Business Connectivity Market Review

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

Annexes

Redacted for publication ✂

Statement

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Annex 1

List of respondents to our consultations

Domestic consultation

A1.1 On 21 April 2011, we published a Call for Inputs (CFI) to gather stakeholders' views on the key issues for our review before starting our substantive analysis of competitive conditions in leased lines markets, specifically inviting views on matters such as market definition, SMP assessment and remedies.[1] The closing date for responses was 1 June 2011 and the following stakeholders responded in writing:

- BT;
- Cable and Wireless Worldwide (C&WW);
- Communications Management Association (CMA);
- Ericsson Ltd;
- Everything Everywhere Ltd (EE) and Mobile Broadband Network Ltd[2] (MBNL);
- Fujitsu;
- Geo Networks Ltd (Geo);
- Independent Networks Cooperative Association (INCA);
- KCOM Group plc (KCOM);
- Telefónica UK Ltd (trading as O2);
- Sky;
- Scottish and Southern Energy plc (SSE);
- TalkTalk;
- Hutchison 3G UK Limited (trading as Three);
- UK Competitive Telecommunications Association (UKCTA);
- Verizon Business (Verizon).

A1.2 On 18 June 2012, we published our second and main consultation document (the June BCMR Consultation) for our Business Connectivity Market Review setting out our proposals for market definitions, market power determinations and remedies.[3] The closing date for responses was 24 August 2012.

[1] http://stakeholders.ofcom.org.uk/consultations/bcmr-inputs/

[2] MBNL is a joint venture between EE and Hutchison 3G UK Limited (Three).

[3] http://stakeholders.ofcom.org.uk/consultations/business-connectivity-mr/

A1.3 On 5 July 2012, we published our third consultation document (the LLCC Consultation) setting out our detailed proposals for a new charge control framework for certain leased lines services.[4] The closing date for responses was 30 August 2012.

A1.4 We received 21 written responses to the June BCMR Consultation (all of the respondents listed below) and 14 written responses (respondents marked by "*" below) to the LLCC Consultation, from the following stakeholders:

- BT(*);
- C&WW (*);
- Colt (*);
- EE and MBNL (*);
- Exponential-e (*);
- Geo;
- KCOM;
- Level 3 (*);
- National Education Network;
- Sky (*);
- SSE;
- TalkTalk (*);
- Telefónica (*);
- Telephony Services Limited (*);
- UK Competitive Telecommunications Association (UKCTA) (*);
- Verizon (*);
- Virgin Media (*);
- Vodafone (*);
- Vtesse;
- Zen Internet; and
- One other communications provider who asked us not to publish its name.

[4] http://stakeholders.ofcom.org.uk/consultations/llcc-2012/?a=0

A1.5 Where respondents provided non-confidential versions of their responses, we have published them on our website.[5]

A1.6 On 15 November 2012, we published our fourth consultation (the November BCMR Consultation) setting out further specific proposals in connection with our review of leased lines markets for our Business Connectivity Market Review.[6] The closing date for responses was 17 December 2012. The following stakeholders provided responses to the consultation:

- BT;
- C&WW;
- Easynet;
- EE;
- Geo;
- Level 3;
- Sky;
- TalkTalk;
- Verizon; and
- Virgin Media.

A1.7 Where respondents provided non-confidential versions of their responses, we have published them on our website.[7]

EU consultation

A1.8 On 21 February 2013, we notified our proposals for EU consultation in our Draft Statement for the Business Connectivity Market Review, inviting comments from the European Commission, BEREC and national regulatory authorities of other Member States.[8] We subsequently identified an error in relation to the Ethernet charge control, and we notified the European Commission of this amendment to our Draft Statement.[9] We discuss comments received from the European Commission in Annex 4.

[5] http://stakeholders.ofcom.org.uk/consultations/business-connectivity-mr/?showResponses=true&pageNum=1#responses

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

[6] http://stakeholders.ofcom.org.uk/consultations/bcmr-reconsultation/

[7] http://stakeholders.ofcom.org.uk/consultations/bcmr-reconsultation/?showResponses=true

[8] http://stakeholders.ofcom.org.uk/consultations/business-connectivity-mr/statement

[9] On 19 March 2013, we published on our website an update to our Draft Statement about this amendment to bring it to the attention of our stakeholders:

http://stakeholders.ofcom.org.uk/binaries/consultations/business-connectivity/BCMR-update-Feb2013.pdf

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 this Statement, including the legal instruments 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 16 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)[10]. 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[11] are contained in a package of five EC Directives, of which two Directives are immediately relevant for present 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.

[10] http://www.legislation.gov.uk/ukpga/2003/21/contents

[11] The Directives were subsequently amended on 19 December 2009. The amendments have been transposed into the national legislation and applied with effect from 26 May 2011 and any references in this Statement to the Act should be read accordingly.

A2.6 Each market review normally involves three analytical 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[12], 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[13] and SMP Guidelines[14] 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[15] (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

[12] 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.

[13] 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.

[14] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2002:165:0006:0031:EN:PDF

[15] 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 relevant parts of this Statement.[16]

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. We further discuss our approach to market definition in Annex 3.

A2.15 While competition law 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 analyses carried out for the purpose of this Business Connectivity Market Review, including the markets we have identified, are without prejudice to any analysis that may be carried out in relation to any investigation pursuant to the Competition Act 1998[17] (relating to the application of the Chapter I or II prohibitions or Article 101 or 102 of the EC Treaty[18]) or the Enterprise Act 2002.[19]

Market analysis procedure

Effective competition

A2.16 Ofcom may, at such intervals as we consider appropriate, carry out market analyses of identified markets for the purpose of making or reviewing market power determinations. However, section 84A of the Act imposes obligations on Ofcom to carry out market reviews within specific timings set out in that section.

[16] See, in particular, 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 for which we have concluded are markets in which ex ante regulation is warranted.

[17] http://www.legislation.gov.uk/ukpga/1998/41/contents

[18] Previously Article 81 and Article 82 of the EC Treaty, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2010:083:FULL:EN:PDF

[19] http://www.legislation.gov.uk/ukpga/2002/40/contents

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 27th 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. In essence, it means that Ofcom needs to determine whether any undertaking in the relevant market is in a position of economic strength affording it the power to behave to an appreciable extent independently of competitors, customers and ultimately consumers. 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 (or promote) effective competition, as it prohibits the abuse of dominance rather than the holding of a dominant position itself. 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 normally 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 SMP obligation, we explain in this Statement 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[20] that would make the network access unnecessary, the investment of the network operator who is required to provide access[21] and the need to secure effective competition[22] 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 in the relevant parts of this Statement. 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.

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 doing so, 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. For the purpose of the Business Connectivity Market Review, we consider that a number of such considerations are relevant, in particular:

- 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 doing so, we have taken account of all relevant considerations, including responses we received during our consultation process, in reaching our conclusions.

[20] Including the viability of other network access products, whether provided by the dominant provider or another person.

[21] Taking account of any public investment made.

[22] 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 of the Act 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[23]), 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.

[23] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:61995CJ0073:EN:PDF

A2.40 To secure that aim, we apply the SMP conditions to the person in relation to which we have made the market power determination in question by reference to the so-called 'Dominant Provider', which we define as "[*X plc*], whose registered company number is [*000*] and any [*X plc*] subsidiary or holding company, or any subsidiary of that holding company, all as defined in section 1159 of the Companies Act 2006".

Annex 3

Approach to market definition

A3.1 This Annex supplements our analyses that identify relevant leased lines markets in relevant parts 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.[24]

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 analyses and conclusions. For a fuller explanation of the principles themselves, stakeholders will find a useful summary of them in the SMP Guidelines themselves.

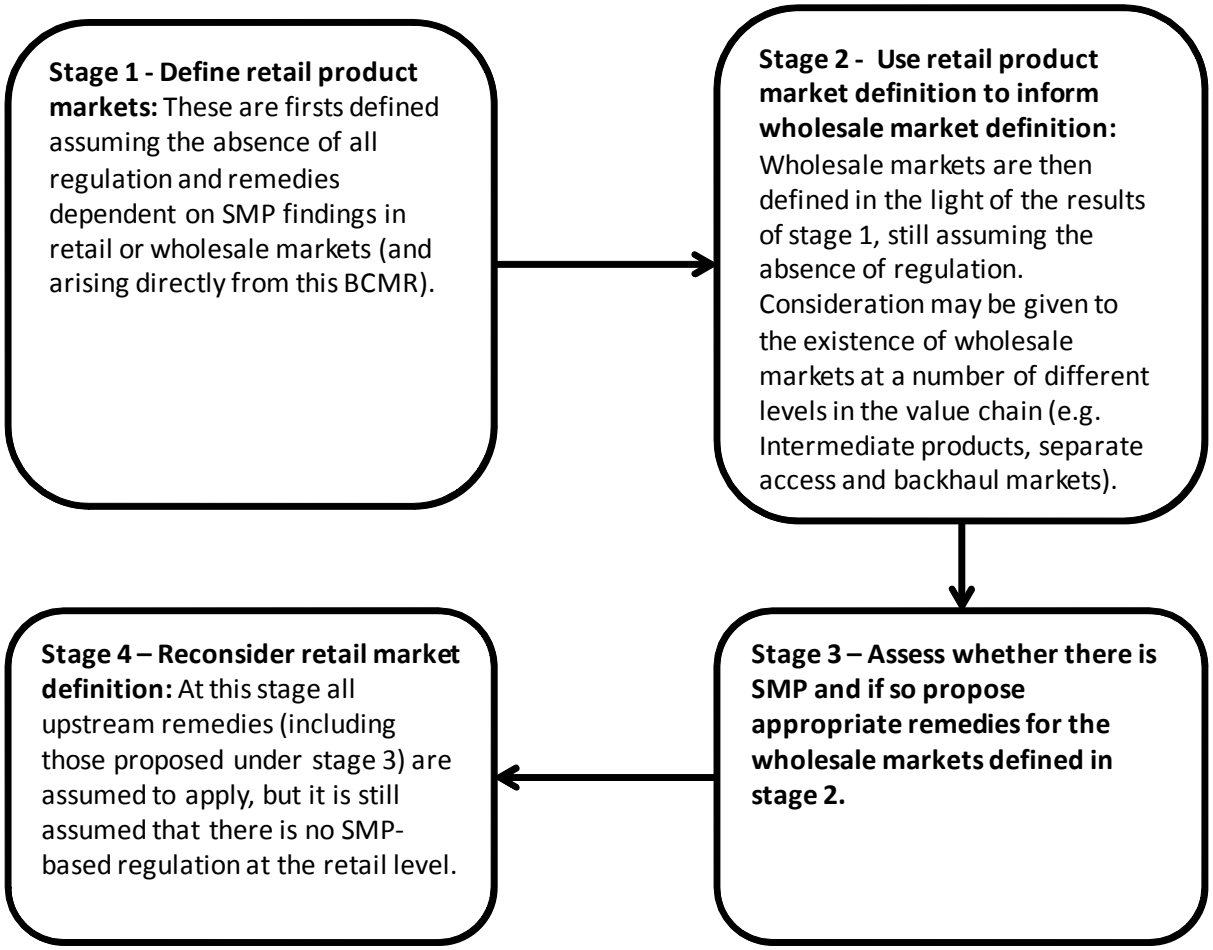
A3.6 While we describe below our analytical approach to market definition, it should be borne in mind that this is not a mechanical or abstract process. The approach is a dynamic one based on our overall understanding of the leased lines markets taking account of available evidence of past behaviour 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

[24] 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.[25] Figure 71 below sets out the sequences of our market definition analysis.

Figure 71: Sequencing of market definition analysis



[25] See Recital 4 of the EC's Recommendation and sections 2.1 and 4 of the Explanatory Note to the EC's Recommendation.

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 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.[26]

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.[27] 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.[28]

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[29] 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

[26] See, in this respect, Recital 4 of the EC's Recommendation states "[h]aving defined retail markets, it is then appropriate to identify *relevant* wholesale markets" (emphasis added). See also the Explanatory Note to the EC's Recommendation (Section 2.1) and the SMP Guidelines (paragraph 44).

[27] The so-called modified Greenfield approach. See also Section 2.5 of the Explanatory Note to the EC's Recommendation.

[28] 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.

[29] 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.

regulation in wholesale markets, Stage 1 is therefore conducted under a hypothetical scenario[30] 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,[31] 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 KCOM for the Hull area) 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 KCOM for the Hull area) 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.[32]

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. 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.

[30] This is consistent with the EC's Recommendation (see Recital 4).

[31] See our assessment of supply-side substitutability below.

[32] See Recital 15 of the EC's Recommendation.

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[33], 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.[34] To identify the product market boundaries in this review, we consider the following[35]:

- 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 demand-side 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.[36]

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.

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

[33] 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.

[34] See, for example, paragraph 38 of the SMP Guidelines.

[35] 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 is whether there exist operators with SMP (see paragraph 38 of the SMP Guidelines).

[36] Consistent with the SMP Guidelines (see paragraph 40).

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.[37] This presumption applies both to unregulated prices and also to regulated, cost-based prices.[38]

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, but it can also be used in the product 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.

[37] See paragraph 42.

[38] 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.

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 2007/8 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. As noted above, the potential impact of expansion of such operators can be taken into account in the assessment of market power.

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[39], 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. self-supplying 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 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

[39] 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.

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.[40]

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 Where operators have existing physical network but are not currently active in the supply of demand side substitutable services, we look at the potential for supply side substitution at the market definition stage. In most other instances we do not consider supply-side substitution would provide a sufficient competitive constraint on the price setting behaviour of operators. Hence we generally do not find it relevant for defining leased lines product markets.

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

[40] As described in Section 5, 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[41]. 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.[42]

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.[43] 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

[41] 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.

[42] 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. See also, in this respect, the ERG Common Position (Section 2).

[43] ERG Common Position on Geographic Aspects of Market Analysis (definition and remedies), October 2008.

distance to purchase a product (i.e. a consumer purchasing products in one city 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."[44]

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 2007/8 Review.

[44] 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[45]. 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.[46]

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.[47] 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.[48]

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

[45] We discuss data centres in Annex 6.

[46] This is consistent with the ERG Common Position (see section 2).

[47] 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.

[48] This is consistent with the ERG Common Position (see section 2).

consider chains of substitution are of limited relevance for defining the geographic scope of leased lines markets.

Common pricing constraints

A3.55 In the June BCMR Consultation, we looked at pricing and price differences in both the wholesale and retail geographic market definition. However, in light of our subsequent market analysis, and having considered consultation responses, we have concluded this criterion is not particularly informative in identifying geographic variations in competitive conditions of the relevant product markets, such that its application is not warranted (see further discussion at paragraphs 5.206 to 5.211).

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.[49]

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 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 on operators and NRAs[50] with regard to data delivery and analysis is reasonable[51].

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[52]. It states that:

> "market definition should be based on the actual conditions of competition, reflected by the behaviour of the market players (e.g. pricing) and the effect of their behaviour on market structure (e.g.

[49] See Section 2.

[50] National regulatory authorities (such as Ofcom in the UK).

[51] See Section 2 of the Executive Summary.

[52] 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).

> 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".[53]

A3.60 The most important criteria identified by the ERG Common Position are:

- barriers to entry;
- number of suppliers;
- distribution of market shares[54]; 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.[55]

A3.62 As set out in detail in Section 5 concerning geographic market definition, the criteria we apply cumulatively to define the geographic scope of the wholesale markets are:

- number of suppliers; and
- distribution of service shares.

A3.63 The criteria we apply cumulatively to define the geographic scope of the retail product markets (i.e. those retail markets for which we identify ex ante regulation may be warranted) are:

- distribution of service shares; and
- the nature of demand, in particular the extent to which consumers source their retail leased lines services from multiple suppliers.[56]

A3.64 We assess barriers to entry[57] when we define the geographic scope of the wholesale markets as part of the application of the number of suppliers' criterion[58]. 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 its 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

[53] See Section 4.1.

[54] 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.

[55] See Section 4.2.

[56] This is consistent with the ERG Common Position (see Sections 2 and 4).

[57] 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).

[58] We do this by assessing the impact of operators' alternative infrastructure.

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.[59]

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 are likely to be lowest (as it captures areas where OCPs already have network infrastructure), 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.[60]

[59] See our resulting wholesale market definition conclusions which include identifying the London area, referred to as the WECLA (Western, Eastern and Central London Area), as a separate geographic market.

[60] See Section 5 of this Statement.

Annex 4

EU consultation

Introduction

A4.1 The measures we have adopted in this Statement have been subject to both a domestic consultation process and then an EU consultation process.

A4.2 We have explained in the main body of this Statement that we have taken due account of all applicable guidelines and recommendations issued by the European Commission and BEREC relating to market identification and analysis, including SMP assessment and remedies, as relevant to our measures. In exercising our discretion as the national regulatory authority for the UK in light of such guidelines and recommendations, the EU consultation then plays a further important role in the development of consistent regulatory practices and the consistent application of the regulatory framework in order to contribute effectively to the development and completion of the internal market.

A4.3 As our domestic consultation is conducted prior to the EU consultation, it also has the benefit of allowing the views of domestic respondents to be addressed and reflected for consideration in the EU consultation. We must take utmost account of any comments received from the European Commission, BEREC and other national regulatory authorities but we may then proceed to adopt our measures, except where our draft measure would, in the Commission's view, create a barrier to the single market or if it has serious doubts as to its compatibility with Community law. In those exceptional cases, further procedures apply depending on whether the concerns relate to market identification or SMP findings, or remedies.

A4.4 As already noted in Annex 1, we notified on 21 February 2013 our proposals for EU consultation in our Draft Statement for the Business Connectivity Market Review, inviting comments from the European Commission, BEREC and national regulatory authorities of other Member States.

Comments by the European Commission

A4.5 On 21 March 2013, we received from the European Commission its comments in its Decision letter concerning Case UK/2013/1428 in respect of our notified proposals. We received no other response from the EU consultation.

A4.6 The European Commission has not raised any concerns about our measures, but it has made two comments.

A4.7 First, the European Commission notes our analysis and the data we have provided, which it says appear to indicate a necessity to continue regulation in the relevant retail markets for a limited period. Specifically, the Commission recognises our arguments for maintaining retail regulation, in particular with regard to the specific needs of certain captive customers who provide key services and who are currently still in the process of migrating from the regulated retail product to different services. However, the Commission requests that we monitor the evolution of this migration closely and to withdraw retail regulation as soon as migration has occurred to a sufficient degree, which would render continued retail regulation obsolete.

A4.8 We appreciate the Commission's comments in that regard. As we explained in our notified Draft Statement[61], we are conscious that the markets under review are changing quite rapidly, and we will therefore continue to keep developments under review. As part of this, we recognise (as the Commission suggests) that there is a need also to closely monitor the effects of the migration that is expected to occur.

A4.9 The European Commission's second comment relates to a specific aspect in relation to our SMP assessment of the prospects for competition over the course of the three year review period as one of several criteria that we have applied in reaching the view that BT has SMP in the market for AISBO in the WECLA+. While the European Commission has not raised any concerns about our finding, it requests that we strengthen in this Statement our reasons for finding SMP in this market in light of our view that this market is likely to show prospective competition in the medium- to long-term future.

A4.10 We address that comment by clarifying our reasoning in relevant parts of Section 7 of this Statement.

[61] See footnote 32 to paragraph 2.49 of the Draft Statement.

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 our analyses for the purpose of this Business Connectivity Market Review, including the geographic analyses which underpins our geographic market definitions. This Annex contains three subsections. The first deals with estimating service shares in symmetric broadband origination (SBO) 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 views 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 further set out and explain our methodology, assumptions and analysis in more detail in this Annex.

Service share methodology used in symmetric broadband origination markets

A5.4 As noted above, this subsection explains how we have calculated service shares in the wholesale markets for SBO services and (where relevant) in retail leased line markets. The general principle is that we wish to measure the proportion that each CP supplies of quantities sold 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 As already discussed in this Statement, 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 SBO services are the furthest upstream active services in the business connectivity value chain. Therefore, in measuring the supply of these wholesale services, we only include services provided by CPs using independent physical (passive) network infrastructure.[62]

A5.8 In addition, in our analysis of SBO 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 effectively in wholesale SBO 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 SBO 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 from another supplier.

Distinguishing between wholesale supply using the CP's 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.[63] However, CPs do not generally directly record whether their sales of leased lines use infrastructure that they provide themselves or infrastructure that they have purchased from another CP. Therefore, we estimate genuine wholesale supply using the data which have been recorded.

A5.12 We do this by taking the sum of all wholesale and retail sales made by a CP to retail customers or other CPs (external sales), which will include resold services, and subtracting from this total the CP's wholesale purchases of leased lines from other

[62] 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).

[63] Active services which are resold can and do exert competitive pressure in downstream retail markets, and we therefore measure this supply when calculating the retail market shares.

CPs. Specifically, for each CP and in each postcode sector[64], we perform the following calculation to measure wholesale supply:

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

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^2B, and provides details of this wholesale purchase in the data supplied to Ofcom. Our methodology will then subtract one circuit end from the CP's sales in the postcode sector in which site B resides. The result is the correct wholesale supply volume 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^2B 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 where we calculate BT's supply from internal supply data from Openreach, rather than from the external sales data from BT's downstream divisions.[65] This is the case for 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 A5.12 above applies.

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

[64] As explained in Section 6, the postcode sector is the building block from which local geographic markets are constructed.

[65] 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.

Classifying circuit ends – distinguishing between "customer ends" and "network ends"

A5.17 Consistent with the approach taken in the 2007/8 Review, we use circuit ends as the unit of supply.[66] 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. This is because, for SBO services which link a customer site to a CP's network, the location of the customer premises is a key determinant of the choice of leased line supplier to that premise.

A5.18 Given this classification of circuit ends, 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 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^1 and N^2. 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^1, N^1N^2 and N^2B. 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.[67] However, in those instances where the CPs provided details from a network inventory, or where sales included internally supplied circuits,[68] 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[69] 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^1, N^1N^2 and N^2B 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. One issue with this solution is the practical problem of identifying network sites. This is discussed in detail below.

[66] 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.

[67] Unless the external customer actually bought the component circuits separately.

[68] Internally supplied circuits are those supplied between different divisions of the same company. For example, Openreach supplies circuits to BT's downstream divisions.

[69] Adopted in both this review and the 2007/8 Review.

Counting circuits within market boundaries

A5.22 The SBO 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 needs 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. 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.

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

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

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 networks 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.

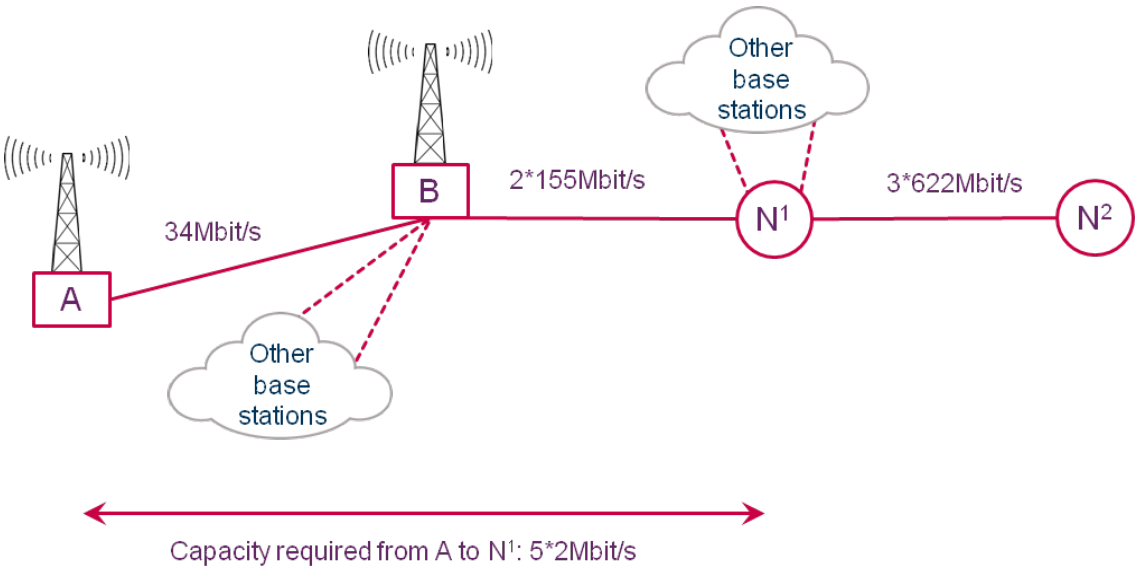
A5.25 Consider the hypothetical example of MNO connectivity presented in the figure A5.3 below. The radio base station at A generates traffic (voice and data) which must be carried back to the core network site at N^1 (e.g. an MSC). This traffic generates a requirement for 10Mbit/s of capacity between A and N^2. The product that is supplied to the MNO is in the form of 5*2Mbit/s circuits between A and N^1. 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^1, and so on;
- In terms of the end-to-end capacity requirement - i.e. 5*2Mbit/s circuits from A to N^1; 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^1.

Figure A5.3 **Hypothetical example of MNO connectivity**



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-to-end 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.[70]

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 imply the CP had recorded the same sale more than once.[71]

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:

- WDM. 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.

- Ethernet. 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,[72] we will record the bandwidth of the underlying circuit.

- SDH. 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 are 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

[70] 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.

[71] 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.

[72] This refers to services where the bandwidth has been limited by the supplier to something less than the full capability of the underlying technology.

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 the 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 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 1000Mbit/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:

i) We now want to include the supply of services which are resold. Therefore, even where CPs 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[73] 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 omitted from the total market supply.

iii) Many wholesale SBO 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 subsection explained the principles and theory behind our service share estimates. This subsection 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

[73] This includes both wholesale and retail, since some retail services are supplied to CPs.

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, our experience from the 2007/8 Review and information gathered during this review. Our requests 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 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 Our information request was unavoidably complex, and we followed up the request with a number of meetings and calls with each of the CPs to ensure we would and had received the correct data. Following various discussions with us, 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, we 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 required 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 subsection explains the various steps taken, and highlights the areas where we have had to exercise our judgement.

A5.42 Following the June BCMR Consultation, we designed a new set of tools to process the raw data. This improvement reduced the extent of discrepancies in the treatment of the data, and it has allowed us 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:

Figure A5.4 **Bandwidth assumptions for ‘N*’ services**

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

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 service 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.[74] 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:

[74] There is much greater variety in the product descriptions, resulting in a lookup table with over 2,700 entries.

- bandwidths in multiples of 10Mbit/s are likely to be Ethernet, and are therefore treated as AI;
- all bandwidths over 1,000Mbit/s are classified as MI, 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 bandwidths will most likely be handed over to the customer via an Ethernet interface.[75] 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.

Figure A5.5 **How interface type was classified**

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%

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.

[75] IEEE802.3 Ethernet standards define interfaces at 10, 100, 1000, 10000 Mbit/s and higher bandwidths.

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

CP	Interface allocation
CWW	TI
COLT	AI
Exponential-e	AI
Global Crossing	TI
KCOM	TI
Neos	AI
Orange Business Services	TI
Verizon	AI
Virgin Media	AI

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 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.[76]

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 [✂ ✂] 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.

[76] 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.

Identifying network and customer sites

A5.57 As explained above, our counting methodology distinguishes between circuit ends at customer sites and those 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 June 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 complex rules. This focuses on entries without a valid postcode, because those with valid postcodes can be categorised in the second stage described below.

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 June 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 have produced a number of different lists of network site postcodes. We have considered the following four options based on the network location data supplied by CPs in response to questions about their own network infrastructure:

i) all sites listed as containing active network equipment, including MNO core sites (7,627 postcodes);

ii) all sites listed as containing active network equipment, excluding 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 have also used the circuit end classifications in the circuit sales and purchases inventories supplied by the CPs as an alternative source of information about network sites. Therefore, we have produced candidate lists of network site postcodes from the postcodes of circuit ends which CPs have labelled as network ends, and collate this information across all CPs.[77] We should note that these lists have then been used to reclassify all circuit ends in the raw data, and so they have produced different results to the classification in the raw data.[78] We have produced three candidate lists of postcodes:

i) 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).

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 we used for the June BCMR Consultation (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 June BCMR Consultation produced consistently lower estimates than any of those produced using the method described above.[79] 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.

[77] 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.

[78] 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.

[79] 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.

Figure A5.7 **BT service share sensitivity results – circuit end classification**

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%
MI	UK less Hull less WECLA+	57%	53%-59%	53%	63%
MI	WECLA+	24%	19%-33%	15%	27%

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 total supply.[80] However, in the light of our sensitivity analysis, we do not believe that the size of the undercount is likely to be such as to result in a material 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 June 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,

[80] 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.

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[81] 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 June 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 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 have calculated a mark-up for entries missing bandwidth and one for circuit ends missing a valid postcode as follows:

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

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

[81] Formula at paragraph A5.16 for BT.

supply), RS (retail supply) or P (purchase dataset), and y is either Geo or Band to indicate either geographic or bandwidth mark-up. $\binom{Wholesale}{Supply} = M_{Geo}^{WS} * M_{Band}^{WS} * \binom{Wholesale\ circuit\ ends}{sold\ with\ valid\ allocation} +$

Changes since the June BCMR Consultation

A5.75 There have been a number of changes to the way we calculate service shares since the publication of the June 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 Ernst & Young. In summary, Ernst & Young found that the tools and model implemented our service share methodology accurately.[82]

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 SBO market shares.[83] In the June BCMR Consultation, we followed the approach taken in the 2007/8 Review 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 2007/8 Review. However, in reviewing this aspect of the methodology following the June BCMR Consultation, we noticed that the geographic distribution of TANs was different to the distribution of circuit ends, and therefore the inclusion of

[82] 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, Ernst & Young 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.

[83] 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.

TAN ends in our measures of supply could potentially bias service shares between different geographic markets.[84] 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[85]. However, as a sensitivity test, we have also calculated 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 0.5% in the low bandwidth TISBO market up to a fall of 7% in the medium bandwidth TISBO market.

5.77.3 Thirdly, the task of classifying circuit ends as being either network or customer sites is now done by us in order to ensure that differences in the ability of CPs to perform such an allocation do not 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 June BCMR 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 June BCMR Consultation results but which we now believe should be included. One set of [✂ ✂] circuits had been excluded in the original cleaning process as they were not thought to be 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 the possibility that some circuits may have been omitted from 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 us 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 us were gathered from a number of different IT 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.

[84] This point was also noted by BT in its response to the Consultation as set out below from paragraph A5.146.

[85] 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.

- 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 us, both CPs suggested that the number of potentially missing circuits was likely to be small. Since the June BCMR 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 bought by that CP.[86]

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 consider that we have made 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 have calculated 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 small amount, and not enough to materially change our view of competition in the relevant markets.

Figure A5.8 **BT service share sensitivity results with [✂] volume set to an upper bound estimate**

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%
MI	WECLA+	24%	24%

A5.83 We have performed 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 subsection, we are aware of a number of reasons why we might be missing some

[86] The CPs advised us that their circuit purchase data do not suffer from the issues affecting the sales data.

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 have found 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.

Figure A5.9 **BT service share sensitivity results with upper bound volume estimates for all OCPs**

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%
MI	UK less Hull less WECLA+	57%	54%
MI	WECLA+	24%	23%

Stakeholder comments on data analysis

A5.84 This subsection discusses points raised by stakeholders concerning our data analysis and service share estimates in response to the June and November BCMR 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 leased lines 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 June BCMR Consultation means that the service share estimates are a reasonable basis for drawing inferences on BT's market power. We have now calculated service shares under a variety of different assumptions, which produces

a range of estimates. We can therefore use this range of values in our final assessment of competitive conditions, rather than relying on a single point estimate. This has given 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.[87] Therefore, in every relevant market we have analysed, but especially in low volume markets, we have taken extra care when using our service share estimates as an indicator of competitive conditions. Furthermore, we have undertaken a thorough and overall analysis of the economic characteristics of the relevant market before reaching our conclusions on SMP, and the range of service share estimates is only one aspect of that analysis in measuring BT's power to behave to an appreciable extent independently of its competitors, customers and consumers.

A5.89 The rest of this subsection 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; and

x) miscellaneous matters.

Missing circuit data

Stakeholder comments

A5.90 In its response to the June BCMR Consultation, BT gives a number of reasons why it believes that we are likely to be missing circuit data relating to some services supplied by OCPs. BT goes on to argue that its own data are not subject to these issues, 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.

[87] 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.

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 SBO element of 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".[88]

5.91.2 We have adopted a number of different and inconsistent definitions of VPNs in the June BCMR Consultation and in the information requests we 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"[89]. 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.[90]

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.[91]

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.

[88] Para 6, page 172, BT response to the June BCMR 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, which we discuss in Sections 3 and 4 of this Statement. 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.

[89] Para 28, page 176, ibid.

[90] 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."

[91] Para 107, page 196, ibid.

Ofcom's view

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 Business Connectivity Market Review. We have also taken all reasonably practicable steps 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, followed by us issuing our information requests in draft form before issuing final requests to ensure (among other things) that CPs would have another opportunity to clarify the specific information we were requesting. Also, following CPs' receipt of final information requests, we held a large number of meetings and discussions with stakeholders to clarify our requirements and assist the CPs in producing the data accurately in the manner and form we had requested.

A5.96 We collected data regarding wholesale purchases as well as supply. As a result, we have been able to perform checks on the consistency of the data.[92] Through this process, we have 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'.[93] 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 have observed 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 as a result of CPs either not understanding our information requirements, or being unable to match their services precisely to the definitions we gave in the information requests.

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 include 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, BT argues that a CP would not be able to provide the details of this circuit as we requested. We accept that 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.

[92] For example, if CP1 provides details of purchases from CP2, we can check that these circuits appear in CP2's inventory of circuit sales.

[93] Para 32, page 177, ibid.

Therefore, we do not believe that this is a valid reason why we should be missing data from the circuit inventories.[94]

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 June BCMR Consultation in relation to the markets in Hull. We found that CP 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.[95] 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 observe just under 21,500 sales from OCPs to other CPs. Based on the supplier name, we observe 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.[96] As an example, BT suggested that COLT's low service shares outside the WECLA might indicate a systematic data recording issue.

[94] 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.

[95] We are now aware of MS3 operating in the Hull area, as discussed in Section 5.

[96] Para 97, page 195, ibid.

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 would not be completely corrected by an equi proportionate mark-up. However, we do not have any reason to believe that 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.

A5.106 Even if there were omissions of this type, there are two reasons why this would not lead to a bias in our service share estimates.

- First, there is no reason to believe that the location of OCP network nodes would be materially skewed relative to the location of OCP customer sites[97].
- 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 (though relatively infrequently[98]) 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+.

[97] 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.

[98] For example, between 2008 and 2012 14 postcode sector changes have been made across the UK. Source: http://www.beacon-dodsworth.co.uk/site/support/postcode_changes. Most postcode sector changes are to provide for new developments.

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 our estimate of 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 of this Statement. Also, the issue of circuit end classification is discussed separately 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 initial information requests by us. 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.[99]

A5.114 By way of example, BT notes that academic institutions often use MISBO services to connect to JANET.[100] Sometimes these are lit services, but there are likely to be circumstances where the relevant institutions self-supply MISBO using dark fibre.[101]

A5.115 BT also states that Table 40 in the June BCMR Consultation 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 June BCMR Consultation, we have undertaken further research into the suppliers mentioned by BT, and a number of other suppliers who did not receive the

[99] Para 26, page 176, ibid.

[100] JANET is a government funded network which provides connectivity to academic (especially higher and further education) institutions. See www.ja.net.

[101] Paras 110 and 113, pages 196-197, ibid.

initial information requests we issued. 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. We contacted 19 of the CPs for further information about their network infrastructure and supply of leased lines. We found that 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 and therefore revising BT's share of the MISBO market in the WECLA downwards 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, 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 we are satisfied that they do. There are two reasons why they might not have appeared in the tables in the June BCMR Consultation. 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 have also calculated 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 Section 7 of this Statement.

Issues regarding methodology

Stakeholder comments

A5.122 In this subsection, we address BT's concerns regarding[102]:

[102] 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.

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 Exponential-e. 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."[103]

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.[104]

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.

[103] Para 1.2, Exponential-e response.

[104] For full details see paras 34-52, pages 177-184, ibid.

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 scenarios 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.[105] As such, BT suggests it is not always possible to classify circuits unambiguously as either AI or TI.[106]

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.[107]

[105] See also footnote 9, page 181, ibid.

[106] Para 69, page 188, ibid.

[107] Para 105, page 196, ibid.

Ofcom's views

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-A5.16 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 subsection, 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.

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 another with 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 this respect, 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 judgement. 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 CPs, 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 Our improvements in data processing and analysis[108] 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 observe 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.
- 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^2B. If we do not correctly identify N^2 as a network node, then our supply calculation would suggest a supply of -1 in the N^2 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

[108] Discussed above from paragraph A5.75.

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 equi-proportionate 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 June BCMR 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.[109]

Ofcom's views

A5.147 TAN ends were included in our supply measures to ensure that total volumes would be comparable with the 2007/8 Review. 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[110] 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."[111]

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 June BCMR

[109] This is explained in detail between paragraphs 89 and 93, pages 192-194, ibid.

[110] For example, see para 1.4, Exponential-e response.

[111] Page 16, UKCTA response.

Consultation. In relation to the sample calculations performed for the June 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.[112]

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 data centres, 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."[113]

Ofcom's views

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 it is done in a consistent way. We consider that this revised methodology has addressed the concerns that BT and OCP service shares were prepared on a different basis. Regardless of the set of network site postcodes used, the revised methodology produces BT service shares which are higher than the estimates using the original method. As explained in the June BCMR Consultation 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 have now performed 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. Interconnection between CPs' WDM services is currently uncommon, both because doing so can be costly and because available technology has not, at least until recently, allowed the CP to assure reliability of the resulting service to the level often required by the end-user. If WDM services are then typically supplied end-to-end by a single CP, it may also be appropriate to calculate service shares using end-to-end wavelengths rather than wavelength ends.

[112] Para 100, page 195, ibid.

[113] Para 102, page 195, ibid.

A5.156 We have addressed these issues through the various network end sensitivity tests. As explained above, we have calculated service shares using several different sets of postcodes to perform the network end classification. These sensitivities include extreme examples where we have included only BT sites and only OCP sites. In doing so, we have aimed to assess the range of possible values with respect to variations in the network end classification.

A5.157 In addition, we have also provided 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 consultation response, and in a separate letter to Ofcom,[114] BT argues that we may be missing OCP data regarding the sales of services which fall outside the scope of this 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, 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 Media to carry cable TV traffic.

Ofcom's views

A5.160 In relation to the contention that we are likely to be missing broadcast circuit data, we observe 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 our information requests 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

[114] Letter dated 30th November 2012.

already seeing the upstream input as this is what the customer appears to be buying.[115] As such, these services are included in our wholesale supply measures.

A5.162 We consider that transport of traffic over Virgin Media'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. Therefore, 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.

Figure A5.10 **BT service share sensitivity results – broadcast services**

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%
MI	UK less Hull less WECLA+	57%	57%	51%
MI	WECLA+	24%	29%	22%

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:[116]

- 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; and

[115] [✂]

[116] For full details of this example, see para 63-69, pages 186-188, ibid.

- 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 in 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.[117] 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,

> "[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."[118]

Ofcom's views

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

[117] Para 125, page 198-199, ibid.

[118] Para 127, page 199, ibid.

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 AI circuits**

CP	% 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 OCPs, across all OCPs 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 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[119], 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 June BCMR Consultation because they did not exclude sales of VPNs and internet access.[120]

Ofcom response

A5.176 We acknowledged this point in the June BCMR Consultation.[121] The developments in our modelling and data processing since the June BCMR Consultation[122] have allowed us to identify VPN and internet access circuits more reliably. Therefore, the

[119] And the highest bandwidth service if a wavelength is subdivided into smaller bandwidth circuits.

[120] Para 104, page 195, ibid.

[121] Para 7.358.

[122] Detailed above.

retail share estimates presented in this Statement 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 we do not include retail ISDN30 services in retail leased line markets and suggested that, as a result, CPs will not have provided details of the underlying wholesale circuits they use to support retail ISDN30 provision. BT argued that in some cases, these circuits could be 2Mbit/s leased lines self-supplied by the OCP. It then argued that we will not have included such circuits in our estimates of OCPs' share of the wholesale low bandwidth TISBO market, with the implication that its own share is overstated.

Ofcom's views

A5.179 In the 2011 ISDN30 charge control statement, we explained that ISDN30 services could be provided over 2Mbit/s leased lines. We said:

> "There are three main forms of supply for retail ISDN30 services […]:
>
> • end to end own infrastructure: the OCP uses its own exchange concentrator and connects it to the customer with a digital bearer running over its own access network;
>
> • own infrastructure and 2Mbit/s PPCs: the OCP uses its own exchange concentrator and connects it to the customer using a PPC rented from BT or another infrastructure provider; and
>
> • wholesale ISDN30 purchased from Openreach: the OCP uses Openreach's wholesale ISDN30 service."[123]

A5.180 Most of the retail ISDN30 market is supplied by CPs (including BT Retail) using Openreach's wholesale ISDN30 service. Around a quarter of retail ISDN30 provision is accounted for by OCPs using their own infrastructure or, in a small number of cases, a wholesale leased line (PPC) bought from BT or another CP. Based on information in the ISDN30 Charge Control Statement and consultations,[124] approximately 680,000 ISDN30 channels were supplied by OCPs over their own end-to-end infrastructure in June 2011. If we assumed that all these channels were supplied using an upstream digital bearer equivalent to a 2Mbit/s TI leased line, and these lines were then included in the low bandwidth TISBO market, the effect would

[123] Para A6.7, charge control statement, http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-price-control/statement/isdn30-annexes.pdf.

[124] In particular, para 4.68 from the Further consultation on wholesale ISDN30 price controls, December 2011, http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-price-control/summary/condoc.pdf, and para A6.13 in the charge control statement.

be to reduce BT's share of this market. However, our sensitivity analysis suggests that this reduction would not be material.

A5.181 The average number of channels per bearer on the Openreach network is 17[125], and the average for ISDN30 services supplied over PPCs is 28.5[126]. We do not know the average for self-supply on OCP networks, but expect that it lies somewhere between these two figures. The high fixed costs associated with using own network infrastructure, in conjunction with the option of a relatively low fixed cost WLR alternative, imply that OCPs are likely to maintain relatively high utilisation of self-supplied bearers.

A5.182 The figure of 17 channels per bearer implies approximately 40,000 circuits self-supplied by OCPs, but this may well be an overestimate. For the sake of our sensitivity test, we use the assumption of 17 channels per bearer. If we include the additional 40,000 self-supplied OCP circuits in the low bandwidth TISBO market in the UK excluding the Hull area, BT's share would fall from 88% to 80%. Even with assumptions which are likely to overstate the additional volume of OCP circuits, this change is not sufficient to materially affect our view of competition in this market.

TI Trunk service share calculation method

A5.183 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.

A5.184 As per our assessment of market shares for terminating segments (AISBO, TISBO and MISBO markets), in our base case, we rely on CPs' 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 datasets used to assess 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.

A5.185 The particular circuit information used to assess trunk market shares using this data 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 postcode data); and
- whether the circuit was sold as part of a VPN-solution.[127]

[125] Para 5.32, Consultation on Price Controls for wholesale ISDN30 services, April 2011. http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-2011/summary/isdn30-2011.pdf.

[126] Para A6.71, Statement on Price Controls for wholesale ISDN30 services, http://stakeholders.ofcom.org.uk/binaries/consultations/isdn30-price-control/statement/isdn30-annexes.pdf.

[127] 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).

A5.186 We have followed five main analytical steps to derive trunk market shares, namely:

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 apply equi-proportionate mark-ups to the circuit counts to account for missing geographic and bandwidth information; and

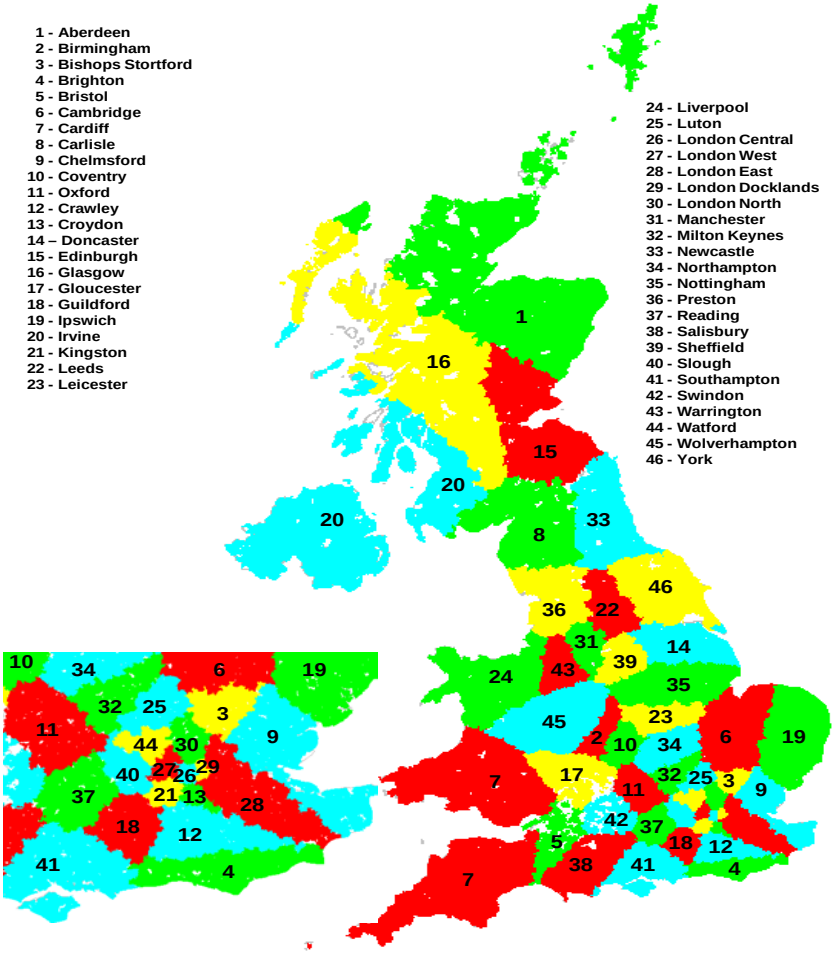
v) we estimate (bandwidth weighted) market shares for the national and regional trunk markets using each CP's self-supply and its sales of trunk to other CPs to compute its total trunk supply.

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

A5.187 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).

A5.188 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**



A5.189 The catchment areas shown in Figure A5.12 are based on the information BT has provided on its PPC logical routing model, whereby[128]:

- 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.

A5.190 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 catchment area (TAN number 41 in Figure A5.12 above).

A5.191 On the basis of these TAN catchment areas, then for each CP and for every single circuit (retail 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 fall entirely within a defined TAN catchment area we count a circuit as a terminating segment only. Consistent with our market definition proposals in Section

[128] BT applies this logical routing model for charging purposes to determine the proportion of circuits that contain trunk or terminating segment.

6, we assume that any TI circuit that links different TAN catchment areas contains a trunk segment.

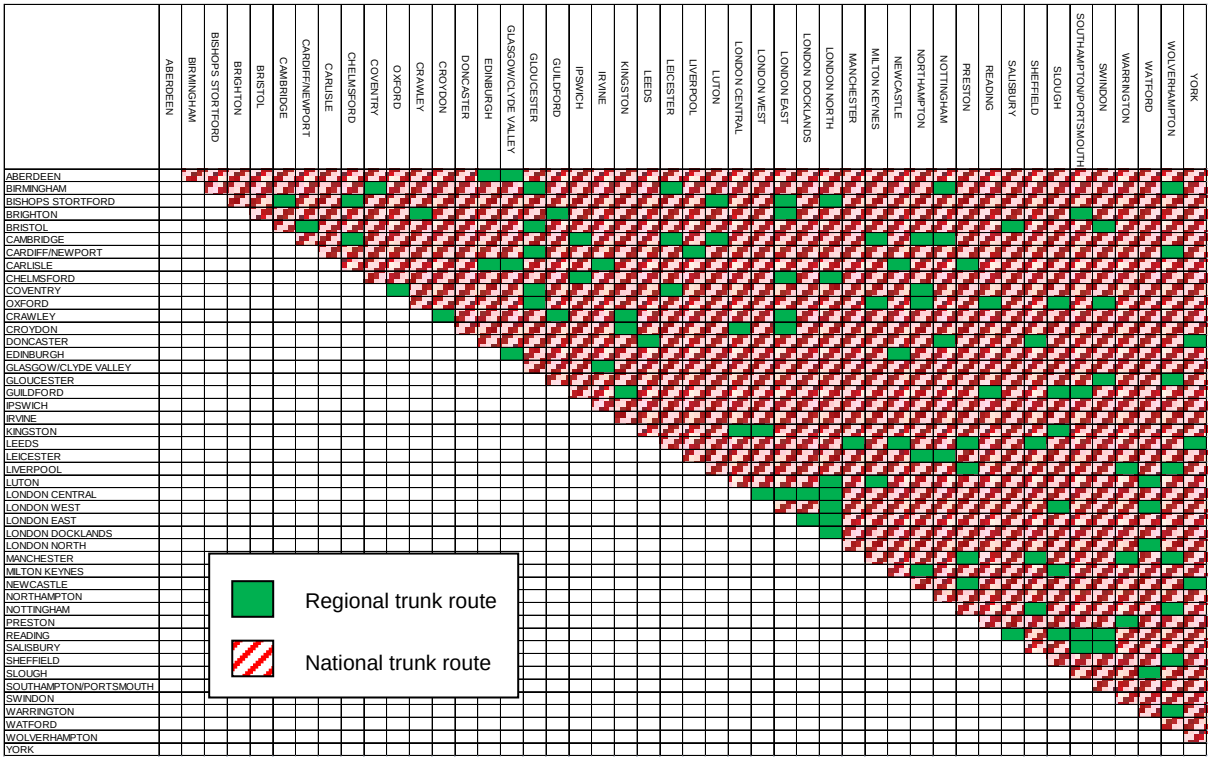
We determine whether TI trunk segments are national or regional

A5.192 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 market. 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.

A5.193 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**



A5.194 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).

A5.195 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

A5.196 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 155Mbit/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.

A5.197 The bandwidth weightings we apply use the European Commission's recommendation on retail leased lines prices as referred to in Ofcom's disaggregated markets statement[129] 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	WEIGHTING FACTOR
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 (>8.2 <=40Mbps)	18
Range 7 (>40 <=50Mbps)	18
Range 8 (>50 <=110Mbps)	22
Range 9 (>110 <=160Mbps)	26
Range 10 (>160 <=623Mbps)	50
Range 11 (>623 <=15000Mbps)	50

Source: Ofcom 2006

A5.198 Hence, in our circuit counts, if a CP sold two circuits at 155Mbit/s (which has a weight of 26) and ten trunk circuits at 64kbit/s (which has a weight of 1), we would produce a weighted average supply measure of 62 trunk circuits.[130]

[129] See page 98: "Disaggregated markets – leased lines", Ofcom, Discussion document, March 2006 http://stakeholders.ofcom.org.uk/binaries/consultations/disagg/summary/consultation.pdf

[130] 2 x 26 (the weighting factor for 155 Mbit/s circuits) plus 10 x 1 (the weighting factor for 64 kbit/s circuits) = 62.

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

A5.199 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.[131]

Mark-ups for missing geographic information

A5.200 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.

A5.201 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 SBO 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).[132]

Bandwidth assumptions for missing bandwidth information

A5.202 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.[133]

A5.203 Where bandwidth information is missing for particular circuit, we have assumed 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

[131] 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.

[132] For example, if a CP sold 10,100 wholesale circuits, and we could identify 1,000 with a national trunk segment, 4,000 with a regional trunk segment and 5,000 circuits with a terminating segment only, then we assume that 10% of the CP's wholesale sales would be 'national trunk'; 40% 'regional trunk'; and the remaining 50% would be terminating segments only. The CP in question had 100 wholesale circuit sales with missing geographic information. We would allocate 10 of these circuits to the national trunk and 40 circuits to the regional trunk market. The CP's final count of wholesale sales of trunk segments would be 1,010 (national) and 4,040 (regional).

[133] 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.

bandwidth weighted circuit counts (consistent with the bandwidth weights set out in Figure A5.14 above).[134]

We estimate wholesale market shares using retail and wholesale circuits

A5.204 Analogous to the wholesale SBO markets, we have based 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:

$$Total\ trunk\ market = BT\ self supply + BT\ sales\ to\ OCPs + OCP\ self supply + OCP\ sales\ to\ CPs$$

A5.205 In order to calculate market shares, we have 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

A5.206 We have estimated 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 have assumed that the difference between the 'retail requirements' and 'wholesale purchases' constitutes self-supplied trunk.

A5.207 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.[135] For OCPs, we do not have information from our circuit data on whether an OCP is able to self-supply trunk segments. Therefore, we have inferred an OCP's self-supply 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 SBO markets, as described from paragraph A5.11 above.

We combine each CP's self-supply and sales of trunk to derive wholesale shares

A5.208 We have then calculated 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

A5.209 In light of the above calculation steps, we have presented in our SMP analysis estimates of BT's market share in the regional trunk and national trunk markets.

A5.210 In Section 6, we have also presented a number of sensitivities around this base case estimate:

[134] This assumption is consistent with the most common bandwidth weight, based on circuits for which we have bandwidth information (and consistent with the average bandwidth weight of 3.48).

[135] 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.

- 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.

- Scenario 2 – we apply no mark-ups to account for missing geographic data. Therefore, only circuits with complete information are considered.

A5.211 We have also run alternative scenarios (scenarios 4 and 5) to address BT's concerns in response to the June BCMR Consultation that our approach to measuring its market share will lead to an upward bias. We set out below in more detail BT's concerns before explaining the alternative scenarios we have calculated to address this issue.

A5.212 We also discuss in Section 6 a scenario that includes circuits sold as part of a VPN-solution (VPN-tail circuits) in our circuit counts.[136] 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.[137]

Stakeholder comments

A5.213 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.

A5.214 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:

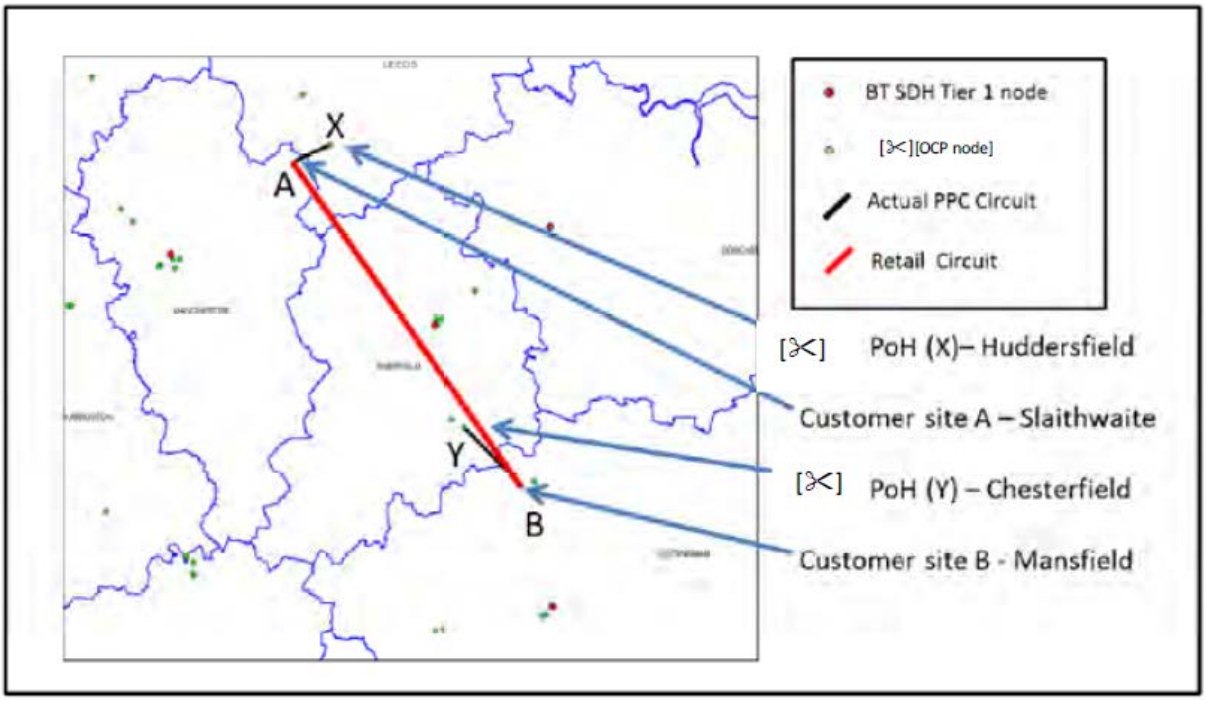
$$Wholesale = Retail - Wholesale\ Purchases + Wholesale\ Provision\ to\ OCPs$$

A5.215 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.

[136] 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 which support VPN-tails will be relatively short distances. On this basis, it would not be appropriate to include them in the trunk market.

[137] 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.

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



A5.216 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).

A5.217 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 the retail circuit AB is between non-adjacent TANs).

A5.218 On this basis, SPC calculated the counts of circuits for regional trunk for BT and the OCP as follows:

$$\textit{Wholesale regional trunk (OCP)} = 0 - (AX+BY) - XY$$
$$= 0 - 2 - 0$$
$$= -2$$
$$\textit{Wholesale regional trunk (BT)} = 0 - 0 + (AX+BY)$$
$$= 0 - 0 + 2$$
$$= +2$$

A5.219 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).[138]

A5.220 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's views

A5.221 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 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.

A5.222 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.

A5.223 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 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.

A5.224 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.

[138] "BCMR: Economic Aspects of the Market Definition of TI Trunk", SPC Network, Page 15, (06 Sept 2012)

Network reach analysis

Introduction

A5.225 This sub-section describes in further detail the methodology and data underpinning the network reach analysis set out in Section 5.

A5.226 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.

A5.227 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 with 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 with flexibility points 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.

A5.228 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.

A5.229 In the later stages of our review, we developed a dedicated computer program that greatly increased the speed of our network reach analysis.[139]

A5.230 All the network reach maps were generated using MapInfo professional.

A5.231 We set out the reasons for the parameters used (i.e. why we use businesses with 250 or more employees and a 200m buffer assumption) in Section 5. We set out below how we gathered the data to perform the network reach analysis.

A5.232 Our analysis was independently audited by Ernst and Young which verified the correctness of our calculations.

Data processing

Postcodes

A5.233 Some of the data we received provided location information based on postcodes. Our network reach analysis uses Eastings and Northings.[140] Thus, it is important to be able to convert postcodes into Eastings and Northings as accurately as possible.

[139] 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.

A5.234 We purchased postcode data sets from Dotted Eyes[141] 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.

A5.235 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.

A5.236 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).

A5.237 To ensure the data was gathered into the correct postcode sector, we used the most up to date postcode.[142] 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.

Locations of business sites

A5.238 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 with 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

A5.239 We requested information on mobile base stations and other network site locations from MNOs.

A5.240 We converted postcode based locations into Eastings and Northings and removed mobile operator specific duplicate entries.

A5.241 We divided mobile sites into those using leased lines and those self-supplied by the mobile operator using microwave links. In this market review, we carried out network reach analysis only for mobile sites using leased lines.

A5.242 We carried out the same checks on the mobile site data as described in the 'Locations of OCP flexibility points' subsection below.

[140] Eastings and Northings provide the coordinates of any given location in the UK in metres East and North of an origin just to the South West of the Isles of Scilly.
https://www.ordnancesurvey.co.uk/oswebsite/gps/information/coordinatesystemsinfo/guidetonationalgrid/page5.html

[141] Dotted Eyes datasets are based on the Ordnance Survey Code-Point with polygons dataset.

[142] To convert postcodes to postcode sectors the last two digits of the postcode are removed.

Locations of BT exchanges[143]

A5.243 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

A5.244 We gathered data centre locations from two sources:

- the web site www.datacentremap.com; and
- a list of data centres provided by BT.

A5.245 Combining the two sources 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

A5.246 For the June BCMR Consultation, we formally requested 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.

A5.247 We defined flexibility points as the points:

a) where an OCP can access its existing infrastructure in order to connect an end-user 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.

A5.248 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.

A5.249 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.

A5.250 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.

A5.251 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;

[143] In Section 5 local exchanges are referred to as LLU sites.

- 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.[144]

A5.252 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;
- 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.

A5.253 Where the OCP confirmed to us that data was not available in a format that we could easily use, we then asked the OCP 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

A5.254 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.

[144] 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.

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

	OCP 1	OCP 2	OCP 3	OCP 4	OCP 5	OCP 6	OCP 7	OCP 8	Total
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**

A5.255 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).

A5.256 A similar analysis was carried out for the mobile sites.

A5.257 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

A5.258 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.

A5.259 For the BT local exchange and data centre sites, the network reach data was processed further to give:

- sum of local exchange or data centre sites, within 200m, 500m and 1000m, by OCP. This provides an indication of the number of such sites each OCP is able to serve for a given build distance; and
- absolute number of local exchange or data centre 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.

A5.260 The above analyses were repeated for particular geographic areas, e.g. the WECLA+.

Sensitivity analysis

A5.261 Some of the assumptions used in the network reach analysis were subject to sensitivity analysis.

A5.262 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	200m	250m
Postcode sectors included in WECLA+	381 (-10%)	421	469 (+11%)

A5.263 Mobile sites self-supplied via microwave were included in the mobile site network reach analysis and found to make little difference to the result.[145]

Network reach audits

A5.264 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 Ernst & Young in January 2013.

A5.265 The purpose of the Ernst & Young audit was to check that the process we documented had been followed and that the calculations and results were accurate based on that process.

A5.266 Ernst & Young externally audited the program, the process and the implementation of the process we used for geographic analysis. In summary, Ernst & Young found that the program worked correctly, the process was followed accurately and the results correctly derived.[146]

Stakeholder comments

A5.267 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.

A5.268 BT commented specifically on the OCP network data. It thought our information was incomplete and failed to capture the full extent of OCP networks. To support its

[145] Mobile high network reach sectors across the UK, with self provide sites included rose by 1.6%.

[146] The scope of the audit did not extend to an assessment of the assumptions used in our analysis, such as buffer distance selected. As such, Ernst & Young were not able to validate the actual geographic analysis, but taking our assumptions as given, they were happy that the analytical steps we took would produce an accurate geographic analysis in accordance with our methodology.

assessment, in Annex 1 to BT's response, it provided an overview of the main OCP networks including network maps.

A5.269 BT also noted that some networks have 'no obvious flexibility points'.

Ofcom's views

A5.270 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.

A5.271 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).

A5.272 Second, we took all of the circuit data provided by CPs and determined the location of each end of every circuit. 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 Section 5).

A5.273 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.

A5.274 With respect to BT's 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;
- 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[147] 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 operators, we directly contacted 9 and questioned them about the services they offer and whether they provision physical network;
- 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 sensitivity for that area. The network extent of one OCP queried by BT ([✂]) was confirmed;

[147] Operators with powers under the Code can seek, by issuing an Electronic Communications Code Notice, to exercise these powers to perform works on land.

- the network reach analysis was rerun with this additional data in January 2013; and

- 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.

A5.275 With respect to BT's 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.

A5.276 A further sensitivity analysis was performed by including the locations of all Virgin Media street cabinets. The results of this are discussed in Section 5.

Annex 6

Data centres

Summary

A6.1 As part of our 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 argues 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 has suggested that we should 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 all stakeholders' 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.[148]

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 the markets we have identified, together with associated market power determinations and 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 certain flexibility in its regulatory obligations 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.

[148] 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).[149]

A6.15 The WECLA+ contains 54 (27%) of the UK-wide set of data centres that we identified. Table A6.1 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 Table.

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

	200m buffer			1km buffer		
# 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%

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.

[149] The publicly available repository is available at www.datacentermap.com. 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 to 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

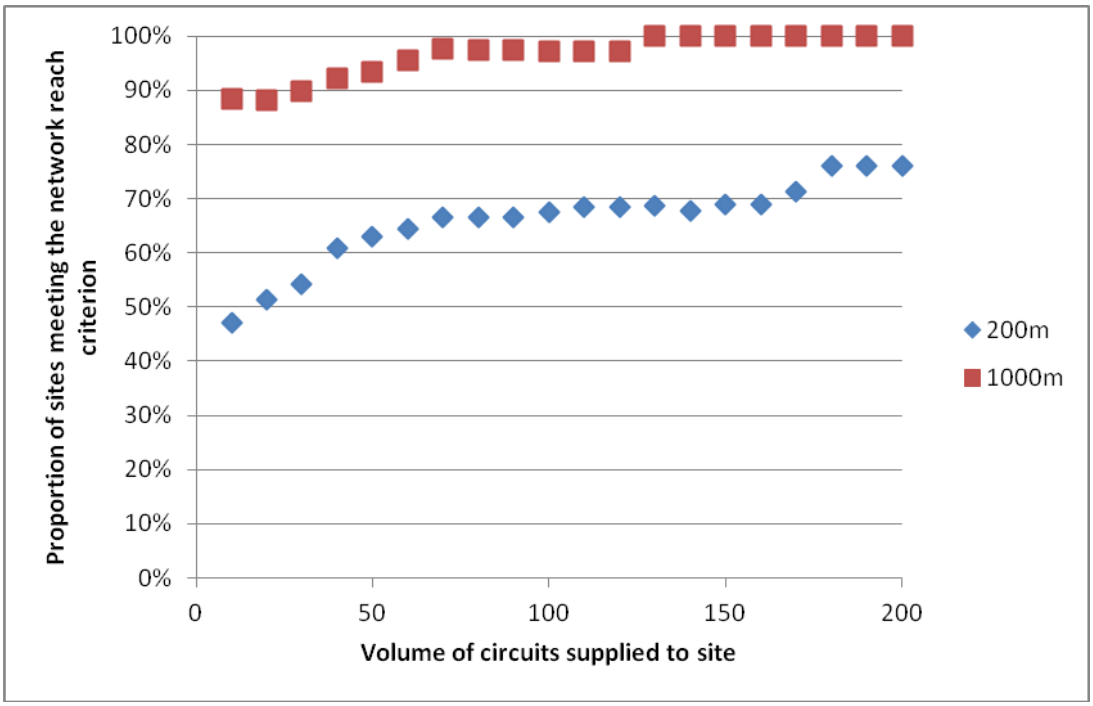
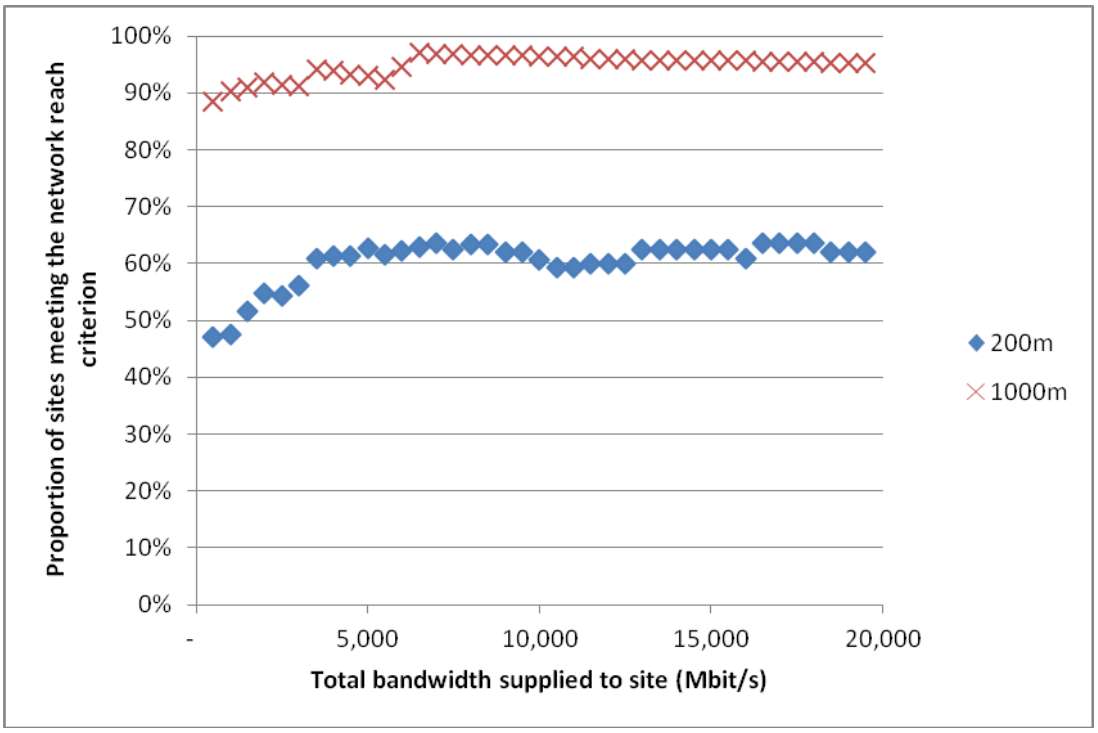


Figure 90 Proportion of sites which meet the 200 metres/1km network reach criterion against the size of the sites as measured by the total bandwidth supplied



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.[150]

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 [✂], a provider of data centres, said that [✂].

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

[150] 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, CWW 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.[151]

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." [152]

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,[153] 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 economically efficient alternative infrastructure, and supplemented by seeking to ensure that CPs can compete effectively elsewhere in downstream markets by

[151] This is consistent with the ERG Common Position (see Executive Summary and Section 6).

[152] 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).

[153] See paragraph 56.

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.[154]

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.

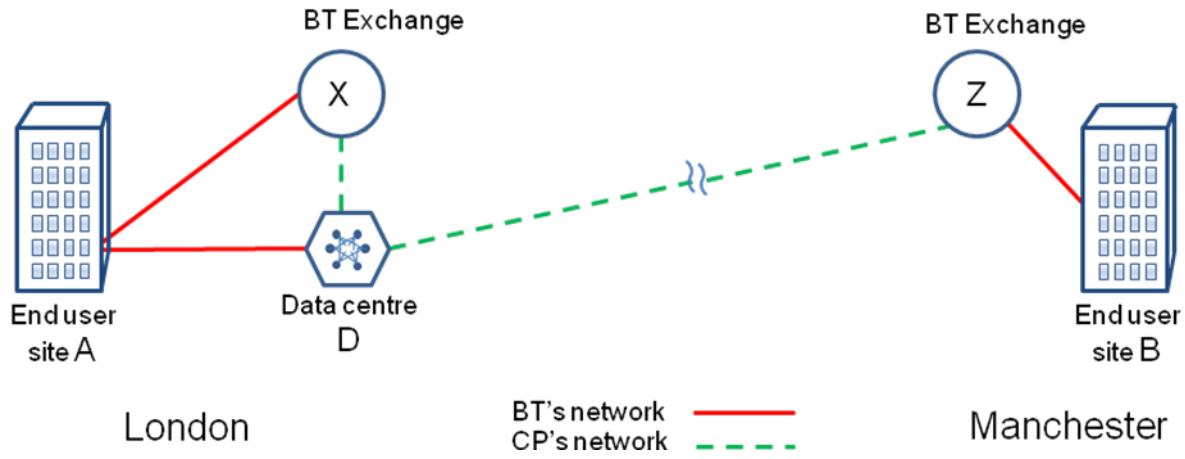
A6.59 However, we do not agree with the general thrust of BT's proposal, which advocates that we take the role of data centres in the market into account in our analysis by adopting a premise-by-premise approach to market definition. Much of the general reasoning that underpins our approach to market 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

[154] See Section 4.2 of the ERG Common Position.

arrangements that should apply. There are particular concerns with a building-by-building 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, D, to a customer's site in Manchester, B, CPs, including BT, are unlikely to do so with a single circuit because of the distance involved. For efficiency reasons, they are likely to use an aggregated (trunk) transmission link between London and a node in Manchester, such as the BT exchange Z, and connect this to a terminating segment from Z to B. Most CPs are likely to require a BT regulated wholesale access service for this terminating segment because, while BT's access network is ubiquitous, other CPs' networks are not. If several CPs have physical networks that enable them to fulfil the segment from the data centre D to the BT exchange Z in Manchester the provision of wholesale services from D to Z may be effectively competitive. If, in those circumstances, BT was not required to provide wholesale services from data centre D, other CPs may nevertheless be able to compete with BT to fulfil the downstream service from D to B by using their or others' physical networks in the segment from D to Z and using regulated access to BT's wholesale service for the segment from Z to B.

A6.62 In contrast, BT is likely to be able to fulfil a service from the same data centre, D, to a nearby customer's site in London, A, as a single circuit from D to A, while other CPs are not likely to be able to do likewise. A CP other than BT may have

connected its physical network to data centre D, and may be interconnected with BT in a London exchange X, but using this infrastructure in connecting D with A would involve two circuits – one in its own network from D to X and one in BT's network from X to A. In general, the single circuit solution is likely to be more efficient. Therefore, if BT was not required to provide wholesale services from data centre D, other CPs would be less likely to be able to compete effectively with BT to fulfil the downstream service between the data centre, D, and the customer site in London, A.

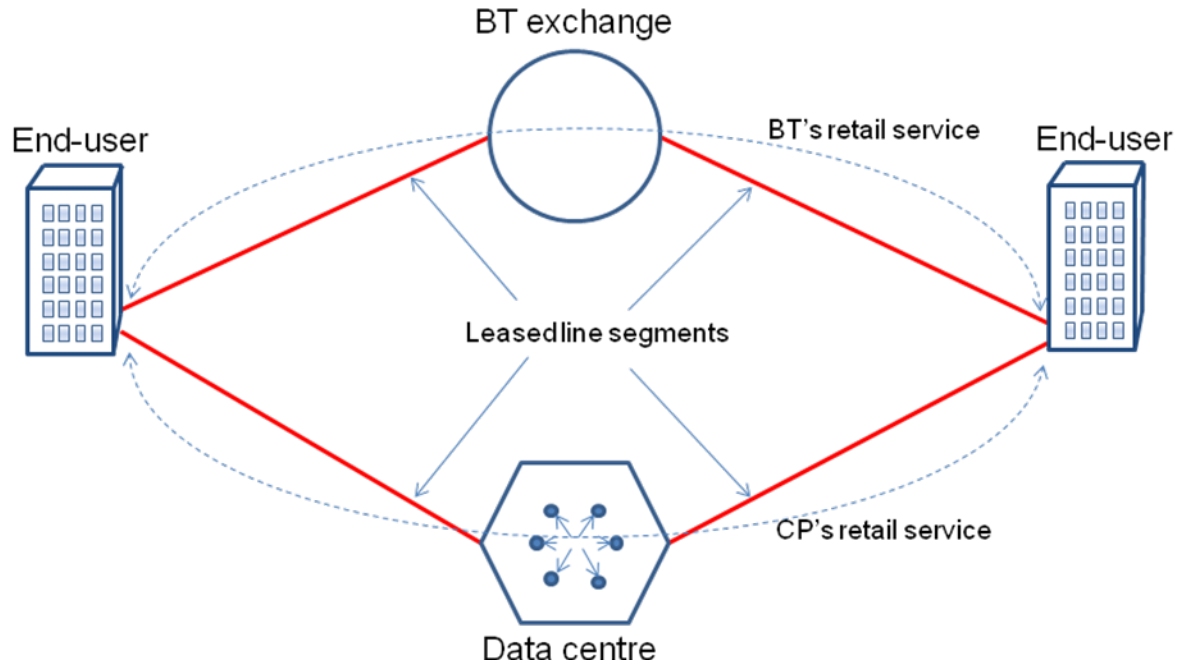
A6.63 While in the example above the contrast in competitive conditions may be sufficiently clear for wholesale services used in the downstream services between the London data centre and customer sites in London and Manchester respectively, the contrast becomes less clear in examples in which the difference in distances between two corresponding services 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 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 Figure A6.2 below.

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



A6.67 It appears therefore that many leased line segments at data centres are part of a wider market for leased line segments which support downstream applications delivered at other locations. 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.[155] We estimate that there are more

[155] 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 Figure A6.3 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.

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

AISBO <=1Gbits/s	MI	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

A6.72 As the Figure 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, £22m, or about one quarter, 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 Figure A6.4 below.

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

	AISBO <=1Gbits/s	MI	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

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 [✂], 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 Figure 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 leased line segments which can be used to support this downstream service is wider than the set of leased line segments used for this purpose at those data centres, as explained in paragraphs A6.66 and A6.67 above. The regulated connectivity which supports downstream services specific to those data centres 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 are likely to be different to those for short circuits of this type. We illustrate in Figure A6.5 below the potential effect of delineation based on the length of a circuit by distinguishing circuits of Type 2 according to their lengths.

Figure A6.5: Data centre ends of circuits of Type 2 with radial distances above and below 50km[156]

	AISBO <=1Gbits/s	MI	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

A6.79 The Figure 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 using the data centres is wider than that which is provided at those data centres and can include, for example, connectivity at BT exchanges.

[156] 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.

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.[157] Our resulting estimates are shown in Figure A6.6 below. The Figure 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.

Figure A6.6: Data centre ends which fall in relevant markets as a percentage of total volumes in their respective market[158]

	AISBO <= 1Gbits/s		MISBO UK ex WECLA+	TISBO <=8Mbits/s	Other TISBO UK ex WECLA+	Revenue in regulated markets (£m p.a.)
	WECLA+	UK ex WECLA+				
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

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".[159] 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

[157] 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.

[158] 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.

[159] See paragraph 61 of the SMP Guidelines. Equally, we note 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".

£8m p.a. revenue. This accounts for approximately 0.4% of the UK wholesale leased lines revenue of approximately £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.[160] In this respect, the different remedies we apply in the very low bandwidth retail TI market are an example of where we have taken into account variations in competitive conditions in a single relevant market, and concluded it is appropriate to impose differentiated obligations on BT.[161]

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”.[162]

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 steps of our market review process.

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, the markets we have identified, together with associated market power determinations and remedies, provide for a substantial degree of appropriate deregulation in respect of many of the

[160] 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).

[161] See Section 10.

[162] See Section 6.

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.

Annex 7

Legal Instrument

NOTIFICATION UNDER SECTIONS 48(1) (SMP CONDITIONS) AND 79(4) (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*'.[163]

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**").[164] 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*'.[165] 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*'.[166] 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 notification under section 48(1) of the Act as dated 2 July 2009 and published at Annex 9 to that document ("**July 2009 Notification**").

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[163] http://stakeholders.ofcom.org.uk/binaries/consultations/llmr/statement/state_note.pdf

[164] http://stakeholders.ofcom.org.uk/binaries/consultations/bcmr08/summary/bcmr08.pdf

[165] http://stakeholders.ofcom.org.uk/binaries/consultations/bcmr08/statement/statement.pdf

[166] http://stakeholders.ofcom.org.uk/consultations/llcc/statement/

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*'.[167] 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**").[168]

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**").[169] 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**").[170] 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**").[171] 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.

[167] http://stakeholders.ofcom.org.uk/binaries/consultations/llcc/statement/LLCC_decision_final.pdf

[168] http://stakeholders.ofcom.org.uk/binaries/consultations/bcmr-inputs/summary/BCMR_Call_for_Inputs.pdf

[169] http://stakeholders.ofcom.org.uk/consultations/business-connectivity-mr/?utm_source=updates&utm_medium=email&utm_campaign=bcmr-june2012

[170] http://stakeholders.ofcom.org.uk/consultations/llcc-2012/

[171] http://stakeholders.ofcom.org.uk/binaries/consultations/bcmr-reconsultation/summary/BCMR_Nov_2012.pdf

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 contained proposals of EU significance for the purposes of the Act. Therefore, after making such modifications of the proposals that appeared to Ofcom to be appropriate following domestic consultation, Ofcom sent on 21 February 2013 a copy of them, and of a draft of the 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.

13. Ofcom received comments from the European Commission on its proposals on 21 March 2013, and has made such modifications to this notification and the Statement accompanying this notification as it considers appropriate.

Determinations for the United Kingdom outside the Hull Area

Market identifications and market power determinations

14. Ofcom has identified 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: 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.	BT
(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.	[—]
(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.	BT
(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 traditional interface regional trunk segments at all bandwidths in the UK.	BT
(l) Wholesale market for traditional interface national trunk segments at all bandwidths 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

15. For the avoidance of doubt, Ofcom has determined 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.

16. The effect of, and Ofcom's reasons for identifying the markets and making the market power determinations referred to in **paragraph 14.** above are set out in the Statement accompanying this notification.

SMP conditions

17. Ofcom is setting, in relation to each of the services markets in which Ofcom is making 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 publication of this notification.

18. Ofcom is setting, in relation to each of the services markets in which Ofcom is to making 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 modifications to that

Notification set out in **paragraph 20.** below. Those SMP conditions shall, unless otherwise is stated in that Schedule, take effect on the date of publication of this notification.

19. Ofcom is setting, in relation to the services market in which Ofcom is making 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 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 publication of this notification.

20. Ofcom is modifying 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 publication of this notification;

(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 publication of this notification.

21. Ofcom is revoking 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 date of publication of this notification.

22. The effect of, and Ofcom's reasons for making, the determinations in relation to the SMP conditions referred to in **paragraphs 17. to 21.** above are set out in the Statement accompanying this notification.

Determinations for the Hull Area

Market identifications and market power determinations

23. Ofcom is identifying 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: 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.	KCOM
(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.	KCOM
(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.	KCOM
(d) Wholesale market for very high bandwidth traditional interface symmetric broadband origination in the Hull Area, at bandwidths of 622Mbit/s.	KCOM
(e) Wholesale market for low bandwidth alternative interface symmetric broadband origination in the Hull Area, at bandwidths up to and including 1Gbit/s.	KCOM

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

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

SMP conditions

25. Ofcom is setting, in relation to each of the services markets in which Ofcom is making 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 publication of this notification.

26. Ofcom is setting, in relation to each of the services markets in which Ofcom is making 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 modifications to that Notification set out in **paragraph 27.** below. Those SMP conditions shall, unless otherwise is stated in that Schedule, take effect on the date of publication of this notification.

27. Ofcom is modifying 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.

28. Ofcom is revoking the SMP conditions to be applied to BT as set out in Schedules 7 to 10 to the December 2008 Notification on the date of publication of this notification.

29. The effect of, and Ofcom's reasons for making, the determinations in relation to the SMP conditions referred to in **paragraphs 25. to 28.** above are set out in the Statement accompanying this notification.

Ofcom's duties

30. In identifying and analysing the markets referred to in **paragraphs 14. and 23.** above, and in considering whether to make the determinations 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.

31. In addition, in making all of the determinations 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

32. 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.

33. 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[172], as subsequently amended by Ofcom;
(k) "July 2004 (KCOM) Notification"	means the notification under sections 48(1) and 86(1) 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[173], as subsequently amended by Ofcom;

[172] http://stakeholders.ofcom.org.uk/binaries/consultations/fin_reporting/statement/finance_report.pdf

[173] http://stakeholders.ofcom.org.uk/binaries/consultations/fin_reporting/statement/finance_report.pdf

(l) “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;
(p) “Ofcom”	means the Office of Communications;
(q) “WECLA”	means the area 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.

M. Gibbs

Competition Policy Director, Ofcom

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

28 March 2013

Schedule 1: List of postal sectors constituting the WECLA

E1 0	EC1R 5	EC3A 5	EC4R 9	SE16 4	SW7 5	UB8 3	W1H 6	W4 2	WC2B 5
E1 1	EC1V 0	EC3A 6	EC4V 2	SE8 5	SW8 1	UB8 9	W1H 7	W4 3	WC2B 6
E1 2	EC1V 1	EC3A 7	EC4V 3	SL1 0	SW8 5	UB9 4	W1J 0	W4 4	WC2E 7
E1 3	EC1V 2	EC3A 8	EC4V 4	SL1 1	SW95 9	W10 5	W1J 5	W4 5	WC2E 8
E1 5	EC1V 3	EC3M 1	EC4V 5	SL1 2	TW13 4	W10 6	W1J 6	W5 2	WC2E 9
E1 6	EC1V 4	EC3M 2	EC4V 6	SL1 3	TW13 5	W11 1	W1J 7	W5 3	WC2H 0
E1 7	EC1V 7	EC3M 3	EC4Y 0	SL1 4	TW14 8	W11 2	W1J 8	W5 5	WC2H 7
E1 8	EC1V 8	EC3M 4	EC4Y 1	SL1 5	TW16 7	W12 0	W1J 9	W5 9	WC2H 8
E14 0	EC1V 9	EC3M 5	EC4Y 7	SL1 6	TW3 1	W12 6	W1K 1	W6 0	WC2H 9
E14 1	EC1Y 0	EC3M 6	EC4Y 8	SL2 5	TW3 2	W12 7	W1K 2	W6 6	WC2N 4
E14 2	EC1Y 1	EC3M 7	EC4Y 9	SL3 9	TW3 3	W12 8	W1K 3	W6 7	WC2N 5
E14 3	EC1Y 2	EC3M 8	N1 0	SL6 0	TW3 4	W13 0	W1K 4	W6 8	WC2N 6
E14 4	EC1Y 4	EC3N 1	N1 6	SL6 1	TW3 9	W13 8	W1K 5	W6 9	WC2R 0
E14 5	EC1Y 8	EC3N 2	N1 7	SL6 2	TW4 5	W14 0	W1K 6	W7 1	WC2R 1
E14 6	EC2A 1	EC3N 3	N1 8	SL6 4	TW4 6	W14 8	W1K 7	W7 3	WC2R 2
E14 7	EC2A 2	EC3N 4	N1 9	SL6 8	TW4 7	W1A 1	W1S 1	W8 4	WC2R 3
E14 8	EC2A 3	EC3P 3	N1C 4	SL9 7	TW5 0	W1A 3	W1S 2	W8 5	
E14 9	EC2A 4	EC3R 5	NW1 0	SW1A 0	TW5 9	W1A 9	W1S 3	W8 6	
E1W 1	EC2M 1	EC3R 6	NW1 1	SW1A 1	TW6 2	W1B 1	W1S 4	W8 7	
E1W 2	EC2M 2	EC3R 7	NW1 2	SW1A 2	TW7 4	W1B 2	W1T 1	W8 9	
E1W 3	EC2M 3	EC3R 8	NW1 3	SW1E 5	TW7 5	W1B 3	W1T 2	W9 3	
E2 6	EC2M 4	EC3V 0	NW1 5	SW1E 6	TW8 0	W1B 4	W1T 3	WC1A 1	
E2 7	EC2M 5	EC3V 1	NW1 6	SW1H 0	TW8 8	W1B 5	W1T 4	WC1A 2	
E3 2	EC2M 6	EC3V 3	NW1 7	SW1H 9	TW8 9	W1C 1	W1T 5	WC1B 3	
E3 3	EC2M 7	EC3V 4	NW1 8	SW1P 1	UB1 1	W1C 2	W1T 6	WC1B 4	
E77 1	EC2N 1	EC3V 9	NW1 9	SW1P 2	UB1 3	W1D 1	W1T 7	WC1B 5	
E98 1	EC2N 2	EC4A 1	NW10 5	SW1P 3	UB10 0	W1D 2	W1U 1	WC1E 6	
EC1A 1	EC2N 3	EC4A 2	NW10 6	SW1P 4	UB11 1	W1D 3	W1U 2	WC1E 7	
EC1A 2	EC2N 4	EC4A 3	NW10 7	SW1V 1	UB18 7	W1D 4	W1U 3	WC1H 0	
EC1A 4	EC2P 2	EC4A 4	NW3 3	SW1V 2	UB18 9	W1D 5	W1U 4	WC1H 8	
EC1A 7	EC2R 5	EC4M 5	NW5 2	SW1W 0	UB3 1	W1D 6	W1U 5	WC1H 9	
EC1A 9	EC2R 6	EC4M 6	NW6 4	SW1W 9	UB3 2	W1D 7	W1U 6	WC1N 1	
EC1M 3	EC2R 7	EC4M 7	NW8 0	SW1X 0	UB3 3	W1F 0	W1U 7	WC1N 2	
EC1M 4	EC2R 8	EC4M 8	SE1 0	SW1X 7	UB3 4	W1F 7	W1U 8	WC1N 3	
EC1M 5	EC2V 5	EC4M 9	SE1 1	SW1X 8	UB3 5	W1F 8	W1W 5	WC1R 4	
EC1M 6	EC2V 6	EC4N 1	SE1 2	SW1X 9	UB4 0	W1F 9	W1W 6	WC1R 5	
EC1M 7	EC2V 7	EC4N 4	SE1 3	SW1Y 4	UB5 6	W1G 0	W1W 7	WC1V 6	
EC1N 2	EC2V 8	EC4N 5	SE1 4	SW1Y 5	UB6 8	W1G 6	W1W 8	WC1V 7	
EC1N 6	EC2Y 5	EC4N 6	SE1 6	SW1Y 6	UB6 9	W1G 7	W2 1	WC1X 0	
EC1N 7	EC2Y 8	EC4N 7	SE1 7	SW3 1	UB7 0	W1G 8	W2 2	WC1X 8	
EC1N 8	EC2Y 9	EC4N 8	SE1 8	SW3 2	UB7 7	W1G 9	W2 3	WC1X 9	
EC1R 0	EC3A 1	EC4R 0	SE1 9	SW3 3	UB7 8	W1H 1	W2 4	WC2A 1	
EC1R 1	EC3A 2	EC4R 1	SE11 5	SW7 1	UB7 9	W1H 2	W2 6	WC2A 2	
EC1R 3	EC3A 3	EC4R 2	SE11 6	SW7 2	UB8 1	W1H 4	W3 6	WC2A 3	
EC1R 4	EC3A 4	EC4R 3	SE16 2	SW7 4	UB8 2	W1H 5	W4 1	WC2B 4	

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 5.3, 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 5.2, 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 very low bandwidth traditional interface leased lines in the UK excluding the Hull Area, at below 2Mbit/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;

Table 2: Core Nodes

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

(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;

(l) "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;

(u) "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	Basingstoke/Bounty
Belfast	Belfast/City; Belfast/Seymour
Birmingham	Birmingham Central; Birmingham Midland Birmingham Perryfields (Bromsgrove); Erdington
Bishops Stortford	Bishops Stortford
Brighton	Brighton Hove
Bristol	Bedminster, Bristol Redcliffe
Cambridge	Cambridge Trunks
Cardiff/Newport	Cardiff; Newport (Gwent)
Carlisle	Carlisle
Chelmsford	Chelmsford Town
Coventry	Coventry Greyfriar; Leamington 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 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;

(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 5.1

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:

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

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 2.25 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 2.25 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 2.25 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—

C*t* is the Percentage Change in charges for the products and services in the sub-basket 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

(l) 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 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 12 months preceding the start of the Relevant Year on which that charge applied) exclusive of discounts in the 12 months preceding the start of 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 12 months preceding the start of 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[174]

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)

[174] 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[175] 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[176] 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)

[175] These charges correspond to the Carrier Price List, Section 57 subpart 3

[176] These charges correspond to the Carrier Price List, Section B12, Part 12.01

Remote site linkage charges

- 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[177] 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

[177] These charges correspond to the Carrier Price List, Section B8, Part 8.01

- 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

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[178] charges

For 3rd 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)[179] services

Equipment charges:

[178] These charges correspond to the Carrier Price List, Section B8, Part 8.03

[179] These charges correspond to the Carrier Price List, Section B8, Part 8.06

- STM1 – Single Wavelength
- STM4/STM16 – Dual Wavelength

Radio Base Station Backhaul – Point of Connection[180] 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

[180] These charges correspond to the Carrier Price List, Section B11, Part 11.01.1

- 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
- 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)

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[181]

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

[181] 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[182]
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[183] **services**

Circuit Migration charges

[182] These charges correspond to the Carrier Price List, Section B8, Part 8.03

[183] 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

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
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- 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[184] services

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

Partial Private Circuits - Other services[185]

[184] These charges correspond to the Carrier Price List, Section B8, Part 8.05

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)
- 34 - 155Mbit/s Mon – Fri standard working hours
- 34 - 155Mbit/s Monday – Friday Out of Hours; Saturdays & Sundays

[185] These charges correspond to the Carrier Price List, Section B8, Part 8.06

- 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)

Equipment charges

- STM1 – Single wavelength
- STM14/STM16 – Dual Wavelength

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[186]

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[187]

- 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[188]

- Rearrange carried out during BT Normal Working Hours

[186] These charges correspond to the Carrier Price List, Section B11, Part 11.02.02

[187] These charges correspond to the Carrier Price List, Section B12, Part 12.01.4

[188] 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[189] charge

- 2Mbits

Survey charges[190]

- All Bandwidths

Visits and Time Related charges[191]

- As required

Bandwidth Changes[192] 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[193] 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[194]

- As per Openreach ECCs except for radio ECCs below
    - Customer Cabinet
    - Radio Monopole
    - Elevated Platform Usage (charge per day)

Standby power[195] charges

- Standby batteries if required

[189] These charges correspond to the Carrier Price List, Section B12, Part 12.01.6

[190] These charges correspond to the Carrier Price List, Section B12, Part 12.01.7

[191] These charges correspond to the Carrier Price List, Section B12, Part 12.01.8

[192] These charges correspond to the Carrier Price List, Section B12, Part 12.01.9

[193] These charges correspond to the Carrier Price List, Section B12, Part 12.01.10

[194] These charges correspond to the Carrier Price List, Section B12, Part 12.01.11

[195] These charges correspond to the Carrier Price List, Section B12, Part 12.01.12

Cancellation charges[196] 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[197] charges

For site linkage charge and 2Mb bandwidth charge

- Year 1
- Year 2
- Year 3
- Year 4
- Standard charges

Charging for Diagnostic Test Officers[198]

- 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[199]

[196] These charges correspond to the Carrier Price List, Section B12, Part 12.01.13

[197] These charges correspond to the Carrier Price List, Section B12, Part 12.01.14

[198] These charges correspond to the Carrier Price List, Section B12, Part 12.01.18

Connection of a new circuit single charge

- 64Kbit/s – 960Kbit/s
- 1Mbit/s
- 2Mbit/s
- 34Mbit/s – 45Mbit/s
- 140Mbit/s – 155Mbit/s

Circuit Rental/Maintenance[200] 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

[199] These charges correspond to the Carrier Price List, Section B8, Part 8.02
[200] These charges correspond to the Carrier Price List, Section B8, Part 8.03

- Local end fixed charge p.a. (3rd party customer link)
- 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 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 "**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 https://www.btwholesale.com/pages/static/Products/Data_and_IP_Connectivity/Partial_Private_Circuits/index.htm
    - For Netstream services, please refer to https://www.btwholesale.com/pages/static/Products/Data_and_IP_Connectivity/Netstream/index.htm
    - 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_Information/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[201].

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—

C*t* is the Percentage Change in charges for the products and services in the sub-basket 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

[201] 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 annual 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 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 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 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 - 100Mb/s service Annual Rental
- 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

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 1 Rental 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

- KCI3 charge starts 5 working days after the KCI3 update is issued on the order.

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 http://www.openreach.co.uk/orpg/home/home.do

- Specifically:

  - For EAD services, please refer to http://www.openreach.co.uk/orpg/home/products/ethernetservices/ethernetaccessdirect/ead.do

  - For EBD services, please refer to http://www.openreach.co.uk/orpg/home/products/ethernetservices/ethernetbackhauldirect/ebd.do

  - For BTL services, please refer to http://www.openreach.co.uk/orpg/home/products/ethernetservices/bulktransportlink/bulktransportlink.do

  - For WES/WEES services, please refer to http://www.openreach.co.uk/orpg/home/products/ethernetservices/wholesaleextensionservices/wes.do

  - For BES services, please refer to http://www.openreach.co.uk/orpg/home/products/ethernetservices/backhaulextensionservices/bes.do

  - For Openreach Network Backhaul Service, please refer to http://www.openreach.co.uk/orpg/home/products/ethernetservices/openreachnetworkbackhaulservices/onbs.do

  - For Backhaul Network Service, please refer to http://www.openreach.co.uk/orpg/home/products/ethernetservices/backhaulnetworkservices/bns.do

  - For Cablelink services, please refer to http://www.openreach.co.uk/orpg/home/products/ethernetservices/cablelink/cablelink.do

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—

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

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 11.5 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 11.5 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 11.5 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[202].

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—

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

where—

C*t* is the Percentage Change in charges for the products and services in the sub-basket 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

[202] Where RPI exceeds 5% the control for the purposes of this paragraph **(i)** 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.

(l) 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 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 Statement by average charges exclusive of discounts in the 12 months preceding the start of 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 Statement by average charges exclusive of discounts in the 12 months preceding the start of 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 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 12 months preceding the start of the Relevant Year on which that charge applied) exclusive of discounts in the 12 months preceding the start of 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 by average actual charges exclusive of discounts in the 12 months 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.

(o) 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 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 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 - 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 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

- KCI3 charge starts 5 working days after the KCI update is issued on the order.

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 annual 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
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 1 Rental 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

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 "**Ethernet Services Basket**", being the products and/or services in Sections 1 to 2 of this Annex, please refer to http://www.openreach.co.uk/orpg/home/home.do

- Specifically:

  - For EAD services, please refer to http://www.openreach.co.uk/orpg/home/products/ethernetservices/ethernetaccessdirect/ead.do

  - For EBD services, please refer to http://www.openreach.co.uk/orpg/home/products/ethernetservices/ethernetbackhauldirect/ebd.do

  - For BTL services, please refer to http://www.openreach.co.uk/orpg/home/products/ethernetservices/bulktransportlink/bulktransportlink.do

  - For WES/WEES services, please refer to http://www.openreach.co.uk/orpg/home/products/ethernetservices/wholesaleextensionservices/wes.do

  - For BES services, please refer to http://www.openreach.co.uk/orpg/home/products/ethernetservices/backhaulextensionservices/bes.do

  - For Openreach Network Backhaul Service, please refer to http://www.openreach.co.uk/orpg/home/products/ethernetservices/openreachnetworkbackhaulservices/onbs.do

  - For Backhaul Network Service, please refer to http://www.openreach.co.uk/orpg/home/products/ethernetservices/backhaulnetworkservices/bns.do

  - For Cablelink services, please refer to http://www.openreach.co.uk/orpg/home/products/ethernetservices/cablelink/cablelink.do

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—

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

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 2.25 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—

C*t* is the Percentage Change in charges for the products and services in the sub-basket 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 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 12 months preceding the start of the Relevant Year on which that charge applied) exclusive of discounts in the 12 months preceding the start of 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 12 months preceding the start of the Relevant Year.

(l) 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 (l) 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 products and/or services comprise, within the "**Retail Analogue Services Basket**" and within the meaning of "**Retail Analogue Sub-cap Services**", please refer to http://btbusiness.custhelp.com/app/answers/detail/a_id/10970/c/2915,2916,3000,3006

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—

C*t* is the Percentage Change in charges for the products and services in the sub-basket 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 order discontinued – indicative quote for Co-location facilities above £60,000
- 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 products and/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 http://www.openreach.co.uk/orpg/home/products/llu/accesslocate/accesslocate.do

  - For Accommodation services, please refer to http://www.openreach.co.uk/orpg/home/products/llu/comingling/comingling.do

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—

C*t* is the Percentage Change in charges for the products and services in the sub-basket 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*, on the day immediately before 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 include—

i. 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 products and/or services comprise, within the meaning of "**ECC Services**", please refer to http://www.openreach.co.uk/orpg/home/products/serviceproducts/excessconstructioncharges/excessconstructioncharges.do

Annex B to Condition 5.6

Starting Charge Adjustment Values pursuant to conditions 5.6

Product and/or service	Start charge (£)
Survey Fee	252
Drilling each external wall	235
Drilling each internal wall non concrete	43
Drilling each internal wall concrete	142
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;

(l) "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 one decimal

place) 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 one decimal place) 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 pre-ordering, 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;

(l) 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 (o).

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;

(l) "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 pre-ordering, 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;

(l) 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.