the WECLA	-96	-23	-28	-132	
Ethernet services outside the WECLA	637	228	271	1,233	11.2%
Ofcom cost adjustments Current cost normalisation	-	-	-55	-	
Exclusion of transmission equipment	-	-	-18	-32	
Exclusion of 21CN costs	-	-5	-5	-20	
Payment terms	-	-	-	-22	
Regulatory asset value (RAV) adjustment to duct assets	-	-	-5	-62	
Total Ethernet basket in 2011/12	637	223	187	1,097	20.7%

#### Figure A12.6: Impact of adjustments on the Ethernet basket<sup>257</sup>

Source: Ofcom modelling.

## **Volume forecasts**

- A12.23 Service volume forecasts are a key determinant of the values of X for the TI and Ethernet baskets. Revenues in the final year of the charge control are calculated as the current and prevailing service price multiplied by their respective final year volume forecasts.
- A12.24 The volume forecasts for the services in the TI and Ethernet baskets are used to derive the total capital and operating costs that BT will need to recover by the end of the proposed charge control period. The values of X are sensitive to these

<sup>&</sup>lt;sup>257</sup> Not all columns may total correctly as numbers have been rounded. Furthermore there are differences between the size of adjustments presented in the table and the size of the adjustment discussed in the section due to the geographic disaggregation and the scope of the basket that reduce the size of the initial adjustment.

<sup>&</sup>lt;sup>258</sup> Capital costs include depreciation and holding losses (gains).

<sup>&</sup>lt;sup>259</sup> The adjustment for ECC relates only to Revenues as BT submitted costs data that did not include ECCs.

forecasts due to the interaction between volumes and the asset volume elasticities and cost volume elasticities, which reflect economies of scale.

A12.25 Below we explain how we arrived at the TI volume forecasts used in the LLCC Consultation, and then how we adjusted them for the final Statement.

### **Volume forecasts for TI services**

# We arrived at our TI volume forecasts for the LLCC Consultation by taking into account forecasts from various sources

A12.26 We derived our LLCC Consultation forecasts from those of three operators. The trend forecasts of each of the three operators are shown in Figure A12.7 and Figure A12.8 below. In considering these forecasts, we noted that these comparisons did not take into account changes in market share, operators' strategies or general trends. Nonetheless, we considered that the trends demonstrated a broadly consistent view of the market.

# Figure A12.7: Comparison of TI volume forecasts, up to and including 2Mbit/s (number of circuits)

[×]

A12.27 Figure A12.7 above sets out the forecasts we received for sub 2Mbit/s and 2Mbit/s services. We considered the forecasts of sub 2Mbit/s and 2Mbit/s services to be particularly important as these make up a considerable proportion of TI volumes (e.g. 98% of local ends in 2010/11).<sup>260</sup>

# Figure A12.8: Comparison of volume forecasts, above 2Mbit/s (number of circuits) [≫]

A12.28 Figure A12.8 shows the comparison of the forecasts for the above 2Mbit/s services. CP1 and CP2 forecast similar rates of decline for the 34/45Mbit/s services. CP1 forecast a more moderate decline in 140/155Mbit/s volumes than CP2. CP3 expected stronger decline in the above 2Mbit/s services and did not distinguish between 34/45Mbit/s and 140/155Mbit/s services.<sup>261</sup> We noted that these services make up a relatively small proportion of TI services.

# We have reassessed our TI volume forecast in light of the outturn for 2011/12 and new volume forecasts we have received

- A12.29 Following the consultation, we have been able to compare our forecast for 2011/12, as reported in the LLCC Consultation, with the actual outturn. We have also received updated volume forecasts for TI services from BT Wholesale, other CPs and industry analysts. We have analysed all these sources when arriving at our decision on volume forecasts.
- A12.30 First, we compared our forecast for 2011/12 with the outturn. In the LLCC Consultation, we forecast a sharp decline in TI volumes in 2011/12. As Figure

<sup>&</sup>lt;sup>260</sup> BT Group response to S135 Notice of 1 July 2011 [>]

<sup>&</sup>lt;sup>261</sup> We noted that CP3's data had been interpolated to ensure comparability between the other two data sets.

A12.9 below shows, this decline has largely been realised, although the actual decline was slightly less than forecast (a 24% decline in local ends as opposed to the -27.5% forecast). We note that for 2011/12 [ $\gg$ ] had forecast a faster rate of decline than the outturn and, in contrast, that [ $\gg$ ] and [ $\gg$ ] had forecast a slower rate of decline.



Figure A12.9: Comparison between consultation forecasts with actual volumes for 2011/12 local ends

- A12.31 Second, since the LLCC Consultation, both BT and CPs have provided new forecasts. We note that BT has forecast a faster decline than the rate we had forecast in the LLCC Consultation. BT explained that it forecast a faster rate of decline due [≫].
- A12.32 In contrast, [%] and [%] have forecast a lower rate of decline for subsequent years than we had forecast in the LLCC Consultation.
- A12.33 We have examined BT's explanations for its forecast of a faster decline in TI services. [≫]. We therefore consider that we do not have clear evidence to support BT's expectation that the decline will be faster than in the LLCC Consultation.
- A12.34 Figure A12.10 below shows a comparison of our LLCC Consultation volume forecasts for TI local ends (across all bandwidths) with the forecasts of [X], [X].

#### Figure A12.10: Comparison of total local end volume forecasts

[×]

A12.35 Figure A12.10 shows that all providers have forecast a decline in circuit numbers but that the rate of decline predicted varies between operators. [X] and [X] both

forecast a lower rate of decline, whereas BT has forecast a higher rate of decline than our LLCC Consultation forecast.

#### **Conclusion on our TI volume forecasts**

- A12.36 Our analysis of 2011/12 data, shows that our forecast of a sharp fall in 2011/12 was in line with the outturn. This gives us confidence in our previous forecasts. We also note that although [≫] and [≫] forecast a slower rate of decline for the charge control period, they also underestimated the actual rate of decline in 2011/12. Furthermore, we note that BT [≫] its new forecasts assume an even faster rate of decline.
- A12.37 Given the relative accuracy of our 2011/12 forecasts and the differences in forecasts between stakeholders, we have decided to continue with our previous forecast rates of volume decline. We have therefore adapted the LLCC Consultation forecasts to the new base year and kept the same rate of change for each circuit type as was previously forecast in the consultation.
- A12.38 Our final forecasts are shown in Figures A12.11 and A12.12 below. By the end of this charge control, we expect the total number of TI circuits to decline by over 60% compared to 2011/12. We predict a similar decline in total capacity delivered through TI circuits.



Figure A12.11: Ofcom forecasts of TI services to 2015/16 (number of local ends)

A12.39 Figure A12.11 shows that sub 2Mbit/s and 2Mbit/s circuits currently make up the vast majority of all TI circuits, and we forecast this to continue as the higher speed TI services (34/45Mbit/s and 140/155Mbit/s) and the mobile backhaul services migrate to higher bandwidth services.

- A12.40 BT intends to close the Digital Private Circuit Network (DPCN) used to carry low bandwidth (sub 2Mbit/s) PPCs by 2018 and has stated that its service level guarantee may reduce to 'best efforts' due to the very limited availability of replacement equipment.<sup>262</sup>
- A12.41 We expect an acceleration in the decline of all local ends from 2011/12 onwards, reaching a level in 2015/16 which is between 10% and 43% of current levels, depending on bandwidth. By 2015/16, we expected the higher bandwidth TI services to have declined by a greater proportion than the low bandwidth TI services.
- A12.42 We use our volume forecasts to derive a view of the capacity delivered over TI services. By multiplying the local end volumes by the relevant bandwidths, we have forecast the capacity delivered over the TI network until 2015/16. This is set out below in Figure A12.12.



Figure A12.12: Ofcom's forecast of TI services capacity (Gbits)

A12.43 As shown in Figure A12.12 above, our forecasts predict that capacity will decline rapidly from 2011/12 to 2013/14 but is expected to decrease at a slower rate from 2013/14 onwards. In terms of circuits, over 50% of capacity was delivered by 2Mbit/s circuits in 2011/12. Our forecasts show that we expect that 2Mbit/s will continue to provide the majority of TI capacity over the forecasting period.

<sup>262</sup> See BT Wholesale PPC Sub-2Mbit/s Strategy Review Briefing

https://www.btwholesale.com/shared/document/News\_and\_Insights/Briefings/PPCs/Sub\_2Mb\_Review\_Briefing\_Revision\_Issue.pdf.

# **Volume forecasts for Ethernet services**

# We arrived at our LLCC Consultation Ethernet volume forecasts by taking into account forecasts from various sources

A12.44 Our LLCC Consultation volume forecasts anticipated significant volume growth in the market for Ethernet services. Our LLCC Consultation forecasts were derived from the forecasts obtained from three providers ('CP1', CP2' and 'CP3') and an industry analyst Ovum (Analyst). These forecasts all showed a consistent pattern of market trends. Figure A12.13 below shows the comparison of the forecasts of these providers for individual circuit types.

# Figure A12.13: Comparison of Ethernet circuit forecasts, up to 1Gbit/s [≫]

- A12.45 By bandwidth, we considered that there was a degree of consistency between the trends forecast by CP1 and the Analyst. Although CP1 forecast a higher rate of growth in 10Mbit/s initially, both forecasts converged to similar rates of growth from 2012/13 onwards. CP3's forecast for 2012/13 was also consistent with the 10Mbit/s forecasts from the CP1 and the Analyst. CP2 forecast a gradual decline in the 10Mbit/s services from 2011/12 onwards, which was different to the other three sources. For 100Mbit/s services, we noted that CP2 expects a significantly higher growth rate than the other sources.
- A12.46 For the 1Gbit/s and above services, we noted that CP2's forecasts showed a similar trend to that of the Analyst's. In comparison, CP1 did not expect a significant growth in the 1Gbit/s services. Instead it expected a sharp increase initially in the above 1Gbit/s services, which then tapers off after 2013/14.
- A12.47 In order for us to compare the impact of the growth rates across the different sources, we calculated the total capacity delivered using Ethernet services. As Figure A12.14 shows the three forecasts predicted a significant increase in capacity, and that, despite the differences in the growth rates of the underlying services by bandwidth, all three predicted similar rates of capacity growth. The growth rates shown were also consistent with the historical growth rates seen between 2007/08 and 2010/11.

#### Figure A12.14: Comparison of capacity forecasts from CP1, CP2 and Analyst<sup>263</sup>

[×]

# We have reassessed our Ethernet volume forecast in light of the outturn for 2011/12 and new volume forecasts we have received

A12.48 Following the consultation, we have been able to compare our forecast for 2011/12, as reported in the LLCC Consultation, with the actual outturn. We have also received updated volume forecasts for Ethernet services from Openreach, other CPs and industry analysts. We have analysed all these sources when arriving at our decision on volume forecasts.

<sup>&</sup>lt;sup>263</sup> CP3 did not provide enough granularity in its forecasts to allow the calculation of its capacity forecast.

A12.49 First, we have compared our Ethernet forecast for 2011/12 with the outturn. In the LLCC Consultation, we forecast considerable growth in EAD and EBD volumes and a steady decline in WES and BES volumes in 2011/12. Overall, the trends predicted were largely accurate. As shown in Figure A12.15 below, there was a slightly smaller decline in WES and BES than anticipated, and a slightly higher increase in EAD and EBD than forecast. The result is that the total number of Ethernet circuits in 2011/12 is just under 3% higher than predicted.

# Figure A12.15: Comparison of 2011/12 consultation forecasts and actual volumes (no. of circuits)



- A12.50 Second, since the LLCC Consultation, we have received updated volume forecasts for Ethernet services from various sources, including Openreach, CPs and an industry analyst. We note that the new Openreach forecasts received are only up to 2013/14. We also note that although in its response to the LLCC Consultation, BT stated that we may need to reduce our forecast growth in Ethernet volumes, this was not reflected in the forecasts it provided for 2012/13 and 2013/14.
- A12.51 Figure A12.16 below sets out our LLCC Consultation forecasts of circuits alongside those of [≫], [≫], [≫], [≫] and [≫]. It shows that, overall, [≫] and [≫] have predicted similar growth rates to that of our LLCC Consultation forecasts. All three of these forecasts have predicted a markedly higher growth in the number of circuits than the Analysys Mason forecast cited in BT's response.<sup>265</sup> Figure A12.16 also shows that [≫] predicted a slightly higher rate of growth to our LLCC Consultation forecasts for 2012/13, while [≫] has forecast slightly lower growth up to 2013/14 and higher growth between 2013/14 and 2015/16.

<sup>&</sup>lt;sup>264</sup> See BT non-confidential response to the LLCC Consultation, paragraph 15, page 44.

<sup>&</sup>lt;sup>265</sup> See BT non-confidential response to the LLCC Consultation, paragraph 14, pages 43 and 44.

# Figure A12.16: Comparison of Ethernet volume forecasts of circuits (Up to and including 1Gbit/s)

### [×]

- A12.52 Our analysis of 2011/12 data shows that our forecast of an increase in EAD and EBD volumes and a fall in WES and BES volumes in 2011/12 was in line with the outturn. This gives us reassurance in the degree of accuracy of our LLCC Consultation forecasts. In addition, the growth in circuits predicted by our forecast is broadly in line with CPs' and analysts' forecasts the LLCC Consultation forecasts.
- A12.53 Figure A12.17 below sets out our LLCC Consultation forecasts for capacity provided by up to and including 1Gbit/s circuits, in comparison with the forecasts submitted by [≫], [≫], [≫], [≫] and [≫].

# Figure A12.17: Comparison of Ethernet volume forecasts of capacity (Up to and including 1Gbit/s)

[×]

A12.54 Overall, Figure A12.17 indicates that, in terms of the trend in capacity growth predicted, our LLCC Consultation forecasts are consistent with the Ethernet forecasts we have received. It shows that Analysys Mason and Ovum predicted similar rates of capacity growth to that predicted in our LLCC Consultation forecast up to 2014/15, while for 2015/16, Analysys Mason forecast slightly lower growth and Ovum forecast higher growth. Figure A12.17 also shows that the LLCC Consultation forecast of capacity growth falls roughly mid way between the capacity growth predicted by [≫] up to 2012/13 (at the lower bound) and the capacity growth predicted by [≫] up to 2013/14 (at the upper bound). We consider that [≫] of capacity growth is an outlier and likely to be more representative of its internal consumption of Ethernet services rather than the overall supply.<sup>266</sup>

### **Conclusion on our Ethernet forecasts**

A12.55 Given the relative accuracy of our 2011/12 forecasts and, as noted above, our circuit growth forecast is broadly in line with CP's and analysts' forecasts, we have decided to continue with our previous forecast volume growth rates. We have therefore adapted the LLCC Consultation forecasts to the new base year and kept the same rate of change for each circuit type as was previously forecast in the consultation.

### Summary of our Ethernet volume forecasts

A12.56 As with TI forecasts, we set out below a summary of our forecasts for Ethernet services. As an additional cross-check, we have compared the trends in capacity derived from our forecasts for Ethernet services and TI services. The decline in TI capacity is consistent with the growth in Ethernet capacity; although we note that the volume growth from Ethernet services more than compensates for the decline in TI capacity, in line with our expectation of overall capacity growth.

<sup>266</sup> [**×**]

- A12.57 We also present in Figure A12.18 the trends in rental volumes for two bandwidth categories (up to and including 1Gbit/s and above 1Gbit/s). In addition, we have derived a view of the trend in capacity delivered using Ethernet services from the volume forecasts (see Figure A12.19).
- A12.58 During the forecasting period (2012/13 to 2015/16), we expect to see significant migration from the legacy Ethernet services (WES and BES) to the newer equivalents (EAD and EBD). We present the specific volume trends for WES, BES, EAD and EBD services in Figure A12.20 below.

### We expect significant growth in demand for high bandwidth Ethernet services

A12.59 In our forecast of Ethernet service volumes, we expect significant growth in demand for higher bandwidth Ethernet services. Our forecast of total Ethernet circuit volumes is summarised in Figure A12.18 below. It shows that there has been significant growth over the period from 2007/08 to 2011/12, and we expect this trend to continue to 2015/16. Of the historical growth in overall circuits, the most pronounced came from up to and including 1Gbit/s circuits, while from 2011/12 onwards, above 1Gbit/s circuits are forecast to grow at a faster rate than lower bandwidth Ethernet circuits (albeit from a lower base).



# Figure A12.18: Ofcom historical and forecast volumes for Ethernet services (number of circuits)

A12.60 This historical upwards trend in the demand for Ethernet services is expected to continue over the period of our analysis. We consider that rental volumes are likely to be driven by the increasing demand for higher bandwidth services and the migration of customers from the lower bandwidth TI services. In addition, we consider that the transition from legacy WES and BES services to the newer EAD and EBD services may provide a suitable opportunity for customers to upgrade to a higher bandwidth service.

[×]

A12.61 With the increase in demand, we also expect to see a significant increase in the capacity delivered over BT's network, as shown in Figure A12.19. To analyse the trend of capacity provided by Ethernet services, we took our forecasts for individual service volumes and multiplied the rental volumes by the corresponding bandwidth. Figure A12.19 demonstrates that capacity grew significantly and that we forecast it to continue.



90.000 Forecast Actual data 80,000 70,000 Above 1Gbit/s 60,000 ■ Up to and including 1Gbit/s (**bit/s** 50,000 40.000 40,000 30,000 20,000 10,000 2007/08 2008/09 2009/10 2010/11 2011/12 2012/13 2013/14 2014/15 2015/16 Source: Ofcom modelling

### Modern Equivalent Asset (MEA) approach

- A12.62 The business connectivity services offered by BT are in a period of change. Volumes of services delivered using traditional interface are declining, whilst Ethernet services, capable of delivering higher bandwidths, are on the increase. In addition, we expect to see a transition from the legacy to newer Ethernet services used to provide the same functionality of current services.
- A12.63 As discussed in Section 20, we have adopted a MEA approach for the purposes of modelling the costs of the legacy WES and BES services. We have modelled these services using the costs of what we consider to be the modern equivalent. To this end. Openreach has supplied us with a mapping of the legacy WES and BES services over to the nearest equivalent EAD or EBD service. We note that this mapping is independent of actual decisions that customers may make when transitioning from legacy to new services and whether they take the opportunity to upgrade their bandwidth at the same time.
- A12.64 Figure A12.20 shows the forecast decline of WES and BES, and the growth of EAD and EBD from 2007/08 through to 2015/16.



# Figure A12.20: Ofcom volume forecast for WES and BES migrations (number of circuits)

- A12.65 The forecasts show a significant increase in EAD volumes, of which only a proportion appears to be a consequence of WES migrations. This growth is also likely to capture the migration from legacy TI services to Ethernet. A similar pattern is observed for BES and EBD circuits. BES circuits are forecast to decline, whilst EBD circuits are forecast to rise.
- A12.66 Figure A12.21 shows the mapping rules we have adopted for the purposes of estimating the costs of providing WES and BES services. For example, the cost of a WES 10Mbit/s service has been set with reference to an EAD 10Mbit/s service. The migration of BES services is possible either to EAD or EBD, depending on the specific demand characteristics at the location. We do not make the MEA assumption for the above 1Gbit/s WES and BES services, as we have not identified a different MEA for these services.

	MEA equivalent				
Legacy service	Standard service	Aggregation	Local access	Local reach	Extended reach
WES 2Mbit/s	EAD 10Mbit/s	N/A	N/A	N/A	N/A
WES 10Mbit/s	EAD 10Mbit/s	No MEA equivalent	EAD Local access 10Mbit/s	EAD 10Mbit/s	N/A
WES 100Mbit/s	EAD 100Mbit/s	No MEA equivalent	EAD Local access 100Mbit/s	N/A	N/A
WES 155Mbit/s	EAD 1Gbit/s	N/A	N/A	N/A	N/A
WES 622Mbit/s	EAD 1Gbit/s	N/A	N/A	N/A	N/A
WES 1Gbit/s	EAD 1Gbit/s	N/A	EAD Local access 1Gbit/s	N/A	EAD Extended reach 1Gbit/s
BES 100Mbit/s	EAD 100Mbit/s or EBD 1Gbit/s	N/A	N/A	N/A	N/A
BES 155Mbit/s	EAD 1Gbit/s or EBD 1Gbit/s	N/A	N/A	N/A	N/A
BES 622Mbit/s	EAD 1Gbit/s or EBD 1Gbit/s	N/A	N/A	N/A	N/A
BES 1Gbit/s	EAD 1Gbit/s or EBD 1Gbit/s	N/A	N/A	N/A	EAD Extended reach 1Gbit/s or EBD 1Gbit/s

#### Figure A12.21: Mapping of services between legacy and newer Ethernet services

## **Cost forecast assumptions**

- A12.67 The forecast of costs for charge control purposes relies on a number of assumptions. The following sections provide an overview of the main ones, which relate to:
  - efficiency;
  - return on capital;
  - asset and cost volume elasticities (AVEs/CVEs); and
  - asset price changes.

### Efficiency

### What are efficiency gains?

- A12.68 In calculating the value of X for each charge control basket, we have taken into account an assumed efficiency gain that BT is expected to make over the next few years. Greater efficiency is achieved when a given level of output is produced with fewer input resources or when a greater level of output is produced with a given level of input resources. Our efficiency assumption is based on several sources of analysis which assess what BT can realistically achieve in terms of reducing its costs over the period of the proposed charge control.
- A12.69 The efficiency rate used in the calculation of the RPI-X cap is the expected year-onyear savings in real unit costs that BT is expected to achieve in the normal course of its operations, abstracting from volume and price changes. It is possible to apply this efficiency assumption to both new capital expenditure and operating costs.
- A12.70 In our modelling of TI services we have decided to apply the efficiency assumption only to opex. There are three main reasons supporting the decision not to apply an explicit efficiency assumption to new capex.
  - a) In our model we have taken into account asset price changes. As these are negative in real terms, this is equivalent to a capex efficiency assumption.
  - b) The forecast decline in volumes for TI services means it is unlikely there will be significant new capital expenditure. The consequence of this is that any potential efficiency in procurement and investment is minor.
  - c) The other consequence of falling volumes is the associated negative capital expenditure (capex), which can be thought of as asset disposals. An efficient operator would be expected to dispose of its unused assets in an efficient manner. Given the type of assets employed in the TI market, it is unlikely that even an efficient operator could command a price for its unused assets higher than the expectations within our model.
- A12.71 For Ethernet services we have modified our approach set out in the LLCC Consultation. Following consideration of the evidence on past and future capital cost efficiency, we have concluded that it is not appropriate to assume that the MEA approach and changes in asset prices capture Openreach's capital cost efficiency. We have therefore applied our efficiency assumption to both new capital and operating costs. For capital costs, the total efficiency assumption will include

efficiency savings attributable to falls in real asset prices, as well as other reductions in capital costs.

- A12.72 We assume separate efficiency assumptions for the TI and the Ethernet baskets. This is due to the functional separation of BT Wholesale and Openreach, which supply TI and Ethernet services respectively. It should also be noted that TI and Ethernet services are based on different underlying technologies and use different equipment. In addition, they are at significantly different stages of life, with TI volumes in a state of decline and Ethernet volumes forecast to grow substantially.
- A12.73 Based on our assessment of the different sources of information set out in the following paragraphs, we have identified the following efficiency assumptions for TI and Ethernet opex and Ethernet new capex:
  - 1.5% per annum on opex for BT Wholesale's provision of TI services;
  - 4.5% per annum on opex and capex for Openreach's provision of Ethernet services.<sup>267</sup>
- A12.74 The detailed description of our approach to the identification of the above efficiency assumptions is provided in the relevant sections (Sections 19 and 20 for TI and Ethernet services respectively).

#### Operating cost efficiency of 1.5% for TI services

- A12.75 We have considered a range of indicators to estimate the efficiency improvement that could reasonably be expected from BT Wholesale. These can be categorised into three broad headings:
  - TI-specific historical trend analysis;
  - BT Wholesale internal efficiency targets; and
  - external benchmarking studies.
- A12.76 Figure A12.22 below, which is also included in Section 19, summarises these efficiency improvements, including two sets of external benchmarking studies.

<sup>&</sup>lt;sup>267</sup> The 4.5% includes real asset price changes.

	TI specific historical trend analysis	BT Wholesale internal efficiency targets	2012 Deloitte Study <sup>268</sup>	Statistical analysis (NERA, Deloitte) <sup>269,270</sup>
Efficiency (%)	~1.5%	[≻]	2.25%	~2%
Comments	Ofcom analysis of BT Wholesale's historical TI cost data	Relates only to SG&A costs, which account for only a small proportion of total BT Wholesale costs	Benchmark against five other European operators	Benchmark against US LECs

Figure A12.22: Evidence on	TI efficiency assumption
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Note: Other sources of evidence were considered. However for the reasons set out below we did not factor these into our final range.

### TI-specific historical trend analysis

- A12.77 The trends of reductions in real unit costs in the recent past for a given service offer a useful indicator for expected future efficiency gains. In its decision on the appeal of 'A new Pricing Framework for Openreach", the Competition Commission (CC) indicated that historical rates "should be reliable for at least the first year of the price control, and represent useful indicators for the whole period under review".<sup>271</sup>
- A12.78 We have calculated BT Wholesale's underlying rate of real unit cost reduction over the period from 2006/07 to 2010/11. Our approach has been set out in previous consultations (for example, the WBA CC 2011)<sup>272</sup>, and is based on total factor productivity (TFP) analysis. This requires the use of the Tornqvist index, which is a standard measure used in productivity analysis which takes into account the impact of changing cost weights over time. Our methodology is set out below.
  - Calculate the output (volume) index change as the sum of all year-on-year volume changes across all cost components.
  - Calculate the input (labour and non-labour) index change as the sum of all yearon-year input changes across all cost components.<sup>273</sup>
  - Derive the unit output index by dividing the input index by the output index.
  - Adjust the unit output index for scale effects (using cost volume relationship assumption consistent with our cost forecasting approach) and any historical

 <sup>&</sup>lt;sup>268</sup> Deloitte, 'Analysis of the Efficiency of BT's Regulated Operations', A report for BT, dated 16 February 2012.
 <sup>269</sup> NERA, 17 March 2008, The comparative efficiency of BT Openreach.

http://stakeholders.ofcom.org.uk/binaries/consultations/llcc/annexes/efficiency.pdf

<sup>&</sup>lt;sup>270</sup> Deloitte, 29 March 2011, 'WBA consultation response' <u>http://stakeholders.ofcom.org.uk/binaries/consultations/823069/responses/BT2.pdf</u>

<sup>&</sup>lt;sup>271</sup> See Paragraph 2.185 CC Determination <u>http://www.competition-</u> <u>commission.org.uk/assets/competitioncommission/docs/appeals/carphone-warehouse-</u> group-plc-local-loop-unbundling-appeals/llu determination.pdf

<sup>&</sup>lt;sup>272</sup> For further details regarding our approach please see Annex 7 of the WBA CC Consultation: <u>http://stakeholders.ofcom.org.uk/binaries/consultations/823069/summary/condoc.pdf</u>

<sup>&</sup>lt;sup>273</sup> To calculate the input index, historical nominal costs were converted into historical real costs using the Average Earnings Index (AEI) for labour costs and RPI for non-labour costs. As noted in our review of Openreach efficiency, we decided that the relationship between BT's pay costs and RPI in the historical period may not give an accurate reflection of the relationship going forward.

catch-up. The remainder represents the historical productivity growth which we assume is equal to future productivity growth.

A12.79 Our approach produces an average of around 1.5% for the reduction in the real unit operating costs in the period from 2006/07 to 2010/11.

#### **BT Wholesale internal efficiency targets**

- A12.80 BT's Medium Term Plan (MTP) is an internal document used for planning purposes within BT. It sets out the financial outlook for BT for the next three years including efficiency targets set internally to BT Group.
- A12.81 In response to our information requests, BT supplied to us its MTP which set a target annual efficiency saving for BT Wholesale of [≫] on Selling, General & Administrative Expense (SG&A) costs only.<sup>274</sup> We noted however that SG&A costs only made up a small proportion (approximately [≫]) of BT Wholesale's operating costs for the provision of TI services and were unlikely to be typical of the whole set of BT Wholesale costs, meaning that it may not have been appropriate to extrapolate from this to the whole of BT Wholesale.

#### **External benchmarking studies**

#### 2012 KPMG Study of BT Wholesale

- A12.82 Ofcom engaged with BT Wholesale to obtain the necessary data that would allow our adviser, KPMG, to perform an efficiency study similar to that undertaken on Openreach in 2009. In contrast to Openreach, where cost allocation is made at the entity level, cost allocation in BT Wholesale is made at the product and service level. This difference in the approach to cost allocation meant that it was not possible to undertake the planned efficiency study. We considered whether it would be appropriate to undertake a fuller study. However, we determined that an assessment of whether those allocations were efficient would have required a review of a significant proportion of BT's costs more generally, to cover those groups of costs partially allocated to TI. In the context of this charge control we considered that it was not proportionate to undertake such an extensive study.
- A12.83 As a result of this, we did not proceed with the study to assess BT Wholesale's efficiency.

#### BT Wholesale Efficiency Study (2012 Deloitte Study)275

- A12.84 The 2012 Deloitte Study was commissioned by BT Wholesale to assess its efficiency relative to five other European operators. Deloitte estimated the model using two different methods, stochastic frontier analysis (SFA) and corrected ordinary least squares (COLS). The estimated coefficients using SFA were found not be statistically different from those estimated using COLS.
- A12.85 To perform the analysis, Deloitte collected annual data from six European operators on total costs, switched lines, minutes and bandwidth for the period from 2005 to 2010. Deloitte also made certain adjustments to the data to ensure comparability. They modelled costs as a function of a number of explanatory variables, such as

<sup>&</sup>lt;sup>274</sup> BT Wholesale response to S135 Notice of 1 July 2011 [X].

<sup>&</sup>lt;sup>275</sup> Deloitte, "Analysis of the Efficiency of BT's Regulated Operations", A report for BT, 16 February 2012.

output factors (e.g. number of lines) and environmental variables (e.g. GDP, population density).

A12.86 The results indicated that, of the six operators analysed, BT was the most efficient. In addition, Deloitte indicated that the results of the study suggested a suitable efficiency target for BT would be 2.25% per annum.

### The NERA/Deloitte efficiency studies

- A12.87 Whereas the 2012 Deloitte study compared BT's efficiency with that of other European operators, earlier studies have compared BT's efficiency with US operators. The NERA efficiency study<sup>276</sup> was commissioned by Ofcom for the purposes of the WLR LLU CC. It was published in December 2008 and was based on stochastic frontier analysis of the Local Exchange Companies (LECs), the regional telephone network incumbents in the USA. NERA fitted a cost function using data from the LECs over time, summarising how costs changed according to different types of variables. It then assessed BT's efficiency on a network basis by comparing BT's actual costs to the expected costs by fitting BT's data on the modelled specification.
- A12.88 The midpoint of the wide range of possible results from the analysis put BT around the top decile of US LECs ranked by efficiency. NERA's report therefore indicated that BT was already operating at an efficient level when compared to the LECs, so that future cost reductions would come mainly from technical progress rather than by eliminating existing inefficiencies.
- A12.89 For the WBA CC, BT commissioned Deloitte to produce an updated version of the efficiency report (2011 Deloitte Study)<sup>277</sup>, which made use of additional data. Deloitte claimed that the results of their study suggested an appropriate efficiency range of 0.6% to 2.8%.

### Evaluation of evidence and decision for efficiency assumption for TI services

- A12.90 To arrive at an appropriate range of efficiency savings, we consider that most weight should have been placed on the sources of evidence which were specific to the TI market, i.e. the historical trend analysis. Our historical trend analysis suggests that an average of around 1.5% is appropriate.
- A12.91 We have also considered BT's internal planning documents as a potential additional indicator of expected future efficiency savings. This source suggests efficiency savings of [≫] were achievable. However, that figure is based only on SG&A costs, which account for a small proportion of BT Wholesale's operating costs for the provision of TI services (approximately [≫]). We believe that this does not cover a sufficiently wide range of BT Wholesale's activities for it to be extrapolated and applied to BT Wholesale's provision of TI services. Therefore, we have chosen not to place significant weight on this source relative to the historical trend analysis.
- A12.92 The benchmarking studies conducted by Deloitte and NERA are not specific to the TI market, although they represent the scope for efficiency improvements for the organisation as a whole. We place relatively less weight on these results compared

<sup>&</sup>lt;sup>276</sup> NERA, 17 March 2008, "The comparative efficiency of BT Openreach." <u>http://stakeholders.ofcom.org.uk/binaries/consultations/llcc/annexes/efficiency.pdf</u>

<sup>&</sup>lt;sup>277</sup> http://stakeholders.ofcom.org.uk/binaries/consultations/823069/responses/BT2.pdf

to the TI-specific analysis of historical data. Nevertheless, we note that the results from each of these benchmarking studies are consistent with our other sources of evidence.

- A12.93 Considering the 2012 Deloitte study, we have some concerns about the robustness of the results. The data set used contains very few cross-sectional observations with little variation over time, meaning the sample size is unlikely to be sufficient to produce reliable estimates. The set of 30 observations is considered a minimum sample size, although we note that the data used in this study does not consist of 30 independent observations but repeated observations of the same six operators over time. We believe that the very high R-squared (97%) produced by the results is consistent with our concern, as it suggests the model is over-fitted, i.e. the model includes too many explanatory variables relative to the number of independent observations.
- A12.94 In addition to this, the methodology 'pools' the data from the six operators together as if they are individual observations. Fitting an equation on this basis imposes a very strong requirement on the data. That is, any element of an operator's cost which is unique to that operator and fixed over time is unrelated to all the explanatory variables in the equation. We consider there are a number of reasons why this assumption may not hold, in particular the possibility that an operator's efficiency is relatively constant over the time period considered. Deloitte have not provided any justification to support their implied assumption using this methodology. The study also notes the high degree of collinearity between the explanatory variables. Whilst we agree that, in a purely statistical sense, collinearity does not bias an estimate, it is known to produce unreliable results, i.e. inflating variance and magnifying any bias in the model. For these reasons, we place little weight on this study for the purposes of determining a suitable efficiency assumption.
- A12.95 The original NERA study conducted in 2008 outlined some of the limitations of its analysis due to difficulties in comparing US LEC and BT's data directly. Further, we disagreed with some aspects of Deloitte's approach in their follow-up studies. Our considerations in that regard are set out in Annex 7 of the WBA CC Consultation.<sup>278</sup>
- A12.96 In light of the above considerations, we regard 1.5% as an appropriate efficiency figure for BT Wholesale's provision of TI services. We note that this may be considered a relatively low target for efficiency improvements compared to those used in other charge controls on BT. However, TI services are a mature and declining set of markets and we believe that the evidence does not justify making a stronger efficiency assumption. We consider that this reflects that there is still some scope for BT Wholesale to reduce operating inefficiency, but less than in other services due to the declining nature of the service. This level of efficiency is also consistent with our analysis of past efficiency savings by BT Wholesale.

# Operating cost and new capital expenditure efficiency of 4.5% for Ethernet services

- A12.97 We have considered a range of indicators to estimate the efficiency improvement that may reasonably incentivise Openreach to bring its costs in line with those of an efficient operator. They can be categorised into three broad headings:
  - Openreach-specific trend analysis;

<sup>&</sup>lt;sup>278</sup> See WBA CC Consultation, Annex 7.

- Openreach internal efficiency targets; and
- external benchmarking studies.

A12.98 Figure A12.23, which is also included in Section 20, summarises these indicators.

	Openreach- specific trend analysis <sup>279</sup>	Openreach internal efficiency targets <sup>280</sup>	2012 Deloitte Study <sup>281</sup>	Statistical analysis (NERA, Deloitte) 282283	KPMG study
Efficiency (% per annum)	[⊁]%	<b>[≻]</b> %	2.25%	~2%	2.3-2.6%
Comments	Ofcom analysis of Openreach's historical cost data	Internal targets set for the subsequent 3 years	Benchmark against 5 other European operators	Benchmark against US LECs	Excludes fault rates and task times

#### Figure A12.23: Evidence for Ethernet efficiency assumption

### Ethernet-specific trend analysis

- A12.99 We have attempted to conduct a similar analysis of trends of Ethernet services as was carried out for TI services. However, it was not possible to obtain meaningful or robust results for the following reasons.
  - The relationship between cost components and the underlying services has changed over the time period considered (2007/08 to 2011/12). This means that costs have not been allocated to the components on a consistent basis.
  - Cost and volume data for Ethernet services are available for five years from 2007/08 to 2011/12. As a result, trend data (differences between one year and the next) are only available for four years. This, coupled with the fact that there is only a limited number of components relating to Ethernet services, results in there being a low number of observations from which to extrapolate a trend.
- A12.100 As a result, we have focused on the historical trend analysis for Openreach as a whole. This is also consistent with other charge controls, such as WLR LLU, which also measure efficiency across Openreach as a whole.

### Openreach-specific trend analysis

A12.101 We have conducted an analysis of Openreach's historical efficiency savings in total costs. The rationale for considering total cost efficiency rather than opex efficiency is set out in Section 20. We estimate that Openreach delivered the following real efficiency savings:

<sup>&</sup>lt;sup>279</sup> Ofcom analysis of BT Group response to S135 Notice [X]

<sup>&</sup>lt;sup>280</sup> BT Group response to S135 Notice [>]

<sup>&</sup>lt;sup>281</sup> Deloitte, "Analysis of the Efficiency of BT's Regulated Operations", A report for BT, 16 February 2012.

<sup>&</sup>lt;sup>282</sup> NERA, 17 March 2008, "The comparative efficiency of BT Openreach." <u>http://stakeholders.ofcom.org.uk/binaries/consultations/llcc/annexes/efficiency.pdf</u>

<sup>&</sup>lt;sup>283</sup> Deloitte, 29 March 2011, "WBA consultation response" <u>http://stakeholders.ofcom.org.uk/binaries/consultations/823069/responses/BT2.pdf</u>

A12.102 Openreach reported that in the three years from 2009/10 to 2011/12, its total cash cost efficiency ranged from [≫]. This gives an average efficiency of approximately [≫].<sup>284</sup> In 2011/12, Openreach's actual cash cost efficiency saving was [≫].<sup>285</sup>

#### Figure A12.24: Evidence for Openreach Total Cost efficiency assumption

	2009/10	2010/11	2011/12
Ofcom estimate of Openreach total cost efficiency (TCE)	[×]	[×]	[≻]

- A12.103 Some of these efficiency savings relate to one-off efficiency improvements. We have included these one-off efficiency savings as similar one-off savings may be achievable in future. The only one-off change we have excluded relates to BT's cumulo bill in 2010/11 as this was a step change from the previous ratings.<sup>286</sup> The step change in cumulo liability arose due to the switch from the 2005 ratings assessment to the 2010 assessment. This ratings assessment is due to be in place until 2015. We consider that as this ratings assessment is due to be in place for most of the charge control, and the difficulties in predicting similar outcome at the next review, that this one-off reduction should be excluded. In contrast to other one-off reductions, we do not consider it reasonable to expect BT to find reductions of a similar magnitude in future. On this basis, we have calculated that over the period from 2008/09 to 2011/12 BT achieved annual efficiency savings averaging around 5%.
- A12.104 These efficiency figures are in real terms, i.e. after inflation. The inflation measure that Openreach has used is the level of inflation actually experienced by its business and reported in its management accounts. In the period in question, this level of inflation was lower than RPI.
- A12.105 Our forecasting model calculates an RPI-X control, and as such requires inputs to be expressed on a basis relative to RPI. In principle, if we were to take BT's historical efficiency improvement as the forecast efficiency gain over the modelled period, we would need to express the historical performance as a change in cost compared with the movement in RPI. Since during the historical period RPI was greater than the BT specific inflation figure with which BT's gain in efficiency was compared, the real unit cost reduction achieved against RPI (i.e. the efficiency gain figure relevant to our model) would be higher than the numbers reported by BT.
- A12.106 However, we do not believe that it would be appropriate to use BT's historical performance against RPI as our forecast of future performance. This is for two reasons.
  - First, in the period between March 2009 and March 2012, the average RPI was 4.5%.<sup>287</sup> Although this was above the cost inflation facing BT, during that time RPI was elevated due to a number of factors that were of limited relevance to

 $<sup>^{\</sup>rm 284}$  We have also received data for 2007/08 and 2008/09. The average efficiency is also ~5% if a four or five year average was used instead.

<sup>&</sup>lt;sup>285</sup> Openreach response to S135 Notice of 28 September 2012 [>].

<sup>&</sup>lt;sup>286</sup> Cumulo rates are the business rates paid by BT Group on its network business. These relate to the use of public land for assets such as poles, duct, street cabinets and the equipment in exchange buildings.

<sup>&</sup>lt;sup>287</sup> Office of National Statistics
BT. These factors included the increase in VAT and the devaluation of sterling leading to higher costs of imported goods.<sup>288</sup>

- Second, while BT's pay costs have historically increased either at or above RPI,<sup>289</sup> during the period 2009/10 to 2011/12 due to an exceptional wage freeze in 2009/10 and due to RPI being higher than expected in the subsequent years, pay costs increased by less than RPI. Thus, if we took as our forecast of efficiency BT's past reductions in real unit costs, as measured relative to RPI, we would be forecasting that BT's wages would in the future lag behind RPI. This would be contrary to our expectation that, over the medium term, the linkage between BT's pay inflation and RPI would be restored, such that pay would no longer be expected to fall in real terms.
- A12.107 Since we believe that BT's efficiency gains versus RPI in this period were distorted because of these effects, we have concluded that we should not use BT's past performance compared with RPI as the forecast efficiency improvement in our model. We have considered whether we could make an adjustment which would adjust for the temporary factors affecting RPI which we would not expect to persist going forward. However, we consider that this would be fraught with difficulty as the Bank of England acknowledge:

"the impact of these factors on inflation is hard to calibrate, and small differences in assumptions can affect the explanation for the strength in inflation."<sup>290</sup>

- A12.108 A further consideration is how BT's past efficiency performance relative to RPI would compare with figures derived from other sources. In particular, while the rebasing of BT's historical performance on an RPI basis would lead to a higher efficiency estimate than 5% p.a., other studies suggested the potential for real efficiency improvements (i.e. annual reduction in real unit costs) was less than 3% p.a. The NERA, Deloitte and KPMG studies suggested that BT was relatively efficient and that the scope for catch-up gains in efficiency (as opposed to frontier shift gains) was limited.<sup>291</sup>
- A12.109 Although we consider these studies less directly relevant than Openreach's historical efficiency, we do believe that the forecast for real unit cost savings to be used in the model should be capable of being decomposed into frontier shift and catch up in a way which is consistent with other data on the potential for improvements each of these types of efficiency. If we were to adjust BT's historical efficiency in order to express it on an RPI basis, we would arrive at a number which does not satisfy this requirement. That is, the figure would imply either that there is significant catch-up efficiency or that there is a high level of frontier shift efficiency. We would therefore be highly likely to overstate the potential efficiency gains BT could achieve.

<sup>&</sup>lt;sup>288</sup> For an explanation of the factors which impacted inflation during that period see the letter from the Governor of the Bank of England to the Chancellor, 15 November 2010, Available at: <u>http://www.bankofengland.co.uk/monetarypolicy/Documents/pdf/cpiletter101116.pdf</u>

<sup>&</sup>lt;sup>289</sup> See BT's response to the LLCC Consultation, footnote 18.

<sup>&</sup>lt;sup>290</sup> See : <u>http://www.bankofengland.co.uk/monetarypolicy/Documents/pdf/cpiletter101116.pdf</u>

<sup>&</sup>lt;sup>291</sup> 'Catch-up' efficiency refers to the efficiency gains an inefficient firm needs to make to achieve industry best practice i.e. to be at the efficiency frontier. 'Frontier shift' refers to efficiency gains made due to technological progress.

A12.110 On balance, taking account of the past evidence from Openreach's past performance, the particular factors affecting the way that performance in cost reduction compares to RPI and the need for corroboration with other sources, we consider that an average efficiency in the region of 5% p.a. provides the most useful estimate of past trends in order to inform our decision on Openreach's future performance.

### **Openreach-specific internal efficiency targets**

- A12.111 As noted above, Openreach's MTP is an internal document used for planning purposes within BT. It sets out the financial outlook for the company for the next three years and sets efficiency targets for each line of business.
- A12.112 Using Openreach's break-down of their efficiency targets, we have calculated a figure based on total cost efficiency savings as a proportion of total costs, as shown in Figure A12.25.<sup>292</sup>

### Figure A12.25: Openreach Medium Term Plan targets

	2012/13	2013/14	2014/15
Total cost Efficiency target	[×]	[×]	[×]

A12.113 Openreach's MTP shows that Openreach has targets of between [ $\gg$ ] and [ $\gg$ ] reductions in total costs over the period from 2011/12 to 2014/15.

### Other external benchmarking studies

#### 2012 Deloitte Study

A12.114 The 2012 Deloitte Study was carried out using data for BT as a whole, not specific to BT Wholesale or Openreach. A brief summary of the study is set out in paragraphs A13.84-A13.86.

### KPMG Study

- A12.115 For the purposes of the WLR LLU CC Consultation, KPMG undertook an analysis for Ofcom which estimated the efficiency gains that could be achieved by Openreach until 2012/13 through benchmarking operating cost components.<sup>293</sup> This was subsequently updated and is explained further in Annex 3 of the WLR LLU CC Statement.
- A12.116 KPMG concluded from the updated analysis that Openreach could deliver average efficiency gains of 2.3-2.6% per annum between 2010 and 2014 on its operating cost. As explained in the full report, KPMG has looked specifically at benchmarking operating cost categories; therefore these percentages represent the potential reduction in costs before any changes in fault rates and task times. A decrease in fault rates or task times is likely to increase the scope for BT to deliver efficiency improvements. In contrast, a reduction in these would tend to increase BT's ability to deliver efficiency improvements.

<sup>&</sup>lt;sup>292</sup> Openreach response to S135 Notice of 28 September 2012 [×]

<sup>&</sup>lt;sup>293</sup> KPMG "Efficiency Review of BT Openreach" March 2010. <u>http://stakeholders.ofcom.org.uk/binaries/consultations/wlr-cc-2011/annexes/Efficiency\_Review\_Report.PDF</u>

### NERA Study and Deloitte 2010 Study

A12.117 See discussion at paragraphs A13.87-A13.89 above.

## Evaluation of evidence and decision for efficiency assumption for Ethernet services

- A12.118 As with TI, we consider it was appropriate to place most weight on the sources of evidence which are most relevant to Ethernet services. In the absence of historical trend analysis specific to Ethernet services, we have placed most weight on the past and projected efficiency savings achieved by Openreach. Over the three years from 2009/10 to 2011/12, we have calculated that Openreach achieved efficiency savings averaging around 5%. We note that, for the purposes of the proposed charge control, we need to extrapolate significantly into the future. Although forecasting further into the future reduces the predictive power of this past trend, it forms a useful starting point.
- A12.119 We have placed less weight on BT's internal planning documents and an extrapolation of their latest rolling forecast. These contained targets for efficiency savings of [≫] per year from 2012/13 to 2014/15. [≫]. We note that the actual efficiency figure for 2011/12 was lower than forecast, suggesting that Openreach does not consistently underestimate actual efficiency improvements.
- A12.120 We consider that the benchmarking studies conducted by NERA and Deloitte are less specific to Ethernet services and therefore have attributed very little weight to these. In addition, the NERA study and the 2008 and 2011 Deloitte studies which made use of the US LEC data were problematic due to data not being directly comparable. We also have concerns over the 2012 Deloitte study due to a limited number of observations in the sample, and minimal variation in the output variables. Nevertheless, we note that these suggest efficiency savings in the region of up to 3% per annum.
- A12.121 From our consideration of the available evidence, we have concluded that Openreach should be able to reduce its cash payments by 5% per annum. This places most weight on the historical evidence of efficiency gains made by Openreach. These show that Openreach has been able to achieve an efficiency saving averaging 5% for the period 2009/10 to 2011/12. We note that Openreach's forecasts suggest that this level should also be achievable in the future.
- A12.122 This efficiency rate is a gross efficiency rate and excludes the offsetting costs of achieving those gains (e.g. the costs of staff leaving the business). We note that the WLR LLU CC found that a gross efficiency rate of 5% corresponds to a net efficiency rate of 4.5% once the costs of leavers were excluded.
- A12.123 We have therefore applied a net efficiency rate of 4.5% to both Openreach's operating costs and new capital expenditures.

### **Return on Capital**

- A12.124 We have included in BT's cost base a return on capital equal to its WACC. The WACC is the minimum return required on BT's investments.
- A12.125 As discussed in Section 19 and 20, we have applied a pre-tax real cost of capital equal to 7.0% for both the TI and Ethernet services. The methodology behind this proposal is explained in Annex 14.

### Asset and cost volume elasticities (AVEs/CVEs)

- A12.126 The impact of forecast changes in volumes on forecast costs in our model (before taking into account efficiency improvements) is determined by asset volume elasticities (AVEs) and cost volume elasticities (CVEs).
  - **AVEs** are used to determine the level of capital costs needed in response to changes in demand (an AVE is defined as the percentage change in assets, valued at gross replacement costs, for a 1% change in volumes).
  - **CVEs** are used to determine the level of operating costs needed in response to changes in demand (a CVE is defined as the percentage change in operating costs for a 1% change in volumes).
- A12.127 An elasticity of one would indicate that costs change proportionately with volumes (resulting in constant unit costs) whilst an elasticity of zero indicates that total costs are fixed (and therefore unit costs will have an inversely proportional relationship with volumes).
- A12.128 We received submissions from BT Wholesale and from Openreach on AVEs and CVEs in response to our information request. Both BT Wholesale and Openreach submitted data based on BT's 'LRIC model'. We have decided to model costs on the basis of this set of elasticities, which is presented in Figure A12.26 (AVEs) and below Figure A12.27 (CVEs). The CVEs reported in Figure A12.27 can be analysed distinguishing between Pay and Non-pay, with a weighted average CVE of 0.52 and 0.65 respectively. The reasoning supporting this choice has been set in Section 19.

	Cost category	BT Wholesale LRIC model AVE <sup>294</sup>
	Cable	0.32
	Duct	0.08
	Local Exchange	0.51
	Main Exchange	0.47
	Transmission	0.83
	Other Network Equipment	0.92
AVES	Motor Transport	0.65
	Land & Buildings	0.73
	Computers and OM	0.72
	Other	0.92
	Other Intangibles	0.92
	Access Fibre	0.80

#### Figure A12.26: AVEs assumed in Ofcom's cost forecasts

<sup>&</sup>lt;sup>294</sup> Openreach response to S135 Notice of 28 September 2012 [X]

# Figure A12.27: CVEs assumed in Ofcom's cost forecasts <sup>295</sup> [≫]

A12.129 For completeness, we note that BT Wholesale also provided 'End of life' AVEs and CVEs. However, we have rejected this set of elasticities on the grounds of the reasoning reported in Section 19.

A12.130 We have used BT's submitted AVEs and CVEs in our charge control modelling.

### **Asset price changes**

A12.131 Asset price changes have offsetting effects on the cost base, namely:

- the first effect relates to the existence of a holding gain as a result of the asset price increases such a gain reduces costs in the year that it occurs. The reverse is true for holding losses; and
- the second effect is the impact on the real return. An asset price rise increases the value of the asset base, and therefore increases the required return in the cost base. Similarly, a fall in the asset price would reduce the value of the asset base and in turn reduce the cost base to be recovered through the charges in the charge control basket.
- A12.132 As a result, the impact of real price changes depends on which effect dominates and it is not known a priori whether it will increase or decrease the overall cost base.
- A12.133 Real holding gains or losses are created where asset prices change at rates other than RPI. Forecasting asset price changes is clearly a challenging task. In the LLCC model, we have taken an average of asset price changes over the past five years updated for 2011/12 prices, as supplied by BT (as shown in Figure A12.28). We have assumed that the real asset price changes apply over the period from 2012/13 to 2015/16.

<sup>&</sup>lt;sup>295</sup> For the sake of clarification, figures reported in this table are those submitted by BT and no further adjustments have been made (e.g. weighting of CVEs by AVEs).

Asset	5 year average nominal price change between 2007/08 and 2011/12	Real price change
Duct	3.6%	0.0%
Local Exchange	-0.3%	-3.8%
Main Exchange	0.0%	-3.4%
Transmission	0.1%	-3.4%
Other Network Equipment	0.0%	-3.5%
Motor Transport	0.0%	-3.5%
Land & Buildings	0.0%	-3.5%
Computers & OM	0.0%	-3.5%
Other intangibles	0.0%	-3.5%
Other	-0.6%	-4.0%
Cable – Copper*	2.0%	-2.1%
Cable - Fibre	2.2%	-1.4%

#### Figure A12.28: Asset price changes assumed in Ofcom's cost forecasts

\* For copper cable we used the five year average from 2006/07 to 2011/12 excluding 2009/10 due to one off events in 2009/10

- A12.134 For copper cable, we used the five year average from 2006/07 to 2011/12 excluding 2009/10 data. This was because in the year 2009/10 there was a very significant increase in the price of copper driven by the recovery of the world economy. We considered that the 2009/10 increase was a one off and would distort the average if included.
- A12.135 As regards the cost categories of "Other network equipment", "Motor Transport", "Land & Buildings", "Computers & OM" and "Other Intangibles", we considered that they have zero holding gain or loss. This was because these assets were valued at historical cost, and they were therefore to be consistent with the accounting treatment of these assets. Consequently, they did not have a holding gain/loss. This meant their values reduced in real terms over the duration of the charge control.<sup>296</sup>
- A12.136 To forecast the value of duct, we assume that the nominal changes in the price of duct in the future will equal RPI. A five year average is not representative of future duct values given a large one off holding gain on duct in 2009/10 and holding losses in 2010/11 and 2011/12 that occurred for reasons that did not involve changes to the underlying asset. The use of RPI to forecast the value of duct was consistent with Ofcom's view of the RAV approach.<sup>297</sup>

# We do not apply any start charge adjustments for TI or Ethernet services

A12.137 A key element in the value of X is the assumed starting level of prices. We use prices expected to be in effect on 31 March 2013. Under certain circumstances we may propose to make one-off adjustments to starting charges in order to bring about changes at the start of the charge control. The value of X would then be

<sup>&</sup>lt;sup>296</sup> The 'Other' category also includes 21CN assets that were revalued for the first time in 2010/11. As we removed 21CN assets from modelling for TI as a result of anchor pricing approach, the historical asset price change applies. In any case, the revaluation effect is small and does not change the 5 year average.

<sup>&</sup>lt;sup>297</sup> A detailed description of the approach is available in the WLR LLU CC.

calculated to take this adjustment into account. Where such an approach is adopted, we need to balance the trade off between one-off changes versus implementing changes through the glide-path.

- A12.138 We consider that a glide path approach is appropriate for these proposed RPI-X controls. However, there may be circumstances under which we might consider one-off adjustments to BT's prices to be implemented at the start of the new charge control period. These might include, for example, scenarios where:
  - there are strong allocative efficiency arguments for bringing prices into line with cost sooner; and/or
  - the previous charges were unregulated or not subject to a charge control.

### Assessment of BT Wholesale charges for TI services

A12.139 The services we model for setting the value of X for the TI basket include all PPC services, Netstream, RBS backhaul and SiteConnect. Of those services, only PPCs are currently directly charge controlled, with the other services indirectly controlled through their use of the same underlying cost components.

### Assessment of BT Wholesale's current charges

A12.140 For each of the PPC services, we have carried out the analysis as set out below.

- We calculated the 2011/12 ratios of DSAC to FAC and DLRIC to FAC as reported in the RFS.
- Given our proposed cost adjustments and other assumptions, we arrived at a different FAC compared to those reported in the RFS in 2011/12. Based on our forecasting assumptions, we were also able to calculate what these FACs might be at the start of the charge control in 2012/13.
- Assuming that DSACs also follow the general trend in FACs, we estimated what these will be in 2012/13 by multiplying the forecast FACs by the 2011/12 ratios.
- We compared BT's current prices in the model with the DSAC estimates for 2012/13 in order to assess if start charge adjustments are needed.
- A12.141 On the basis of this analysis we have noted that all of BT's charges appear to be below DSAC in 2012/13. The model shows eight charges to be below DLRIC in 2012/13: PPC 140/155Mbit/s connection, PPC 64Kbit/s connection, RBS sub 2Mbit/s connection, PPC 2Mbit/s connection, PPC 140/155Mbit/s distribution, PPC CELA 140/155Mbit/s trunk, PPC non-CELA 140/155Mbit/s trunk, and PPC 622Mbit/s trunk. 2011/12 revenues for PPC 64Kb/s connections, PPC 140/155Mb/s connections and RBS sub 2Mb/s connections are below £1m for each of these services and not expected to increase in the future.
- A12.142 We have not identified any distortions to competition which could arise from these specific services. The main distortion which could arise from low pricing is that it would deter efficient entry. However, given the decline in the TI market we considered that such entry would be unlikely in any case. We are not making start charge adjustments to these services.

A12.143 We therefore have not applied any one off adjustments to TI charges at the start of the charge control.

### Assessment of BT Wholesale's charging structure

- A12.144 CWW brought appeals against the LLCC 2009 and raised issues relating to the one-off adjustments proposed. As part of CWW's Notice of Appeal (NoA') it identified a number of examples that it claimed demonstrated that the resulting structure of charges was "inefficient, discriminatory and distorts competition"<sup>298.</sup> The CC ruled that "C&W failed to demonstrate that Ofcom erred in adjusting some prices and not others within the TI basket" for the reasons it had set out.
- A12.145 Our assessment of current charges based on the RFS does not suggest the need for one-off adjustments to TI charges. We explain below our considerations as to whether the observations CWW made to LLCC 2009 still persisted today and, if so, whether there is a case for making one-off adjustments to PPC charges.<sup>299</sup>

#### DPCN versus 2Mbit/s circuits

- A12.146 CWW observed that it was more expensive to use some DPCN circuits than 2Mbit/s circuits. Its assessment was based on average circuit distances for the different bandwidths, comparing average monthly rental prices and assuming a contribution to other charges from connection, POH and DPCN bearers<sup>300</sup>. CWW argued that, as CPs purchase more nx64kbit/s circuits<sup>301</sup>, they were charged more compared to a 2Mbit/s circuit.
- A12.147 BT Wholesale sells nx64kbit/s circuits as multiples of 64kbit/s circuits and this is reflected in BT Wholesale's current charges.<sup>302</sup> For example, a 256kbit/s circuit attracts twice the charge for main link, terminating and trunk segments compared to a 128kbit/s circuit. As more 64kbit/s circuits are bundled together, these charges can mount up and can result in higher per kilometre charges than a 2Mbit/s circuit.
- A12.148 As part of Ofcom's response to CWW's observation<sup>303</sup>, we noted that the costs of providing DPCN circuits were higher than costs of providing a 2Mbit/s local end. BT's Statement of Intervention (SoI) further explained that the difference in technology is one of the reasons for this. The CC supported this and concluded that "it would appear difficult to make comparisons between DPCN and non-DPCN services as they are underpinned by different technologies". On this basis, we considered that the price differential between DPCN and 2Mbit/s circuits was not an anomaly and therefore that it is appropriate to allow BT the freedom to set its own pricing structure for them, subject to the constraints of the charge control conditions.

<sup>302</sup> PPC charges are available at: <u>https://www.btwholesale.com/pages/static/Library/Pricing\_and\_Contractual\_Information/carrier\_price\_list/cpl\_sectionb8partialprivatecircuits.htm</u>

<sup>&</sup>lt;sup>298</sup> Cable & Wireless UK v Office of Communications (Leased Lines Charge Control), Case 1112/3/3/09, Notice of Appeal, <u>http://www.catribunal.org.uk/237-4334/1112-3-3-09-Cable--Wireless-UK.html</u>

<sup>&</sup>lt;sup>299</sup> See paragraph 3.218 of the Competition Commission's Determination, 30 June 2010, available at the above link.

<sup>&</sup>lt;sup>300</sup> These assumptions were presented as evidence in the LLCC appeal, and are now archived. We can obtain these if necessary.

<sup>&</sup>lt;sup>301</sup> A PPC operating at nx64kbit/s is a wholesale circuit from a Third Party Customer Link to a CP's Point of Handover. These circuits are available at bandwidths from 128kbit/s to 960kbit/s in increments of 64kbit/s.

<sup>&</sup>lt;sup>303</sup> See paragraph 3.236 of the Competition Commission's Determination, 30 June 2010.

### DPCN terminating versus trunk charges

- A12.149 CWW's second observation was that DPCN trunk charges were more than three times DPCN terminating charges. It argued that this was illogical because (i) there was little difference between trunk and terminating segments from an engineering perspective, and (ii) if there was a difference, trunk should be priced lower than terminating segments as economies of scale should make the costs of trunk lower than the costs of terminating segments. CWW also argued that there should be no difference between the relative prices of DPCN trunk and terminating segments and non-DPCN trunk and terminating segments.
- A12.150 We noted<sup>304</sup> that trunk charges were brought into the charge control for the first time as a result of the BCMR 2008.<sup>305</sup> BT's Sol argued that the new pricing structure proposed in LLCC 2009 "rebalanced the charges between trunk and terminating segments and aligned prices more closely with costs". The CC concluded that there was "not sufficient evidence to support the allegation that the structure of charges … is anti-competitive". Again, in relation to the relative trunk and terminating prices for DPCN and non-DPCN circuits, BT submitted that there was no correlation between the cost ratios at different bandwidths, and that the two types of services are delivered using different technologies.
- A12.151 For the purposes of this charge control we carried out an assessment of current PPC charges. We find that for nx64kbit/s circuits trunk charges (including main link, on a per kilometre basis) are lower than terminating segments for average circuit lengths. For higher bandwidth circuits, this holds true for average externallypurchased circuits, which are significantly shorter than average internally-consumed PPC circuits. Given these developments since the start of the existing charge control, we consider that it is appropriate to delegate pricing decisions on relative charges to BT, subject to the constraints of our proposed charge control.

### Trunk charges at different bandwidths

- A12.152 CWW observed that the per kilometre charge for some DPCN trunk products were higher than the per kilometre charge of 2Mbit/s trunk.
- A12.153 Figure A12.29 below compares trunk charges by bandwidth based on BT Wholesale's Carrier Price List from 1 October 2009 (start of the existing charge controls) with the prices as at 1 October 2012. It shows that trunk charges in general have reduced during the three year period, and in particular, 64kbit/s trunk charges have reduced relative to 2Mbit/s charges. However, it is still the case that the per kilometre charge for some DPCN trunk products is more expensive than some 2Mbit/s charges.

<sup>&</sup>lt;sup>304</sup> See paragraph 3.230 of the Competition Commission's Determination, 30 June 2010.

<sup>&</sup>lt;sup>305</sup> <u>http://stakeholders.ofcom.org.uk/binaries/consultations/bcmr08/summary/bcmr08.pdf</u>



#### Figure A12.29: Comparison of trunk charges by bandwidth

A12.154 BT's response to this point during the LLCC Appeal was that "DPCN technology does not utilise trunk. Direct comparison of transmission costs using different technologies was simply not possible".<sup>306</sup> We consider that the pricing difference does not warrant intervention as the two services are based on different technologies.

#### Terminating versus trunk charges for 2Mbit/s circuits

- A12.155 On the 2Mbit/s charges, CWW observed that trunk was 3.3% more expensive than 2Mbit/s terminating segments.<sup>307</sup> If the 2Mbit/s trunk price was being brought down to DSAC and 2Mbit/s terminating segments were below DSAC, then it was likely that terminating segments were more expensive than trunk. CWW argued that this should be reflected in the pricing structure.
- A12.156 We note that, since the LLCC 2009, PPC trunk charges and terminating segment charges have been charge controlled in the same basket. Figure A12.30 below sets out the 2Mbit/s trunk and terminating segment charges over three periods between 2009 and 2012. It shows that, since 2009, terminating segment charges have increased while trunk segment charges have decreased. The result is that terminating charges are now more expensive on a per km basis than trunk. We consider that the changes in the charges of trunk and terminating segments indicate that BT has rebalanced its pricing structure since the beginning of the last charge control and that the current trunk and terminating segment charges are likely to broadly reflect the underlying costs of providing them.

### Figure A12.30: Comparison of 2Mbit/s charges between 2009 and 2012

Charge	1 October 2009	1 October 2011	1 October 2012
Terminating segment charge (per km per annum)	£45.34	£51.57	£58.32
Trunk segment charge (per km per annum)	£46.83	£42.61	£46.33

Source: BT Wholesale Carrier Price List

<sup>&</sup>lt;sup>306</sup> See paragraph 3.241 of the Competition Commission's Determination, 30 June 2010.

<sup>&</sup>lt;sup>307</sup> In 2009, the 2Mbit/s trunk charge was £46.83 per km, while the 2Mbit/s terminating charge was £45.34 per km.

### Comparison of 34/45Mbit/s and 140/155Mbit/s trunk charges

- A12.157 CWW's last observation was that the price of 45Mbit/s trunk was over twice the price of 155Mbit/s trunk. CWW argued that from a technical perspective there was no reason why 34Mbit/s or 45Mbit/s circuit could not be routed over a 155Mbit/s bearer and therefore no reason why there should be such a price differential. CWW pointed out that within the PPC product portfolio there was no product option for customers to route 45Mbit/s circuits over 155Mbit/s and that there was no obvious reason why the efficiently incurred costs of 45Mbit/s trunk should be greater than those for 155Mbit/s.
- A12.158 Figure A12.30 above shows that the per kilometre charge for a 34/45Mbit/s circuit was just over twice the charge for a 155Mbit/s circuit in 2009 and that this margin has since reduced. In Ofcom's response to CWW during the appeal, we noted that one reason for this is that the costs of trunk circuits are not geographically uniform in that they vary depending on location. This, in turn, may reflect the density of trunk circuits on particular routes. So, if a higher proportion of 45Mbit/s circuits were in "high cost" areas or on low-density routes, the result might be that the average cost of 45Mbit/s trunk was higher than that of 155Mbit/s.
- A12.159 In its assessment, the CC was not persuaded by CWW's view on the pricing differential and how this would have led to inefficient and discriminatory pricing. In particular, the CC argued that that "in an industry with large common costs, the 'correct' cost of each product is very difficult to know", which was the basis of CWW's argument.

#### We have not applied any start charge adjustments to TI services

A12.160 Based on our assessment of the current level of charges and the charging structure, we do not believe there is sufficient evidence to make one-off adjustments to BT Wholesale's current prices. As per the CC's findings, we do not believe that some of the pricing anomalies as put forward by CWW "were indeed anomalies". For other areas, we believe that our decision provides BT with the flexibility to price on a cost-reflective basis, subject to the sub-caps. Indeed, the CC believed that this was "a sensible division of powers... and reflected a considered judgement by Ofcom consonant with the purposes of the 2003 Act".

### Assessment of Openreach charges for Ethernet services

A12.161 As with TI services, we have also evaluated the case for any one-off adjustments to Ethernet services. Ethernet services above 1Gbit/s were not previously subject to SMP regulation, hence no DSACs or DLRICs were provided in the 2010/11 RFS. DSACs and DLRICs are available for WES services up to 1Gbit/s disaggregated by bandwidth (10Mbit/s, 100Mbit/s and 1000Mbit/s rentals), for BES services (1000Mbit/s rentals), for EAD services up to 1Gbit/s disaggregated by bandwidth and for EBD services aggregated across bandwidths.

#### Assessment of Openreach current charges

A12.162 We have updated our analysis with the 2011/12 base year data, to see if any charges fall outside the DSAC and DLRIC cost orientation benchmarks. The analysis showed that in 2012/13 no charges are expected to be above DSAC or below DLRIC. Therefore, we have decided not to make start charge adjustments.

- A12.163 We have also extrapolated DLRIC floors and DSAC ceilings forward on the basis of the movement in FAC costs to 2015/16, in order to see whether it is likely that the charges will exceed DSAC ceilings by the end of the charge control.
- A12.164 The results of our model show that all Ethernet services for which DSAC is reported will be below forecast DSAC in 2015/16. Given that all reported charges for Ethernet services are below forecast DSAC in the first year of the control as well, we consider that the sub caps we are imposing are sufficient to prevent prices becoming excessive during the duration of the control.

### Assessment of Openreach charging structure

A12.165 Within Ethernet services, the total price paid for a circuit increases depending on the capacity of the circuit. This increase in price as capacity increases is sometimes referred to as the 'bandwidth gradient' in pricing. We have considered whether Openreach might be in a position to produce such a bandwidth gradient with potentially anti-competitive effects. Our reasoning is set out below.

#### Ethernet service prices and costs by bandwidth

A12.166 Figure A12.31 shows that the rental prices of basic WES, BES and EAD circuits increase as bandwidth increases. For example, the step increase in price between 10Mbit/s and 100Mbit/s is 8% for EAD, 12% for BES and 33% for WES. However, the step increase between 100Mbit/s and 1Gbit/s is substantially greater: more than 100% increase for all three services.

#### Figure A12.31: Ethernet services rental charges as at 1 October 2012

Service	Total price per circuit per annum	Average price per Mbit/s (£/circuit/annum)
WES		
10Mbit/s	3,202	320.16
100Mbit/s	4,260	42.60
1Gbit/s	9,060	9.06
2.5Gbit/s	[×]	[×]
10Gbit/s	[×]	[×]
BES		•
10Mbit/s	3,110	311.00
100Mbit/s	3,476	34.76
1Gbit/s	7,529	7.53
2.5Gbit/s	[×]	[×]
10Gbit/s	[×]	[×]
EAD		•
10Mbit/s	3,353	335.26
100Mbit/s	3,629	36.29
1Gbit/s	7,779	7.78

Source: Ofcom analysis of BT Group data submitted in response to S135 Notice of 28 September 2012<sup>308</sup>

<sup>&</sup>lt;sup>308</sup> BT Group response to S135 Notice of 28 September 2012 [>].

- A12.167 However, although total prices increase with bandwidth, the increases are less than the corresponding increases in capacity for these circuits. Figure A12.31 shows that for each circuit type, the average price per Mbit/s falls as bandwidth increases, i.e. customers benefit from lower average prices per Mbit/s as they purchase more bandwidth. For example, the price of an EAD 1Gbit/s circuit is £7.78 per Mbit/s compared to £335.26 per Mbit/s for the 10Mbit/s variant.
- A12.168 We note that the bandwidth gradient in pricing is unlikely to be driven by differences in marginal costs.
- A12.169 To illustrate this, we consider the FAC profile of WES services up to 1Gbit/s. Figure A12.32 below shows that the FACs of WES rental services increase by only a small proportion as bandwidth increased. This suggests that there is little difference in the marginal costs of WES services across different bandwidths and is likely to reflect the fact that the technology and equipment used to deliver WES services is largely the same regardless of the bandwidth that is being provided. In the case of the WES services depicted below, the difference in FACs is mainly due to the higher proportion of admin-related costs (i.e. common costs) allocated to the higher bandwidth services.



#### Figure A12.32: WES rental fully allocated costs (FACs) in 2011/12 (per circuit)

Source: Appendix 1.2.1, p. 106 of BT's 2011/12 Regulatory Financial Statements

### Incentives regarding the bandwidth gradient

- A12.170 As the pricing gradient does not appear to reflect differences in marginal costs, this suggests that Openreach earns a higher gross margin on high bandwidth circuits than on low bandwidth circuits. High bandwidth circuits therefore make a greater contribution to the recovery of fixed and common costs.
- A12.171 We have examined whether Openreach could have an incentive to price the different bandwidth products in an unduly discriminatory and/or anti-competitive way. Such an incentive could arise if the higher capacity circuits were purchased disproportionately by other CPs rather than BT itself. We note that Openreach is required to set the same prices, use the same processes and the same timescales

for all their customers, internal or external. Figure A12.33 sets out the split of volumes of WES, BES and EAD circuits sold internally and externally.

Figure A12.33. Ethernet internal rental volumes by customer type in 2011/17
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Service	2011/12	2015/16
WES		
10Mbit/s	[×]	[×]
100Mbit/s	[×]	[×]
1Gbit/s	[×]	[×]
2.5Gbit/s	[×]	[×]
10Gbit/s	[×]	[×]
BES	'	
10Mbit/s	[×]	[×]
100Mbit/s	[×]	[×]
1Gbit/s	[×]	[×]
2.5Gbit/s	[×]	[×]
10Gbit/s	[×]	[×]
EAD	'	•
10Mbit/s	[×]	[×]
100Mbit/s	[×]	[×]
1Gbit/s	[×]	[×]

Source: BT's 2012 RFS and BT Group response to S135 Notice of 28 September  $2012^{309}$ .

A12.172 Figure A12.33 shows that in 2011/12 the majority of WES and EAD circuits were purchased [X] migration [X].

A12.173 [>>]

A12.174**[×**]

A12.175 By the end of the charge control, most circuits are forecast to be EAD as a result of migration, particularly as new supply of WES and BES up to and including 1Gbit/s has been withdrawn since 31 May 2011. Therefore, we expect internal volumes to continue to make up a significant proportion of the overall total in 2015/16.<sup>310</sup>

### Bandwidth gradients and economic efficiency

- A12.176 Allowing for an upward-sloping bandwidth gradient (i.e. higher costs for more capacity) may be an efficient way to recover fixed and common costs, particularly if this is accompanied by decreasing average costs, as observed in Openreach's current charging structure in Figure A12.31.
- A12.177 The services that make up the Ethernet basket are characterised by high fixed and common costs and low marginal costs largely because much of the underlying network infrastructure that Openreach uses to deliver these services is common

<sup>&</sup>lt;sup>309</sup> BT Group response to S135 Notice of 28 September 2012 [>].

<sup>&</sup>lt;sup>310</sup> See Openreach announcement at: <u>http://www.openreach.co.uk/orpg/home/updates/briefings/ethernetservicesbriefings/eth</u>

across different bandwidths and services. For example, all of these services use elements of the same assets like duct, fibre, equipment, while many location-related costs (e.g. accommodation or air-conditioning) and management systems are common across all bandwidths and services. This view was supported by the CC in the CWW appeal.

A12.178 Finally, since the demand for Ethernet services is changing rapidly over the next few years, this approach also allows Openreach the ability to re-optimise prices and respond to new patterns of demand quickly.

### We will not make any start charge adjustments to Ethernet services

- A12.179 We have not identified any particular strategic incentives on Openreach in relation to the bandwidth gradient. We therefore consider it appropriate to allow Openreach some flexibility to determine the most appropriate structure of prices, subject to meeting the charge control conditions.
- A12.180 This flexibility is not unlimited. As described in Section 18, we use DSAC and DLRIC benchmarks to assess whether individual charges are at a level which may give rise to competitive distortions. As described in Section 20, we have assessed whether any charges for Ethernet services fall outside the DSAC and DLRIC cost orientation benchmarks. The analysis showed that in 2012/13 no charges for which we have DSAC and DLRIC data, are expected to be above DSAC or below DLRIC. Therefore, we have decided not to make start charge adjustments.
- A12.181 We have also DSAC ceilings forward on the basis of the movement in FAC costs to 2015/16, in order to see whether it is likely that the charges will exceed DSAC ceilings by the end of the charge control. As described in Section 20, as a result of this analysis, we have decided to impose a sub-basket for EAD 1 Gbit/s services to keep the charge for these services below forecast DSAC throughout the charge control period.

### **Cost forecasting approach**

A12.182 We have forecast capital costs and operating costs separately.

### **Forecasting of capital costs**

- A12.183 We split the cost forecasts into two parts. The 'steady state' element is the forecast of what would happen to costs if there was no change in volumes during the charge control period. The 'additional' element is the change in cost induced by changing volumes. If volumes increase this will be positive, if volumes fall this will be negative.
- A12.184 The steady state and additional elements are summed together to generate a total cost forecast.
- A12.185 Figure A12.34 explains the terminology used in this section.

Name	Description
Gross Replacement Cost (GRC)	The current cost accounting equivalent of Gross Book Value, i.e. the cost of BT replacing its assets now.
Net Replacement Cost (NRC)	The current cost accounting equivalent of Net Book Value, i.e. depreciated replacement cost of BT's assets.
Operating capability maintenance (OCM)	A Current Cost Accounting (CCA) convention, where the depreciation charge to the profit and loss account relates to the current replacement cost of the firm's assets, taking account of specific and general price inflation.
Financial capital maintenance (FCM)	A CCA accounting convention, where the depreciation charge to the profit and loss account includes holding gains or losses due to changes in asset prices, in addition to the OCM depreciation charge. This is in real terms, relative to RPI.
Mean capital employed (MCE)	BT's definition of Mean Capital Employed is total assets less current liabilities, excluding corporate taxes and dividends payable, and provisions other than those for deferred taxation. The mean is computed from the start and end values for the period, except in the case of short-term investments and borrowings, where daily averages are used in their place.
Fully allocated costs (FAC)	An accounting approach under which all the costs of the firm are distributed between its various services. The fully allocated costs of a service may therefore include some common costs that are not directly attributable to the service.
Inflation	The general change in prices across the economy. We have used RPI data obtained from the Office of National Statistics (ONS) and HM Treasury.
Real asset price change (APC)	Changes in valuation of underlying assets over and above RPI.
WACC	BT's weighted average cost of capital.
Return on capital employed (ROCE)	The ratio of accounting profit to capital employed. The measure of capital employed can be either HCA or CCA.
Asset lives	Asset lives of each component are calculated by dividing the GRC by the depreciation charge in the base year assuming straight line depreciation.

### Figure A12.34: Explanation of accounting terms

A12.186 Figure A12.35 sets out the abbreviations used in the cost forecasting calculations.

### Figure A12.35: Abbreviations used in cost forecasts

Abbreviation	Description
GRC(t)	The value of Gross Replacement Cost (GRC) in year t (taken as a year-end figure)
GRC(t-1)	The value of GRC previous year (taken as a year-end figure)
NRC (t)	Net Replacement Cost in year t
Capex (t)	Capital expenditure in year t
OCM dep (t)	Operating Capability Maintenance depreciation in year t
HGL (t)	Holding gains or losses in year t
NCA (t)	Net Current Assets in year t
eff	Percentage reduction in costs arising from efficiency gains at constant volumes

### Forecasting of 'steady state' capital costs

A12.187 The 'steady state' element is the forecast of what would happen to costs if there was no change in volumes during the charge control period. Figure A12.36 presents the steady state calculations used by Ofcom's forecasting model.

Calculation	Description
Gross Replacement Cost (GRC)	Base year GRC is taken from BT's response to our information request. Subsequent years are calculated as: GRC(t) = GRC(t-1) * [1 + APC(t)]
OCM depreciation (OCM dep)	Base year OCM depreciation is taken from BT's response to our information request and is the sum of HCA depreciation and CCA depreciation. In subsequent years we assume straight line depreciation, calculated as: OCM dep(t) = GRC(t) / asset life Where asset life is equal to the ratio GRC/OCM dep in the base year.
Capital expenditure (Capex)	Base year capital expenditure is assumed to be equal to OCM dep. Subsequent years are calculated as: Capex(t) = Capex(t-1) * $[1 + APC(t)] * (1 - eff)^{311}$
Net replacement cost (NRC)	Base year NRC is taken from BT's response to our information request. Subsequent years are calculated as: NRC(t) = NRC(t-1) * [1 + APC (t)] + Steady state capex (t) – Steady state OCM dep (t) We assume in the Steady state capex (t) = OCM dep (t), hence NRC(t) = NRC(t-1) * [1 + APC (t)]
Holding gains or losses (HGL)	HGL(t) = - Steady state NRC(t) * APC(t)

Figure A12.36: Approach to forecasting steady state capital costs

### Forecasting of 'additional' capital costs

- A12.188 The 'additional' element is the change in cost induced by changing volumes of services relative to the steady state. If volumes increase this will be positive, if volumes fall this will be negative.
- A12.189 Figure A12.37 presents the additional calculations used by Ofcom's forecasting model. All changes are forecast relative to the base year. As with the steady state capital and depreciation costs, additional costs are also forecast as year-end values.

Calculation	Description
Additional GRC	GRC(t) = GRC(t-1) * [1 + APC(t)] + steady state capex(t) + additional capex(t)
Additional OCM dep	OCM dep(t) = ad GRC(t) / asset life
Additional capex	Capex(t) = Total GRC(t-1) * [1 + APC(t)] * (1-eff) * AVE * volume change %(t)
Additional NRC	NRC(t) = NRC(t-1) * [1 + APC (t)] * AVE * volume change %(t)
Holding gains or losses (HGL)	HGL(t) = - Additional NRC(t) * APC(t)

Figure A12.37: Approach to forecasting additional capital costs

### Forecasting of total capital costs

A12.190 As mentioned above, we have forecast the total capital cost as the sum of the steady state and additional elements for each cost category discussed in Figure A12.36 and Figure A12.37. For GRC, capex and OCM depreciation we forecast the

<sup>&</sup>lt;sup>311</sup> The assumption on the efficiency for Ethernet capex is calculated such that the real asset price trend and the efficiency assumption total the total efficiency assumed for Openreach (4.5%).

total cost including the RAV adjustment mentioned in Figure A12.3 and Figure A12.5.

A12.191 We have calculated the total return on capital and the net current asset at the service level, according to the calculations presented in Figure A12.38.

Figure A12.38: Approach to forecasting return on capital

Calculation	Description
Net Current Asset (NCA)	NCA(t) = NCA(t-1) * (1+ volume change %)
Return on capital	Return on capital (t) = [NRC(t) + NCA(t)] * pre tax real WACC

### Forecasting of operating costs

A12.192 Figure A12.39 presents the operating cost calculations used by our forecasting model.

### Figure A12.39: Approach to forecasting operating costs

Calculation	Description
Pay	Base year pay is taken from BT's response to our information request. Subsequent years are calculated as: $^{312}$ Pay(t) = Pay(t-1) *(1 - eff) * [1 + volume change %(t) * CVE]
Non-pay	Base year non-pay is taken from BT's response to our information request. Subsequent years are calculated as: Non-pay(t) = Non-pay(t-1) * $(1 - eff) * [1 + volume change %(t)* CVE]$

A12.193 In its response to the LLCC Consultation Openreach claimed that Pay costs should be forecast to increase faster than RPI, namely by RPI+1%, on the basis of ONS data on real average wage increases over the last 21 years.<sup>313</sup> We have considered this, and note that whilst this may be true over a longer term period, more recent evidence we have gathered does not support BT's position.<sup>314</sup> Given this, our best forecast is for Pay to increase with RPI..

### Forecasting of service costs and the value of X

- A12.194 We have calculated total component costs on a component-by-component basis as the sum of operating and capital costs. For a service that uses a number of different components, the total costs of service *y* is calculated using the following steps:
  - Unit component costs(t) = Total component costs(t) / Component volumes(t);
  - Unit service costs(t) = Matrix multiplication of Unit component costs(t) and Usage factor by service y for each of the components; and

<sup>&</sup>lt;sup>312</sup> We have now amended the description of the formula used in the model to forecast operating costs, which in the LLCC Consultation included the asset price trend.

<sup>&</sup>lt;sup>313</sup> BT Group response to the LLCC Consultation [>>]

<sup>&</sup>lt;sup>314</sup> BT Group response to S135 Notice of 28 September 2012 [September 2012 [S

- Total service costs(t) = Unit service costs(t) \* Service volumes(t)
- A12.195 Having selected the appropriate services to include in a basket, the model then calculated total basket costs and total basket revenues:
  - Total basket costs(t) = Sum of individual service costs(t); and
  - Total basket revenues(t) in the absence of a charge control = Prices(0) \* Service volumes(t), where Price(0) is the start charge for each service.
- A12.196 To determine the value of X for each basket, the model compares the total costs and revenues in the last year of the charge control. We solve the value of X for this basket such that the two were equal in the final year.
- A12.197 The value of X is effectively the weighted average real annual price change for the services in the basket. That is, assuming that with the introduction of the charge control, the value of X is applied equally for all services within a basket, the value of X could be solved as:

 $X = (Costs_T / [Price_0 * VolumesT])^{1/3} - 1$ 

Where:

 $Costs_T$  = Forecast costs at the end of the charge control (2015/16)

 $Price_0 = Service prices at the start of the charge control (2012/13)$ 

 $Volumes_T = Service volumes at the end of the charge control$ 

### Key quantitative issues

- A12.198 We discus below how the model approached a number of modelling challenges concerning:
  - services disclosed in the regulatory accounts compared to those on the Openreach price list;
  - usage factors and the conversion between component-level costs to servicelevel costs;
  - Ethernet basket migration credit;
  - calculation of administrative and other costs; and
  - reallocation of costs between TI and Ethernet baskets.

### **Service prices**

A12.199 We note that the rental volumes reported are all year average volumes<sup>315</sup> such that the average prices shown in the RFS reflect largely what is available on the BT

<sup>&</sup>lt;sup>315</sup> Section 8.6, "A study of BT's Regulatory Financial Statements for business connectivity markets", 25 November 2008, Analysys Mason. http://stakeholders.ofcom.org.uk/binaries/consultations/llcc/annexes/analysysmason.pdf

Wholesale and Openreach<sup>316</sup> price lists. They may differ slightly due to both price changes during the year and volume changes. For connection volumes, they are reported as the total year volume due to the one-off nature of these charges.

- A12.200 For the base year analysis shown in Figure A12.4 and Figure A12.6 the prices used are, in effect, the average revenues by service type reported by BT Wholesale and Openreach. Both parties provided us with their respective revenue reconciliation statements for the year 2011/12.
- A12.201 As explained above, the start charges we use for the purposes of proposing the values of X for the TI and Ethernet baskets are from BT Wholesale and Openreach price lists. We describe below in detail service products where this is not the case.
- A12.202 We note that the figures in the RPI-X model are quoted in 2011/12 prices. Therefore, any service price we use for the start of the charge control in 2012/13 has to be rebased. We use the RPI inflation figures as reported by the (ONS)<sup>317</sup> for this conversion.

#### Service prices for TI services

A12.203 For the PPC services the rental charges for each constituent of the circuit (i.e. local end, main link, distribution and trunk) is separately identified and charged. For those services we use BT Wholesale's charges as set out in its Carrier Price List (CPL) B8.03, applicable from 1 October 2012. The connection charge for each circuit is also identified separately. The charges are set out in CPL B8.02 and apply from 1 October 2012 onwards.

#### Radio Base Station (RBS) backhaul

A12.204 RBS backhaul service charges can be found in B11.02 for connection charges and B11.03 for rental charges. The charges have been effective from 1 December 2011 onwards and there were no announced changes to these charges.

### Figure A12.40: Published connection charges for new RBS backhaul circuits

Provision charge per circuit	Single charge	Effective Date	Single charge	Effective Date
128Kbit/s – 960Kbit/s	£550.43	1/11/10 – 30/11/11	£603.27	1/12/11
2Mbit/s	£1886.24	1/11/10 – 30/11/11	£2,045.40	1/12/11
2Mbit/s Subsequent (note 11)			£1050.00	01/06/07

Source: BT Wholesale carrier price list B11.02

A12.205 BT Wholesale noted that the published price in the RFS was slightly different to the average price calculation based on the prices in Figure A12.40 because of the volume mix. BT Wholesale also noted that for the 2Mbit/s circuits, many of the volumes are from subsequent connections which were charged at £1050. We have estimated subsequent volumes to represent 76% of all volumes, based on a

<sup>&</sup>lt;sup>316</sup> BT Wholesale carrier price list is available at:

https://www.btwholesale.com/pages/static/Library/Pricing\_and\_Contractual\_Information/carrier\_price\_ list/cpl\_sectionb8partialprivatecircuits.htm. Openreach Ethernet service pricing is available at http://www.openreach.co.uk/orpg/home/products/pricing/loadPricing.do

<sup>&</sup>lt;sup>317</sup> The dataset is available at <u>http://www.ons.gov.uk/ons/datasets-and-tables/data-selector.html?dataset=mm23</u>.

comparison of the 2011/12 average price in the RFS with the average prices in the price list.

- A12.206 For the purposes of the start charges, we use £603.27 for the sub 2Mbit/s circuits and £1804.85<sup>318</sup> for the 2Mbit/s circuits.
- A12.207 Although RBS Backhaul circuits use the same underlying inputs as PPCs (i.e. these circuits have a certain number of links, local ends etc), the rental charges are simplified so that there is a simple charge based on bandwidth and distance. These are listed in B11.03 of the CPL. However, the volumes and costs are disaggregated into the individual constituents of the RBS circuit. For the purposes of comparing costs and revenues, BT Wholesale matched rental revenues against the RBS local end services. Given this assumption, we have used this average revenue as the start charge for RBS local ends.

### **SiteConnect**

- A12.208 For SiteConnect BT Wholesale's price list (B12.01) shows that as of 1 June 2012, this service was no longer available to new customers. This has been reflected in BT Wholesale's service volume forecasts. The connection charge is therefore not relevant for our analysis.
- A12.209 As with RBS backhaul, SiteConnect charges are based on bandwidth and distance only, even though it also uses the same underlying components as PPCs. The revenues have also been matched against the main link part of the SiteConnect service. When BT Wholesale's price list does not provide prices disaggregated at the same level as costs, we have used the average revenues as the start charges. This is the approach we have adopted for SiteConnect charges since these have not changed since 2 March 2007.

### Netstream 16 Longline

A12.210 Netstream 16 Longline is a special option of the Netstream service. It is used by mobile operators for connections between small satellite sites and major sites and is available for 2Mbit/s. As with SiteConnect services, we have used the average revenue as the start charge for Netstream 16 Longline services.

### Service prices for Ethernet services

A12.211 Openreach also provided us with the reconciliation statement for the 2011/12 financial year. The information provided is in greater detail than is available in the RFS, as shown in the examples below:

<sup>&</sup>lt;sup>318</sup>  $\pounds$ 1804.85 = 24% \*  $\pounds$ 2045.40 + 76% \*  $\pounds$ 1050.00.

Aggregation within service bandwidth categories	Aggregation across bandwidths	Aggregation across services
"Wholesale extension services (WES) 10Mbit/s rental" includes:	"WES other bandwidths rental" includes:	"Other Ethernet rentals" includes:
WES 10Mbit/s Local reach	WES 2Mbit/s	Street access
WES 10Mbit/s Local access managed	WES 155Mbit/s	Broadcast access
WES 10Mbit/s	WES 622Mbit/s	Optical spectrum services
WES 10Mbit/s Managed	WES Aggregation ML VLAN	Bulk Transport Link (BTL)
WES Aggregation 10Mbit/s Access	WES Aggregation ML RJ45	Cablelink
	Ethernet resilience option 2	Openreach Network Backhaul Services (ONBS)
		ONBS resilience option 2

#### Figure A12.41: Level of aggregation in the RFS

Source: BT Group response to S135 Notice of 28 September 2012<sup>319</sup>

- A12.212 As with the BT Wholesale submissions, the average prices in the RFS differ to those in the price list due to price and volume changes during the year. For the purposes of reconciliation of base year revenues with those in the RFS, we have used the average revenues as submitted by Openreach.
- A12.213 As explained below, for our cost modelling, we have been provided with usage factors at a service group level (i.e. we have an average usage factor for EAD 10Mbit/s rather than separate usage factors for EAD 10 Local Access and EAD 10 Extended Reach). This means that on the cost side, we are assuming that within a service group, the relative proportions of different variants (e.g. local access, extended reach and standard product) does not change over time. In order to be consistent with our cost modelling, we have also kept the proportions of variants constant when forecasting revenues.
- A12.214 For the start charges, Openreach has provided us with detailed volume forecasts prior to the aggregation shown in the RFS. Openreach has also provided us with the corresponding prices (including the 'Terms on Application' charges for the above 1Gbit/s services) for each of the products. These are the ones we used as the start charges.

### Ethernet Backhaul Direct (EBD)

A12.215 EBD services are available at 1Gbit/s or 10Gbit/s and the pricing is distance independent. Instead, the rental charges differ by band:

<sup>&</sup>lt;sup>319</sup> BT Group response to S135 Notice of 28 September 2012 [X]

Feature	Band A	Band B	Band C	Weighted average
1Gbit/s	7,782	9,227	13,450	8,086
1Gbit/s Extended reach	15,564	17,009	21,232	15,691
10Gbit/s	[⊁]	[⊁]	[⊁]	[⊁]
10Gbit/s Extended reach	[×]	[×]	[×]	[×]

### Figure A12.42: Ethernet Backhaul Direct (EBD) rental charges (£ excluding VAT)

Source: Openreach price list, BT Group response to S135 Notice of 28 September 2012<sup>320</sup>

A12.216 The EBD volumes provided are not split by band. We have obtained information from the BCMR Consultation analysis that suggests that the majority of the circuits are in Band A. We have used the split between the different bands to arrive at a weighted average price as our start charge for EBD services.

### **Discounts**

A12.217 In the base year revenue reconciliation analysis Openreach submitted<sup>321</sup>, it showed that while no Metro offer discount has been applied to services, some EAD services have been offered with a minimum term discount. Such discounts are offered only to a very limited extent in the Ethernet market and accounted for a very small percentage of Ethernet revenues in 2011/12.<sup>322</sup> Hence, given that their amount is not significant, we have decided not to take any discount into account for the purpose of setting start charges

### **Usage factors**

- A12.218 We received base year data from BT in the form of service level costs, split by component. We also received from BT the matrix of usage factors that allow us to convert from unit component costs to unit service cost for the network component costs. Usage factors describe how much components are used in the provision of TI and Ethernet services.
- A12.219 We calculate the costs allocated to each service by multiplying the usage factors by the amount applied to relevant components. The matrix of component-to-service usage factors and the individual values of the usage factors incorporate BT's cost allocation methodologies as set out in its Detailed Attribution Methods (DAM).<sup>323</sup> We identify the following two main types of costs<sup>324</sup>:
  - Network component costs the calculation of the cost of service provision represents the utilisation of one or more network components, and its cost is therefore determined by an attribution of component costs.
  - Administrative and other costs typically these were costs that were allocated on a top-down basis, for example, on a pro rata basis using full-time equivalents

<sup>&</sup>lt;sup>320</sup> BT Group response to S135 Notice of 28 September 2012 [×].

<sup>&</sup>lt;sup>321</sup> BT Group response to S135 Notice of 28 September 2012 [X].

<sup>&</sup>lt;sup>322</sup> BT Group response to S135 Notice of 28 September 2012 [>].

<sup>&</sup>lt;sup>323</sup><u>http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2012/RFS\_2012.p</u> <u>df</u>

<sup>&</sup>lt;sup>324</sup> See Appendix 1.2 of BT's RFS 2012:

http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2012/index.htm

(FTE). Component costs were allocated onwards to services based on volumes multiplied by usage factors for each product.<sup>325</sup>

A12.220 We also use usage factors in order to convert the service volume forecasts provided by BT into corresponding component volumes. In turn, these component volumes are used to forecast total component costs in conjunction with other assumptions such as AVEs and CVEs. Usage factors are therefore an important part of the steps involved in our forecasting methodology. To check the accuracy of the usage factors submitted by BT, we reviewed the data received from BT Wholesale and Openreach relevant for the calculation of the network component and service costs as summarised below.

### Usage factors for TI services

- A12.221 BT Wholesale provided usage factors in greater detail than is available in Appendix 1.2 of the RFS. For example, BT Wholesale provided usage factors for RBS 2Mbit/s Local End and for 2Mbit/s local end for CLZ and non-CLZ areas separately. We carried out the following exercises to check the accuracy of the submitted TI usage factors:
  - We calculated component volumes by summing the product of the volumes of each service and the relevant service-to-component usage factors. The results of this calculation were compared to the component volumes reported in the Network Activity Statement (Appendix 1.1 of the 2011/12 RFS).
  - Using the 2011/12 cost and volume data BT Wholesale had provided, we calculated the matrix of unit component costs and unit service costs for all services in the TI basket using BT's CCA FAC methodology.<sup>326</sup> Cost usage factors were derived by dividing each service-to-component unit cost by the relevant total component unit cost. The service unit costs and component unit costs we calculated were checked against those reported in Appendix 1.2 of BT's 2011/12 RFS. We then compared the usage factors calculated using this method with those submitted by BT Wholesale.
- A12.222 We found that the usage factors for certain service-by-component combinations, including SDSL Rental to E side copper current and RBS Sub 2Mbit/s local end to PC rental 64Kbit/s link local end, were incorrect because the service volumes BT Wholesale used in its calculations were incorrect. As a result, we decided to adjust the usage factors for these service-by-component combinations using information from the 2011/12 RFS and cost and volume data submitted by BT Wholesale. For the usage factors which reconciled to the 2011/12 RFS we used those submitted by BT Wholesale.

### **Usage factors for Ethernet services**

A12.223 Openreach provided usage factors to a similar level of detail as that provided in Appendix 1.2 of the RFS, which sets out usage factors mappings of super components to service groups in the low bandwidth AISBO market.

<sup>&</sup>lt;sup>325</sup> We model administrative and other costs on a service basis (i.e. rather than component). As a result, for this cost type we do not use usage factors to convert component costs into service costs.

<sup>&</sup>lt;sup>326</sup> This follows the same structure as Appendix 1.2 of BT's RFS – "Calculation of FAC based on component costs and usage factors".

- A12.224 There are eight super components used by Ethernet services, each of which are made up of more detailed "cost components".<sup>327</sup> The usage factors based on super components are weighted averages of the usage factors based on the underlying components. Our view was that it is more precise to use usage factors based on components and on this basis we requested usage factors based on components. We were informed by Openreach that it would not be possible for it to provide usage factors at the component level as it only performs usage factor mapping at the super component level and anything below this level would not be audited or checked.<sup>328</sup> We accepted Openreach's views on this and modelled costs on a super component level.
- A12.225 Similarly, the service groups reported in the RFS are made up of the individual service variants which are sold by Openreach.<sup>329</sup> The usage factors based on service groups are therefore a weighted average of the usage factors based on the individual service variants. Our view was that it is more precise to use usage factors based on individual service variants if the mix of individual service variants within a service group changes during the forecasting period then the service group usage factors (a weighted average) based on 2011/12 volumes might not be appropriate for forecasting costs in subsequent years. For this reason we requested from Openreach usage factors for individual service variants (i.e. the same level of service disaggregation used in the volume and revenue data provided).
- A12.226 Openreach was unable to provide usage factors to the same level of service disaggregation as had been provided for volumes and revenues. We therefore used the service group usage factors to model costs. This implicitly assumes that the proportions of service variants within service groups remain constant over the forecasting period.<sup>330</sup>
- A12.227 Openreach did not provide any usage factors for high bandwidth AISBO services (above 1Gbit/s) which fall within the Ethernet basket. Following discussions with Openreach's costing team, we took the decision to calculate usage factors for above 1Gbit/s ourselves using the 2011/12 cost and volume data which had been provided. To do this, we calculated the matrix of unit super component costs and unit service costs for all services in the Ethernet basket using BT's CCA FAC methodology.<sup>331</sup> Usage factors were derived by dividing each service-to-super component unit cost by the relevant total super component unit cost. We also used this exercise to assess the accuracy of the usage factors Openreach provided for up to and including 1Gbit/s services in the Ethernet basket by comparing our results with the submitted usage factors. We found that the usage factors Openreach had submitted reconciled with the cost data it had provided and Appendix 1.2 of the 2011/12 RFS.
- A12.228 As an additional check, we calculated super component volumes by summing the product of the volumes of each service and the relevant service-to-super

<sup>&</sup>lt;sup>327</sup> For example, the "Wholesale & LAN extension services fibre etc" super component includes what used to be defined as "Wholesale & LAN extension services fibre etc" as well as "Ethernet Access Direct electronics", "Ethernet Access Direct fibre", "Ethernet Access Direct Rental", "Other Ethernet Rental" etc.

<sup>&</sup>lt;sup>328</sup> Ofcom meeting with Openreach on 3rd October 2011.

<sup>&</sup>lt;sup>329</sup> For example, the WES 100Mbit/s rentals service group includes standard WES 100Mbit/s rentals, WES Local Access 100Mbit/s rentals and WES Aggregation 100Mbit/s rentals.

<sup>&</sup>lt;sup>330</sup> As noted above, we have made a consistent assumption when modelling revenues.

<sup>&</sup>lt;sup>331</sup> This follows the same structure as Appendix 1.2 of BT's RFS – "Calculation of FAC based on component costs and usage factors".

component usage factors we had calculated. The results of this calculation were compared to the component volumes reported in the Network Activity Statement (Appendix 1.1 of the 2011/12 RFS). We found that the usage factors we had calculated from the cost and volume data reconciled to those in the Network Activity Statement.

A12.229 Following these checks, we decided to use the usage factors Openreach submitted, and, for services not reported in the RFS, those we had calculated from the 2011/12 cost and volume information.

### Ethernet basket transition cost adjustment

- A12.230 During the course of the proposed charge control period, customers are forecast to migrate from legacy to new Ethernet circuits.<sup>332</sup> Openreach has withdrawn certain bandwidths of WES/WEES and BES circuits from new supply<sup>333</sup> and is encouraging existing purchasers of legacy Ethernet circuits to migrate to the new Ethernet products.<sup>334</sup>
- A12.231 In Section 20, we explained that the adoption of the MEA approach needs to be consistent with the expectation that an efficient operator will recover its costs. We also explained that it may not be possible for even an efficient operator to move seamlessly from one MEA to another, as there may be transition costs in moving from one technology to another.
- A12.232 We noted that the legacy Ethernet services had higher operating costs than the new Ethernet services. In order to migrate customers to the new Ethernet service, and so benefit from these lower costs, upfront costs needed to be incurred. The MEA approach we proposed to adopt does not take into account the transition costs in migrating from legacy to new Ethernet services. This poses a risk that even an efficient operator will not be able to seamlessly adopt the MEA at all points in time.
- A12.233 As explained in Section 20, following our assessment of responses to the consultation we have modified our methodology for calculating the transition cost adjustment. Our adjustment for transition costs will now be based on the transition costs associated with legacy customers who are not forecast to migrate over the charge control period. We make no allowance for transition costs for customers who are forecast to migrate, as the connection costs to new services are already included in the cost base. As in the LLCC Consultation, we consider that an appropriate measure of the costs of migrating customers on legacy Ethernet services to new Ethernet services is the underlying cost of connecting these customers to the MEA services (EAD and EBD).
- A12.234 We have therefore calculated the transition cost adjustment that will be allowed to Openreach on the basis of (i) the volume of customers forecast to be renting WES, WEES and BES circuits in the final year of the charge control (2015/16) and (ii) the

<sup>333</sup> Openreach announcement of 31 January 2011, available at: <u>https://www.openreach.co.uk/orpg/home/updates/briefings/ethernetservicesbriefings/ethernetservices</u> <u>briefingsarticles/eth00411.do</u>

<sup>&</sup>lt;sup>332</sup> By legacy Ethernet, we mean services such as WES, WEES and BES. By new Ethernet we mean services such as EAD, EBD and BTL.

<sup>&</sup>lt;sup>334</sup> For example, Openreach has offered reductions on EAD connection fees for CPs migrating from legacy Ethernet products. See:

http://www.openreach.co.uk/orpg/home/updates/briefings/ethernetservicesbriefings/ethernetservice

predicted average EAD connection unit costs over the charge control period. We carried out the following steps to calculate the transition cost adjustment:

- Each of the WES, WEES and BES services that will need to be migrated to new Ethernet services were assigned a corresponding MEA service (i.e. an EAD/EBD service of the same / similar bandwidth).
- The forecast rental volumes of the relevant WES, WEES and BES services in the final year of the charge control were multiplied by the forecast average connection costs of the corresponding MEA services over the charge control period.
- A12.235 Using this methodology, we calculated a transition cost adjustment equal to approximately £22m. In our cost forecasting, we will take the transition cost adjustment into account by assuming that legacy Ethernet customers migrate evenly over the course of the charge control. As a result, we apply the transition cost adjustment in the model by adding one third of our estimated migration credit to the forecast cost stack at the end of the charge control in 2015/16.

### Administrative and other costs

A12.236 BT has a number of administrative cost components that do not have associated volumes, as shown in Figure A12.43. Usage factors for these components represent the proportion of total admin costs attributed to a particular service. Without volumes we cannot use the AVE/CVE relationship to forecast how such costs change in the future. For some components all the costs are allocated across the leased lines markets, whilst others are spread across other regulated wholesale markets as well as unregulated markets.

Cost component	Total costs allocated to all markets (£m)	Total costs allocated to PPCs (£m)	Total costs allocated to Ethernet services up to 1Gbit/s (£m)
Edge Ethernet ports	5	1	0
Core/Metro connectivity	66	9	0
MSAN-Metro connectivity link	29	14	3
Service centres - assurance	45	0	9
Sales product management	20	0	6
Service centres – provision	123	0	50
DSLAM capital/maintenance	214	0	0
SG&A partial private circuits	28	27	0
SG&A private circuits	7	6	0
Very High Tisbo Equipment Depn	0	0	0
High Tisbo Equipment Depn	4	4	0
Access Cards (other services)	45	3	37
AISBO Excess Construction	13	0	13

#### Figure A12.43: Administrative and other costs in 2011/12

Source: Appendix 1.3.1 of BT's 2011/12 Regulatory Financial Statements.

A12.237 Both BT Wholesale and Openreach have provided detailed allocations for each of these components to the individual services. We have used this as the base year

data. This avoids the need for multiplying these components with their respective usage factors.

- A12.238 The approach adopted in LLCC 2009 for forecasting such costs was based on calculating AVEs and CVEs for the relevant components based on their GRC weightings, and then forecasting these costs according to service volume (rather than component volume) changes.
- A12.239 We do not believe this approach is appropriate for this charge control. The implied AVEs and CVEs are mostly between 0.5 and 0.75. With the dramatic changes in volumes, this implies significant changes in the unit costs at the service level. Total admin costs are also forecast to increase very significantly, at a rate which implies a cost volume relationship well above the weighted average CVE in the base year. Since these costs are allocated on a top-down basis, we believe that as volumes increase they would attract a higher allocation of these costs, and the same would apply when volumes decline. The AVEs and CVEs by service in the base year are in effect a snapshot based on current allocation methodologies.
- A12.240 We have adopted a modified approach whereby we aggregate these types of costs at the basket level (rather than at service level), and forecast them according to the total number of circuits in the basket. This results in changes to unit service costs which are more consistent with the expected change in admin costs. We have forecast admin costs according to the following formula:

Admin-cost<sub>t</sub> = Admin-cost<sub>t-1</sub> \* (% change circuit volumes in basket<sub>t</sub>\* CVE + 1) \* (1 – efficiency)

A12.241 For the purposes of the admin cost forecasts we have used a CVE of 0.57, which is consistent with the overall weighted average pay and non-pay CVEs. We note that this formulation is consistent with our general approach to forecasting operating costs.

### **Reallocation of costs between TI and Ethernet baskets**

- A12.242 Volumes and revenues are expected to migrate significantly from TI services to Ethernet services over the charge control. The number of Ethernet circuits is expected to grow, while the number of TI circuits is expected to fall. These changes are going to largely offset each other, so that the overall impact on leased line revenues is relatively modest.<sup>335</sup>
- A12.243 Many of the costs incurred to deliver TI and Ethernet services are common. For example, assets (such as duct, land and buildings) as well as operational and administration costs that are used to support leased lines across the two markets. Consequently, many of the same costs incurred in supporting the SDH networks in place at the beginning of the period will still be incurred in operating the Ethernet infrastructure we expect to be in place by the end of the charge control period.
- A12.244 Cost components are defined in BT's system such that TI and Ethernet services do not share the same underlying cost components, even though these components use the same underlying assets. So, if TI volumes fall by 75%, the unit cost of the

<sup>&</sup>lt;sup>335</sup> Across the two markets, there will be a net decline in the number of circuits primarily due to the large volume of low bandwidth TI services not offset by growing Ethernet services. Before the impact of Ofcom's regulation, we expect that the total revenue from leased lines markets would change by less than 5% per annum across the two markets.

duct allocated to TI at the start of the period would increase significantly, to reflect the fact that fixed costs would then only be allocated over a quarter of the original volumes. Conversely, if Ethernet volumes rise by 50% the unit cost allocated to Ethernet would fall significantly. We consider that this is not an accurate prediction of the true cost evolution as we would expect BT to allocate costs to reflect the changing use of the assets. As a result, there is a need to explicitly reallocate some costs between the TI and Ethernet baskets.

- A12.245 We have decided to reallocate capital and operating costs from the TI basket to the Ethernet basket.
- A12.246 In the LLCC 2009, we addressed the issue through reallocation of some shared costs from the declining services to the growing services. We have made a similar adjustment for this charge control. Our approach for total costs in turn is described below.

### We have decided to reallocate a proportion of non-marginal total costs

- A12.247 Over the period, we expect BT to reallocate common costs to reflect the changing use of that network. This means that BT will allocate fewer costs to declining services, and more to growing services. Specifically, the share of total costs allocated to TI will fall reflecting the lower use of the network by TI circuits, and the share of costs allocated to Ethernet services will rise.
- A12.248 For both capital and operating costs, we have adopted a similar approach as set out in the LLCC 2009<sup>336</sup> in determining the amount of total costs to reallocate. In detail, we decided to reallocate from the TI to the Ethernet basket a share of non-marginal total costs. The LLCC 2009 outlined different approaches to reallocating fixed and common costs. These are summarised in Figure A12.44 below.

Method	Description	Applicable to LLCC?
Equi-proportional mark-up	Common costs attributed in proportion to direct and indirectly attributable cost of the service.	Yes. Can attribute non-marginal costs relative to marginal costs of the TI and Ethernet services.
Relative outputs	Common costs attributed in proportion to their share of total output.	Yes, by looking at changes in TI and Ethernet service volumes.
Revenue method	Common costs attributed in proportion of share of total revenue.	No, because cost allocation method was used to determine prices, which in turn determined revenues.
Activity-based costing	Common costs allocated based on activities undertaken to provide service.	No, because underlying cost components were not common across TI and Ethernet services.
Ramsey approach	Common costs allocated on basis of relative demand elasticities.	No, because of the burden of information required to estimate demand elasticities.

#### Figure A12.44: Common approaches to cost allocation

Source: "Annex I: Background to cost allocation", Office of Fair Trading, 2006. http://www.oft.gov.uk/OFTwork/markets-work/public-information

A12.249 Figure A12.44 shows that of the five different approaches outlined, two – 'the Equiproportional mark-up' and 'the Relative Output' – are applicable to our charge

<sup>&</sup>lt;sup>336</sup> See paragraphs A7.179 to A7.193 of the LLCC 2009 Statement.

control. Both of these approaches require the calculation of the proportion of marginal costs in total costs.

- A12.250 The equi-proportional mark-up approach requires the calculation of marginal costs for both the TI and Ethernet services in order to determine relative marginal costs. This involves a number of iterative steps that require the conversion of marginal component costs to service costs to determine the relative costs, applying this percentage to the non-marginal component costs, and then converting this to service costs.
- A12.251 The relative output method is more straightforward to apply. This takes the nonmarginal costs and reallocates these costs based on changes in relative output.
- A12.252 We consider that the most appropriate proportion of costs is given by the proportion of TI customers in the base year predicted to migrate to Ethernet services by the final year of the charge control.<sup>337</sup> This is the approach we adopted in the LLCC 2009, modified to take into account the expectation that not all TI customers will migrate to Ethernet services.
- A12.253 We have quantified the share of non-marginal costs on the basis of the rate of migration/volume decline in TI volumes that is likely to move towards Ethernet services. The BCMR market research indicates that 29% of TI customers are likely to move from TI to Ethernet services by the final year of the charge control.<sup>338</sup> The rationale supporting this assumption is discussed in Section 19.
- A12.254 We have followed these steps.
  - We have calculated total costs, including Admin costs, to be recovered based on the volume forecasts, AVEs, CVEs and efficiency based on the formulae set out in tables Figure A12.36, Figure A12.37, Figure A12.38 and Figure A12.39.
  - As with the LLCC 2009 approach, we have calculated the proportion of these total costs that are 'non-marginal', i.e. fixed with respect to volume changes. This is done by multiplying the capital and operating cost forecasts for each component with their respective AVEs and CVEs. For example, if a component has a CVE of 0.6, this implies that 40% of costs (i.e. 1-0.6) are non-marginal.
  - Of the non-marginal costs, we have allocated a proportion in line with the proportion of TI customers in the base year predicted to migrate to Ethernet services by the final year of the charge control. This proportion is based on our market research finding that 29% of TI customers are likely to move from TI to Ethernet services.<sup>339</sup> We have assumed that these non-marginal, or fixed, costs do not vary with volume and in practice these costs will be allocated on a top-down basis as the underlying volumes change.

A12.255 The total amount of costs that we have reallocated to the Ethernet basket is £46m.

<sup>&</sup>lt;sup>337</sup> See Section 19 of this Statement.

<sup>&</sup>lt;sup>338</sup> See Jigsaw Research, Business Connectivity Services Review, 11 October 2011, pp 62, (section 8.6 "Replacing leased lines with ADSL or Ethernet").

<sup>&</sup>lt;sup>339</sup> See Jigsaw Research, Business Connectivity Services Review, 11 October 2011, pp 62, (section 8.6 "Replacing leased lines with ADSL or Ethernet").

A12.256 Figure A12.45 sets out the steps we have described above in calculating the amount to be reallocated.

Figure A12.45: App	proach to reallocation	of total costs from	<b>TI to Ethernet basket</b>
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Description of approach		Comments
Total costs in 2015/16 in TI basket	£300m	
Of which non-variable costs in 2015/16	£157m	This is the amount of total costs that does not vary with the volume of TI services.
		This amount is calculated by multiplying the cost forecasts for each component with their respective CVEs (for operating costs) and AVEs (for capital costs).
		For example, for operating costs if a component has a CVE of 0.6, this would imply that 40% of operating costs (i.e. 1-0.6) are non-variable.
Share of TI customers expected to migrate to Ethernet services.	29%	From Jigsaw Research market research
Reallocation to Ethernet basket	£46m	These costs are calculated as 29% * £157m and are reallocated to the Ethernet basket.

### We have decided to reallocate £46m in total to the Ethernet basket

A12.257 We therefore have decided to reallocate £46m from TI to Ethernet. This reallocation reduces the charge control for TI from RPI+8.50% to RPI+2.50%. This impact is offset by a change in the charge control for Ethernet basket from RPI – 13.00% to RPI – 11.00%. There is a neutral impact on BT's total revenues.

### **Results of our modelling**

- A12.258 From the information above the model produces cost forecasts for each service for each year. These are compared against the service revenues, and the values of X are then calculated so that in the final year forecast revenues and costs are equal.
- A12.259 Sections 19 and 20 set out our approach to the charge controls. Based on this analysis, we have set the following controls:
  - for the TI basket, a charge control of RPI+2.50%; and
  - for the Ethernet basket, charge control of RPI-11.00%.
- A12.260 The above values of X are the amount by which TI and Ethernet charges would need to reduce in real terms in order to bring them into line with forecast costs, including a return on capital, by the end of the charge control.

### Annex 13

## **PPC** Points of Handover

### Introduction

- A13.1 In this section we set out our conclusions on the charge controls for PPC POH services. In particular we:
  - describe PPC POH and the structure of their charges;
  - review the PPC POH revenue section of annex 6 of the LLCC Consultation;
  - review the PPC POH proposals from annex 6 of the LLCC Consultation;
  - summarise and discuss the stakeholder responses to our proposals; and
  - conclude with the PPC POH price controls we are imposing.

### Summary

- A13.2 Given that the POH Statement published in September 2011 set some of the PPC POH charges to LRIC, our view is that these charges are already set at an efficient level. We therefore do not impose any starting charge adjustments to the services covered by the POH Statement.
- A13.3 For the PPC POH charges that were not part of the recent POH Statement, we also are not imposing any starting charge adjustments for the following reasons:
  - with TI services in decline, the expected volumes of new connections are small and so is the corresponding revenue. We therefore consider that bottom-up modelling of these charges would not be proportionate, and
  - our analysis of the rental charges not covered by the POH Statement (Type I rental) shows that they are generally consistent with the LRIC estimates. As such, we do not consider it appropriate to have any starting charge adjustments.
- A13.4 As explained in Section 19, we propose to place all of the current POH charges within the wider TI basket, with a sub-basket of RPI-0%. The POH charges will also be subject to the each and every charge control of RPI+10%.

### Background

- A13.5 A POH is an important component which enables infrastructure-based competition. Operators are often reliant on BT for PPCs to link end-user sites back to their own respective core networks. In essence, a POH is the link that connects BT's circuits to an operator's own network. Once it is set up, the operator can hand over as many individual circuits as the capacity of the link allows, at no extra cost.
- A13.6 Such a link comprises the physical infrastructure (fibre and duct) and terminating equipment. In the LLCC 2009 we characterised PPC POHs as being either a Type I or a Type II. Figure A13.1 below illustrates those two Types, which can be summarised as follows.

- Type I PPC POHs are purchased by CPs on wholesale terms. There are 212 different charges within this category comprising 108 rental, 100 connection, three additional charges and a bearer charge; and
- Type II PPC POHs are legacy products that were initially purchased by CPs from BT on retail terms but have subsequently been migrated onto wholesale PPC terms. There are four rental charges that apply to the existing installed base of Type II PPC POHs. Connection charges no longer apply since new Type II PPC POHs are no longer available.

OCP

node

### Figure A13.1: Types of POH

Type II POH

#### Type I POH Type I POH costs are recovered by In Span Handover (ISH) - BT provide equipment at their connection and annual rental charges ISH node and connect to their nominated footway box The type I POH charges are independent of the number of PPCs handed over In Span Handover extended (ISH ext) - BT provide equipment SH ext at their node and connect to an OCPs nominated footway box Customer Sited Handover (CSH) - BT provide equipment CSH at their and the OCPs node and provide the connection stomer BT footway End **BT** network SDH node 3

3<sup>rd</sup> party POH rental - BT provide equipment at their and the OCPs node and provide the connection Type II POH costs are recovered by a per PPC annual rental charge called the 3<sup>rd</sup> party POH rental

- A13.7 BT recovers its costs through a combination of POH connection and rental charges. Customer specific capital costs are recovered through connection charges, which include any equipment that BT installs at either end of the link, and that element of the fibre pair between BT's exchange building and the CP's premises that it cannot re-use (i.e. the blown fibre element). Other costs include contractual maintenance charges from BT's equipment suppliers and are recovered through the rental charges.
- A13.8 BT also levies an additional charge on all circuits delivered over a type I POH, aimed at recovering that element of costs not recovered via the previous two charges. We refer to these as the 'additional POH charges'.

### The LLCC Consultation proposals

- A13.9 In the LLCC Consultation, we distinguished between Type I POH charges, Type I additional charges and Type II charges.
- A13.10 Figure A13.2 below showed a breakdown of the PPC POH revenues from BT's RFS.<sup>340</sup> The numbers included in the figure are based on the 2010/11 RFS and therefore do not reflect the impact on revenues of the adjustments we mandated to Type I additional charges and Type II rental charges in the POH Statement. In

<sup>&</sup>lt;sup>340</sup> See page 75 of BT's 2011/12 RFS:

http://www.btplc.com/Thegroup/RegulatoryandPublicaffairs/Financialstatements/2012/RFS\_2012.pdf

2010/11 revenue from all PPC POH charges accounted for £8m out of BT's total TI revenue of £898m. This includes both connection and rental charges.

Type of POH	Charging category	Number of charges per category	2010/11 revenue
	Connection	100	£0.16m
Type I	Rental	108	£3.78m
	Additional charges	4	
Type II	Rental	4	£4.29m
	Total	£8.23m	

#### Figure A13.2: Number of PPC POH charges and revenue by type

- A13.11 We noted that the current and expected future demand for new Type I connection charges was very low. In 2010/11, the total revenue for Type I connection charges was just £160k. BT Wholesale advised us that there were just three new PPC POH connections in 2010/11.<sup>341</sup> The figures for 2011/12 were expected to be similar.<sup>342</sup> This is because TI services were declining as customers gradually migrated to alternative services, resulting in an increase in spare capacity on existing POH and a consequent low requirement for new POH.<sup>343</sup>
- A13.12 As illustrated by Figure A13.2 above, the revenue for PPC POH rental charges was much more significant. In 2010/11, total PPC POH rental revenue was approximately £8m.
- A13.13 We noted that in the POH Statement<sup>344</sup>, we had developed a bottom-up LRIC model to set the charges for Type II rental and Type I additional charges (the additional POH charges). These eight charges covered over 50% of the total TI PPC POH revenue for 2010/11 (see Figure A13.2 above). We considered that these charges were already set at an efficient level, since they were based on the estimated LRIC for the relevant services in September 2011.
- A13.14 As a result, we proposed that no starting charge adjustments were needed for Type II rental and Type I additional and bearer charges. We also proposed to impose a charge control of RPI-0% on these services.

<sup>&</sup>lt;sup>341</sup> Although the RFS reported 55 new connections (p.75 of the 2010/11 RFS), BT explained that there were three connections and the remaining reflected [ $\gg$ ], see BT Wholesale response to S135 Notice of 21 May 2012 [ $\gg$ ]

<sup>&</sup>lt;sup>342</sup> On 1 October 2011 BT provided a spreadsheet detailing new POH connections for 08/09, 09/10, 10/11 and the first half of 2011/12 as 100, 51, 3 and 2 respectively.

<sup>&</sup>lt;sup>343</sup> [**X**]

<sup>&</sup>lt;sup>344</sup> LLCC PPC Points of Handover pricing review - Final Statement on modifications of SMP Conditions <u>http://stakeholders.ofcom.org.uk/consultations/revision-points-handover-pricing/final-statement/</u>

# We proposed no starting charge adjustments for Type I connection and rental charges

A13.15 Type I connection charges and rental charges were not covered by our decision in the POH Statement. However, we concluded in the POH Statement that LRIC is more appropriate than a FAC approach for POH charges generally. This reasoning also applies to Type I connection and rental charges. We reviewed whether there was a need to make any starting charge adjustments to those charges.

### Type I connection charges

A13.16 As noted above, there were just three new Type I connections in 2010/11, with total resulting revenues of less than £160k. Minimal new connections are expected in future. As there are 100 different connection charges, modelling the LRIC cost of each connection would be a time-consuming and costly task. We did not consider that it would be an appropriate use of regulatory resources to model charges for which there is limited demand, and where the impact on customers and competition would be minimal. We therefore proposed to make no starting charge adjustments to these charges.

### Type I rental charges

### LRIC approach

- A13.17 There were 108 Type I rental charges which were not covered by the POH Statement. In the POH Statement, we set the Type II rental charges and Type I additional charges to LRIC using a bottom-up LRIC model. We considered whether we could use the same approach for the Type I rental charges.
- A13.18 The Type I rental charges relate to maintenance costs. BT has 108 such charges. Modelling the exact cost of all of these 108 charges would entail significant resource. However, we were able to review a representative sample of these charges using the model we developed for the Type I additional charges and the Type II rental charges.
- A13.19 We used the model developed for the POH Statement to calculate LRIC estimates for nine of these maintenance charges.<sup>345</sup> The nine maintenance charges that were reviewed covered each of the main groups of POH charges. These nine charges represented over 50% of Type I POH rental revenues.
- A13.20 Our calculations used data on failure rates and equipment costs which were published as part of the POH Statement. Where alternatives existed for POH configurations, we considered each combination of handover type (CSH, ISH extended and ISH) with each handover bandwidth (2.5Gbit/s, 622Mbit/s and 155Mbit/s). We then compared our estimates of LRIC, with BT's rental charge.
- A13.21 Our review showed that the average level of rental charges was consistent with our LRIC estimates. Specifically, we found that the weighted average price level was consistent with our weighted average LRIC estimate, although some individual charges varied from 15% above our LRIC estimate to 15% below our LRIC estimate.

<sup>&</sup>lt;sup>345</sup> The nine charges chosen are SMA-1, SMA-4 and SMA-16 dual fibre 1300nm each for ISH, ISH extension and CSH POH.

- A13.22 We considered whether to make adjustments to bring the individual charges into line with our LRIC estimates. We considered that this would not be appropriate as our analysis found the overall price level was in line with LRIC, and increasing some charges while decreasing others would be disruptive to customers. We also noted that there was a margin for error in our LRIC estimates, which may make such finetuning of charges inappropriate. Finally, we considered that, as all POH are purchased by external customers, BT does not have a strategic incentive to increase some POH charges at the expense of others. Based on this analysis, we did not consider adjustments appropriate.
- A13.23 We considered extending the model to include the rental charges for which we did not have detailed data. We considered that this would not be an appropriate use of regulatory resources. The charges reviewed covered each of the main groups of POH charges, and accounted for over 50% of revenues. We had no reason to believe that the sample used was unrepresentative.

### The LLCC Consultation proposals

- A13.24 We proposed no starting charge adjustments for PPC POH. In summary, we considered this approach to be the most appropriate option because:
  - the additional POH charges covered in the POH Statement had recently been set to LRIC;
  - there are expected to be minimal new POH connections in future, therefore modelling the costs of the 100 connection charges would have involved a disproportionate use of regulatory resources;
  - for the remaining BT Type I rental charges, our bottom-up LRIC analysis of a sample of these charges was consistent with the LRIC approach applied to the additional charges; and
  - the POH rental charges (excluding the additional POH charges set via the POH Statement) account for a small percentage of the total PPC cost.<sup>346</sup>
- A13.25 Consequently, as set out in Section 5 of the LLCC Consultation, we proposed to place these charges in a single TI basket with a sub-cap of RPI-0%. Given that POH services may be seen as particularly important for competition, as they are essential for infrastructure competition we considered it to be appropriate to err on the side of lower rather than higher charges. We also considered that POHs may be less subject to economies of scale than TI circuits as a whole. This is because POH services are supported by a smaller equipment base than other TI services. Thus, as POH volumes fall, CPs can consolidate the remaining circuits more easily. Therefore, as volumes fall, the unit costs of providing these services may not increase in the same way as other TI services.

### The LLCC Consultation responses

A13.26 BT agreed with our proposals for treatment of POH but argued for two amendments.

<sup>&</sup>lt;sup>346</sup> We estimated that these rental charges would account for a maximum of 3% of the charge for a 2Mbit/s PPC depending on the specific PPC and POH deployment.
- BT considered we should remove POH on a LRIC basis, and not a FAC basis, when making an adjustment to the base year costs. This would then be consistent with our POH analysis.<sup>347</sup>
- BT considered we should use the same cap on POH as on the TI basket because there is less opportunity for efficiency gains, and it is more challenging to achieve cost reductions if POH maintenance costs increase.<sup>348</sup>
- A13.27 CWW agreed with our proposals in general. However it argued that, to prevent BT rebalancing POH charges between type I and type II, we should either place type I and type II POH in separate sub-baskets or; place a sub-cap of RPI+5% on individual POH charges. CWW noted that this was a particular concern given our proposal to use prior financial year weighting, as CWW expects to see a shift in volumes to Type 1 POH.<sup>349</sup>

#### Our response and conclusions

- A13.28 The stakeholder responses on these issues relate to our basket design, and to our base year cost adjustments. Our decisions on these issues are contained in Section 19.
- A13.29 In relation to our assessment of POH charges, we received no stakeholder comments on these areas. We have also noted that there have been no material changes since our analysis was conducted. We have therefore decided to impose no starting charge adjustments for PPC POH and place these charges in a single TI basket with a sub-cap of RPI-0%.

<sup>&</sup>lt;sup>347</sup> See BT non-confidential response to the LLCC Consultation page 17.

<sup>&</sup>lt;sup>348</sup> See BT non-confidential response to the LLCC Consultation page 48.

<sup>&</sup>lt;sup>349</sup> See CWW non-confidential response to the LLCC Consultation page 72-73.

Annex 14

# Cost of capital

# Introduction

- A14.1 In this Annex, we set out our estimate of BT's cost of capital. This is to be used in the charge controls we are imposing on BT in this statement in respect of leased lines services.
- A14.2 We estimate and apply different costs of capital for different parts of BT because the different parts of BT have different systematic risk profiles. We estimate the rate for BT Group plc (BT Group), this is then split into a rate for the copper access network (Openreach), and the rest of BT, which is not covered by the Openreach rate (the 'Rest of BT').
- A14.3 The cost of capital is important for setting charge controls, particularly as it makes up a significant proportion of the cost of most regulated telecommunications services. It is also particularly important to investors to provide them with a reasonable expectation that they can recover their investment and make a reasonable rate of return.
- A14.4 This means, in turn, that we attach weight to the objective of promoting regulatory predictability by ensuring a consistent regulatory approach over appropriate periods, provided that we are satisfied that the circumstances of a specific case do not warrant us taking a different approach.

# Summary

A14.5 We have estimated the pre-tax real cost of capital for the Rest of BT to be used in these charge controls to be 7.0%. This is set out in Figure A7.1 below, along with the estimates for BT Group and Openreach, respectively.

	Openreach	BT Group	Rest of BT
Real risk-free rate	1.3%	1.3%	1.3%
Inflation	2.8%	2.8%	2.8%
Nominal risk-free rate	4.1%	4.1%	4.1%
Equity beta (mid-point)	0.90	1.01	1.13
Asset beta (mid-point)	0.60	0.67	0.74
ERP	5%	5%	5%
Gearing <sup>350</sup>	40%	40%	40%
Debt premium	1.7%	1.7 – 2.3%	2.3%
Debt beta	0.15	0.15	0.15
Tax rate	21%	21%	21%
Pre-tax real WACC	6.0%	6.5%	7.0%
Pre-tax nominal WACC	8.9%	9.4%	10.0%

#### FigureA14.1: BT Cost of capital February 2013

A14.6 In the LLCC Consultation, we proposed to use a pre-tax real cost of capital estimate for the Rest of BT of 6.5% - as we estimated in the WBA CC (along with separate

<sup>&</sup>lt;sup>350</sup> This is the 2 year average gearing which is used to de-lever the equity beta. We have used a current gearing level of 32% to re-lever the asset beta.

estimates of the cost of capital for BT Group and Openreach, respectively).<sup>351</sup> These estimates are reproduced in the Figure below.

#### Figure A14.2: BT Cost of capital July 2011

	Openreach	BT Group	Rest of BT
Real risk-free rate	1.4%	1.4%	1.4%
Inflation	3%	3%	3%
Nominal risk-free rate	4.4%	4.4%	4.4%
Equity beta	0.67 – 0.94	0.77 – 1.04	0.87 – 1.14
Asset beta	0.41 – 0.55	0.46 - 0.59	0.51 – 0.65
ERP	5%	5%	5%
Gearing	50%	50%	50%
Debt premium	2%	2 – 2.5%	2.5%
Debt beta	0.15	0.15	0.15
Tax rate	24%	24%	24%
Pre-tax real WACC	5.6%	6.1%	6.5%
Pre-tax nominal WACC	8.8%	9.2%	9.7%

#### Our approach to the cost of capital

#### The LLCC Consultation proposals

- A14.7 In the LLCC Consultation, we proposed to use the WACC applicable to the Rest of BT for the leased lines services covered by our proposed charge controls. This was based on an assessment of the cyclicality of demand for leased lines services and, to a lesser extent, an analysis of the underlying asset base. We discussed this analysis in Section 4 of the LLCC Consultation.
- A14.8 We estimated the WACC for Openreach, BT Group and the Rest of BT, respectively, in detail in the WBA CC.<sup>352</sup> In that statement, we explained that we intended to use the WACC figures estimated in the WBA CC Statement for future relevant charge controls, provided that the estimates remain relevant. We noted that consistency is important, but that this needs to be balanced against the possible need for updating those cost of capital estimates. Specifically, we stated that:

"The cost of capital estimates for BT...have been calculated for the purposes of the WBA charge control which will apply to 2013/14. However, we intend to apply these rates to other relevant charge controls. In the case of the forthcoming WLR/LLU charge controls, for example, we note that the charge control statement is likely to be published towards the end of 2011.

We intend to apply the cost of capital estimates shown below to the relevant charge controls. However, we will review the evidence on the individual parameters at the time of the publication of these charge controls to ensure that the estimates remain relevant. If the

<sup>&</sup>lt;sup>351</sup> Table 6.3, page 97 of the WBA CC Statement:

http://stakeholders.ofcom.org.uk/binaries/consultations/823069/statement/statement.pdf

<sup>&</sup>lt;sup>352</sup> The cost of capital estimated in the WBA Statement was appealed by BT. This appeal has been concluded and the CAT upheld Ofcom's estimate for the purposes of that Statement. Full details are available at:

http://www.catribunal.org.uk/237-7278/1187-3-3-11-British-Telecommunications-plc-Wholesale-Broadband-Access-Charge-Control.html

evidence suggests that these cost of capital estimates are no longer appropriate, we will update the estimates. However, in deciding whether an update is necessary, we will have regard to the importance of maintaining a consistent approach.<sup>353</sup>"

- A14.9 That statement reflected two important considerations.
  - First, that consistency is important in order to provide investors with a reasonable expectation that they can recover their investment and make a reasonable rate of return. We believe that this creates a regulatory environment which encourages efficient investment.
  - Second, having regard to the desirability of a consistent approach, any decision would need to be appropriate in the context of any future charge control review. It would be inappropriate for us to fetter our discretion as to future charge control reviews.
- A14.10 In light of this position, we considered whether our estimate of BT's cost of capital calculated for the purposes of the WBA CC remained appropriate in the subsequent WLR LLU CC (which we published in March 2012).<sup>354</sup> In that statement, we reviewed the most recent available evidence on the individual parameters to ensure that the estimates remained relevant. We concluded that they were appropriate.
- A14.11 In the LLCC Consultation, we explained that the cost of capital estimated in the WBA Statement remained appropriate for the proposed charge controls, without the need to update the estimate.
- A14.12 This was because our updated analysis was performed just a few months prior to the LLCC Consultation, as part of the WLR LLU CC. In that statement, we found that the WBA CC estimates remained appropriate. We did not identify any reasons for a need to undertake additional analysis for the purposes of coming to a provisional view on the cost of capital to be used in the LLCC Consultation.
- A14.13 In reaching this provisional view, we also took account of the recent CC Determination in respect of BT's appeal against our decisions in the WBA CC concerning the cost of capital, as noted above. However, we explained that we would consider any movements in the cost of capital parameters prior to reaching a decision on the proposals set out in the LLCC Consultation in order to ensure that the proposed estimate of the WACC remains appropriate. We stated that, if the relevant parameters have changed materially, we would consider whether a change to our cost of capital estimates would be appropriate.
- A14.14 In the WLR LLU CC, we set out why the cost of capital estimates in the WBA CC remained appropriate, based on the following reasoning:
  - there had been no significant change in the majority of parameters to warrant a change in our estimates from those in July 2011;
  - we observed an increase in the two-year BT Group asset beta and a decrease in the risk free rate since July 2011. The exact magnitude of these opposing

<sup>&</sup>lt;sup>353</sup> See paragraph 6.7 to 6.8 of the WBA Statement.

<sup>&</sup>lt;sup>354</sup> See Annex 8 of the WLR LLU CC Statement

changes was uncertain, however we expected the net effect on the overall WACC to be small; and

- we also noted the principle set out in the WBA CC that consistency is important in order to provide investors with a reasonable expectation that they can recover their investment and make a reasonable rate of return. We continue to believe that this creates a regulatory environment which encourages efficient investment.
- A14.15 In arriving at our proposal not to adjust the WACC set out in the WBA CC for our provisional view on the cost of capital, we also had particular regard to:
  - the proximity of the LLCC Consultation to the WLR LLU CC, including our updated analysis as published in March 2012; and
  - the small and uncertain likely impact on the overall WACC of the changes in parameter values observed since July 2011, as set out in the WLR LLU CC.
- A14.16 We set out our conclusions on the cost of capital below. In particular, in relation to the parameters of the WACC, we:
  - i) explain what we said in the WLR LLU CC, which we considered remained appropriate at the time of the LLCC Consultation;
  - ii) summarise the relevant consultation responses received;
  - iii) consider any new evidence which is available; and
  - iv) conclude on the appropriate estimate of each parameter value.

#### Consultation responses

- A14.17 Most respondents did not comment in detail on our approach to the cost of capital. Those who did broadly agreed with our approach, however BT made specific comments in relation to some of the parameters of the WACC.
- A14.18 Most respondents who commented on our approach to the WACC agreed that Ofcom should use up to date information, as proposed in our consultation. Reponses in relation to specific parameters are summarised below in relation to the relevant parameter.
- A14.19 In addition, some respondents commented on the use of the Rest of BT rate for the services covered by the current charge controls. BT and Virgin agreed that the Rest of BT WACC was the appropriate rate to use. However TalkTalk stated that the "Rest of BT figure overstates the business risk and WACC for supplying Ethernet circuits".<sup>355</sup> We discuss this further below.
- A14.20 In light of stakeholder responses, we have set out below our considerations and conclusions on:
  - i) whether we should update individual paramaters values for our cost of capital calculation in the current charge controls;

<sup>&</sup>lt;sup>355</sup> See TalkTalk non-confidential response to the LLCC Consultation, paragraphs 5.52 to 5.56, pages 46-47.

- ii) whether the Rest of BT WACC is the appropriate rate to use; and
- iii) how these conclusions impact our estimate of the cost of capital to be used in the current charge controls.

#### Key parameter values

#### The LLCC Consultation proposals

- A14.21 As set out in the WBA CC, for reasons of consistency, we proposed to apply the rates, reproduced in Figure A14.2 above, in all relevant charge controls, provided that the estimates of the individual parameters would remain appropriate.<sup>356</sup>
- A14.22 We therefore considered, as part of the WLR LLU CC, the individual parameters used to arrive at the cost of capital. In the LLCC Consultation, we set out the revised estimates of each of these parameters, as updated for the WLR LLU CC. In summary we did not consider that there had been a material change in the following parameters, from July 2011 to March 2012, to warrant a revised estimate:
  - debt premium;
  - inflation; and
  - equity risk premium (ERP).
- A14.23 We observed changes in the following parameters since our July 2011 estimates:
  - the risk-free rate; and
  - BT Group Beta.
- A14.24 We observed an increase in the two-year BT Group asset beta and a decrease in the risk free rate since July 2011.
- A14.25 In addition, we noted that the expected corporation tax rate for 2014/15 had fallen as a result of the March 2012 budget announcement.
- A14.26 We discuss each of these parameters in more detail below.

#### Debt premium

#### The LLCC Consultation proposals

- A14.27 We estimated the debt premium for BT Group to be within the range 2%-2.5% in the July 2011 WBA Statement.<sup>357</sup> This was consistent with the proposed estimate in the WBA CC Consultation.<sup>358</sup>
- A14.28 This was estimated by reference to the yield on BT's 2016 Sterling denominated bond, over and above benchmark gilt yields.<sup>359</sup> We updated our analysis to January

<sup>&</sup>lt;sup>356</sup> See paragraph 6.7-6.8 of the WBA Statement.

<sup>&</sup>lt;sup>357</sup> See paragraph 6.54 to 6.78 WBA CC Statement:

<sup>&</sup>lt;sup>358</sup> See paragraph 6.145 to 6.150 of the WBA CC Consultation

2012. Over the six month period (to January 2012), the spread on BT's 2016 bond, over the benchmark, remained broadly in this range. We noted that it fell below 2% in July 2011, and increased above 2.5% in November/December 2011, however it subsequently fell below 2.5%. We therefore believed that the range 2%-2.5% remained appropriate.

A14.29 For the purposes of disaggregating the BT Group WACC, we estimated that 2% would be appropriate for Openreach and 2.5% would be appropriate for the rest of BT. This reflected the argument that a business with a lower perception of default risk (i.e. Openreach) may have a lower cost of debt than the Rest of BT. The assessment in the WBA Statement was based on comparing the debt premium for network utilities, which ranged from 1-1.5% and the BT Group debt premium which was 2-2.5% in July 2011.

#### Our conclusions

- A14.30 We received no specific consultation responses in relation to the debt premium, however we note that most stakeholders asked Ofcom to use the most recent data.
- A14.31 We have looked at the most recent spread over government bonds of BT's 2016 bond and note that the spread fell below 2% from July 2012. In December 2012, the spread was approximately 1.5%.
- A14.32 Over the 12 month period to December 2012, the average debt premium for BT's 2016 debt was 2.1% with more recent data below 2%, this suggests that the debt premium estimated for the WBA CC may no longer be a reasonable proxy for the cost of BT's debt.

<sup>&</sup>lt;sup>359</sup> We use BT's 2016 GBP bond for the purpose of estimating the debt premium for BT. This bond is the most suitable since it is the shortest-dated GBP bond in issuance by BT, and therefore is the closest match to the charge control period. We also note that GBP bonds of longer maturity exhibit similar premia above equivalent period gilts.



#### Figure A14.3 estimate of BT's debt premium

lune 2009 December 2009 lune 2010 December 2010 lune 2011 December 2011 lune 2012 December 2012

Source: Bloomberg, Ofcom analysis at December 2012

- A14.33 We have also compared this to other sterling denominated BT bonds which exhibit a similar pattern, although BT's 2020 sterling denominated bond implied a debt premium of around 1.7% at December 2012.
- A14.34 The data for the year to December 2012, suggests a lower range would be more appropriate for the BT Group debt premium. Taking into account the recent fall in yields and the average spread on BT's 2016 debt, we have used a range of 1.7% to 2.3% as a proxy for the BT Group debt premium.

#### Inflation

#### The LLCC Consultation proposals

- A14.35 We noted in the WBA CC that an inflation assumption of 3% reflected an appropriate estimate of market expectations of RPI for the purposes of estimating the WACC. Both the WBA CC and the LLCC are modelled in real terms, therefore the real pre-tax WACC is used.
- A14.36 In the WBA CC, we explained that we would ensure that the RPI forecast for modelling asset price changes and the RPI used to forecast the cost of capital would be consistent. We proposed to use an equivalent approach in future charge controls.
- A14.37 In the LLCC Consultation, we noted that for the purposes of the proposed charge controls for leased lines services we used a forecast RPI of 3% for 2015/16, where necessary. Therefore we considered that the forecast inflation of 3% used to calculate the nominal WACC remained appropriate.

#### Our conclusions

A14.38 We received no specific consultation responses in relation to inflation used in the cost of capital, however we note that most stakeholders asked Ofcom to use the most recent data.

- A14.39 For the purposes of calculating the WACC, we have concluded that the appropriate RPI estimate is that for the final year of the charge controls. This is because it is the final year price which determines the X in the RPI + or X control. The 2015/16 RPI estimate is 2.8%.<sup>360</sup>
- A14.40 We consider that it is important that the inflation assumption used in the WACC estimate is consistent with the inflation index used by the charge controls covered by this statement. For this reason we are using an inflation assumption of 2.8% in our estimation of the WACC.

#### Equity risk premium

#### The LLCC Consultation proposals

- A14.41 We estimated the Equity Risk Premium (ERP) to be 5% in the WBA Statement. This reflected recent work by Professors Dimson, Marsh and Staunton (DMS)<sup>361</sup> from the London Business School, which tracks the average premium that investors have earned from equities (as opposed to bonds or gilts) over time.
- A14.42 In addition, we considered regulatory benchmarks, market commentary and academic/user surveys.
- A14.43 At the time of the LLCC Consultation, we did not consider that there was compelling evidence to suggest that an ERP of 5% was no longer appropriate, in particular as it was based on recent DMS evidence.
- A14.44 The latest historical ERP evidence reported by DMS, in the 2012 sourcebook, showed that the historical premium of equities over bonds for the UK was 5%. In addition, in the 2012 report, DMS suggested a long-run arithmetic mean premium for the world index of around 4.5%-5%.

#### Our conclusions

- A14.45 We received no specific consultation responses in relation to the ERP, however we note that most stakeholders asked Ofcom to use the most recent data which we consider below.
- A14.46 As noted above, we cited the most recent historical ERP evidence reported by DMS in our LLCC Consultation. At the time of this statement, the 2012 report remains the most recent report available.
- A14.47 We have also considered recent survey evidence which does not suggest that a rate of 5% is inappropriate.<sup>362</sup>
- A14.48 In addition, we have considered the latest evidence on volatility of the FTSE Allshare index. This suggests that volatility has fallen, and is closer to its long run mean. This does not support an increase in the ERP.

<sup>&</sup>lt;sup>360</sup> Inflation is calculated on the basis of the medium term RPI forecasts using annual average new forecasts from 'HM Treasury Forecasts for the UK economy: a comparison of independent forecasts' <u>http://www.hm-</u> <u>treasury.gov.uk/d/201208forcomp.pdf</u>. These forecasts were prorated to calculate forecast RPI for March.

<sup>&</sup>lt;sup>361</sup> Dimson, Marsh and Staunton "Credit Suisse Global Investment Returns Sourcebook 2011" Credit Suisse Research Institute. See paragraph 6.79-6.96 WBA Statement.

<sup>&</sup>lt;sup>362</sup> Fernandez, Aguirreamalloa and Corres, "Market Risk Premium used in 82 countries in 2012: a survey with 7,192 answers" June 2012; Graham and Harvey "The equity risk premium in 2012"

- A14.49 However, there is some evidence that the volatility itself has been more variable in recent years. That is to say, the uncertainty about market volatility has increased, and it may be that this increased uncertainty has led to higher expected returns on equities. In other words, the market may require a risk premium for the uncertainty with respect to market volatility. If this were the case, we might wish to reconsider the level at which we set the ERP.
- A14.50 It may be that this increased uncertainty is related to the financial crisis, and as this abates the uncertainty will decline. Including a risk premium for such uncertainty amounts to a departure from the underlying assumptions of the CAPM and therefore such an adjustment is not to be considered lightly.
- A14.51 We note that, although there is an interesting argument that an increase in the volatility of market volatility could result in investors demanding a higher premium above the ERP previously identified, we consider that the evidence about the persistence of such uncertainty in the future is not conclusive and the method by which we would incorporate any such risk premium into our existing methodology is also not clear.
- A14.52 We also place weight on consistency in our approach, and would be reluctant to introduce new datasets and a new methodology (i.e. consideration of the uncertainty of volatility on market returns) unless there was sufficient evidence to support its inclusion. In this instance, we do not consider that this is the case.
- A14.53 As a result of this, we continue to rely on the DMS report and indicators of market volatility. We therefore continue to believe that 5% remains an appropriate estimate of the ERP, in particular based on the latest (2012) DMS report.
- A14.54 We note below that the risk free rate and the ERP tend to move in opposite directions. Although we consider that the evidence suggests a fall in the risk free rate, we do not see compelling evidence to support an increase in the ERP. We discuss this further below.

#### **Real risk-free rate**

#### The LLCC Consultation proposals

A14.55 We noted in the WLR LLU CC that the real risk-free rate had fallen further since the publication of the WBA CC in July 2011. In the WBA CC, our estimate of the real risk-free rate was 1.4%. In arriving at this estimate, we considered average yields on indexed linked gilts and implied forward rates. Figure A14.4 below shows the movements in these datasets from July 2011 to February 2012.

Figure A14.4	: Changes	in index-linked	("i-l") gilt evidence
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	WBA CC Statement July 2011, %	WLR LLU CC Statement Feb 2012, %
Average of last 5 years for 5 yr i-l gilts	1.2	0.8
Average of last 10 years for 5 yr i-l gilts	1.6	1.3
Average of last 5 years for 10 yr i-l gilts	1.3	1.0
Average of last 10 years for 10 yr i-l gilts	1.6	1.5
Implied forward rate on 5 yr i-I gilt at Feb 2014 <sup>363</sup>	c0.9	c(0.5)

Source: Bank of England, Ofcom analysis

- A14.56 We noted that the continued downward trend in gilt yields and forward rates implied a reduction in the real risk-free rate.
- A14.57 In the WBA CC, we considered the implied forward rates on five year gilts. We noted that these had declined significantly and were out of line with the observed historical gilt yields. We updated our analysis and this continued to be the case. We noted that the implied forward rates on indexed linked gilts were below zero at the time of the WLR CC.
- A14.58 In the WLR CC we explained that implied forward rates continued to be volatile and therefore we were cautious about placing significant weight on these rates.
- A14.59 Calculating the risk-free rate using the five year averages of ten year and five year indexed linked gilts also suggested a reduction in the real risk-free rate from 1.4%. These averages are shown in Figure A14.5 below.

# Figure A14.5: five and ten year gilt yields average rate (real) at 6<sup>th</sup> January 2012

Average period	ten year gilts (%)	five year gilts (%)
6 January 2012	-0.7	-1.4
1 month	-0.5	-1.3
3 months	-0.3	-1.2
1 year	0.2	-0.8
2 years	0.4	-0.5
5 years	1.1	0.8
10 years	1.5	1.3

Source: Bank of England, Ofcom analysis

A14.60 The above Figure reflects a fall in real gilt yields over the year to January 2012. Only one data point (ten year average on a ten year gilt) was above our estimate of the risk-free rate, and this had fallen from 1.6% in July 2011. We noted that all other average rates remained below the risk free rate of 1.4% estimated in July 2011.

#### Consultation responses

A14.61 BT noted the data presented by Ofcom in the LLCC Consultation, and stated that it accepts "the direction of the movement in the data on gilt yields<sup>364</sup>". However, it

<sup>363</sup> The estimates for Jan 2012 and July 2011 represent the implied future yield on an investment in a five year

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ILG made in Feb 2014 calculated using the following formula: f_{t,T} = \left[\frac{(1+r_T)^T}{(1+r_t)^t}\right]^{\frac{1}{T-t}} - 1.
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<sup>&</sup>lt;sup>364</sup> See BT's non-confidential response to the LLCC Consultation, paragraph 9, page 50.

argues that the fall in gilt yields is not sufficient to result in no change to the overall WACC.

A14.62 BT also noted that current UK gilt yields have been affected by the global macroeconomic climate which it suggests means "additional caution is required in estimating longer term rates".<sup>365</sup>

#### Our response and conclusions

A14.63 We have updated the analysis of gilt yields to December 2012, which shows a continued decline in the rates for both five and ten year gilts.

Figure A14.6: five and ten year gilt yields average rate (real) at 6 December 2012

Average period	ten year gilts (%)	five year gilts (%)
6 December 2012	-0.7	-1.4
1 month	-0.6	-1.4
3 months	-0.6	-1.4
1 year	-0.2	-1.0
2 years	0.1	-0.7
5 years	0.6	0.2
10 years	1.2	1.0

Source: Bank of England, Ofcom analysis

- A14.64 In addition, the implied forward rates have also decreased from those estimated in July 2011. The three year forward rate on a five year gilt has fallen from 1.05% in July 2011 to approximately -0.5% in December 2012.
- A14.65 As BT notes, there has been a fall in gilt yields over the period from July 2011 to the time of the LLCC Consultation. In addition, more recent data to December 2012 suggests a further fall. The estimates of the real risk-free rate continue to be negative in the short term and remain low over the longer term.
- A14.66 We continue to believe that a degree of caution is required when interpreting the current data, this is because of the high level of uncertainty which has persisted. In addition, the effects of quantitative easing and a flight to safety still remain. We also note that the purposes of the charge controls are to set prices for 2015/16, therefore our forecast real risk free rate is one which is appropriate for the end of the charge control period.
- A14.67 Although we note that estimates of the real risk free rate have continued to fall, we have also considered the implications of this for the equity market premium. If we believe that the risk free rate has fallen because equities have become more risky or because investors are becoming more risk averse, then we would expect an increase in the ERP to reflect this.
- A14.68 We consider that there is a relationship between the risk free rate and the ERP. Therefore, we are reluctant to make a significant change in the risk-free rate without considering an increase in the ERP, something which is not supported by current evidence.
- A14.69 The CC noted the interaction between the ERP and the risk free rate, in the Mobile Call Termination appeal in 2011, in response to an argument by Dr Hird that Ofcom had not reflected the connection between the tendency of the risk free rate (RFR) to

<sup>&</sup>lt;sup>365</sup> See BT's non-confidential response to the LLCC Consultation, paragraph 9, page 50.

fall during a crisis, at the same time as the tendency of the ERP to increase. The CC noted that Ofcom did not err in this regard as:

"Ofcom was mindful of the tendency of the RFR and ERP to move in opposite directions".<sup>366</sup>

- A14.70 We have balanced the possibility of increasing the ERP, whilst decreasing the riskfree rate further. However, as noted above, we do not have sufficient evidence to support a further increase in the ERP. It may be that the ERP is higher as a result of an increase in the variability (or risk) associated with equity market volatility, however we do not have sufficient evidence of this to justify a change to our established methodology and well-understood evidence base.
- A14.71 We consider it is appropriate, however, to reflect the continued fall in estimates of the real risk free rate to some degree. We have therefore used a point estimate of 1.3% for the real risk-free rate.

#### BT Group equity & asset beta

#### The LLCC Consultation proposals

- A14.72 We set out our methodology for assessing the asset beta for BT Group in the WBA CC.<sup>367</sup> The asset beta for BT Group is calculated by de-levering the equity beta for a given time period at the average gearing observed over that same period.<sup>368</sup> In the WBA CC, we estimated an asset beta range of 0.46-0.59 for BT Group.
- A14.73 We updated the estimate of the asset beta for BT Group, in the WLR LLU CC, using revised data from Bloomberg which is set out in Figure A14.7 below. We noted that the mid-point of the two-year daily asset beta range increased from the WBA asset beta of 0.525 to approximately 0.64.
- A14.74 We noted that the one-year daily beta estimate also increased relative to that estimated in July 2011, however the five-year weekly beta remained within the range estimated in the WBA Statement (0.46 0.59).<sup>369</sup>

<sup>&</sup>lt;sup>366</sup> See paragraph 3.915 of the Competition Commission determination, 9 February 2012. In respect of the MCT appeal: cases 1180-1183/3/3/11.

<sup>&</sup>lt;sup>367</sup> See paragraph 6.97 to 6.154 of the WBA CC Statement:

<sup>&</sup>lt;sup>368</sup> We then re-lever the asset beta using an appropriate gearing level. In the WBA Statement, the gearing used to re-lever the asset beta was based on the historical average gearing level. In the WBA Statement, we noted that it may be appropriate to use a forward looking gearing for the purpose of re-levering, however the impact of using a different gearing on the overall WACC was negligible. As part of the WBA appeal, the Competition Commission considered that using a prospective gearing assumption is preferable to using a historical average. However, it found that Ofcom did not err in its calculation of the beta as the impact was negligible. As a result, in future, when re-levering the asset beta, we will use prospective gearing. In the consultation, we did not amend our re-levered beta estimate for the purposes of the charge control for leased lines as we considered it would have a negligible impact on the overall WACC. We noted that the CC upheld our decision to use the historical average gearing to de-lever the equity beta and we will therefore continue with this approach to estimating the asset beta.

<sup>&</sup>lt;sup>369</sup> As explained in the WBA Statement, we place greatest weight on the 2-year beta. However, the 5-year weekly beta provides a useful cross-check, particularly during periods of financial market volatility.

#### Figure A14.7: Revised BT Group asset beta estimates (9 January 2012)

	1 year daily data	2 year daily	data	5 year weekly data
Equity beta	1.06	1.04		0.86
Average Gearing	39%	44%		40%
Asset beta	0.70	0.64		0.57

Source: Bloomberg, Ofcom analysis

- A14.75 We explained that, all other things being equal, a change in the asset beta could potentially support a modest increase in the cost of capital for BT Group.
- A14.76 Although we noted that the asset beta may have increased over the six months to January 2012, we explained that this cannot be looked at in isolation. If we were to update the asset beta, we would also have to update the risk free rate, where we observed a downward trend in estimates.

#### Consultation responses

- A14.77 BT was the only respondent to consider the beta specifically. It stated that using data to August 2012 (rather than March 2012) would show an increase in the asset beta which exceeds the decrease in the risk free rate and "would be unlikely to simply 'net off' overall".<sup>370</sup> It argued that this would justify an increase in the overall WACC.
- A14.78 BT argued that the two year data to March 2012 was distorted by the fall in BT's market capitalisation as a result of the global financial crisis. It therefore argued that more recent rolling averages (i.e. from August 2012 onwards) were more "in line with longer term trends and future market expectations".<sup>371</sup>

#### Our response and conclusions

- A14.79 Following publication of the LLCC Consultation, we commissioned a report from Brattle Group in December 2012<sup>372</sup> which shows the most recent equity beta estimates for BT Group, along with revised gearing estimates.
- A14.80 The most recent data shows that the two year BT Group equity beta has increased from a mid-point of 0.91 in June 2011 to a mid-point of 1.01 at December 2012 (within an equity beta range of 0.92-1.11).
- A14.81 In addition, the average gearing for BT Group over the same period has fallen from 50% in July 2011 to 40% at December 2012. This average two year gearing is used to de-lever the equity beta and arrive at the asset beta.
- A14.82 The revised estimate for BT's asset beta has therefore increased from a mid-point of 0.525 in July 2011 to 0.67 at December 2012.

<sup>&</sup>lt;sup>370</sup> See BT's non-confidential response to the LLCC Consultation, paragraph 5, page 49.

<sup>&</sup>lt;sup>371</sup> See BT's non-confidential response to the LLCC Consultation, paragraph 6, page 49.

<sup>&</sup>lt;sup>372</sup> The Brattle report which will be published alongside the Statement.

	1 year daily data	2 year daily	data	5 year weekly data <sup>373</sup>
Equity beta	0.99	1.01		0.85
Average Gearing	41%	40%		45%
Asset beta	0.64	0.67		0.54

#### Figure A14.8: BT Group asset beta mid-point estimates (December 2012)

Source: Brattle, Bloomberg, Ofcom analysis

- A14.83 For the purposes of re-levering the asset beta, the current gearing<sup>374</sup> is used. At the time of this statement, the most recent estimate for BT Group's gearing was 32%<sup>375</sup>.
- A14.84 We note that the five year weekly equity beta is significantly lower than the one and two year equity betas. However, we note that the five year data covers an extended period of the global financial crisis.
- A14.85 The one year asset beta is within the confidence interval for the two year beta which suggests that the BT Group asset beta is more stable than we have observed during previous, recent cost of capital estimates.
- A14.86 The most recent one and two year data shows an increase in the BT Group asset beta, as suggested by BT.
- A14.87 In conclusion, we have used the latest estimates of the BT Group two year equity beta and two year gearing to de-lever the beta (as shown in the Figure above) this shows a mid-point estimate of the asset beta for BT Group of 0.67.
- A14.88 We have then used the current gearing of 32% to re-lever the asset beta for BT Group. This gives a forward looking equity beta of 0.91 for BT Group.

#### Tax rate

#### The LLCC Consultation proposals

- A14.89 We updated the tax rate in July 2011 to take account of the acceleration of the corporate tax rate reduction, announced in the March 2011 Budget. The expected rate of UK corporation tax rate from 2013/14 was predicted to be 24% at the time of the WBA CC.
- A14.90 The March 2012 Budget set out plans for a further acceleration of the corporation tax rate reduction. At the time of the LLCC Consultation, the most recent expectation of the main rate of UK corporation tax for the year beginning 1 April 2013 was 23% and the expected rate for the year beginning 1 April 2014 was 22%.<sup>376</sup>
- A14.91 We did not propose to update the cost of capital to take account of the most recent movements in other parameters in the LLCC Consultation, therefore we did not update our estimate of the lower corporation tax rates announced. However, we

<sup>&</sup>lt;sup>373</sup> Five year weekly data is from Bloomberg

<sup>&</sup>lt;sup>374</sup> This is consistent with the Competition Commission's determination in the WBA appeal.

<sup>&</sup>lt;sup>375</sup> Calculation as at 11 Jan 2013 using the latest net debt figure reported by BT of £9.04m in the September 2012 half year report and the market capitalisation value (taken from Bloomberg on 11 Jan) of £19.37bn

<sup>&</sup>lt;sup>376</sup> <u>http://www.hm-treasury.gov.uk/budget2012\_fair\_efficient\_tax.htm</u>

explained that we would update our estimate of the corporation tax rate when we estimate the WACC at the time of the statement.

- A14.92 As the proposed charge controls were expected to run to 2015/16, we proposed to use the expected corporation tax rate of 22% in calculating the Rest of BT WACC.
- A14.93 We noted that the reduction from 24% to 22% reduced the Rest of BT WACC by less than 0.2%.

#### Consultation responses

A14.94 BT and TalkTalk both agreed with our proposal to take account of the latest tax rate in the WACC calculation.

#### Our response and conclusions

- A14.95 The 2012 Autumn Statement by the Chancellor set out the Government's proposed tax rate for 2014/15 of 21%.
- A14.96 We have used the most recent estimate of the WACC for the latest available period (2014/15), of 21% in the WACC calculation.

#### **Disaggregation of the BT Group WACC**

#### The LLCC Consultation proposals

- A14.97 In order to disaggregate the BT Group WACC into a separate WACC for Openreach and the Rest the BT, we have two parameters which are assessed separately for the Openreach and the Rest of BT. These are:
  - i) the asset beta; and
  - ii) the debt premium.

#### Asset beta

- A14.98 Within the LLCC Consultation, we proposed to use the same method for disaggregation of the BT Group asset beta as set out in the WBA Statement.
- A14.99 We estimated the Openreach asset beta by reference to the asset betas of network utilities, and the BT Group beta. We considered that Openreach sits above to the top end of the network utility range (estimated to be 0.26-0.37 in the WBA CC). Considering where Openreach sits on the 'risk spectrum' we estimated an asset beta for Openreach which was approximately 10% or 0.05 below that of BT Group. We noted that this was a similar differential to that estimated in May 2009, the previous estimate of the cost of capital<sup>377</sup>.
- A14.100 We then considered the impact of this assumption on the Rest of BT asset beta. As we estimate that Openreach and the Rest of BT make up approximately half of the MCE of BT Group each, we assume that the two parts of BT Group would contribute equally to the WACC. Therefore by reducing the BT Group asset beta by 10% to estimate the Openreach asset beta, we would need to increase the BT Group asset beta by 10% to estimate the Rest of BT asset beta.

<sup>&</sup>lt;sup>377</sup> WBA Statement paragraph 6.225

A14.101 We then performed a cross-check of the asset beta of the Rest of BT. Although it is difficult to get a like-for-like comparator, given the demand characteristics of the Rest of BT (and BT Retail in particular), we would be uncomfortable supporting the view that the Rest of BT would be perceived as more risky than operators such as TalkTalk or Colt. As our estimate of the Rest of BT asset beta was below these 'comparator' asset betas, we considered our estimate was reasonable.

#### Debt premium

- A14.102 In the WBA CC, we explained that we use a higher debt premium for the Rest of BT than Openreach. This is because we considered that a business with lower systematic risk would be likely to have a lower cost of debt.
- A14.103 We considered that Openreach was likely to have a lower cost of debt compared to the BT Group as a whole. The lower systematic risk means that Openreach may be able to target a higher credit rating which could in turn result in a lower cost of raising finance. This would suggest that a lower cost of debt assumption is appropriate for Openreach.
- A14.104 In the WBA CC, we considered the range of debt premium observed for the network utilities which was around 1-1.5%. We also considered our range for the BT Group debt premium of 2-2.5%. We concluded that applying a debt premium of 2% for Openreach and 2.5% for the Rest of BT would be a reasonable approximation of relative risk in relation to the debt premium.
- A14.105 This was consistent with our view of where Openreach sits on the 'risk spectrum' relative to utilities and to the Rest of BT, which we applied in disaggregating the BT Group beta.

#### Consultation responses

- A14.106 Respondents did not comment on either the disaggregation of the BT Group asset beta between Openreach and the Rest of BT.
- A14.107 We also received no responses on the different debt premium estimates for Openreach and the Rest of BT.

#### Our conclusions

#### Asset beta

- A14.108 The December 2012 Brattle report on BT's equity and asset beta provides estimates for comparable UK utilities. This report shows that the recent BT Group asset beta estimates remain higher than for those of other comparable UK utilities.
- A14.109 The difference between the BT Group estimate and that of the network utilities has increased, although the peer-group average asset beta estimate for network utilities remains similar to the estimate in July 2011. Therefore it is the increase in the BT Group asset beta that has driven the increase in the gap between BT Group and the network utilities.
- A14.110 Although we note that it is also difficult to find a like-for-like comparator for the Rest of BT, we have also considered asset beta estimates for the closest comparators

available. These are Colt Group and TalkTalk Telecom Group, the asset betas of which have fallen from our July 2011 estimates to below that of BT Group.<sup>378</sup>

- A14.111 As the Rest of BT and Openreach continue account for roughly half of BT Group's assets, the approach taken in July 2011 to increase and decrease the BT Group asset beta by equal amounts remains appropriate. Therefore if we were to decrease the asset beta of Openreach by a greater amount than previously estimated (to reduce it closer to the top end of the network utility range), we would also need to increase the asset beta of the Rest of BT even further beyond those of its closest comparators.
- A14.112 As we consider that Openreach is closer to the Rest of BT than a network utility, we continue to believe that reducing the BT Group asset beta by 10%, the same differential used in May 2009 and July 2011, provides a suitable estimate for the Openreach asset beta. This results in an Openreach asset beta of 0.60 (0.07 lower than BT Group). In addition, increasing the BT Group asset beta by 0.07 to 0.74 provides a suitable estimate of the Rest of BT asset beta.

#### Debt premium

- A14.113 As discussed above, we use a higher debt premium for the Rest of BT than Openreach. This is because we consider that a business with a lower risk of default would be likely to have a lower cost of debt.
- A14.114 As noted by the Competition Commission in the LLU Appeal Determination, this is very difficult to estimate because there are no direct comparators available for Openreach:

"We note that there is no stand-alone proxy for the Openreach business from which to observe a capital structure or a debt premium".<sup>379</sup>

- A14.115 In order to estimate an appropriate debt premium for Openreach, we have considered the range of debt premium observed for the network utilities which is currently around 0.9-1.3%, this is lower than the estimation at the time of the WBA CC of 1-1.5%.
- A14.116 We consider that Openreach is likely to have a higher cost of debt than the network utilities, but would have a lower cost of debt than the Rest of BT. This is consistent with our assessment of the relative risk of Openreach discussed above in relation to the asset beta.
- A14.117 We have therefore also considered our range for the BT Group debt premium of 1.7-2.3%. We consider that applying a debt premium of 1.7% for Openreach and 2.3% for the Rest of BT would be a reasonable approximation of relative risk of these parts of BT for the purposes of estimating the debt premium.

<sup>&</sup>lt;sup>378</sup> The two year daily beta for Colt Group (100% equity funded) is 0.5, against the FTSE All share index. The two year daily asset beta for TalkTalk Telecom Group is around 0.47 against the FTSE All share index as at December 2012.

<sup>&</sup>lt;sup>379</sup> Paragraph 2.367 available at:

http://www.competitioncommission.org.uk/appeals/communications\_act/llu\_determination.pdf

### The appropriate WACC for the current charge controls

#### The LLCC Consultation proposals

- A14.118 In the LLCC Consultation, we proposed to use the Rest of BT rate for the services covered by the current charge controls.
- A14.119 This was consistent with the approach taken in the LLCC 2009 and was based on an assessment of the cyclicality of demand for leased lines services and, to a lesser extent, an analysis of the underlying asset base.

#### Consultation responses

- A14.120 Three respondents commented on the use of the Rest of BT rate for the services covered by the current charge controls. BT and Virgin agreed that the Rest of BT WACC was the appropriate rate to use. However TalkTalk stated that the "Rest of BT figure overstates the business risk and WACC for supplying Ethernet circuits."<sup>380</sup>
- A14.121 TalkTalk argued that the Rest of BT WACC reflects the non-copper access parts of BT Group, including:
  - a) Regulated wholesale leased lines;
  - b) Wholesale broadband access, wholesale voice services;
  - c) UK residential/business retail services; and
  - d) Telecoms/IT services to large corporates In UK and overseas.
- A14.122 TalkTalk argued that other areas have materially higher levels of risk/volatility than the supply of wholesale Ethernet/TI. TalkTalk accepted that the Openreach WACC "may not be entirely appropriate to use for Ethernet services." It therefore proposed to use a figure lower than the Rest of BT rate. TalkTalk stated that "Given there are limited reference figures for the cost of capital, we consider that Ofcom should at the very least use the BT Group figure of 6.1% to acknowledge the relatively lower risk versus the 'Rest of BT'".<sup>381</sup>

#### Our response and conclusions

- A14.123 We disagree that the Rest of BT rate overstates the WACC for leased lines services covered by these charge controls. In the LLCC 2009, Ofcom set the WACC for leased lines services using the Rest of BT rate.
- A14.124 The CC upheld Ofcom's decision to use the Rest of BT rate as the appropriate rate for services covered by these charge controls in the LLCC 2009 appeal<sup>382</sup>. In particular, the CC considered Ofcom's arguments about the proportion of shared assets between Openreach and leased lines, the demand for leased lines services and analysis of the customer base i.e. that business customers were more able to reduce their consumption of bandwidth and thus reduce the amount paid to BT,

<sup>&</sup>lt;sup>380</sup> See TalkTalk non-confidential response to the LLCC Consultation, paragraphs 5.52 to 5.56, pages 46-47.

<sup>&</sup>lt;sup>381</sup> See TalkTalk non-confidential response to the LLCC Consultation, paragraphs 5.55, page 47.

<sup>&</sup>lt;sup>382</sup> Case 1112/3/3/09 Cable and Wireless v Office of Communications, Determination of the Competition Commission dated 30 June 2010. Paragraph 4.238-4.333.

unlike residential customers who predominantly can only reduce consumption by disconnecting. The CC stated that:

"the arguments presented by Ofcom and BT tended to support the view that demand for leased lines services was more sensitive to economic conditions than demand for Openreach services."

- A14.125 In that determination, the CC considered whether Cable & Wireless (C&W) had demonstrated that the Rest of BT rate was too high for the leased lines services, and therefore the use of BT Group would be appropriate. The CC noted that in order for C&W to make a case that Ofcom had erred, it would need to demonstrate why and to what extent the Rest of BT was not appropriate. The CC found that there was insufficient evidence to support C&W's contention that the Rest of BT rate was too high for leased lines services. We consider that the same applies to the argument put forward by TalkTalk in relation to the use of BT Group WACC. We do not consider that there is sufficient evidence to support the argument that the Rest of BT rate is not appropriate for leased lines services.
- A14.126 Furthermore, we calculate the BT Group WACC for the purposes of estimating the Openreach and Rest of BT WACC. We do not apply the BT Group WACC to specific services. If we were to use the BT Group WACC, we would need to evidence that it was the appropriate rate and would need to recalculate the WACC for both Openreach and the Rest of BT to reflect the revised share of BT Group assets within each section. If leased lines services were no longer in the Rest of BT, for example, the Rest of BT would no longer make up 50% of the mean capital employed of BT Group. Therefore the disaggregation would need to be adjusted.
- A14.127 As stakeholders agree with our analysis that the Openreach WACC is not appropriate to use for the services covered in these charge controls, we consider our options are therefore to use the Rest of BT rate, or to further disaggregate the BT Group WACC and calculate another separate WACC for the services covered by these charge controls.
- A14.128 In our 2005 statement 'Ofcom's approach to risk in the assessment of the cost of capital' we set out the conditions under which we would consider further disaggregation. These are:
  - there are strong a priori reasons for thinking that the systematic risk faced by the project was significantly different from that faced by the overall company (e.g. different income elasticities of demand and/or stability of cash flows);
  - ii) there is evidence which can be used to assess variations in risk, e.g.:
    - it is possible to identify benchmark firms that are close to "pure play" comparators in terms of having similar risk characteristics to individual projects within the firm;
    - it is possible to use other quantitative analysis (such as quantified risk assessments or the analysis carried out by PwC on behalf of Ofcom to assess variations in risk);
    - data on the firm are available at a disaggregated level (e.g. via separated accounts); and

- iii) correctly identifying variations in risk, and reflecting this in an adjusted rate of return, is likely to bring about significant gains for consumers.
- A14.129 We do not consider that these conditions are met in relation to the services covered by these charge controls. In our view, the present circumstances are similar to those which were recognised by the CC in its 2010 determination.<sup>383</sup> The CC noted, in relation to the argument that Ofcom should have conducted fresh calculations to establish a cost of capital for the leased lines business:

"We consider that Ofcom and BT have presented credible arguments that fresh calculations to establish a cost of capital for the leased lines business were an unrealistic proposition due to lack of evidence to support specific disaggregation. In particular, BT's arguments that leased lines shared costs and assets with other services and there were significant synergies and other linkages between leased lines services and other parts of BT support Ofcom's view that it was difficult to consider leased lines to be a standalone business that could be benchmarked to an identifiable set of pure-play comparators and that would enable a sufficiently reliable assessment of beta to be made for Ofcom's purposes".<sup>384</sup>

A14.130 We continue to believe that the Rest of BT rate is the best proxy for the services covered by the current charge controls. We do not consider that there is sufficient evidence to warrant further disaggregation and believe that the Rest of BT estimate serves as a better proxy than the Openreach estimate.

#### Net impact on the cost of capital

#### The LLCC Consultation proposals

- A14.131 At the time of the WLR CC, we considered that updating BT's estimated cost of capital to take account of recent movements in the asset beta, the risk free rate and the tax rate would not materially change our overall estimate from that in July 2011.
- A14.132 Given the uncertainty around the risk free rate and the asset beta, and the overall margin of error in estimating the WACC, we did not think there was sufficient evidence to warrant a change in the WACC.
- A14.133 We were particularly mindful of the views of the CC on the mechanics of the Capital Asset Pricing Model (CAPM). In its Determination of the LLU Appeal, the CC noted:

"...the estimation of the cost of equity, which dominates the overall calculation of the WACC, has a significant margin of error".<sup>385</sup>

A14.134 We also considered the principle set out in the WBA CC that consistency is important in order to provide investors with a reasonable expectation that they can recover their investment and make a reasonable rate of return. We explained that this creates a regulatory environment which encourages efficient investment.

<sup>&</sup>lt;sup>383</sup> <u>http://www.catribunal.org.uk/238/Judgments.html</u>

<sup>&</sup>lt;sup>384</sup> Case 1112/3/3/09 Cable and Wireless v Office of Communications, Determination of the Competition Commission dated 30 June 2010. Paragraph 4.236

<sup>&</sup>lt;sup>385</sup> Case 1111/3/3/09 The Carphone Warehouse Group Plc v Office of Communications (Local Loop Unbundling), Determination of the Competition Commission dated 31 August 2010 at §2.406: <u>http://www.catribunal.org.uk/237-4154/1111-3-3-09-The-Carphone-Warehouse-Group-Plc.html</u>

- A14.135 Given the proximity to the WLR LLU CC, the small and uncertain likely impact on the overall WACC and the need for consistency, we did not think that updating the cost of capital was justified at the time of the LLCC Consultation.
- A14.136 For the reasons set out above, our provisional proposal was to use the WACC estimated in the WBA CC for the purposes of setting the charge controls for the leased line services. We proposed to use the pre-tax real Rest of BT rate of 6.5%.
- A14.137 We stated our intention to consider any changes in the cost of capital parameters prior to making a decision on our proposals, in order to ensure that the proposed estimate of the WACC remained appropriate. We explained that if the relevant parameters changed materially, we would consider whether a change to our cost of capital estimates would be appropriate. We illustrated the potential impacts of such changes within our sensitivity analysis for both TI and Ethernet services.
- A14.138 We asked respondents whether they agreed with our proposals for the treatment of the cost of capital.

#### Consultation responses

A14.139 Respondents did not comment in detail on our approach to the cost of capital, but those who did stated that we should use the most up to date estimates in order to calculate the WACC.

#### Our response and conclusions

- A14.140 We have taken into account the latest evidence, and have adjusted the individual parameters accordingly.
- A14.141 As a result of updating the individual parameters of the WACC, we estimate a revised BT Group WACC of 6.5% in real terms. The Rest of BT real pre-tax WACC of 7.0% will be used for the purposes of modelling the charge controls for the services covered by this statement.
- A14.142 We note that we will be undertaking a review of our cost of capital methodology later in the year, as part of the WLR and LLU market review.

# Annex 15

# Geographic analysis for retail very low bandwidth traditional interface market

- A15.1 In Section 5 we discussed the key evidence which has informed our proposal to define, for retail very low bandwidth TI leased lines, a national geographic market (excluding the Hull area). In this Annex, we present further results on the state of competitive conditions in this product market using an assessment of service shares.
- A15.2 We have produced below Figures displaying the variation in BT's service share first throughout the UK and then focusing on the London area.

#### Figure A15.1: BT's service share in the very low bandwidth TI retail market: UK





Figure A15.2: BT's service share in the very low bandwidth TI retail market: London

Note: Service share values are coloured as per the previous legend. The WECLA outline is in blue, the London Metro is outlined in black, the 2007/8 CELA outlined in green and motorways are in grey.

- A15.3 We have evaluated the average service shares in the key areas proposed as separate geographic markets for other (wholesale) product markets. The average service share for very low bandwidth TI retail services in the UK (excluding Hull) is 84%; in the WECLA+ it is 66%; while in the UK excluding the WECLA+ and Hull it is 89%. Accordingly, average shares in both areas are high and we do not distinguish between the two areas in our market definition.
- A15.4 The Figure below displays the distribution of BT's service shares across all the UK postcode sectors. BT's share differs across postcode sectors, with extreme values of 100% and 0%. However, such variations are to be expected where the number of sites in an individual postcode sector may be very low.

#### Figure A15.3 Distribution of BT very low bandwidth TI retail service shares UK-wide



A15.5 Overall, the Figures above show that there is little variation in BT's service share in the very low bandwidth TI retail market when assessed on a postcode sector basis. This analysis shows that, throughout the UK, BT holds a significantly high share of services supplied, which signals limited variation in competitive conditions by geography, with the exception of Hull.

#### Annex 16

# Sources of evidence

# Introduction

- A16.1 We have noted throughout the consultation the evidence we have relied upon in relation to our findings and how we have relied upon that evidence. This Annex lists the main sources of that evidence. We also list all responses to our various consultations and to our various notices under section 135 of the Communications Act 2003.
- A16.2 Whilst the Annex lists the main evidence we have relied upon, the list is for convenience only and is not intended to be exhaustive.

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- A16.14 Business Connectivity Services Review, Market research, January 2008. http://stakeholders.ofcom.org.uk/binaries/consultations/bcmr/statement/research.pdf
- A16.15 Service level guarantees: incentivising performance, Statement and Directions, March 2008. http://stakeholders.ofcom.org.uk/binaries/consultations/slg/statement/statement.pdf
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- A16.17 Variations to BT's Undertakings under the Enterprise Act 2002 in respect of BT's NGN, Space and Power and OSS separation, Statement, October 2008. <u>http://stakeholders.ofcom.org.uk/binaries/consultations/variations\_bt/statement/statement071008.pdf</u>
- A16.18 Variation to and exemption from BT's Undertakings under the Enterprise Act 2002 related to IPStream in certain geographic markets and Wavestream National, Statement, December 2008. http://stakeholders.ofcom.org.uk/binaries/telecoms/policy/bt/wavestream1208.pdf
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- A16.20 Leased Lines Charge Control, A new charge control framework for wholesale traditional interface and alternative interface products and services, Consultation, December 2008. <u>http://stakeholders.ofcom.org.uk/binaries/consultations/llcc/summary/leasedlines.pd</u>
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- A16.22 Replicability and the regulation of BT's retail low bandwidth digital leased lines, Draft Consent, Consultation, June 2009. <u>http://stakeholders.ofcom.org.uk/consultations/low\_bandwidth/</u>
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- A16.54 The Electronic Communications and Wireless Telegraphy Regulations 2011. http://www.legislation.gov.uk/uksi/2011/2949/made?view=plain
- A16.55 The Competition Act 1998. http://www.legislation.gov.uk/ukpga/1998/41/contents
- A16.56 The Enterprise Act 2002. http://www.legislation.gov.uk/ukpga/2002/40/contents

# **Competition Commission/Office of Fair Trading Documents**

A16.57 Office of Fair Trading, Market Definition – Understanding Competition Law, OFT 403, December 2004. <u>http://www.oft.gov.uk/shared\_oft/business\_leaflets/ca98\_guidelines/oft403.pdf</u>

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A16.58 Cable & Wireless UK supported by Verizon UK Limited v Office of Communications supported by British Telecommunications PLC, Case No: 1112/3/3/09 – September 2010. <u>http://www.catribunal.org.uk/237-4334/1112-3-3-09-Cable--Wireless-UK.html</u>

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A16.59 British Telecommunications plc v Office of Communications supported by Everything Everywhere Limited, Hutchison 3G UK Limited (Case No: 1171/3/3/10) and by Virgin Media Limited, Everything Everywhere Limited, TalkTalk Telecom Group plc and British Sky Broadcasting Limited, (Case No: 1172/3/3/10). http://catribunal.org/files/1171-72\_BT\_Judgment\_030511.pdf

- A16.60 Cable & Wireless UK v Office of Communications (Leased Lines Charge Control), Case number 1112/3/3/09, 20 September 2010. <u>http://www.catribunal.org.uk/237-4334/1112-3-3-09-Cable--Wireless-UK.html</u>
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- A16.71 Commission Staff Working Document, Accompanying document to the Commission Recommendation on Relevant Product and Service Markets within the electronic communications sector susceptible to ex ante regulation in accordance with Directive 2002/21/EC of the European Parliament and of the Council on a common regulatory framework for electronic communications networks and services {(C(2007) 5406)}. http://ec.europa.eu/information\_society/policy/ecomm/doc/library/proposals/sec200 7 1483 final.pdf
- A16.72 Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications networks and services (Framework Directive). <u>http://eur-</u> lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2002:108:0033:0033:EN:PDF
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- A16.101 Ralph Santitoro, Metro Ethernet Services A Technical Overview, 2003. <u>http://metroethernetforum.org/metro-ethernet-services.pdf</u>
- A16.102 MEF Synchronization for Mobile Backhaul December 2010. <u>http://www.ixiacom.com/pdfs/library/white\_papers/MEF-</u> <u>MBH\_Synch\_HaughHirdRam-Draft\_101208\_1725\_1.pdf</u>
- A16.103 Royal Mail Door to Door FAQ. <u>http://www.royalmail.com/marketing-</u> services/campaign-delivery/door-door/faqs#29600259.

# Stakeholder Responses to our Call for Inputs

A16.104 Stakeholder responses are published on the Ofcom website, grouped together by consultation. Due to the large number of responses links to the responses landing

page are provided only (for the full list of respondents to the Call for Inputs, see also Annex 1 of the Consultation).

A16.105 Responses to the Business Connectivity Market Review – Call for Inputs – April 2011. <u>http://stakeholders.ofcom.org.uk/consultations/bcmr-inputs/?showResponses=true&pageNum=1#responses</u>

# Information Requests for the Market Review

- A16.106 We issued a series of notices under section 135 of the Communications Act 2003, requiring various CPs to provide specified information as set out in the Notice. These information requests and the responses received are listed below.
- A16.107 Information request of 23 May 2011 covering specified information about network and network reach, business connectivity retail services, provision of wholesale services to OCPs, purchases of wholesale services from OCPs and internal selfsupply. Information received from:
  - Response from BT Group.
- A16.108 Information request of 23 May 2011 covering specified information about network and network reach, business connectivity retail services, provision of wholesale services to BT and OCPs, purchases of wholesale services from BT and other OCPs. Information received from:
  - Response from AT&T;
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  - Response from Colt Technology Services;
  - Response from Cable and Wireless Worldwide;
  - Response from Easynet Global Services;
  - Response from Exponential-e Limited;
  - Response from Geo Networks Limited;
  - Response from Global Crossing UK Telecommunications Ltd;
  - Response from KCOM Group;
  - Response from Level 3 Communications Limited;
  - Response from MLL Telecom Limited;
  - Response from Neos Networks (Scottish and Southern Energy Limited);
  - Response from Newnet (c/o Timico Limited);
  - Response from Orange Business Services;
  - Response from TalkTalk Group;

- Response from Verizon Global Solutions UK Ltd;
- Response from Virgin Media;
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- A16.109 Information request of 23 May 2011 covering specified information about network and network reach and about leased lines volumes and revenues, in particular about purchases of wholesale services from BT and other CPs and self-supplied circuits used to deliver MNO's mobile network connectivity requirements. Information received from:
  - Response from Everything Everywhere Limited;
  - Response from Vodafone Limited;
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- A16.110 Information request of 10 August 2011 covering specified information related to the identification of the telecommunications markets for retail leased lines, any other forms of retail business connectivity services and associated wholesale services and the assessment of market power within them (In particular information about typical Ethernet purchasing scenarios, the new Openreach Ethernet network and optical spectrum products). Information received from:
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  - Response from AT&T;
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  - Response from Geo Networks Limited;
  - Response from Global Crossing UK Telecommunications Ltd;
  - Response from KCOM Group;
  - Response from Level 3 Communications Limited;
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  - Response from British Telecommunications plc.
- A16.113 Information request of 3 November 2011 covering specified information related to the identification of the telecommunications markets for retail leased lines, any other forms of retail business connectivity services and associated wholesale services and the assessment of market power within them (in particular information on retail traditional interface leased line services at 8Mbit/s and below). Information received from:
  - Response from British Telecommunications plc.
- A16.114 Information request of 22 December 2011 covering specified information related to the identification of the telecommunications markets for retail leased lines, any other forms of retail business connectivity services and associated wholesale services and the assessment of market power within them (in particular information on the equipment costs associated with the provision of new wholesale Ethernet-based leased line services and information on the relative costs of provisioning WDM services ). Information received from:
  - Response from British Telecommunications plc.
- A16.115 Information request of 11 October 2012 covering specified information related to the identification of the telecommunications markets for retail leased lines, any other forms of retail business connectivity services and associated wholesale services and the assessment of market power within them (covering specified information about TOA data). Information received from:
  - Response from British Telecommunications plc
- A16.116 Information request of 7 December 2012 covering specified information related to the identification of the telecommunications markets for retail leased lines, any other forms of retail business connectivity services and associated wholesale services and the assessment of market power within them (covering specified information about EFM data). Information received from:
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## A16.117 [🔀

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## A16.118[🔀

**X**].

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  - Response from BT Openreach.
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A16.124 [**X**].

A16.125 [X].

A16.126 [×].

A16.127 [🔀 ].

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## Annex 17

# Glossary

## Accumulated (HCA) depreciation

Totality of deductions made to the original purchase price of a tangible fixed asset to reflect its cumulative consumption since acquisition.

## Accumulated (CCA) depreciation

Totality of deductions made to the gross replacement cost of a tangible fixed asset to reflect its cumulative consumption since acquisition.

## Alternative interface symmetric broadband origination (AISBO)

A form of symmetric broadband origination service providing symmetric capacity between two sites, generally using an Ethernet IEEE 802.3 interface.

## Anchor pricing

An approach that sets the upper bound for charges of existing services by reference to the cost of providing those services using existing technology. This ensures that the introduction of new technology which is intended to provide a greater range of services does not inappropriately lead to an increase in the cost of the existing services.

#### **Ancillary services**

Services that relate to the core rental services and that are of an ancillary nature but which fall within markets in which BT has been found to have SMP.

#### **Asset lives**

Asset lives of each component are calculated by dividing the GRC by the depreciation charge in the base year assuming straight line depreciation.

## Asset Volume Elasticity (AVE)

The percentage increase in capital costs required for a 1% increase in volume.

## Asymmetric Digital Subscriber Line (ADSL)

A variant of DSL that supports higher bandwidth on downlink transmissions, i.e. from the exchange to the end user than from the end user to the exchange.

#### Asynchronous Transfer Mode (ATM)

A network technology that uses asynchronous time division multiplexing techniques and which supports data transmissions at up to 622Mbit/s.

## **Backhaul Ethernet Services (BES)**

A wholesale Ethernet service which provides high speed, point-to-point data circuits. Each one provides a secure link from a customer's premises, to a Communications Provider's Digital Subscriber Line Access Multiplexer and the Communications Provider's site.

#### Bandwidth

In digital telecommunications systems, the rate measured in bits per second (bit/s), at which information can be transferred.

## **Base-station Controller (BSC)**

An element of a mobile telephone network that controls a number of Radio Base Stations.

## Bulk Transport Link (BTL)

A BT wholesale Ethernet product which provides high capacity, resilient solution for the delivery of multiple Openreach services from an Openreach Handover Point (OHP) to a Communications Provider's site not located in a BT Local Exchange.

## **Capital expenditure**

Spending on assets that have physical substance and are held for use in the production or supply of goods or services, for rental to others, or for administrative purposes on a continuing basis in an entity's activities.

## **Compound Annual Growth Rate (CAGR)**

The year-on-year smoothed annualised growth rate of an investment. It can be calculated as

follows: CAGR =  $\left(\frac{Ending Value}{Beginning Value}\right)^{\left(\frac{1}{number of years}\right)} - 1$ 

## **Cost Volume Elasticity (CVE)**

The percentage increase in operating costs for a 1% increase in volume.

## **Consumer price index (CPI)**

The consumer price index (CPI) is a measure of inflation. It measures changes in the price level of consumer goods and services purchased by households. The most significant item excluded in the CPI, but included in the RPI, is mortgage interest rate payments.

## **Current Cost Accounting (CCA)**

An accounting convention, where assets are valued and depreciated according to their current replacement cost whilst maintaining the operating or financial capital of the business entity.

## **Customer Premises Equipment (CPE)**

Sometimes referred to as customer apparatus or consumer equipment, being equipment on consumers' premises which is not part of the public telecommunications network and which is directly or indirectly attached to it.

## **Customer Sited Handover (CSH)**

An interconnection between BT and another communications provider where the BT handover circuit terminates at the communications provider's premises.

## Cost Volume Relationship (CVR)

The relationship of how cost and volumes move in relation to one another.

## **Digital Local Exchange (DLE)**

The telephone exchange to which customers are connected, usually via a concentrator.

## Distributed long run incremental cost (DLRIC)

The LRIC of the individual service with a share of costs which are common to other services over BT's core network.

## **Digital Main Switching Unit (DMSU)**

The main type of tandem switch, primarily used for conveying long distance calls. DMSUs form the backbone of the trunk network.

## **Digital Private Circuit Network (DPCN)**

The BT Wholesale sub 2Mbit/s aggregation and cross-connect network.

## Distributed stand alone cost (DSAC)

An accounting approach estimated by adding to the DLRIC a proportionate share of the inter-increment common costs. Rather than all common costs shared by a service being allocated to the service under consideration, the common costs are instead allocated amongst all the services that share the network increment.

## **Digital Subscriber Line (DSL)**

A family of technologies generically referred to as DSL or xDSL that enable ordinary copper telephone lines to transmit broadband signals. ADSL (Asymmetric Digital Subscriber Line), HDSL (High bit rate Digital Subscriber Line) and VDSL (Very high data rate Digital Subscriber Line) are all variants of xDSL.

#### Equi-proportional Mark-Up (EPMU)

The application of the same percentage mark-up to the incremental costs of two or more services.

#### Ethernet

A packet-based technology originally developed for and still widely used in Local Area Networks. Ethernet networking protocols are defined in IEEE 802.3 and published by the Institute of Electrical and Electronic Engineers. Developments of this technology known as Metro Ethernet or Carrier Ethernet are now being used in communications providers' networks to provide leased line and backhaul services.

#### **Ethernet Access Direct (EAD)**

A wholesale Ethernet product which offers permanently connected, point-to-point high speed data circuits that provide a secure and un-contended access service for Communications Providers. EAD is a next generation network compatible service designed to complement Openreach's Ethernet Backhaul Direct (EBD) and Bulk Transport Link (BTL) products already offered within the Connectivity Services portfolio.

#### Ethernet Backhaul Direct (EBD)

A wholesale Ethernet product which offers permanently connected, point-to-point high speed data circuits that provide a secure and un-contended backhaul service for Communications Providers.

## **Excess Construction Charges (ECC)**

A charge levied by BT where additional construction of duct and fibre or copper is required to provide service to a customer premise.

#### Ethernet in the First Mile (EFM)

A network technology for the delivery of Ethernet services over access networks. Although the technology also encompasses fibre access networks, in common usage EFM refers to the provision of Ethernet services over copper access networks.

#### Fully allocated cost (FAC)

An accounting approach under which all the costs of the company are distributed between its various products and services. The fully allocated cost of a product or service may therefore include some common costs that are not directly attributable to the service.

#### Financial capability maintenance (FCM)

The maintenance of an entity's financial capability (i.e. the amount of the shareholders' equity interest) when determining the profitability of an entity.

## **Frame Relay**

A packet-based technology used to connect several Local Area Networks.

## Fibre-to-the-Cabinet (FTTC)

An access network structure in which the optical fibre

extends from the exchange to the cabinet. The street cabinet is usually located only a few hundred metres from the subscriber's premises. The remaining part of the access network from the cabinet to the customer is usually copper wire but could use another technology, such as wireless.

## Fibre-to-the-Premises (FTTP)

An access network structure in which the optical fibre network runs from the local exchange to the end user's house or business premise. The optical fibre may be point-to-point – there is one dedicated fibre connection for each home – or may use a shared infrastructure such as a GPON. Sometimes also referred to as Fibre To The Home (FTTH).

## Gbit/s

Gigabits per second (1 Gigabit = 1,000,000,000 bits) A measure of bandwidth in a digital system.

#### **General Building Cost Index (GBCI)**

A national index that measures the costs of construction work including materials and labour.

#### **Gigabit Passive Optical Network (GPON)**

A shared fibre network architecture that can be used for NGA.

## **Gross Replacement Cost (GRC)**

The cost of replacing an existing tangible fixed asset with an identical or substantially similar new asset having a similar production or service capacity.

#### HCA (historical cost accounting) depreciation

The measure of the cost in terms of its original purchase price of the economic benefits of tangible fixed assets that have been consumed during a period. Consumption includes the wearing out, using up or other reduction in the useful economic life of a tangible fixed asset whether arising from use, effluxion of time or obsolescence through either changes in technology or demand for the goods and services produced by the asset.

#### In Building Handover (IBH)

BT provides a POC at collocation space rented by a CP in a BT local exchange

#### In Span Handover (ISH)

An interconnection between BT and another communications provider where the BT handover circuit terminates at a point between BT's premises and the communications provider's premises.

#### Internet Protocol (IP)

A network technology used in packed-switched networks to route packets across network nodes.

#### kbit/s

Kilobits per second (1 kilobit = 1,000 bits) A measure of bandwidth in a digital system.

#### Leased line

A permanently connected communications link between two premises dedicated to the customers' exclusive use.

#### Local Area Network (LAN)

A network typically linking a number of computers together within a business premise, enabling intercommunication between users and access to email, internet and intranet applications.

## Local loop

The access network connection between the customer's premises and the local serving exchange, usually comprised of two copper wires twisted together

## Local Loop Unbundling (LLU) backhaul circuit

A circuit provided by BT that enables the connection of a communications provider's DSLAM to a communications provider's point of connection with BT's SDH network.

#### Long Run Incremental Cost (LRIC)

The cost caused by the provision of a defined increment of output given that costs can, if necessary, be varied and that some level of output is already produced.

#### Local Serving Exchange (LSE)

A building which houses electronic equipment that connects telephone calls. Backhaul links from a CP are terminated here to connect internet access links to end user premises.

#### Multiple Interface Symmetric Broadband Origination (MISBO)

Multiple interface leased line either operating at speeds > 1Gbits/s or delivered with WDM equipment at the end-user's premises.

#### Modern equivalent asset (MEA)

The approach to set charges by basing costs and asset values on what is believed to be the most efficient available technology that performs the same function as the current technology.

#### Mean capital employed (MCE)

The mean value of the assets that contribute to a company's ability to generate revenues.

## Mobile switching Centre (MSC)

A component of a mobile telephone network that switches voice calls between mobile users.

## Multi Protocol Label Switching (MPLS)

A packet-based technology that uses label switching techniques in order to improve and prioritise the routing of packets between network nodes. MPLS is commonly deployed in VPN and NGN core applications.

## Multiple Service Access Node (MSAN)

A network access device associated with an IP-based core network that provides network interfaces for telephony, broadband and other services. MSANs are typically installed in a telephone exchange or a roadside cabinet.

#### Mbit/s

Megabits per second (1 Megabit = 1 million bits). A measure of bandwidth in a digital system.

#### Net current assets (NCA)

Total current assets less current liabilities.

#### Next generation access (NGA)

A new or updgraded access network capable of supporting much high capacity broadband services than traditional copper access networks. Generally an access network that employs optical fibre cable in whole or in part.

## Next Generation Network (NGN)

An IP based multi-service network capable of providing voice telephony, broadband and other services.

## Net replacement cost (NRC)

Gross replacement cost less accumulated depreciation based on gross replacement cost. An alternative is *Depreciated replacement cost* (of tangible fixed assets other than property:-The cost of replacing an existing tangible fixed asset with an identical or substantially similar new asset having a similar production or service capacity, from which appropriate deductions are made to reflect the value attributable to the remaining portion of the total useful economic life of the asset and the residual value at the end of the asset's useful economic life.

## **Operating capability maintenance (OCM depreciation)**

The maintenance of an entity's operational capability (i.e. the capacity to produce goods and services) when determining the profitability of an entity. OCM depreciation is calculated as the sum of CCA depreciation and HCA depreciation.

#### **Operating expenditure**

Costs reflected in the profit and loss account excluding depreciation financing costs such as interest charges.

## **Openreach Network Backhaul Services (ONBS)**

Openreach Network Backhaul Service offers connectivity between a Communications Providers equipment installed within Co-location, Netlocate or BT Locate at a BT MSAN Site, and their equipment installed within Co-location, Netlocate or BT Locate at either the nearest BT MSAN Site, BT Metro Node Site or another BT MSAN Site or Metro Node Site which is within a distance of 15 radial kilometres of the first BT MSAN/Metro Site.

#### Partial Private Circuit (PPC)

A generic term used to describe a category of private circuits that terminate at a point of connection between two communications providers' networks. It is therefore the provision of transparent transmission capacity between a customer's premises and a point of connection between the two communications providers' networks. It may also be termed a part leased line.

#### Plesiochronous Digital Hierarchy (PDH)

An older digital transmission technology that uses Time Division Multiplexing. Although PDH systems are is still in widespread use, they are being replaced by SDH and increasingly Ethernet services.

## **Points of Connection (POC)**

A point where one communications provider interconnects with another communications provider for the purposes of connecting their networks to 3rd party customers in order to provide services to those end customers

## Point of Handover (POH)

A point where one communications provider interconnects with another communications provider for the purposes of connecting their networks to 3rd party customers in order to provide services to those end customers.

#### **Passive Optical Network (PON)**

A particular configuration of fibre-optic network that brings optical fibre cabling and signals all or most of the way to the end user

#### Public Switched Telephone Network (PSTN)

A telecommunications network that uses circuit switched technology to provide voice telephony services.

#### Radio Base Station (RBS) backhaul circuit

A circuit provided by BT that connects a mobile communications provider's base-station to the mobile communications provider's mobile switching centre.

#### **RAV model**

This model calculates the forecast asset values, depreciation and holding gains for Access Copper and Duct. The model also applies a regulatory adjustment (RAV adjustment) previously applied by Ofcom.

#### Regulatory asset value (RAV)

The value ascribed by Ofcom to an asset or capital employed in the relevant licensed business.

#### **Regulatory financial statements (RFS)**

The financial statements that BT is required by Ofcom to prepare, have audited and publish.

#### Return on capital employed (ROCE)

The ratio of accounting profit to capital employed. The measure of capital employed can be either Historic Cost Accounting (HCA) or Current Cost Accounting (CCA).

#### **Retail price index (RPI)**

A measure of inflation published monthly by the Office for National Statistics. It measures the change in the cost of a basket of retail goods and services.

#### Service Level Agreement (SLA)

A contract between a network service provider and a customer that specifies, usually in measurable terms, what services the network service provider will furnish.

#### Service Level Guarantee (SLG)

A contractual agreement specifying the compensation payable if the service provider fails to deliver the agreed service performance.

#### Stand Alone Cost (SAC)

An accounting approach under which the total cost incurred in providing a product is allocated to that product.

#### Storage Area Network (SAN)

A high bandwidth special-purpose network that connects different kinds of data storage devices with associated data servers on behalf of a larger network of users.

#### Supplementary depreciation

The additional depreciation charge to convert an HCA depreciation charge into a CCA depreciation charge.

#### SSNIP

Small but Significant Non-transitory Increase in Price, usually considered to be 5 to 10 per cent, which is part of the hypothetical monopolist test used in market definition analysis.

## Synchronous Digital Hierarchy (SDH)

A digital transmission standard that is widely used in communications networks and for leased lines.

## Symmetric broadband origination (SBO)

A symmetric broadband origination service provides symmetric capacity from a customer's premises to an appropriate point of aggregation, generally referred to as a node, in the network hierarchy. In this context, a "customer" refers to any public electronic communications network provider or end-user.

## Symmetric Digital Subscriber Line (SDSL)

A DSL variant that allows broadband signals to be transmitted at the same rate from end user to exchange as from exchange to end user.

#### Tier 1

A tier in BT's SDH network that denotes a network of nodes covering areas of high population. These nodes are connected by very high capacity line systems and denote the BT trunk network.

#### Traditional interface symmetric broadband origination (TISBO)

A form of symmetric broadband origination service providing symmetric capacity from a customer's premises to an appropriate point of aggregation in the network hierarchy, using a ITU G.703 interface.

#### Time Division Multiplexing (TDM)

A method of combining multiple data streams for transmission over a shared channelby means of time-sharing. The multiplexor shares the channel by repeatedly allowing each data stream in turn to transmit data for a short period. PDH and SDH are examples of systems that employ TDM.

## Voice over IP (VoIP)

A generic term used to describe telephony services provided over IP networks.

## Virtual Private Network (VPN)

A technology allowing users to make inter-site connections over a public telecommunications network that is software partitioned to emulate the service offered by a physically distinct private network.

#### Wave Division Multiplex (WDM)

An optical frequency division multiplexing transmission technology that enables multiple high capacity circuits, to share an optical fibre pair by modulating each on a different optical wavelength.

## Weighted average cost of capital (WACC)

The rate that a company is expected to pay on average to all its security holders to finance its assets.

#### Wide Area Network (WAN)

A geographically dispersed telecommunications network, typically a corporate network linking multiple sites at different locations.

## Wholesale Extension Service (WES)

A BT wholesale Ethernet product that can be used to link a customer premise to a node in a communications network.

## Wholesale end-to-end service (WEES)

A BT wholesale Ethernet product that can be used to provide a point-to-point connection between two customer's sites.

## 21st Century Network (21CN)

BT's next generation network upgrade.