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## Dark Fibre Consultation

Consultation on adding dark fibre to the remedies for business connectivity markets

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### **CONSULTATION:**

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## About this document

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Leased lines are high-quality, dedicated, point-to-point data transmission services used by businesses and providers of communications services. As well as being essential components of many businesses communications systems, they are also essential to support the provision of mobile telephone and fixed residential broadband services.

We have found BT to have significant market power (SMP) in the provision of wholesale leased lines services of all bandwidths at and below 1Gbit/s in many parts of the UK.

This consultation sets out our proposal to introduce a dark fibre remedy to address BT's SMP in these markets. We believe that dark fibre is an important remedy in these markets as it offers greater scope to unlock efficiency and innovation benefits than active remedies alone.

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# 1. Introduction

- 1.1 In the 2016 BCMR Statement, Ofcom introduced a dark fibre remedy, requiring BT to provide unlit strands of its optical fibre, to which access-seekers could attach their own electronic equipment to deliver business connectivity services. Dark fibre enables innovation and allows purchasers to save money on equipment costs, therefore supporting the spread of fibre-based services across the UK.
- 1.2 For 15 months, between April 2016 and July 2017, industry worked with BT to develop the detailed technical and operational aspects of the dark fibre product. During this period, in December 2016, BT published a reference offer for dark fibre. BT's development costs for the product have been funded by its customers, as BT was provided with an allowance under the 2016 Leased Lines Charge Control (2016 LLCC). BT has already incurred the vast majority of the costs of developing a dark fibre product.
- 1.3 We understand that telecoms providers are keen to purchase dark fibre from BT and have invested in systems and processes to use it.
- 1.4 Dark fibre is, therefore, a product which BT is ready and able to provide, for which its costs of development have been covered, and for which it is clear to BT that there is demand from many of its key customers. Despite this, BT has chosen to not supply this product.<sup>1</sup>

## We are consulting on requiring BT to provide dark fibre

- 1.5 The Competition Appeal Tribunal (the Tribunal) ruled that Ofcom erred in certain aspects of its market definition in the 2016 BCMR Statement. As a result of this, Ofcom is removing the remedies imposed under the 2016 BCMR Statement, including the dark fibre remedy.<sup>2</sup> However, the Tribunal was not required to make any ruling about our assessment of dark fibre.
- 1.6 Today we are, in the BCMR Temporary Conditions Statement,<sup>3</sup> making temporary SMP findings in respect of BT in wholesale leased line services of all bandwidths at and below 1Gbit/s using contemporary interface (CI) technologies<sup>4</sup> (collectively referred to as Lower Bandwidth CISBO services).<sup>5</sup> We have imposed temporary SMP obligations concerning the

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<sup>1</sup><https://www.openreach.co.uk/orpg/home/updates/briefings/ethernet-services-briefings/ethernet-services-briefings-articles/eth02817.do>.

<sup>2</sup> Ofcom, *Business Connectivity Market Review 2016, Revocation of certain measures imposed in the business connectivity markets*, 21 November 2017, [https://www.ofcom.org.uk/\\_data/assets/pdf\\_file/0018/108018/BCMR-Revocation-Notification.pdf](https://www.ofcom.org.uk/_data/assets/pdf_file/0018/108018/BCMR-Revocation-Notification.pdf).

<sup>3</sup> Ofcom, *Business Connectivity Markets, Temporary SMP conditions in relation to business connectivity services*, 21 November 2017 (BCMR Temporary Conditions Statement), [https://www.ofcom.org.uk/\\_data/assets/pdf\\_file/0019/108019/BCMR-Temporary-Conditions.pdf](https://www.ofcom.org.uk/_data/assets/pdf_file/0019/108019/BCMR-Temporary-Conditions.pdf).

<sup>4</sup> Including Ethernet in the First Mile (EFM).

<sup>5</sup> Very High Bandwidth (VHB) CISBO services comprise wholesale leased line services above 1Gbit/s using CI technology and WDM services of all bandwidths.

supply of active products in order to safeguard competition and protect the interests of consumers. These SMP obligations will remain in force until 31 March 2019.

- 1.7 In that context, we consider in this consultation whether to add a requirement on BT to provide dark fibre in addition to the other remedies imposed in the BCMR Temporary Conditions Statement. As part of this dark fibre consultation, we are also consulting on the market definition and SMP assessment set out in the BCMR Temporary Conditions Statement.
- 1.8 We continue to believe that introducing dark fibre would promote efficiency and better sustain effective competition than would be possible with active remedies alone. These benefits would include:
- improving productive efficiencies by allowing providers to reduce equipment costs overall;
  - enhancing dynamic efficiencies by offering telecoms providers more scope to innovate and to differentiate their leased line services; and
  - offering future opportunities to simplify regulation.<sup>6</sup>
- 1.9 In the 2016 BCMR Statement, a key element of ensuring a smooth transition to dark fibre was the design of the remedy. Our review and proposals presented in this consultation are based on the design of dark fibre determined in the 2016 BCMR Statement, as adapted for the revised market definition.
- 1.10 We propose to retain the retail minus pricing approach with reference to BT's 1Gbit/s active services, as developed in the BCMR 2016 and subsequently revised in our decision to amend the way in which non-domestic business rates (NDR) are treated in the calculation of the dark fibre price.<sup>7</sup> We consider that this pricing approach will allow for a smooth introduction of dark fibre in conjunction with existing active remedies. We consider that our proposed approach will be an appropriate and proportionate way to introduce a dark fibre remedy that will more effectively address BT's SMP in the Lower Bandwidth CISBO markets.
- 1.11 We recognise that telecoms providers may wish to use dark fibre in order to supply services above 1Gbit/s. However, we have not at this stage reached a conclusion as to whether BT has SMP in relation to these services. Therefore, as explained in section 3, we propose that BT should be able to use contractual limitations to prevent the use of dark fibre to supply VHB CISBO services.
- 1.12 Under this approach, we believe that the case for dark fibre is clearer than it was under the BCMR 2016<sup>8</sup>:

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<sup>6</sup> Section 7, Volume 1, 2016 BCMR Statement reviews in detail the benefits of dark fibre access.

<sup>7</sup> Ofcom, *Non-domestic rates and the price for regulated Dark Fibre*, 30 June 2017 (2017 NDR Statement), [https://www.ofcom.org.uk/data/assets/pdf\\_file/0021/103647/statement-non-domestic-rates-dark-fibre.pdf](https://www.ofcom.org.uk/data/assets/pdf_file/0021/103647/statement-non-domestic-rates-dark-fibre.pdf).

<sup>8</sup> Ofcom, *Business Connectivity Market Review*, 28 April 2016, (the 2016 BCMR Statement) <https://www.ofcom.org.uk/consultations-and-statements/category-1/business-connectivity-market-review-2015>. When

- a) The benefits of dark fibre remain significant, even in circumstances where BT may decide to limit the use to services of 1Gbit/s or below.
  - b) Productive efficiencies may be higher than we anticipated in 2016.
  - c) The risks of introducing dark fibre in the Lower Bandwidth CISBO markets are low.
  - d) Most of the costs of developing the dark fibre remedy have already been incurred.
  - e) Having been through the development process, in conjunction with the industry, BT has established that it can supply a workable dark fibre product.
- 1.13 We do not consider it appropriate to postpone a reconsideration of dark fibre to the next review of the business connectivity markets. Dark fibre is almost ready for launch and telecoms providers have invested in systems and processes to launch it.
- 1.14 In the light of the above we are consulting on whether to introduce a dark fibre remedy for the period April 2018 to March 2019. We are consulting for a period of just over one month and the deadline for responses is 29 December 2017. In considering an appropriate duration of the consultation period, we have taken into account that the proposed dark fibre remedy is based to a large extent on the design and analysis of risks and benefits that were subject to extensive consultation under the BCMR 2016. We also recognise that potential purchasers, who had readied their operations to take a dark fibre product, need clarity on the course of regulation. We aim to notify a draft statement setting out our conclusions in light of the consultation responses to the European Commission in early 2018, followed by a final statement before the end of the first quarter of 2018.
- 1.15 In the BCMR Temporary Conditions Statement, we set the charge control for the Ethernet basket, taking into account our dark fibre proposals. In the charge control modelling we have updated our forecast of dark fibre take-up and the necessary cost uplifts, resulting in a control of CPI-13.50% in each of Period 1 and Period 2 of the control. This compares to a control of CPI-12.75% in each of Period 1 and Period 2 if we were to base our calculations on the 2016 BCMR Statement.<sup>9</sup>
- 1.16 We will consider the question of what overall package of remedies is appropriate for the business connectivity markets in the next BCMR.

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referring to the 2016 Business Connectivity Market Review (BCMR 2016) or the 2016 BCMR Statement, we also refer to our subsequent decision to amend the way in which non-domestic business rates are treated in the calculation of the dark fibre price as set out in our statement *Non-domestic rates and the price for regulated Dark Fibre*, 30 June 2017 (the 2017 NDR Statement), [https://www.ofcom.org.uk/data/assets/pdf\\_file/0021/103647/statement-non-domestic-rates-dark-fibre.pdf](https://www.ofcom.org.uk/data/assets/pdf_file/0021/103647/statement-non-domestic-rates-dark-fibre.pdf).

<sup>9</sup> We estimate that absent a dark fibre remedy the Ethernet basket control would be CPI-14.50% in each of Period 1 and Period 2. Should we decide to not impose a dark fibre remedy in Spring 2018, we will update the final year of the charge control accordingly.

## Impact assessment

- 1.17 The analysis presented in this consultation constitutes an impact assessment as defined in section 7 of the Communications Act 2003 (the Act).
- 1.18 Impact assessments provide a valuable way of assessing different options for regulation and showing why the preferred option was taken. They form part of best practice policy-making. This is reflected in section 7 of the Act, which means that generally we have to carry out impact assessments where our proposals would be likely to have a significant effect on businesses or the general public, or when there is a major change in Ofcom's activities. However, as a matter of policy, Ofcom is committed to carrying out impact assessments in relation to the great majority of our policy decisions.<sup>10</sup>

## Equality impact assessment

- 1.19 Ofcom is separately required by statute to assess the potential impact of all our functions, policies, projects and practices on race, disability and gender equality. Equality Impact Assessments (EIAs) also assist us in making sure that we are meeting our principal duty of furthering the interests of citizens and consumers regardless of their background or identity.
- 1.20 It is not apparent to us that the proposals set out in this consultation are likely to have any particular impact on race, disability and gender equality. Specifically, we do not envisage the impact of any outcome to be to the detriment of any group of society. Nor do we envisage any need to carry out separate EIAs in relation to race or gender equality or equality schemes under the Northern Ireland and Disability Equality Schemes. This is because we anticipate that our regulatory intervention will not have a differential impact in relation to people of different gender or ethnicity, on consumers in Northern Ireland or on disabled consumers compared to consumers in general. Similarly, we do not consider that our proposals will have a particular impact on consumers in different parts of the UK or between consumers on low incomes.

## Structure of this document

- 1.21 The structure of this document is as follows:
- a) In section 2, we explain our approach to market assessment for the purposes of this review. We consult on the market definition and SMP findings that we set out in the BCMR Temporary Conditions Statement.
  - b) In section 3, we set out the design and implementation of our proposed dark fibre remedy, including our proposals to impose specific remedies relating to the provision of dark fibre, including non-discrimination, requirements concerning a reference offer,

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<sup>10</sup> For further information about our approach to impact assessments, see the guidelines, *Better policy-making: Ofcom's approach to impact assessment*, [https://www.ofcom.org.uk/\\_data/assets/pdf\\_file/0026/57194/better\\_policy\\_making.pdf](https://www.ofcom.org.uk/_data/assets/pdf_file/0026/57194/better_policy_making.pdf)

transparency as to quality of service, and regulatory reporting of information concerning the provision of dark fibre.

- c) In section 4, we re-visit the benefits and costs of the proposed dark fibre remedy, in light of its application to the Lower Bandwidth CISBO markets, and the fact that many of the development costs of dark fibre have already been incurred.
- d) In section 5 we consider the impact of our proposed dark fibre remedy on the charge control.

## 2. Market assessment

### Introduction

- 2.1 In the BCMR Temporary Conditions Statement, we decide that BT has SMP:
- a) in a market comprising wholesale leased line services of all bandwidths at and below 1Gbit/s using contemporary interface (CI) technologies<sup>11</sup> (collectively referred to as Lower Bandwidth CISBO services) in the London Periphery (LP);
  - b) in markets comprising Lower Bandwidth CISBO services in the central business districts (CBDs) of each of Bristol and Manchester; and
  - c) in a market comprising Lower Bandwidth CISBO services in the Rest of UK, excluding Hull, the Central London Area (CLA), the LP and the CBDs of Bristol, Birmingham, Glasgow, Leeds and Manchester (RoUK excluding the Five CBDs).
- 2.2 We have also defined markets comprising Lower Bandwidth CISBO services in the CLA and the CBDs of each of Birmingham, Glasgow and Leeds. However, we have not made an SMP finding in relation to these markets.
- 2.3 We have decided that the CI core consists of links between any of: (a) the 107 exchanges specified in column 2 of Schedule 22 of the BCMR Temporary Conditions Statement; (b) the 56 trunk aggregation nodes (TANs) that we identified in the 2013 BCMR Statement<sup>12</sup> (excluding links between exchanges within the same TAN); and (c) the 64 data centres identified in the 2016 BCMR Statement.
- 2.4 The above market definitions and market power determinations will apply until 31 March 2019.

### Approach to market assessment for the purposes of this review

- 2.5 We have considered whether it may be appropriate to introduce a dark fibre remedy to address BT's SMP in the Lower Bandwidth CISBO markets by reference to the decisions we have taken in the BCMR Temporary Conditions Statement on SMP and remedies.<sup>13</sup> Further, in accordance with our findings in the BCMR Temporary Conditions Statement, we have evaluated our dark fibre remedy on the basis that we have not reached a conclusion as to whether BT has SMP in respect of wholesale leased line services above 1Gbit/s using CI technology and WDM services of all bandwidths (collectively referred to Very High Bandwidth (VHB) CISBO services).

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<sup>11</sup> This market includes Ethernet in the First Mile (EFM) but excludes WDM services of all bandwidths.

<sup>12</sup> Ofcom, *Business Connectivity Market Review*, 28 March 2013. <https://www.ofcom.org.uk/consultations-and-statements/category-2/business-connectivity-mr>

<sup>13</sup> We provide our reasoning on product market definition, geographic market definition and market power findings in section 2 of the BCMR Temporary Conditions Statement and do not reproduce it here.

- 2.6 The Tribunal has found Ofcom to have erred in relation to the various aspects of the 2016 BCMR Statement market definition. We note in the BCMR Temporary Conditions Statement that, in considering what steps it is appropriate to take, we have taken into account the Tribunal's reasoned judgment, reaching conclusions where we have been able to conduct the analysis necessary to address the Tribunal's findings, or where it is clear that our conclusions would not be affected by the Tribunal's findings. We have used those parts of Ofcom's reasoning and analysis from the BCMR 2016 which the Tribunal's judgment did not overturn, taking into account new evidence that has arisen since the completion of the BCMR 2016.
- 2.7 There are therefore some services in relation to which we have been able to conclude that BT has SMP on a forward-looking basis until 31 March 2019. These conclusions are based on the analysis carried out in the BCMR 2016, taking into account the Tribunal's judgment and new evidence that has arisen since the completion of the BCMR 2016.
- 2.8 In defining markets for this purpose, we were mindful that market definition is not an end in itself, but it is a tool to enable the assessment of market power.<sup>14</sup> For this reason, we approached the exercise of defining markets with a view to identifying services where we could find that BT has SMP on the basis of the evidence and analysis available to us now.
- 2.9 The absence of an SMP finding in respect of specific services, areas or exchanges should therefore not be taken as a conclusion that those services, areas or exchanges are competitive, nor does it prejudice the outcome of the market assessment in our next BCMR.
- 2.10 As part of this dark fibre consultation we are consulting under section 84(2) of the Act on the market definition and SMP assessment set out in the BCMR Temporary Conditions Statement. Section 84(2) of the Act provides that where we have identified and analysed a market for the purposes of making a market power determination, we may carry out further analyses of that market for one or both of the following purposes:
- a) reviewing market power determinations made on the basis of an earlier analysis;
  - b) deciding whether to make proposals for the modification of SMP conditions set by reference to a market power determination made on such a basis.
- 2.11 As set out in section 4, we consider that introducing dark fibre would promote efficiency and better sustain effective competition than would be possible with active remedies alone. We are therefore consulting on proposals to modify the BCMR Temporary Conditions to add our proposed dark fibre remedy. In doing so, we consider it is also appropriate to review the market power determinations made in the BCMR Temporary

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<sup>14</sup> See for example paragraph 2 of the European Commission *Notice on the Definition of the Relevant Market for the Purposes of Community Competition Law*. It is also notable that in some circumstances competition authorities will not consider it necessary to conclude on the boundaries of a market at all: see for example paragraph 5.2.4 of the Competition Commission and Office of Fair Trading *Merger Assessment Guidelines*, [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/284449/OFT1254.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/284449/OFT1254.pdf).

Conditions Statement by asking for views and evidence on the markets defined and on whether BT has SMP in the Lower Bandwidth CISBO markets until 31 March 2019.

- 2.12 If our further analyses of the Lower Bandwidth CISBO markets, following responses to this consultation, lead us to conclude that any aspect of the market definition or SMP assessment contained in the BCMR Temporary Conditions Statement is incorrect, we will consider what remedies (if any) would continue to be appropriate. Conversely, if our further analyses following this consultation confirm our decisions in respect of the market definition and SMP assessment contained in the BCMR Temporary Conditions Statement, the decisions contained in the BCMR Temporary Conditions Statement (including those relating to the imposition of the BCMR Temporary Conditions and directions) will remain in force until 31 March 2019.

**Question 2.1:** Do you agree with our findings in relation to product market definition as set out in paragraphs 2.9 to 2.13 of the BCMR Temporary Conditions Statement, namely that we define a market comprising wholesale leased line services of all bandwidths at and below 1Gbit/s using contemporary interface (CI) technologies, including EFM? Please set out your reasons and supporting evidence for your response.

**Question 2.2:** Do you agree with our findings in relation to geographic market definition as set out in paragraphs 2.14 to 2.19 of the BCMR Temporary Conditions Statement, namely that we define the following geographic markets: (a) the CLA; (b) the LP; (c) the CBDs of each of Birmingham, Bristol, Leeds, Glasgow and Manchester; and (d) the RoUK excluding the Five CBDs? Please set out your reasons and supporting evidence for your response.

**Question 2.3:** Do you agree with our assessment of the CI Core, as set out in paragraphs 2.101 to 2.111 of the BCMR Temporary Conditions Statement? Please set out your reasons and supporting evidence for your response.

**Question 2.4:** Do you agree with our findings that BT has SMP in the markets for Lower Bandwidth CISBO services in the LP, the CBDs of each of Bristol and Manchester and the RoUK excluding the Five CBDs, up to the end of March 2019, as set out in paragraphs 2.20 to 2.100 of the BCMR Temporary Conditions Statement? Please set out your reasons and supporting evidence for your response.

## 3. Proposed dark fibre remedy

### Introduction

- 3.1 In this section, we explain why we consider that introducing a passive remedy in the form of dark fibre in the Lower Bandwidth CISBO markets would promote efficiency and better sustain effective competition than would be possible with active remedies alone.
- 3.2 We explain why we continue to believe that the design of the dark fibre remedy established in the BCMR 2016, with adjustments to take account of our SMP findings, will ensure a smooth transition to passive remedies in these markets.
- 3.3 We then present the details of the scope and design of our proposed dark fibre remedy. This is summarised in Table 3.1.

**Table 3.1: Summary of the proposed dark fibre remedy on the Lower Bandwidth CISBO markets**

Obligation	Summary
<b>Specific access obligation</b>	<p>Provide dark fibre terminating segments upon reasonable request and on fair and reasonable terms and conditions and charges.</p> <p>Provide dark fibre terminating segments, including:</p> <ul style="list-style-type: none"> <li>• Disaggregated access and backhaul segments</li> <li>• Short range end-to-end segments</li> </ul>
<b>Non-discrimination</b>	<ul style="list-style-type: none"> <li>• No undue discrimination</li> <li>• Equivalence of inputs</li> </ul>
<b>Pricing</b>	<p>‘Active-minus’ by reference to the corresponding 1Gbit/s active product and the distributed long run incremental cost (LRIC) of its active elements, complemented by guidance on the calculation of the LRIC of the active elements.<sup>15</sup></p>
<b>Reference Offer</b>	<ul style="list-style-type: none"> <li>• Specified minimum requirements for the Reference Offer.</li> <li>• Service Level Agreements (SLAs) and Service Level Guarantees (SLGs) to be agreed and finalised as part of industry negotiations regarding product specification and to enter into force six months after the launch of dark fibre.</li> </ul>
<b>Implementation</b>	<ul style="list-style-type: none"> <li>• Publish a Reference Offer within one month of the date of the publication of the Final Statement.</li> <li>• Launch dark fibre access within one month of the date of the publication of the Final Statement.<sup>16</sup></li> </ul>

<sup>15</sup> See Annex 24 of the 2016 BCMR Statement as revised by Annex 3 of the 2017 NDR Statement.

<sup>16</sup> As noted in section 1, we intend to publish our final statement before the end of the first quarter of 2018.

Obligation	Summary
<b>Transparency as to quality of service</b>	<ul style="list-style-type: none"> <li>Key Performance Indicators (KPIs) defined in Direction.</li> <li>Reporting requirements to come into effect three months from launch.</li> </ul>
<b>Regulatory financial reporting requirements</b>	<p>Information published in the RFS:</p> <ul style="list-style-type: none"> <li>Dark Fibre Services: (Non-Confidential Statements); the total volumes, average prices and revenues for dark fibre non-LA, dark fibre LA services and dark fibre Main Link Services (including their variants)</li> <li>volume, average price, revenue and total FAC cost for BT's dark fibre services in aggregate</li> </ul> <p>Information provided to Ofcom in private:</p> <ul style="list-style-type: none"> <li>The schedule entitled 'Dark Fibre Services Revenues and Costs'.</li> </ul>

- 3.4 The proposed dark fibre access obligation is in addition to the package of remedies we have decided to impose on BT in the BCMR Temporary Conditions Statement. This reflects the fact that the industry continues to rely on active remedies.

## We continue to believe a dark fibre remedy is appropriate

- 3.5 A contemporary interface leased line is comprised of optical fibre connecting two locations and equipment on each end of the line which is used to 'light' the fibre to transmit information between locations. The physical components of a leased line service can be categorised as 'active' components (e.g. electronics) and 'passive' components (e.g. duct and unlit fibre). The passive components can be thought of as a necessary input into active services and as such we refer to passive services as being higher up the supply chain.
- 3.6 Prior to the 2016 BCMR Statement, Ofcom's remedies in the leased line market required that BT, as the SMP provider, provided only regulated 'active' services. This meant that telecoms providers who wished to offer their own leased line services were unable to purchase passive inputs from BT and use these in combination with active components to create their own active services.
- 3.7 In the 2016 BCMR Statement, we concluded that introducing a passive remedy in the form of dark fibre would promote efficiency and better sustain effective competition in fibre-based leased lines than would be possible with active remedies alone. We concluded that a passive remedy in the form of dark fibre would allow rival providers to create their own active services by purchasing passive inputs from BT. We considered that this would expose active components to competition, thereby facilitation greater competition in leased lines.
- 3.8 In the BCMR Temporary Conditions Statement, we impose a set of active remedies to address BT's SMP. This consultation proposes to impose a dark fibre remedy to operate alongside the BCMR Temporary Conditions. We believe that a combination of passive and active remedies in the business connectivity markets is the most effective package of

remedies to protect consumers and promote competition during the transition period towards greater reliance on passive remedies.

3.9 We believe that the analysis of dark fibre conducted in the 2016 BCMR Statement is, in most respects, also applicable to our assessment of the most effective set of remedies to address the competition problems we have identified in the Lower Bandwidth CISBO markets. We believe that introducing dark fibre will result in the following benefits (which were first identified in the BCMR 2016):<sup>17</sup>

- a) Cost savings (productive efficiency) – More of the supply chain is exposed to competitive pressure. This will give telecoms providers opportunities to avoid duplication of electronic equipment, thus reducing costs. We have reason to expect that benefits from this source are greater than we believed in 2016. In addition, telecoms providers may be able to realise synergies between the electronic equipment adopted and downstream services. There may also be a cost impact from reduced fault frequency.
- b) Greater scope for innovation (dynamic efficiency) – Allowing telecoms providers to have greater control and flexibility in developing their services in respect of the active layer gives them greater scope to develop new and bespoke services and/or optimise their network design.
- c) Potential reduction in downstream regulation – Promoting competition based on regulated access to dark fibre (in combination with competition from end-to-end infrastructure providers) would enable the downstream regulation of active products to be reduced or eliminated in the future. Although we do not expect this benefit to be realised before 31 March 2019, it aligns with our longer term aim of favouring remedies further up the supply chain.

3.10 As in the BCMR 2016, we recognise that introducing a remedy higher up the supply chain creates risks.<sup>18</sup> We concluded in the 2016 BCMR Statement that these risks could be addressed by the design and pricing of dark fibre access.

3.11 We consider below, by reference to the design elements of the dark fibre remedy in the 2016 BCMR Statement, the design of an appropriate and proportionate way to introduce a dark fibre remedy intended to address BT's SMP in the Lower Bandwidth CISBO markets. In doing so, we explain whether any changes to the design and pricing are necessary. In section 4 we then consider the benefits and costs of this proposed remedy.

3.12 We note that in the Wholesale Local Access (WLA) review we have proposed to amend the current usage restrictions on physical infrastructure access (PIA) to enable telecoms providers to use the PIA remedy to deploy local access networks offering both broadband and non-broadband services (including leased lines) provided that the purpose of the network deployment is primarily the delivery of broadband services to homes and

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<sup>17</sup> Our detailed assessment of the benefits of the proposed dark fibre remedy is set out in section 4.

<sup>18</sup> Our detailed assessment of the impacts and risks of the proposed dark fibre remedy is set out in section 4.

businesses. We consider that this mixed use may enable investment in the provision of broadband services more generally.<sup>19</sup>

- 3.13 We expect to publish our final decisions concluding the WLA review in early 2018, with new measures taking effect on 1 April 2018. If the current usage restrictions on the PIA are amended as proposed, telecoms providers will only be able to use the remedy for leased lines if the purpose of a deployment is primarily the delivery of mass broadband services in the relevant area. The PIA remedy would not therefore be an option for network deployments for a different purpose, including those primarily for leased lines or leased lines only. In light of this, and given that the proposed PIA remedy is aimed solely at addressing competition problems in the WLA markets, we believe that there will be demand for dark fibre and that the proposed dark fibre remedy is needed to address BT's SMP in the Lower Bandwidth CISBO markets.<sup>20</sup>

## Requirement to provide access to dark fibre on reasonable request

### Scope of the dark fibre remedy

- 3.14 We propose to include a network access condition in the Lower Bandwidth CISBO markets requiring BT to provide access to its fibre infrastructure for the purposes of providing disaggregated leased line terminating segments upon reasonable request. The dark fibre access obligation would be imposed on the Lower Bandwidth CISBO markets in the LP, the CBDs of each of Bristol and Manchester, and the RoUK excluding the Five CBDs.
- 3.15 We consider that telecoms providers should be able to use the dark fibre remedy for any purpose that falls within the scope of the Lower Bandwidth CISBO markets. Telecoms providers should therefore be able to use the dark fibre remedy to provide disaggregated access and backhaul segments and short-range end-to-end terminating segments at bandwidths of up to and including 1Gbit/s.
- 3.16 The benefits of dark fibre are likely to be realised across a range of applications and undue restrictions in product use may reduce the benefits of dark fibre. Therefore, for the same reasons as in the 2016 BCMR Statement, we do not consider it appropriate to restrict the use of the proposed dark fibre remedy to any specific applications or products *within* the markets in which we find BT to have SMP.
- 3.17 Dark fibre is inherently more flexible than an active wholesale remedy because telecoms providers other than BT provide the active equipment. We have therefore considered whether to propose restrictions to minimise the risk of dark fibre being used for purposes

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<sup>19</sup> Ofcom, *Wholesale Local Access Market Review, Consultation on Duct and Pole Access remedies*, 20 April 2017, (April 2017 DPA Consultation) [https://www.ofcom.org.uk/data/assets/pdf\\_file/0008/101051/duct-pole-access-remedies-consultation.pdf](https://www.ofcom.org.uk/data/assets/pdf_file/0008/101051/duct-pole-access-remedies-consultation.pdf)

<sup>20</sup> We also note that as part of the WLA market review, we have analysed the risks associated with the proposals to amend the current usage restrictions on PIA and considered that they are unlikely to have a material impact in business connectivity markets within the WLA market review period (see paragraph 4.113 and Annex 5, April 2017 DPA Consultation).

that fall *outside* the scope of the Lower Bandwidth CISBO markets, specifically core conveyance and for bandwidths above 1Gbit/s.

- 3.18 The proposed dark fibre obligation would be limited to the Lower Bandwidth CISBO markets in which we have proposed that BT has SMP. Consequently, BT would not be required to supply dark fibre circuits for purposes that fall outside the scope of those markets. BT would therefore have the commercial freedom to restrict usage of its dark fibre product to prevent it being used for core conveyance and for bandwidths above 1Gbit/s.
- 3.19 We consider that BT would be able to implement an effective contractual restriction to this effect if it so chooses and that such restrictions would not be unduly burdensome for BT to administer or monitor.
- 3.20 Dark fibre purchasers would have compelling incentives to comply with such a contractual restriction. Using dark fibre for bandwidths above 1Gbit/s would constitute a breach of contract. This could lead to sanctions, including termination of the service, which would be highly damaging for the provider and their relationship with their customer. In addition, major users of dark fibre would not want to be perceived as untrustworthy business partners who were prepared to breach contractual obligations.
- 3.21 We consider that purchasers of dark fibre are unlikely to be able to use it for bandwidths above 1Gbit/s without this coming to BT's attention. For example, BT would require access to the circuit ends for maintenance purposes. In many cases it would be apparent whether the active equipment connected to the circuit was capable of supporting bandwidths above 1Gbit/s. BT would then be able to invoke its contractual rights to check the provider's records, or inspect the service management interface to verify actual bandwidth on the circuit. In addition, if a customer that was previously purchasing a 10Gbit/s active circuit switched to dark fibre, then BT would have a reasonable suspicion that it was being used for bandwidths above 1Gbit/s.
- 3.22 We note that in the context of another passive remedy (PIA, previously imposed in the WLA markets), BT was able to adopt a simple, contractual solution to reflect the scope of the PIA remedy.<sup>21</sup>
- 3.23 We recognise that there is a potential risk of BT framing such a commercial restriction too tightly, so that it may render the proposed dark fibre remedy less effective for the Lower Bandwidth CISBO services. If this were to occur, we would be prepared to act: either through an investigation into BT's compliance with the obligation to provide dark fibre

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<sup>21</sup> Clause 3.2 of BT's PIA RO requires the telecom provider to only use PIA for the allowed purposes. Non-compliance with this provision constitutes a material breach of contract under clause 2.3(a)(ii), allowing BT to terminate the agreement upon notice and provides that in the event of such a breach BT has discretion to refuse to accept any further orders from that telecoms provider until the breach has been rectified. The RO also requires telecoms providers to maintain relevant records, which BT has the right to inspect on reasonable notice under clause 7. See: <https://www.openreach.co.uk/orpg/home/products/ductandpoleaccess/contracts/contracts/downloads/PIAConditionsApril17.pdf>

access in the Lower Bandwidth CISBO markets, or through the dispute resolution mechanism.

- 3.24 As we discuss in more detail below, we are proposing to impose a distance limitation as an additional safeguard against usage for core conveyance and to provide additional transparency about permissible circuit lengths.

## Design of the dark fibre remedy

- 3.25 In the 2016 BCMR Statement we decided that the technical, operational (provisioning and repair) and commercial aspects of BT's current offer of wholesale Ethernet services (in particular EAD and EAD LA) should be used as a benchmark for establishing the arrangements applicable to dark fibre. BT's EAD products provide a range of connectivity options which fulfil telecoms providers' access and backhaul requirements, and BT's processes for providing those active products should therefore be capable of adaptation to include the provision of dark fibre. We also acknowledged that the operation of BT's dark fibre products would differ from Ethernet products in some respects.<sup>22</sup>
- 3.26 BT's wholesale Ethernet products (in particular, EAD and EAD LA) are the main products that BT currently supplies for Lower Bandwidth CISBO services. In view of our design objective for the dark fibre remedy, we therefore consider that they are also a suitable benchmark for a dark fibre product for the Lower Bandwidth CISBO markets.
- 3.27 Since the 2016 BCMR Statement, BT has developed its dark fibre product modelled on its Ethernet products, in collaboration with telecoms providers and the Office of the Telecommunications Adjudicator (OTA).
- 3.28 In view of the discussion above, we consider that BT's dark fibre product should be suitable for the Lower Bandwidth CISBO markets with only minor changes to reflect the difference between the Lower Bandwidth CISBO markets we are proposing to define in this consultation and the CISBO markets we defined in the 2016 BCMR Statement.
- 3.29 In the rest of this section we discuss the key design aspects of the dark fibre remedy we are proposing and explain where our proposals differ from the remedy we imposed in the 2016 BCMR Statement. The non-price design aspects of the proposed dark fibre remedy are summarised in Table 3.2.

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<sup>22</sup> For example, some differences in fault repair processes may be necessary since BT would not have the proactive circuit monitoring capabilities that it has with active services.

Table 3.2: Summary of non-price design aspects of dark fibre

Design aspect	Proposed approach
<b>Circuit configurations</b>	BT to provide dark fibre terminating segments of the following types: <ul style="list-style-type: none"> <li>disaggregated access and backhaul segments; and</li> <li>short range end-to-end segments.</li> </ul>
<b>Parity with active wholesale products</b>	Dark fibre product should be comparable to the optical elements of the corresponding active wholesale products.
<b>Arrangements concerning provision of new infrastructure</b>	The same arrangements should apply for both the active and dark fibre remedies and the existing charging arrangements for network extensions in relation to active services would provide the most suitable solution for dark fibre.
<b>Distance limits</b>	Distance limit of 45km for dark fibre based on the end-to-end radial distance of the circuit.
<b>One or two fibre circuits</b>	BT to provide one and two fibre circuits.
<b>Provisioning, repair and service migration processes</b>	The provisioning, repair and service migration processes which were developed by BT in collaboration with industry for the dark fibre remedy imposed in the 2016 BCMR Statement should be suitable for the proposed dark fibre remedy. These are specified in BT's dark fibre reference offer (RO). <sup>23</sup>
<b>Interconnection and accommodation services</b>	The interconnection and accommodation remedies that apply to active wholesale products should also apply to dark fibre.

### Circuit configurations

3.30 To ensure that purchasers of dark fibre are not at a competitive disadvantage to purchasers of active wholesale services, we consider that telecoms providers should be able to obtain dark fibre circuits in similar configurations to BT's current range of active services. To achieve this, we propose to impose an obligation comparable to the one imposed on BT for active wholesale services, requiring BT to provide dark fibre terminating segments in the following configurations:

- a) Disaggregated access and backhaul segments; and
- b) Short-range end-to-end segments.

3.31 This proposed obligation is consistent with our approach in the 2016 BCMR Statement.<sup>24</sup>

<sup>23</sup> BT's dark fibre Reference Offer (the dark fibre RO), see:

<https://www.openreach.co.uk/orpg/home/products/darkfibreaccess/darkfibreaccess.do>

<sup>24</sup> 2016 BCMR Statement, Volume 1, paragraph 9.11.

### Parity with active wholesale products

- 3.32 We propose that BT should be required to ensure that its dark fibre product is comparable to the optical elements of the corresponding wholesale active services. BT would thus be required to ensure that dark fibre circuits are provided in the same manner, using the same systems and processes and within the same or a shorter period of time, save in respect of objectively justifiable differences.

### Arrangements concerning provision of new infrastructure

- 3.33 We propose that the same arrangements concerning the provision of new infrastructure should apply for both the active and dark fibre remedies, and the existing charging arrangements for network extensions in relation to active services would provide the most suitable solution for dark fibre. We consider that this approach, as adopted in the 2016 BCMR Statement, will effectively ensure consistency with active services.

### Distance limits

- 3.34 As noted above, dark fibre is inherently more flexible than active services and, absent other restrictions, could readily be used to provide core conveyance which falls outside the scope of the Lower Bandwidth CISBO markets. We therefore consider that it would be appropriate to take steps to mitigate this risk and that the solution adopted in the 2016 BCMR Statement would be suitable.<sup>25</sup>
- 3.35 We propose to impose an upper distance limit of 45km (measured on a straight-line basis between circuit ends). This would provide an additional safeguard to complement any contractual restriction that BT may impose (on usage for core conveyance), minimising the risk of dark fibre being used to provide core conveyance. It would also provide transparency about the circuit lengths that are permissible. We consider that this approach would effectively minimise the risks relating to the competitive core market.

### One or two fibre circuits

- 3.36 To ensure that purchasers of dark fibre are not at a competitive disadvantage to purchasers of active wholesale services, we consider that telecoms providers should be able to obtain dark fibre circuits in similar configurations to BT's current range of active services. On this basis, we propose to require BT to provide one or two fibre circuits. This is consistent with our approach in the 2016 BCMR Statement.

### Provisioning, repair and service migration processes

- 3.37 The provisioning, repair and service migration processes were developed by BT in collaboration with telecoms providers during the implementation process for the dark fibre

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<sup>25</sup> 2016 BCMR Statement, Volume 1, paragraphs 9.27 to 9.29.

remedy imposed in the 2016 BCMR Statement. The processes were specified in BT's dark fibre RO.<sup>26</sup>

- 3.38 As noted above, these processes have been modelled on the processes for BT's wholesale Ethernet services which include Lower Bandwidth CISBO services. We therefore consider that these processes would be suitable for the proposed dark fibre remedy for Lower Bandwidth CISBO services and are unlikely to require any modification.

### Interconnection and accommodation services

- 3.39 We consider that telecoms providers will require interconnection and accommodation services to use the dark fibre remedy effectively. As previously discussed, we expect the dark fibre and active wholesale products to be very similar. We also expect that dark fibre would be used for the same purposes as active wholesale products and in the same configurations (e.g. disaggregated access and backhaul segments etc.). We therefore consider that the interconnection and accommodation remedies imposed on the market for Lower Bandwidth CISBO services in the BCMR Temporary Conditions Statement<sup>27</sup> would also be suitable for dark fibre. We therefore propose that these obligations should also apply to the dark fibre access obligation. This follows the same approach as the 2016 BCMR Statement.<sup>28</sup>

## Requirement not to discriminate unduly and Equivalence of Inputs

- 3.40 A non-discrimination obligation is intended as a complementary remedy to the network access obligation, principally to prevent the dominant provider from discriminating in favour of its own downstream divisions and to ensure that competing providers are placed in an equivalent position. Without such an obligation, the dominant provider is incentivised to provide the requested wholesale network access service on terms and conditions that discriminate in favour of its own downstream divisions.
- 3.41 Non-discrimination can have different forms of implementation. A strict form of non-discrimination would result in the SMP operator providing exactly the same products and services to all telecoms providers (including its own downstream divisions) on the same timescales, terms and conditions (including price and service levels), by means of the same systems and processes and by providing the same information, an arrangement which has become known as Equivalence of Inputs (EOI). A less strict implementation of non-discrimination may allow for flexibility and result in a more practical and cost-effective implementation of wholesale inputs in cases where it is economically justified.
- 3.42 We propose to impose an EOI requirement and a no undue discrimination obligation on BT on the same terms as described in the 2016 BCMR Statement as modified by our decisions in the 2017 NDR Statement. In relation to EOI, this means that BT should provide dark fibre

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<sup>26</sup> <https://www.openreach.co.uk/orpg/home/products/darkfibreaccess/darkfibreaccess.do>

<sup>27</sup> BCMR Temporary Conditions Statement, sections 3 and 4.

<sup>28</sup> 2016 BCMR Statement, Volume 1, paragraphs 9.38 to 9.40.

on the basis of EOI, but it will not be required to consume a dark fibre product in providing active services.<sup>29</sup> We consider that this analysis holds for this review period and is not altered by the fact that the dark fibre remedy aims to address the competition issues we have identified in the Lower Bandwidth CISBO markets.

- 3.43 In the 2017 NDR Statement we decided to modify the EOI obligation by providing that this obligation should not apply to the extent necessary to enable BT to comply with the pricing obligation in respect of NDRs.<sup>30</sup> Given that we propose to impose the same pricing obligation in respect of dark fibre in this consultation, we believe that the modification to the EOI obligation made in the 2017 NDR Statement remains appropriate.

## Approach to pricing dark fibre

- 3.44 We propose that dark fibre will be subject to a basis of charges obligation, with pricing calculated on the same basis as specified in the 2016 BCMR Statement and revised in the 2017 NDR Statement. We propose that dark fibre prices must be calculated on an ‘active-minus’ basis. This means that prices must be: first derived from the effective prices of the corresponding 1Gbit/s wholesale Ethernet active access products (EAD, EAD LA and Main Link), and second adjusted to reflect an “active differential”.<sup>31</sup> This active differential would consist of:
- a) the long run incremental costs (LRIC) avoided by BT when providing dark fibre;
  - b) a deduction to reflect an estimate of NDRs of the telecoms provider lighting the fibre as determined in the 2017 NDR Statement; and
  - c) the LRIC of any objectively justifiable differences between dark fibre and the corresponding active service.
- 3.45 We consider that using BT’s EAD, EAD LA and Main Link 1Gbit/s services as the reference products promotes a smooth transition to dark fibre. Setting the dark fibre price with reference to BT’s 1Gbit/s product will largely eliminate opportunities for rivals to arbitrage BT’s active services on the Lower Bandwidth CISBO markets.
- 3.46 As recognised in the 2017 NDR Statement, the NDR adjustment will not precisely match the NDRs payable by individual purchasers of dark fibre for all circuits. However, for the reasons set out in the 2017 NDR Statement we believe that for most circuits it offsets the NDR differential appropriately.<sup>32</sup>
- 3.47 We therefore consider that the use of dark fibre by a provider (and entry in the active layer) should generally only occur if the provider has lower incremental cost than BT in

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<sup>29</sup> 2016 BCMR Statement, Volume 1, paragraphs 9.74 to 9.78.

<sup>30</sup> 2017 NDR Statement, paragraphs 2.147 and 2.148.

<sup>31</sup> The price of dark fibre must reflect the effective price of the corresponding 1Gbit/s wholesale Ethernet access product at the time of placing the order. For example, if there are time-limited discounts in place at the time the dark fibre is being ordered these discounts should be reflected in the pricing.

<sup>32</sup> 2017 NDR Statement, paragraph 2.110.

relation to non-NDR elements (productive efficiency) or if the provider can exploit genuine innovation benefits from differentiating its service to end customers (dynamic efficiency).

3.48 A detailed assessment of our approach to pricing can be found in paragraphs 9.85 to 9.110 and Annex 23 of the 2016 BCMR Statement, as amended by the 2017 NDR Statement.

3.49 We propose to complement the pricing obligation with guidance relating to the calculation of the LRIC of the active elements. We consider that the guidance will provide greater flexibility than specifying a value in the charge control. We propose to publish the same guidance as that which was set out in Annex 24 of 2016 BCMR Statement, as amended by Annex 3 of the 2017 NDR Statement.

3.50 Consistent with our decisions in the 2016 BCMR Statement,<sup>33</sup> we also propose that the charge controls which we impose in the BCMR Temporary Conditions Statement on accommodation services, Excess Construction Charges (ECCs) and Time Related Charges (TRCs) provided in connection with the Lower Bandwidth CISBO services should equally apply to accommodation services, ECCs and TRCs provided in connection with the proposed dark fibre remedy. We would not expect there to be a difference between these ancillary services required by telecoms providers who purchase active products and the ancillary services required by telecoms providers who purchase dark fibre. We would therefore consider it appropriate that the same services and prices apply whether used alongside dark fibre or active products.

## Minimum requirements for Reference Offer

3.51 We propose that BT should be required to publish a Reference Offer (RO) for dark fibre in the Lower Bandwidth CISBO markets on the same terms set out in the 2016 BCMR Statement.<sup>34</sup> In particular, we propose that the RO for dark fibre must set out (as a minimum) such matters as:

- a) a clear description of the services on offer including technical characteristics and operational processes for service establishment, ordering and repair;
- b) the locations of points of network access and the technical standards for network access;
- c) conditions for access to ancillary and supplementary services associated with the network access including operational support systems and databases etc;
- d) contractual terms and conditions, including dispute resolution and contract negotiation/renewal arrangements;
- e) charges, terms and payment procedures; and

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<sup>33</sup> 2016 BCMR Statement, Volume 2, section 8.

<sup>34</sup> 2016 BCMR Statement, Volume 1, paragraphs 9.177 to 9.182.

- f) SLAs and SLGs to be agreed and finalised as part of industry negotiations regarding product specification and to enter into force 6 months after the launch of dark fibre (by 1 October 2018).
- 3.52 We also propose that the RO for dark fibre must set out an explanation of any differences between the matters referred to in paragraph 3.50 which apply to the provision of dark fibre and the same matters which apply to the relevant reference product.
- 3.53 This was the approach followed in the 2016 BCMR Statement and we consider that these requirements should apply to the dark fibre remedy on the Lower Bandwidth CISBO markets because the RO will assist in transparency for the monitoring of anti-competitive behaviour as well as providing visibility to the terms and conditions on which other providers will purchase dark fibre services.

## Implementation timetable

- 3.54 In the 2016 BCMR Statement, we concluded that BT would need some time to develop a dark fibre product and that it would need to negotiate some aspects of the product design with other telecoms providers. We therefore required BT to publish a final RO on 1 December 2016 (seven months after publication of the 2016 BCMR Statement) and to launch the dark fibre product on 1 October 2017 (17 months after publication of the 2016 BCMR Statement).
- 3.55 Most of the preparatory work for the launch of the dark fibre product has already been completed. We consider that BT will be able to conclude those activities which it needs to undertake before launching the dark fibre product within a period of one month.
- 3.56 As discussed above, we do not consider that it would be necessary for BT to make significant amendments to the dark fibre product to reflect the amended market definition. The RO may, however, require limited amendments, for example if BT wished to apply a contractual restriction to prevent usage of dark fibre above 1Gbit/s.<sup>35</sup>
- 3.57 We therefore propose that BT should be required to launch the dark fibre product, including the publication of the RO, within one month of the publication of our final statement.
- 3.58 We propose that BT should be subject to the obligation to give notice to its customers of any change in dark fibre prices; not less than 28 days' notice for any price reductions and not less than 90 days' notice for any other changes in price. However, given our proposal to require launch of dark fibre one month after our final statement, we propose to consent to BT not being required to give 28 days' notice when it announces dark fibre prices for the launch day.

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<sup>35</sup> Any such contractual restrictions imposed by BT should refer to the service rate rather than the transmission rate.

## Transparency as to quality of service

- 3.59 We propose to impose a direction requiring BT to provide quality of service information in the form of KPIs on dark fibre provided in the Lower Bandwidth CISBO markets once it is launched, on the same basis as set out in the 2016 BCMR Statement.<sup>36</sup> Such information would be needed to ensure that we are able to monitor performance outcomes as between active and passive remedies and to complement our measures to address potential discriminatory behaviour. We also believe that such information is likely to play a role for telecoms providers and BT in relation to SLAs and SLGs.
- 3.60 In the 2016 BCMR Statement we allowed a period of six months between the introduction of dark fibre and the delivery of the KPI data for the first relevant month. We now propose a period of three months because Openreach will have already completed some of the work necessary to generate the KPIs as part of the dark fibre product development it carried out in the 15 months between April 2016 and July 2017.

## Regulatory financial reporting

- 3.61 In the 2016 BCMR Statement we decided to impose the following specific requirements in relation to reporting of information in respect of the provision of dark fibre:
- a) Information published in the Regulatory Financial Reporting Statement (RFS):
    - i) Dark Fibre Services: (Non-Confidential Statements) which must set out: (i) fully allocated unit costs for each reference product; and (ii) the total volumes, average prices and revenues for dark fibre non-LA, dark fibre LA services and dark fibre Main Link Services (including their variants);
    - ii) In the market summary for each of the following wholesale markets: (i) the Lower Bandwidth CISBO Services in the London Periphery, (ii) the Lower Bandwidth CISBO Services in the Combined Geographic Business Markets<sup>37</sup> and (iii) the Lower Bandwidth CISBO Services in the Rest of UK, BT must disclose the volume, average price, revenue and total FAC cost for BT's dark fibre services in aggregate.
  - b) Information provided to Ofcom in private:
    - i) The schedule entitled Dark Fibre Services Revenues and Costs which must set out how the charge for each Dark Fibre Access non-LA variant, Dark Fibre Access LA variant and Dark Fibre Access Main Link variant has been calculated.<sup>38</sup>
- 3.62 In view of our proposed dark fibre remedy, we propose to impose the above requirements. Consistent with our approach in the 2016 BCMR Statement, we consider that it would be

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<sup>36</sup> 2016 BCMR Statement, Volume 1, paragraphs 9.197-9.201.

<sup>37</sup> In the BCMR Temporary Conditions Statement we required BT to report information in respect of Lower Bandwidth CISBO services for the LP including the CBDs of each of Bristol and Manchester (the Combined Geographic Business Markets), and the RoUK excluding the Five CBDs in separate market groupings. Consistent with this, we propose to require BT to report information in respect of the provision of dark fibre with the same market groupings.

<sup>38</sup> 2016 BCMR Statement, Volume 1, section 16.

important that telecoms providers and Ofcom are provided with this additional information to ensure transparency of the pricing of regulated dark fibre services in the Lower Bandwidth CISBO markets.

**Question 3.1:** Do you agree with our proposed design of the dark fibre access remedy? Please set out your reasons and supporting evidence for your response.

**Question 3.2:** If BT were to make available a dark fibre product based on the design set out above, how long would it take before your company was in a position to purchase it? From what date would you want BT to make such a product available?

## 4. Benefits, risks and costs of the proposed dark fibre remedy

### Introduction

- 4.1 In this section, we present our detailed assessment of the benefits and risks that the proposed dark fibre remedy would bring in the Lower Bandwidth CISBO markets, over and above active remedies. We rely on evidence that informed the 2016 BCMR Statement, and update our assessment in light of new evidence made available since then. We do not include VHB CISBO services in our assessment because, in view of our proposed SMP findings, there would be no regulatory obligation on BT to supply dark fibre to be used to supply VHB CISBO services. Our assessment is focused on the benefits and risks that arise from customers using dark fibre for services at or below 1Gbit/s.
- 4.2 In the next part of this section we assess the:
- a) likely take-up of dark fibre and
  - b) benefits of dark fibre, including:
    - i) the scale of the cost savings that dark fibre may facilitate;
    - ii) the impact of innovation facilitated by dark fibre; and
    - iii) the potential for reduced regulation of active services in future.
- 4.3 We then consider the risks and costs of our proposal to introduce dark fibre in the Lower Bandwidth CISBO markets.<sup>39</sup>
- 4.4 Finally, we conclude on the overall case for this remedy, based on our consideration of the likely costs and benefits.

### Benefits of the proposed dark fibre remedy

#### Likely take-up of dark fibre

- 4.5 The benefits of dark fibre will be realised where providers take up dark fibre services. We have therefore assessed situations where providers may prefer to use dark fibre as opposed to an active leased line.
- 4.6 Leased lines are used by three main types of customers: enterprise customers, mobile network operators (MNOs) and mass-market fixed broadband service providers. Enterprise customers typically use leased lines as components of ICT solutions in connecting their

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<sup>39</sup> Given that the potential risks of a dark fibre remedy were comprehensively discussed in the 2016 BCMR Statement, we refer where appropriate to that content in this consultation.

premises to a network. MNOs and providers of mass-market fixed broadband services often use leased lines to link nodes in their networks.<sup>40</sup>

- 4.7 We expect that, absent a dark fibre remedy, there would be around [X] active leased lines purchased from BT at bandwidths of 1Gbit/s and below in 2018/19, of which [X] are at a bandwidth of 1Gbit/s.
- 4.8 Dark fibre could in theory be used for any of the applications outlined above. As such, where providers see advantages in using dark fibre over an active product (e.g. due to cost savings), we would expect that they would do so. Due to our proposal to set the regulated dark fibre price at the price of 1Gbit/s (minus the active components), the most likely situations where providers will take a dark fibre circuit are where they would otherwise take a 1Gbit/s active product.
- 4.9 For the purposes of the charge control, we have estimated the number of dark fibre circuits that might be taken up in the period 2018/19. We explain our forecasting methodology in more detail in section 5. We provisionally conclude that there is scope for significant take-up of these services.
- 4.10 We recognise that there is the potential for demand for dark fibre to build 1Gbit/s leased lines to be dampened where providers are deterred from using dark fibre because of uncertainty about whether they will be able to upgrade their services to bandwidths above 1Gbit/s in the future. We nevertheless think that there will be substantial take-up of dark fibre because of the significant cost savings available (see paragraphs 4.11-4.38 below), other advantages relating to innovation and, potentially, the ability to delay upgrades to active circuits of bandwidths above 1Gbit/s.<sup>41</sup>

## Cost savings

- 4.11 The costs of a leased line service include the initial investment in the fibre and electronics, the operation of the equipment itself, and fault detection and repair.
- 4.12 In this sub-section, we re-evaluate the scope for overall cost savings as a result of introducing dark fibre for Lower Bandwidth CISBO services.<sup>42</sup> We identified these types of cost savings in the 2016 BCMR Statement, but we have since updated our assessment in light of new information.

## Savings from reductions in equipment

- 4.13 We identified the scope for cost savings through reductions in equipment in the 2016 BCMR Statement.<sup>43</sup> Having taken account of new information, we now believe that the

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<sup>40</sup> Specifically, they use these services to provide backhaul from aggregation sites to their own networks.

<sup>41</sup> There may be some situations where a provider will take dark fibre circuits because the cost savings it can achieve across multiple circuits are greater than the cost savings it would achieve by aggregating active circuits to an active 10 Gbit/s circuit.

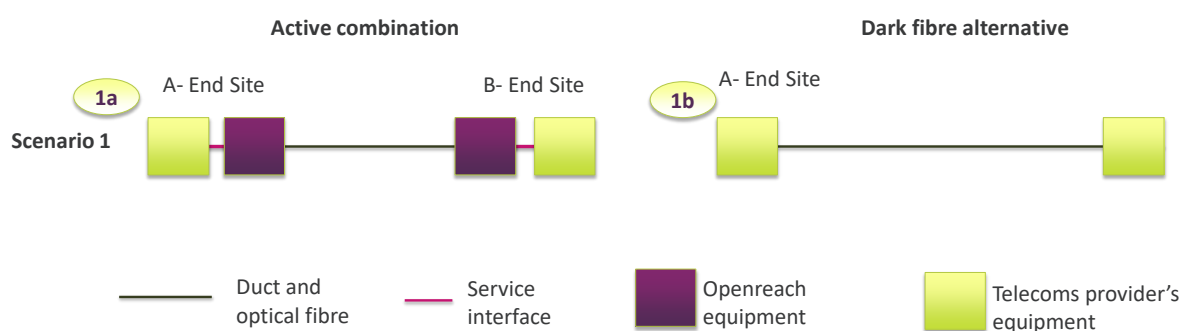
<sup>42</sup> In economic terms, costs savings can be thought of as an increase in productive efficiency. Productive efficiency is achieved when the costs of production are minimised. In the context of leased lines this would refer to a leased line of a given specification being provided to a customer at the lowest possible cost.

<sup>43</sup> 2016 BCMR Statement, paragraphs A18.147-A18.163.

scope for equipment cost savings from our proposed dark fibre remedy may be greater than we previously thought.

- 4.14 Openreach's active services provided to other telecoms providers and end-users include the equipment required to provide the service. In many cases Openreach's customers also connect their own equipment to each end of the Openreach circuit, either to provide additional control over the service (e.g. better monitoring capabilities) and/or to provide a downstream service such as a VPN. This equipment duplication is known as 'bookending'.
- 4.15 Generally, the equipment used by telecoms providers has comparable functionality to Openreach's equipment. One of the most significant opportunities for cost savings, therefore, relates to reduced equipment, because the provider's equipment can be configured to replicate the functions of Openreach's electronic equipment.
- 4.16 The extent of potential cost savings depends on the combinations of network equipment currently in use. Specifically, cost savings will be made when the current solution requires the equipment of an intermediate provider or end-customer, as well as that of Openreach. The use of dark fibre will mean that, in many cases, the equipment can be consolidated and therefore that savings can be made. The precise combination of equipment used for a given leased line will depend on the service required by the customer as well as the telecoms provider's network design.
- 4.17 Figure 4.1 illustrates the equipment in use in a particular, and common, scenario where a telecoms provider has a choice between an active combination or a dark fibre alternative. There are other potential combinations of equipment that we discuss further at paragraph 4.22 and onwards.

**Figure 4.1: Change in equipment between active and dark fibre services**



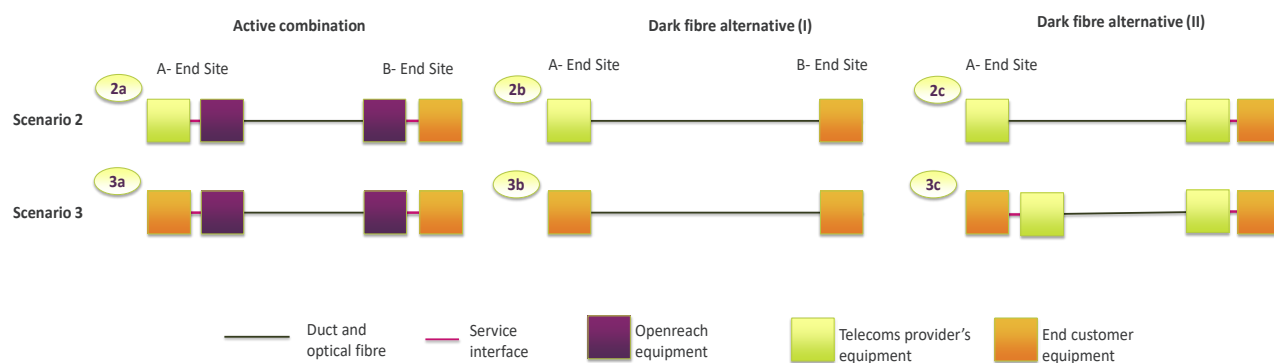
Source: Ofcom.

- 4.18 The 'active combination' shown in Figure 4.1 illustrates a typical situation in which a provider purchases an active wholesale leased line service from Openreach.<sup>44</sup>

<sup>44</sup> Openreach's equipment is co-located with that of the provider and the provider's equipment (e.g. an aggregation device) communicates with Openreach's transmission terminal's service interfaces.

- 4.19 The 'dark fibre alternative' shown in Figure 4.1 illustrates the same service being provided to the end-customer using dark fibre. In this case, the functions previously performed by Openreach's equipment are now performed by the provider's equipment.<sup>45</sup> This allows corresponding cost savings, not only through reduced equipment, but also savings in maintenance, power and space.
- 4.20 We have estimated the scale of these cost savings based on publicly available information and our own assumptions. We have focused on the cost saving for new connections by comparing the cost that would be incurred should a new connection be established using dark fibre as opposed to an active circuit. Further, we examine only new connections at a bandwidth of 1Gbit/s.
- 4.21 For an EAD 1Gbit/s service, we estimate that the cost saving from using dark fibre rather than an active circuit is around £400 per year, roughly 14% of the active rental charge.<sup>46</sup> For an EAD LA 1Gbit/s service we estimate that the cost savings from using dark fibre rather than an active circuit is around 18% of the EAD LA active rental charge. Our methodology is outlined in Annex 5.
- 4.22 We consider that the scenario illustrated in Figure 4.1 is one of the most common circuit configurations. However, we recognise that it is only one possible combination of equipment for leased line services. Figure 4.2 below illustrates a range of other possible combinations, where Openreach's equipment interfaces directly with the end-customer at one, or both ends, in the active combinations.

**Figure 4.2: Change in equipment between active and dark fibre services**



Source: Ofcom.

<sup>45</sup> Specifically, the long range optical transmission function performed by Openreach's transmission terminals is now performed by the provider's equipment. The provider's equipment in the dark fibre alternative uses long-range lasers to transmit directly into Openreach's fibre. This reduces the amount of equipment needed, including elimination of the four short-range lasers (and associated receivers) used between the provider's and Openreach's equipment in the 'active combinations'. In the current design of Openreach's dark fibre product, there would be a short "tail" of the provider's fibre between the provider's equipment and Openreach's fibre.

<sup>46</sup> Based on Openreach's prices as of 1 October 2017 of £2,850 per year for the "active" EAD 1 Gbit/s service and £2,250 per year for the corresponding EAD LA service. The savings therefore represent 14% of the EAD and 18% of the EAD LA rental prices. It is likely that the percentage savings will increase if Openreach reduces prices to comply with the charge control we have imposed in the BCMR Temporary Conditions Statement. For more details see Annex 5.

- 4.23 In these situations, the scope for reduction in the total amount of equipment used may be more limited.
- 4.24 Using the same methodology as outlined in paragraph 4.20 (and explained further in Annex 5), we have estimated the cost savings under these scenarios as well and summarise them in Table 4.1.

**Table 4.1: Cost savings for different combinations of equipment to deliver an EAD 1Gbit/s service**

	Active description	Dark fibre alternative	Circuit type	Approximate cost saving	
				£ per annum	% of active price
Scenario 1	Telecoms provider equipment at both ends	Dark fibre alternative	EAD	400	14%
			EAD LA	400	18%
Scenario 2	Telecoms provider equipment at one end, End-user equipment at the other	Dark fibre alternative (I)	EAD	400	14%
			EAD LA	400	18%
		Dark fibre alternative (II)	EAD	100	4%
			EAD LA	100	4%
Scenario 3	End-user equipment at both ends	Dark fibre alternative (I)	EAD and EAD LA	no saving	n/a
		Dark fibre alternative (II)	EAD and EAD LA	no saving	n/a

*Note: Scenarios shown here are single fibre, non-resilient combinations.*

- 4.25 Overall, we consider that, where dark fibre is likely to be taken up, the scope for savings is significant. For example, for an EAD 1Gbit/s circuit we understand that it is likely to be in the range of 4% to 14%.
- 4.26 The overall magnitude of the cost savings that might be obtained through reduced duplication of equipment will depend on the extent to which providers would expect to use each of the different scenarios outlined in the preceding sub-section.
- 4.27 Since we expect dark fibre to be mostly used for new connections, we cannot be exactly sure of the proportions of forecast circuits that will belong to the different scenarios above, since there is no existing configuration to observe. Neither do we have detailed evidence on the relative prevalence of different equipment configurations currently in use. However, it is our current judgement, based on our understanding of the industry, that Scenario 1 is a common situation, and that Scenario 2 is less prevalent, but not unusual, whereas we consider Scenario 3 to be less prevalent still and very rare. We expect Scenario 3b to be even more uncommon since it would involve an unmonitored dark fibre circuit

and would therefore only be used by a very sophisticated end-user. Further, we believe that where cost savings are more limited, there is less prospect that providers will take-up dark fibre in these scenarios.

- 4.28 There could also be some further cost savings from switching existing circuits but we consider these are likely to be materially smaller.<sup>47</sup>
- 4.29 In Annex 5 we discuss in more detail how we have estimated the potential cost savings for providers using dark fibre and discuss additional examples of circuit types and combinations of equipment.

### **Fault frequency, detection and repair**

- 4.30 Leased lines are critical components in the delivery of most high-quality communications services to end-users, including mobile, broadband and business services. As such, a fault can have a direct impact on the end-user experience.
- 4.31 In the 2016 BCMR Statement we set out our view on the scope for impacts on fault frequency, detection and repair caused by our then proposed dark fibre remedy to influence costs.<sup>48</sup> We consider that a contractual restriction applied by BT to prevent usage of dark fibre above 1Gbit/s would not materially alter the cost impact on fault frequency, detection and repair and therefore our view remains broadly in line with that expressed in the 2016 BCMR Statement.
- 4.32 We expect that, in general, the causes of faults for active circuits and dark fibre circuits will be very similar. However, where use of dark fibre allows a reduction in equipment, there will be fewer points of failure and therefore we would expect a lower frequency of faults. Dark fibre will therefore benefit these consumers, both directly through more reliable services and potentially through reduced costs, if there are associated reductions in required repairs.
- 4.33 The fault detection and repair processes for dark fibre would differ from those for active services, because telecoms providers other than Openreach would be operating the network equipment that facilitates monitoring and fault diagnosis. We therefore expect costs of these services to differ between active services and provider services based on dark fibre. However, we see no reason why providers should not be able to develop repair processes that perform at least as well with dark fibre as with Openreach active leased lines.<sup>49</sup> While the overall impact is unclear, it could be positive. We discuss this issue in more detail below.

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<sup>47</sup> As set out in section 5, we expect telecoms providers to switch c. 1,300 existing circuits to dark fibre during the period 1 April 2018 – 31 March 2019. In such cases, there would also be a cost saving for the telecoms provider. However, there is likely to be less scope for overall productive efficiencies in the case of existing lines, since Openreach's equipment costs are already sunk and eliminating the need for them can no longer be considered an overall saving.

<sup>48</sup> 2016 BCMR Statement, paragraphs A18.104-18.116.

<sup>49</sup> With dark fibre, fault detection and, in the case of faults other than breaks in Openreach's fibre, repair, are entirely in the provider's control and it is strongly incentivised to ensure faults are fixed in a timely manner.

- 4.34 Overall, we would likely expect benefits in the form of lower fault rates and potentially reduced costs associated with fault reduction and repair.

### Other cost savings

- 4.35 We consider that competition based on dark fibre would make more elements of the network contestable by BT's competitors compared with competition based on active remedies only. For example, competitors would be able to make their own choices in relation to the network equipment used, according to their own individual network requirements.<sup>50</sup> This would put additional competitive pressure on cost efficiency in respect of the active layer.
- 4.36 We also consider that, given the high cost of BT's system upgrades associated with new developments, the introduction of the proposed dark fibre remedy may provide telecoms providers with scope to realise additional cost saving opportunities. This may make smaller developments to address niche demand more viable.<sup>51</sup>
- 4.37 Whilst we acknowledge that any niche developments will remain niche even with the dark fibre remedy, we also consider that telecoms providers will have greater scope to realise additional cost savings for projects of all sizes and, therefore, the cost saving benefits will extend beyond those relating to niche developments.<sup>52</sup>

### Conclusion

- 4.38 Overall, we see significant scope for there to be productive efficiencies, even in the short term, as a result of the dark fibre remedy. Our estimates show substantive cost saving opportunities, not just to customers but to the network as a whole.

### Greater scope for innovation with dark fibre

- 4.39 Innovation in products and services is often the most important source of benefits for consumers of telecoms services. We believe that we can increase the scope for innovation in the relevant leased line markets by exposing a greater part of the value chain to competition.
- 4.40 In our 2016 BCMR Statement, we said that innovation included both technological improvements and more broadly the ability of providers to effect change more readily by acting independently of BT.<sup>53</sup> This description of innovation benefits continues to apply. A contractual restriction applied by BT to prevent usage of dark fibre above 1Gbit/s would not fundamentally change the fact that dark fibre would provide an environment more conducive to innovation. We recognise that a contractual restriction on dark fibre to Lower Bandwidth CISBO services would prevent specific innovations in VHB services, but

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<sup>50</sup> 2016 BCMR Statement, paragraphs A18.141-A18.146.

<sup>51</sup> 2016 BCMR Statement, paragraph A18.168.

<sup>52</sup> 2016 BCMR Statement, paragraph A18.169.

<sup>53</sup> 2016 BCMR Statement, paragraph A18.64.

nevertheless we believe that there is scope for innovation with Lower Bandwidth CISBO services.

- 4.41 Innovation is, by its nature, difficult to predict, but we see that there is scope for innovation to occur in the following ways:
- Innovation in services, features and packages—delivering new services, features or packages such that new end-products can be used.
  - Innovation in method of delivery of services—using more efficient equipment or designing networks in different ways to better serve customers.
  - Speed of innovation—innovations described above may be viable under both active services or dark fibre, but may happen quicker under the latter.

#### **Innovation in services, features or packages**

- 4.42 The proposed dark fibre remedy should promote innovation in the services to end-customers. For example, providers will have greater scope to be able to provide new services and features, or bundle existing features into different packages.<sup>54</sup>
- 4.43 Dark fibre will give providers a greater ability to differentiate their services. Under the current active remedies, Openreach's development of products is subject to regulations, to ensure transparency and strict non-discrimination in the developments Openreach decides to undertake for its telecoms provider customers, which include BT's downstream divisions. Therefore, any new feature that is developed by Openreach (even if it is developed at the specific request of a sole provider) must be offered to all customers at the same time and on the same terms. This reduces the ability of providers to differentiate themselves, and reduces any first-mover advantage that a provider might have when requesting a new service from Openreach. Incentives to pursue differentiation are therefore dampened.
- 4.44 With dark fibre, every telecoms provider (including BT's downstream businesses) will have opportunities to achieve a first-mover advantage, by deciding independently of its rivals and of Openreach what to develop, when and how quickly, and without having to rely on Openreach to carry out the development. First-mover advantages may reflect a wide range of benefits gained by a telecoms provider adopting its own course in the market, including know-how, business processes, designs and differentiated business models.
- 4.45 We expect that this will deliver benefits because:
- any telecoms provider will be able to carry out its chosen developments with its own management, resources and systems at a pace it controls, and will no longer need to rely on Openreach to carry them out;
  - delays, costs and uncertainties which a telecoms provider confronts in debating and negotiating development requirements with Openreach and with other telecoms providers will be avoided;

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<sup>54</sup> 2016 BCMR Statement, paragraph A18.73.

- each telecoms provider will be free to choose and configure the equipment to best suit its needs and those of its customers; any provider would be able to choose for itself the functions it uses from the range of functions supported by its electronic equipment. As a consequence, a telecoms provider will therefore have greater choice over how it charges its customers for such services and features. In contrast, with active leased line access, Openreach does not necessarily make available all capabilities supported by its electronic equipment, and this can limit providers' design choices; and
- providers which serve their customers both by accessing BT's network and by operating their own fibre network will be able to harmonise the solutions they provide using their own networks with those they provide using BT's network, gaining economies of scale. This would be possible because, in using dark fibre, customers could choose electronic equipment compatible with (or identical to) the equipment they use in their own networks, whereas, in using active Openreach leased lines, some capabilities required to deliver providers' services may not be supported by Openreach's electronic equipment.

4.46 In addition, a dark fibre remedy would give providers full control over the choice and operation of the terminal equipment connected to dark fibre circuits, giving them greater flexibility in relation to:

- choice of service protocols (e.g. flexibility to choose protocols other than Ethernet);
- choice of service features;
- selection of service quality features such as repair and provisioning timescales;<sup>55</sup> and
- harmonisation of services, features and service characteristics with those offered at locations where telecoms providers operate their own networks.

4.47 In the 2016 BCMR Statement we described some specific potential innovations that might arise as a result of a dark fibre remedy, such as the ability to have more control over features of the service offered to customers.<sup>56</sup> These examples were based on evidence submitted to us by stakeholders, which indicates that there is demand for the opportunity to make these types of change.

### **Innovation in method of delivery of services**

4.48 The proposed dark fibre remedy would allow the 'active-layer' to be exposed to competition. As such, there may be greater scope for innovation over the equipment that is used to deliver the 'active' part of a leased line service (i.e. electronics and lasers). This is because telecoms providers would have more choice over this equipment and its specifications when not using a BT active product.

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<sup>55</sup> We consider that the proposed dark fibre remedy could provide telecoms providers with greater control of some aspects of quality, for example controlling when and how to upgrade and/or reconfigure services. With dark fibre, telecoms providers could offer differentiation within service levels, such as improved levels of customer service, improved resilience and/or faster repair times. However, we also recognise that the proposed dark fibre remedy would only address service quality issues related to active circuits and not any issues related to the underlying fibre which would be the same.

<sup>56</sup> 2016 BCMR Statement, paragraphs A18.76–A18.83.

- 4.49 Dark fibre may enable the removal of obstacles to the deployment of alternative network solutions that may be cheaper or more efficient in some manner. These solutions may not necessarily be “new technology”.
- 4.50 We recognise that these technological innovations may also be possible absent a dark fibre remedy. However, the proposed dark fibre remedy would promote the incentives and opportunity for providers to engage in these innovations in a stronger way than under active remedies. If a range of providers are seeking to exploit opportunities that suit each of their business models, and each were able to do so, we would expect greater innovation than if only one provider can undertake the innovation and must offer its benefits to all downstream providers.
- 4.51 One further area where a positive impact on investment might be expected is where telecoms providers are seeking to compete for a multi-site contract and where they are able to connect only some of those sites using their own infrastructure. In these circumstances, and in the absence of the proposed dark fibre remedy, a provider would need to rely on BT’s regulated active products for some of the sites. This would reduce its ability fully to differentiate its offering from those of its competitors, and/or exploit the full benefits of its own infrastructure in being able to offer a uniform service offering across all sites.
- 4.52 We consider that dark fibre would enhance the ability of telecoms providers to compete for multi-site connectivity, as they would be able to provide a similar service to the customer in areas where they rely on BT’s network to that in areas where they use their own network. Accordingly, by increasing the potential to compete for more multi-site contracts, the use of dark fibre could act as a complement to a provider’s own infrastructure, thus encouraging rival infrastructure investment.

### Speed of innovation

- 4.53 A further difference between active remedies and dark fibre is that the speed of innovation may also be faster under dark fibre.
- 4.54 With active remedies, the current Statement of Requirements (SoR) process is the only avenue available to develop or make changes to regulated active access services on Openreach’s network.<sup>57</sup> It is a formal process, which defines how requirements are submitted, debated and agreed between Openreach and telecoms providers. Openreach must be persuaded of the business case for any new development before it can proceed with it. The ensuing negotiations are often protracted, and, in about two thirds of cases, end without producing any new development.
- 4.55 If a development does proceed, Openreach carries it out, putting the results into effect by making changes in its chosen equipment, its systems and its operating procedures. The

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<sup>57</sup> We have decided not to require an SoR process in the temporary conditions until March 2019 so BT is free to change this process. However, given the duration of negotiations between BT and industry over a new process, it is likely that the current process will stay in place until March 2019.

time such a development takes is, on average, about 17 months, and ranges from one month to over five years.

- 4.56 With the proposed dark fibre remedy, providers' choices in relation to terminal equipment and associated services features would be free of the constraints of the SoR process. Providers would instead be able to make commercial decisions about innovations, independently of BT (and of each other), based on their own assessment of their customers' needs and the potential risks and rewards. They should be able to make these decisions and implement them more quickly than under the SoR process.

## Conclusion

- 4.57 We continue to believe that there is substantial evidence to support the scope of possible innovations from dark fibre as set out in the BCMR 2016. We also recognise that innovation is, by its very nature, forward-looking and uncertain, and that its benefits may only be realised in the medium or long term. Our focus is therefore on prospective innovation. We consider that the proposed dark fibre remedy will improve the scope for innovation and that this will provide support for it in its own right, without needing to identify in advance all of the innovations that will result from the remedy. We therefore place significant weight on enhancing the conditions for innovation, in particular creating sharper incentives for innovation that arise under competition, since such innovations could yield significant benefits for consumers.

## Potential relaxation of active remedies

- 4.58 In this consultation, we are proposing dark fibre as a remedy alongside the active remedies already imposed in the leased lines market(s). Our expectation is that at least some telecoms providers will take up dark fibre and as such become less reliant upon BT's active services.
- 4.59 While we are continuing to require active remedies for this review period, we recognise that in the medium to long term a successful dark fibre remedy may make it feasible to relax or withdraw active remedies in the leased lines market(s).
- 4.60 Withdrawal of regulation would reduce some of the regulatory burden on BT, for example, there may be the ability to withdraw the SoR process for leased line services. This in turn should reduce its costs and simplify its operations.

## Openreach's proposed Optical Spectrum Access Filter Connect service

- 4.61 In October 2017, Openreach launched a consultation on a new Optical Spectrum Access (OSA) service named OSA Filter Connect.<sup>58</sup> This product would allow providers greater control over their service than with currently available OSA services, but less control than

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<sup>58</sup><https://www.openreach.co.uk/orpg/home/updates/briefings/ethernet-services-briefings/ethernet-services-briefings-articles/eth03517.do>.

they would achieve with a dark fibre product, since Openreach would continue to manage the service.<sup>59</sup>

4.62 The development of this product is at consultation stage and therefore the extent of its launch and deployment is uncertain. Nevertheless, we do not consider that it would achieve the same benefits as our proposed dark fibre remedy. This is because:

- Openreach still provides active equipment and there is therefore less scope for cost savings than with dark fibre;
- The pricing of the product is high compared to dark fibre and hence likely to suppress take-up;<sup>60</sup>
- OSA Filter Connect is not suitable for access network deployments, whereas this is an important potential application for dark fibre;
- The product is likely to sit in the VHB CISBO market, whereas our proposed dark fibre remedy is designed to address the market for services at 1Gbit/s and below.

## Risks and costs of the proposed dark fibre remedy

### Risks of dark fibre for the Lower Bandwidth CISBO markets

4.63 In the 2016 BCMR Statement, we identified a number of potential risks and costs of our dark fibre remedy.<sup>61</sup> Many of these risks arose from the possibility that telecoms providers might switch from VHB CISBO active services to dark fibre, thereby putting downward pressure on the price and volumes of VHB CISBO active services. We currently propose to introduce dark fibre for the Lower Bandwidth CISBO markets, and we are not placing any obligation on BT to supply dark fibre where it would be used to supply VHB CISBO services.

4.64 Accordingly, many of the risks previously identified in the 2016 BCMR Statement are no longer relevant. These risks, which no longer apply, included:

- a) The potential need for BT to rebalance its active pricing structure by flattening the bandwidth gradient. We expected that the main pricing impact of our decision on dark fibre in the BCMR 2016 would have been to bring down VHB CISBO prices, with no flattening of the bandwidth gradient for circuits of 1Gbit/s or below. Since BT will be able to limit dark fibre usage for circuits of 1Gbit/s and below, we no longer expect our proposed dark fibre remedy to have any material impact on VHB prices. Removing this impact on the bandwidth gradient means that a number of risks previously identified no longer apply: the loss of potential allocative efficiency benefits associated with

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<sup>59</sup> Openreach would light the fibre and manage the service on an end to end basis, but providers would be able to connect their equipment directly to the optical filter in the OSA bearer.

<sup>60</sup> Openreach's 18 October 2017 industry consultation on OSA Filter Connect included pricing guidance of £12,233 to £15,550 for connection, and £6,275 to £7,485 for rental.

<sup>61</sup> See 2016 BCMR Statement, Volume 1, paragraphs 7.68-7.78, Annex 19 and Annex 20. We said that the risks might include: (i) undermining BT's existing investments in its network, (ii) weakening BT's incentives to invest in its network in future, (iii) threatening BT's opportunity to recover its efficiently-incurred costs, (iv) reducing allocative efficiency, and (v) impacts on investments in rival infrastructure.

unwinding the bandwidth gradient or the greater potential for VHB CISBO services to be used to aggregate multiple lower bandwidth circuits.<sup>62</sup>

- b) The potential for competitors to use dark fibre to arbitrage VHB CISBO services, potentially leading to distorted investment signals and productive inefficiencies. Our proposed remedy no longer provides for these arbitrage opportunities.
- c) The impact on rival investment and existing competition in VHB CISBO services.

4.65 In this sub-section we review whether there are risks that might still apply where dark fibre is used for Lower Bandwidth CISBO services only, namely:<sup>63</sup>

- impacts on BT's cost recovery and investment incentives;
- impacts on the structure of competition;
- implications for fault detection and repair; and
- impacts on rival investment.

### **BT's cost recovery and investment incentives**

4.66 Our dark fibre remedy does not undermine BT's ability to recover its costs. Our charge control proposals give BT the opportunity to recover its efficiently incurred costs for leased line services, taking appropriate account of the expected take up of dark fibre and its potential to replace some active leased line products. The details of how we have done this are explained in section 5. Since our proposals provide BT with the opportunity to recover its efficiently incurred costs, they are also consistent with providing BT with appropriate incentives to invest.

### **Structure of competition**

4.67 In the 2016 BCMR Statement,<sup>64</sup> we considered as a potential risk whether passive remedies may require certain economies of scale, which might result in (downstream) market consolidation, with smaller telecoms providers exiting the market. We concluded that there was not a high likelihood of a large impact, nor would the impact be likely to reduce competition, for the reasons outlined below. We do not think the concerns are any greater now.

4.68 We consider this risk to be small because the additional investment for dark fibre may be limited, even when taking into account operating and maintenance costs.<sup>65</sup> In many cases, telecoms providers can operate dark fibre circuits with the same equipment they currently deploy when using an active service. Therefore, it is unclear that smaller telecoms

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<sup>62</sup> BT has previously argued that stronger incentives to aggregate circuits might result in incentives for telecoms providers to move to fibre lean networks, which BT argued would be productively inefficient. We did not and do not accept that these were significant concerns in their own right (see 2016 BCMR Statement, paragraphs A19.120-A19.129), but with no obligation to provide dark fibre for VHB CISBO services the matter does not arise at all.

<sup>63</sup> All of these matters were considered in BCMR 2016.

<sup>64</sup> 2016 BCMR statement, paragraphs A19.136-A19.139

<sup>65</sup> 2016 BCMR Statement, paragraph A23.19

providers would face significant costs above those incurred in active services such that they would be excluded from the market.

- 4.69 Even if the use of dark fibre would require significant economies of scale and/or investment, smaller telecoms providers would not necessarily exit the market. A smaller telecoms provider which provides specialist services may still want to purchase regulated dark fibre to increase its flexibility over the services it provides. Also, smaller telecoms providers that are not specialist services providers could still buy an active service from an alternative (dark fibre-based) provider instead of exiting the market. This could be similar to the market today where non-BT infrastructure operators offer active services to downstream providers.

### **Fault detection and repair**

- 4.70 In general, fault detection and repair activities are likely to be similar regardless of whether a circuit is provided as an active service or dark fibre by Openreach. There would be differences in whether Openreach or the purchaser carries out these activities. In particular, for dark fibre, fault detection and repair (except repairs to Openreach's fibre) would be entirely in the purchasing provider's control. We do not expect the overall number of site visits to be materially higher for dark fibre than for active services.
- 4.71 Dark fibre could pose a risk if it meant that faults were not detected or repaired efficiently, or if it led to additional costs for Openreach in dealing with faults. However, we do not think these risks are significant.
- 4.72 Purchasers of dark fibre would have strong commercial incentives to coordinate effectively with Openreach to ensure that faults are detected and repaired efficiently. We would not expect them to purchase and use dark fibre if effective arrangements were not in place. Openreach has published a final reference offer for dark fibre, which includes a description of the fault repair process agreed with providers. In addition, the concentration of remote monitoring and remote diagnoses with the purchasing provider could actually reduce costs, by reducing the need for the provider to co-ordinate with Openreach. Finally, eliminating duplication of terminal equipment would reduce the incidence of faults, as less active equipment would be involved in the provision of a service.
- 4.73 We do not expect fault detection and repair for dark fibre to lead to significant additional costs overall. Providers have strong incentives to diagnose faults as accurately as possible and restore the service within the shortest possible time. They currently have electronic equipment installed (including where they use Openreach's active leased lines), and have comparable capabilities to detect, locate and repair faults. We have no reason to believe they would be less effective in doing this than Openreach is for active services. In addition, Openreach can also incentivise providers through appropriately high callout charges where a fault is incorrectly diagnosed.

## Impact on rival investment

- 4.74 In the BCMR 2016, concerns were raised that dark fibre and the 2016 Leased Lines Charge Control (2016 LLCC) generally would make it less profitable for competitors to invest in new infrastructure, particularly for Virgin, CityFibre and niche operators focussing on VHB CISBO or dark fibre sales. In significant part these concerns were directed at the impact dark fibre would have on prices and volumes in the VHB CISBO segment, concerns which no longer arise. In principle, dark fibre limited to Lower Bandwidth CISBO services might still potentially have implications for rival investment and competition. However, as discussed in this section, we do not think that this gives rise to significant risks.
- 4.75 In a counterfactual without dark fibre, investors in rival infrastructure would need to compete with BT's active products in order to win business. Our approach to pricing dark fibre on a 1Gbit/s active-minus basis is generally consistent with the pricing of the 1Gbit/s active product (the most expensive product that dark fibre could compete with), and therefore does not provide a price advantage compared to any active products.<sup>66</sup>
- 4.76 Dark fibre does offer significant benefits over and above BT's active products, including the potential for innovation, differentiation, and cost efficiencies (see paragraphs 4.11-4.60 above). These benefits will make purchasing access to the BT network more attractive than would be the case without dark fibre. These benefits are important in their own right, but we doubt that they are of sufficient magnitude to have a material impact on rival investment.<sup>67</sup> Moreover, as well as supporting more effective competition downstream, these benefits may also encourage network expansion by rivals using a mix of dark fibre and self-build, which may not be economic if investors had to rely on self-build alone.
- 4.77 Our general approach to the current charge control is to set access prices to reflect BT's costs. The Competition and Markets Authority (CMA) found in Ofcom's favour in relation to CityFibre's appeal of the 2016 LLCC, supporting this position.<sup>68</sup> This approach, with which our dark fibre proposals are consistent, should not deter efficient rival investment.
- 4.78 There are some commercial providers that specialise in the provision of dark fibre. We evaluated the risk that our dark fibre remedy might have a particular impact on such specialists in the 2016 BCMR Statement.<sup>69</sup> Our view, which has not changed, is that these

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<sup>66</sup> The NDR adjustment component of the dark fibre price is based on an estimate of the costs that would be faced by other telecoms providers, rather than BT's costs. However, as set out in the 2017 NDR Statement, overall constraints on BT's pricing remain consistent with our general approach. See 2017 NDR Statement, paragraph 2.131.

<sup>67</sup> In the 2016 BCMR Statement, we considered that only VHB CISBO services would face an incremental price reduction as a result of dark fibre, and hence the main source of impacts on rival investment would be through impacts on VHB. See 2016 BCMR Statement, paragraph A20.56.

<sup>68</sup> CMA Final Determination on Leased lines price control appeals 3.249-3.252

<sup>69</sup> Data presented in the 2016 BCMR Statement showed that the supply of commercial dark fibre to end users involved limited volumes (around 4,000 circuits in the LP and RoUK combined in 2014), compared to more than 270,000 circuits in the LP and RoUK combined. This is consistent with our view that retail dark fibre was mainly purchased by niche customers with specialist needs. See 2016 BCMR Statement, Table 4.3

are often niche specialist sales,<sup>70</sup> often for VHB CISBO circuits,<sup>71</sup> that the impact of BT offering dark fibre on such supplies may therefore be limited,<sup>72</sup> and that the scale of competition in this area is likely to be limited.<sup>73</sup> This view is strengthened where BT is not required to supply dark fibre for VHB CISBO services. Accordingly, we do not think that our proposed dark fibre remedy poses significant risks for efficient rival investment.

## Direct implementation costs

- 4.79 In the 2016 BCMR Statement, we recognised that introducing a new remedy would likely result in BT incurring additional development costs. We considered it reasonable to seek to provide BT with a fair opportunity to recover efficiently incurred implementation costs, which we included in the setting of the 2016 LLCC.<sup>74</sup>
- 4.80 Since the publication of the 2016 BCMR Statement, industry worked with BT over the course of around 15 months to develop the detailed technical and operational aspects of the dark fibre product. BT's development costs for the product have been funded by its customers through their inclusion in the 2016 LLCC. BT has spent the vast majority of these development costs. These costs can therefore be considered sunk and so not relevant for this analysis of the costs and benefits of introducing dark fibre in this consultation. Accordingly, we expect our current proposal would require minimal additional development costs beyond those already incurred. We expect the cost of introducing a contractual restriction to be minimal, as it would require only a small change to the already-developed product. Our charge control proposals give BT the opportunity to recover its efficiently incurred dark fibre implementation costs as set out in section 5.

## Potential for regulated dark fibre to be used for VHB CISBO services

- 4.81 As we explained in section 3, we believe that BT indeed will be able to limit supply to circuits at and below 1Gbit/s if it chooses to do so. We do not, therefore, anticipate any material impact on the VHB CISBO market.
- 4.82 We, therefore, have no reason to consider that there would be material evasion by dark fibre purchasers of contractual restrictions put in place by BT. However, even if there were

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<sup>70</sup> A specialised, nimble supplier may be better placed to meet the requirements of such users relative to a provider that uses a generic regulated product (i.e. the dark fibre remedy). Our analysis of pricing in the 2016 BCMR Statement did show that commercial dark fibre prices materially exceeded the price of regulated dark fibre remedy. However, this would not be unexpected given the currently limited supply and usage of commercial dark fibre, and the material volume used for bandwidths above 1Gbit/s.

<sup>71</sup> 2016 BCMR Statement, paragraph A20.80

<sup>72</sup> Non-price aspects of the scope of the dark fibre remedy (which, for example, is not applicable in the competitive core or for circuits with great than 45km radial distance) also act to limit its impact on commercial dark fibre. Commercial dark fibre providers will not face these limits, and so will be able to offer a dark fibre solution for a broader set of uses. We do not consider that the regulated dark fibre product would act as a benchmark in these 'out-of-scope' areas, given that potential customers would not be able to use the regulated product as an alternative to commercial dark fibre for these uses.

<sup>73</sup> 2016 BCMR Statement, paragraph A20.86

<sup>74</sup> 2016 BCMR Statement, paragraphs A19.145-A19.147

some evasion, any impact on VHB CISBO services would be significantly less than envisaged in our original remedy.

- 4.83 BT may make a commercial decision to supply dark fibre for VHB CISBO services. As this would not be a regulated product, BT would be free to set a higher price for such use of dark fibre, to limit any arbitrage possibilities if it wished to do so.

## Overall case for dark fibre

- 4.84 We explained above why we consider that a passive remedy in the form of dark fibre access would promote efficiency and better sustain effective competition in leased lines than would be possible with active remedies alone.
- 4.85 The availability of dark fibre would allow telecoms providers to create their own active services. We consider that this would facilitate greater competition higher up the supply chain, exposing active components to competition.
- 4.86 We consider that dark fibre could be purchased by a number of different types of customers, for various applications in the Lower Bandwidth CISBO markets, including:
- Telecoms providers, to supply retail business connectivity to enterprise customers;
  - Mobile network operators, for example to supply backhaul from aggregation sites to their networks, and
  - Fixed line broadband providers, for backhaul.
- 4.87 We believe that there will be considerable benefits from imposing dark fibre access in the Lower Bandwidth CISBO markets. As we noted above, the main sources of these benefits are cost savings, the increased potential for innovation and the possibility to reduce regulation of active services in the future.
- 4.88 As set out above, the potential risks of our proposed remedy would be minimal, and the costs of developing the product have already been sunk.
- 4.89 It is possible that demand for dark fibre at the 1Gbit/s level may be somewhat reduced from our expectations in BCMR 2016, given that we expect it to only be available for Lower Bandwidth CISBO services. Even in circumstances where providers would have wished to use it for services at 1Gbit/s, they may be cautious to purchase dark fibre if they anticipate that they may wish to upgrade to VHB CISBO services in the future. Some telecoms providers may choose alternative solutions for applications that are likely to require bandwidths above 1Gbit/s in the near future. Nonetheless, we consider that telecoms providers would purchase dark fibre, in particular due to the considerable (up to 18%) cost savings that may be available due to the potential to reduce duplication of electronic equipment.
- 4.90 We have outlined our proposed design for the dark fibre remedy. We consider that an active minus pricing structure, with reference to BT's 1Gbit/s EAD active product would allow for a smooth introduction of dark fibre, and a smooth transition during the period

where active remedies co-exist alongside passive ones, while removing any risk of pricing arbitrage.

- 4.91 We believe that the benefits arising from imposing a dark fibre remedy in the Lower Bandwidth CISBO markets are likely to be substantial. We also consider that the potential risks from the introduction of the proposed dark fibre remedy, including those to rival infrastructure operators, would be minimal. We believe this to be the case in all areas where we propose to find BT to have SMP, including those which have the potential to exhibit a somewhat higher degree of competition (the LP and the CBDs of Bristol and Manchester) when compared to the Rest of UK. In our view, the benefits from imposing the proposed dark fibre remedy would clearly outweigh all the potential risks, including to infrastructure competition, and the proposed dark fibre remedy, in conjunction with the BCMR Temporary Conditions, is therefore the appropriate means of addressing the competition problems that we have identified in all of the SMP markets, including the LP and the CBDs of Bristol and Manchester.
- 4.92 In evaluating the risks and benefits of the proposed dark fibre remedy, we have looked principally at the current review period to ensure that this assessment is positive in the period until 31 March 2019 and to confirm that the proposed dark fibre remedy, in combination with an appropriately adjusted charge control, will provide BT with a fair opportunity to recover its efficiently incurred costs. However, we recognise that it is also necessary to look over the longer term, particularly when introducing a new remedy such as dark fibre with some of its benefits potentially taking longer to emerge. We believe that the benefits and risks are likely to be positively correlated with each other and with take-up of dark fibre. Over the medium and long term, there are therefore good reasons to believe that the benefits would be likely to continue to outweigh the risks. We also consider that the risks can continue to be managed through careful regulation in future market reviews.

## Legal tests

### Tests under sections 87 and 88

- 4.93 Section 87 of the Act authorises Ofcom to set SMP conditions requiring the dominant provider to provide such network access and relevant facilities as Ofcom may, from time to time, direct. These conditions may, pursuant to section 87(5), include provision: (i) for securing fairness and reasonableness in the way in which requests for network access are made and responded to; and (ii) for securing that the obligations in the conditions are complied with within periods and at times required by or under the conditions. The definition of access and the way in which we might assess reasonable demands for access are set out in our Access Guidelines.
- 4.94 When considering the imposition of SMP conditions in a particular case, we must take into account, in particular, six factors set out in section 87(4) of the Act, including, among others:

- a) the technical and economic viability of installing and using other facilities, including the viability of other network access products, whether provided by the dominant provider or another person, that would make the proposed network access unnecessary;
  - b) the feasibility of the proposed network access;
  - c) the investment made by the person initially providing or making available the network or other facility in respect of which an entitlement to network access is proposed (taking account of any public investment made); and
  - d) the need to secure effective competition (including where it appears to us to be appropriate, economically efficient infrastructure based competition) in the long term.
- 4.95 Section 88 of the Act states that Ofcom should not set a price control or other SMP conditions falling within section 87(9)<sup>75</sup> except where it appears from the market analysis that there is a relevant risk of adverse effects arising from price distortion and it also appears that the setting of the condition is appropriate for the purposes of:
- a) promoting efficiency;
  - b) promoting sustainable competition; and
  - c) conferring the greatest possible benefits on the end-users of the public electronic communications services.
- 4.96 We consider that it is appropriate in cases where we have found that a telecoms provider has SMP (such as BT in this case) to impose an access obligation on that provider requiring it to meet all reasonable requests for network access within the relevant wholesale market, irrespective of the technology required, on fair and reasonable terms, conditions and charges.
- 4.97 In the BCMR Temporary Conditions we have found that BT has SMP in the Lower Bandwidth CISBO markets in the LP, the CBDs of Manchester and Bristol and the RoUK excluding the Five CBDs. We have also identified the competition concern that in the absence of appropriate *ex ante* regulation, BT would not make access to its networks, services or associated facilities available on terms that would secure efficient investment and innovation, both in the relevant wholesale markets and in the related downstream retail markets. We have imposed SMP conditions to address the identified competition concerns, including a general obligation to provide network access on reasonable request.
- 4.98 In light of our proposed design of the dark fibre remedy and the assessment of the risks and benefits presented in this section, we have provisionally concluded that it would be appropriate to impose an SMP condition pursuant to section 87(3) of the Act, requiring BT to provide dark fibre access in the Lower Bandwidth CISBO markets.

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<sup>75</sup> Other SMP conditions falling within section 87(9) in addition to price controls are: (i) such rules as we may make in relation to those matters about the recovery of costs and cost orientation; (ii) such rules as we may make for those purposes about the use of cost accounting systems (in this document we refer to such rules as regulatory financial reporting requirements); (iii) such obligations to adjust prices in accordance with such directions given by us as we may consider appropriate.

- 4.99 This obligation would facilitate competition in downstream markets by enabling telecoms providers to compete further up with the supply chain without the need to build a comprehensive network, an investment which we consider represents a structural barrier to entry in these markets. The requirement for BT only to meet reasonable requests also ensures that due account is taken of the feasibility and economic viability of installing and using other facilities and the investment made by BT.
- 4.100 We also consider that the basis of charge condition and the regulatory financial reporting requirements meet the criteria under sections 87 and 88 of the Act and adequately address the identified risk that BT might fix and maintain its prices for dark fibre in the Lower Bandwidth CISBO markets at an excessively high level. In particular, we consider that pricing dark fibre on an active-minus basis with reference to BT's EAD, EAD LA and Main Link 1Gbit/s products will promote efficiency by ensuring that the use of dark fibre by a telecoms provider (and entry in the active layer) should only occur if the telecoms provider has lower incremental cost to BT (productive efficiency) or if the telecoms providers can exploit genuine innovation benefits from differentiating its service to end customers (dynamic efficiency). We consider that the proposed regulatory financial reporting requirements are necessary to ensure the appropriate maintenance of accounts in order to monitor BT's activities with regard to the pricing of the proposed dark fibre remedy.
- 4.101 In setting charge controls, section 88 also requires that we must take account of the extent of the investment in the matters to which the condition relates of the person to whom the condition is to apply i.e. BT. We consider that our proposed pricing approach for dark fibre which takes into account the impact of dark fibre on BT's cost recovery by adjusting the level of the charge control<sup>76</sup> will provide BT with an opportunity to recover its efficiently incurred costs (including a cost of capital). Our proposed approach will therefore provide BT with incentives to invest and innovate.

### Tests under sections 3, 4 and 47

- 4.102 We consider that the proposed conditions meet our duties under sections 3 and 4 of the Act and the Community requirements under section 4 of the Act. The obligations would promote efficient and sustainable competition in the provision of electronic communications networks and services by ensuring that BT offers wholesale products to enable telecoms providers to compete effectively with BT in downstream markets.
- 4.103 The proposed conditions and directions are in accordance with section 47(2) as they are:
- a) objectively justifiable, in that they facilitate and encourage access to BT's network and therefore promote competition to the benefit of consumers;
  - b) not unduly discriminatory, as they are only for BT and no other telecoms provider has been found to hold a position of SMP in these markets;

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<sup>76</sup> We set out the impact of our proposed dark fibre remedy on the charge control in section 5.

- c) proportionate, since they are targeted at addressing the market power that we propose BT holds in these markets and do not require it to provide access if it is not technically feasible or reasonable; and
  - d) transparent in that the conditions and directions are clear in their intention to ensure that BT provides access to its networks in order to facilitate effective competition.
- 4.104 We have taken utmost account of the BEREC Common Position in preparing our proposals. We consider that our proposals are consistent with the best practice set out in the BEREC Common Position.
- 4.105 For the reasons set out above, we are satisfied that the proposals to include dark fibre in the network access condition and associated SMP conditions (as set out in Annex 6) meet the relevant tests set out in the Act.

**Question 4.1:** Do you agree with our assessment of the benefits of our proposed dark fibre remedy? Please set out your reasons and supporting evidence for your response.

**Question 4.2:** Do you have evidence on the current relative prevalence of each scenario of active equipment configurations as shown in Figures 4.1 and Figure 4.2? Please set out your reasons and supporting evidence for your response.

**Question 4.3:** Do you agree with our view, as expressed in paragraph 4.27, that situations where cost savings to providers will be available from dark fibre are likely to be common? Please set out your reasons and supporting evidence for your response.

**Question 4.4:** Do you agree with our assessment of the risks and costs of our proposed dark fibre remedy? Please set out your reasons and supporting evidence for your response.

**Question 4.5:** Do you agree that we should impose a dark fibre remedy for the period April 2018 to March 2019? Please set out your reasons and supporting evidence for your response.

## 5. Impact on charge control

### Introduction

5.1 In the BCMR Temporary Conditions Statement we have decided to impose the following charge controls in the Lower Bandwidth CISBO markets:

- a control of CPI-13.50% for period starting on 1 December 2017 and ending on 31 March 2018 (Period 1); and
- a control of CPI-13.50% in period starting 1 April 2018 and ending 31 March 2019 (Period 2).

5.2 In this section, we set out our provisional views on the impact of the proposed dark fibre remedy on these charge controls. Should we decide not to impose a dark fibre remedy following this consultation, the Period 2 control would be modified to CPI-15.75%.

### Background

#### 2016 BCMR Statement

5.3 In the 2016 BCMR Statement, we forecast Ethernet basket costs and revenues, taking into account expected migration of active circuit volumes to dark fibre during the control period. We made three adjustments to our cost forecasts to provide BT with the opportunity to recover its efficiently incurred costs:

- a) **Common cost uplift:** uplift to the Ethernet basket cost forecast to ensure BT recovered its efficiently-incurred common costs. This was to account for the forecast migration of active VHB services to dark fibre.<sup>77</sup> This common cost uplift was approximately £1.4m in total in the final year of the 2016 control;
- b) **Stranded asset uplift:** uplift to the Ethernet basket cost forecast to ensure BT recovered its efficiently incurred equipment costs in light of the use of the dark fibre remedy to replace existing active services. This stranded asset uplift was approximately £0.7m in total in the final year of the 2016 control; and
- c) **Implementation cost uplift:** uplift to the Ethernet basket cost forecast to ensure that BT's recovery of its efficiently incurred implementation costs was not put at risk.<sup>78</sup> This implementation cost uplift was approximately £[8<] in the final year of the 2016 LLCC.<sup>79</sup>

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<sup>77</sup> Because VHB CISBO services make a higher contribution to fixed and common costs than 1Gbit/s circuits, migration to dark fibre which is priced on an active 1Gbit/s minus basis would result in lower fixed and common cost recovery.

<sup>78</sup> Although the implementation cost uplift is spread across the three years of the charge control, we understand that the implementation costs have been largely sunk (as discussed in section 4).

<sup>79</sup> 2016 BCMR Statement, Volume 2, paragraph 5.20.

## 2017 NDR Statement

- 5.4 In the 2017 NDR Statement, we set out amendments to the calculation of the prices that BT charges for dark fibre services and for charge controlled Ethernet services. The need for the amendments arose from an appeal against the 2016 BCMR Statement by TalkTalk. The Competition and Markets Authority found that Ofcom was wrong to use a measure of BT's non-domestic rates (NDR) costs as part of the calculation for the price of dark fibre products. As a consequence of our amendments, we adjusted the Ethernet basket by reducing the value of X in the final year of the control (2018/19) from -13.50% to -12.75%.

## BCMR Temporary Conditions Statement

- 5.5 In the BCMR Temporary Conditions Statement we say that, for the purposes of setting charge controls in the period until March 2019, we are forecasting Ethernet basket costs and revenues on the basis that a dark fibre remedy would be in place by 2018/19.<sup>80</sup>

## Our proposals

- 5.6 As set out in section 3, we are proposing to impose a dark fibre access remedy for the period between 1 April 2018 and 30 March 2019. As set out in the 2016 BCMR Statement, the dark fibre remedy affects the Ethernet control through its impact on the volume mix of active circuits included in the basket and the cost uplifts included to ensure that BT has the opportunity to recover its efficiently incurred costs.<sup>81</sup> We first set out our revised volume forecast for dark fibre and then discuss these impacts on the charge control.

## Forecasting take-up of dark fibre

- 5.7 We expect that our proposal to introduce a dark fibre remedy would lead to take-up of dark fibre products by a number of providers. While we would not seek to predict precisely where and for what purpose individual providers would use dark fibre, we expect that dark fibre will be used to replace new and existing circuits with different types of technology.
- 5.8 For the purposes of setting the charge control we need to provide a specific forecast of take-up. We set out our methodology for forecasting the take-up of dark fibre under the remedy we proposed in the 2016 BCMR Statement.<sup>82</sup> In that statement, we forecast that in 2018/19 around [X] dark fibre circuits would be taken up across all bandwidths and including both new connections and migration of existing circuits.<sup>83</sup> Table 5.1 below sets out the cannibalisation assumptions we used in the 2016 BCMR Statement to generate our volume forecast.

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<sup>80</sup> BCMR Temporary Conditions Statement, paragraphs 5.37-5.42.

<sup>81</sup> 2016 BCMR Statement, Annex 33.

<sup>82</sup> 2016 BCMR Statement, paragraphs A32.51 to A32.57.

<sup>83</sup> 2016 BCMR Statement, paragraphs A32.51 to A32.57.

Table 5.1: 2016 BCMR Statement cannibalisation assumptions

Product		Existing circuits (17/18)	Existing circuits (18/19)	New circuits (17/18)	New circuits (18/19)
EAD LA	10 / 100Mbit/s	0%	0%	0%	0%
	1Gbit/s		4%	25%	95%
	10Gbit/s		17%	25%	95%
EAD & WES/BES	10 / 100Mbit/s		0%	0%	0%
	1Gbit/s		6%	25%	95%
	10Gbit/s		29%	25%	95%
OSA	>1Gbit/s		0%	25%	95%
EBD	1Gbit/s		0%	1%	6%
	10Gbit/s		12%	14%	57%

Source: Ofcom analysis

- 5.9 We note that this level of take-up, in what would have been the first full year of the implemented remedy, would have been consistent with our expectation of a slow build-up in take-up, as the industry transitioned to use dark fibre.
- 5.10 We have used our 2016 forecasts as a starting point for our revised forecasts for take-up of the remedy that we are proposing in this consultation, taking into account the new findings on the geographic scope in the BCMR Temporary Conditions Statement,<sup>84</sup> and making adjustments to account for:
- the revised time period for which we propose dark fibre would now apply (April 2018 to March 2019 as opposed to October 2017 to March 2019); and
  - the removal of VHB CISBO services from the forecasts.
- 5.11 In the 2016 BCMR Statement, we estimated the number of circuits that would use dark fibre for the 18 months between October 2017 and March 2019. Given the proposed later implementation date of dark fibre, we have revised the forecasts by taking the rate of migration from active to dark fibre services we forecast for the first 12 months – covering the periods October 2017 to March 2018 and April 2018 to September 2018 – and applying these to the relevant new connection and rentals volumes forecast for the 12 months of 2018/19 (April 2018 to March 2019). We are no longer forecasting any dark fibre take-up prior to April 2018.
- 5.12 In our 2016 BCMR Statement forecasts of dark fibre take-up, we assumed that 95% of EADLA, EAD and OSA new active circuits and 57% of EBD new circuits at 10Gbit/s would migrate to dark fibre. We also assumed that respectively 17%, 24%, 0% and 12% of existing circuits of these types would move to dark fibre. Since we now propose to require BT to

<sup>84</sup> The CBDs of Birmingham, Glasgow and Leeds account for about 2% of BT's Lower Bandwidth CISBO circuits in the UK, resulting in a decrease of about 2% of the overall dark fibre volume forecast.

supply dark fibre for use in the Lower Bandwidth CISBO markets, we have removed all dark fibre circuits which would have carried VHB CISBO services from our forecasts.

- 5.13 Table 5.2 sets out the proposed cannibalisation assumptions we have used to generate the dark fibre volume forecast used for this consultation, taking into account the revised time period and the removal of VHB CISBO services.

**Table 5.2: Proposed cannibalisation assumptions**

Product		Existing circuits (17/18)	Existing circuits (18/19)	New circuits (17/18)	New circuits (18/19)
EAD LA	10 / 100Mbit/s	0%	0%	0%	0%
	1Gbit/s		2%		73%
EAD & WES/BES	10 / 100Mbit/s		0%		0%
	1Gbit/s		3%		73%
EBD	1Gbit/s		0%		4%

Source: Ofcom analysis

- 5.14 It is possible that potential users of dark fibre who believe that they will need to upgrade their speed to above 1Gbit/s in the near future will be dissuaded from using dark fibre, due to the upgrade process from dark fibre to one of BT's VHB services. However, it needs to be recognised that the upgrade process from a BT 1Gbit/s active service to a BT VHB active service is not always straight forward and in many cases the equipment will need to be changed. Therefore, we do not believe that the dark fibre upgrade process will materially reduce the demand for dark fibre at 1Gbit/s, particularly as we estimate there are material cost savings to be had at this level (see section 4).
- 5.15 Having made these adjustments, we now forecast that the take-up of dark fibre will be around 11,000 circuits in 2018/19 as shown in Table 5.3 below.

**Table 5.3: Forecast take-up of dark fibre (1 April 2018 – 30 March 2019)**

	1 Gbit/s	Total
Existing connections	1,277	1,277
New connections	9,857	9,857
Total	11,135	11,135

## Impact on the charge control

- 5.16 As a consequence of our lower dark fibre volume forecast, compared to the 2016 BCMR Statement, we forecast BT to have an additional [X] EAD 1Gbit/s active circuits in 2018/19. Due to the fact that EAD 1Gbit/s circuits generally earn a higher margin over FAC than other services in the Ethernet basket, the inclusion of these additional EAD 1Gbit/s

circuits results in the difference between forecast revenues and cost for the Ethernet basket increasing by around £10m in 2018/19.

- 5.17 In terms of costs, we continue to believe that uplifts are required to provide BT with the opportunity to recover its efficiently incurred costs. However, due to the differences between the proposed dark fibre remedy and that set out in the 2016 BCMR Statement (changes in timing and the volume of affected services), we have made the following changes to the 2018/19 cost uplifts:
- **Stranded assets uplift:** The magnitude of this proposed adjustment partly depends on the volume of active circuits that are expected to migrate to dark fibre by the end of the control period. We have therefore proposed to scale down this adjustment in line with the lower migration volumes we are forecasting under our new proposals. This has a relatively minor impact, resulting in an uplift of c.£0.1m in the final year of the control (vs c.£0.7m in 2016 BCMR Final Statement).
  - **Implementation costs uplift:** As set out in section 4, we consider that BT is likely to have incurred the majority of development costs in order to achieve the intended October 2017 commencement date set out in the 2016 BCMR Statement. We consider that the charge control should continue to allow the recovery of these costs and have included the same allowance of approximately £[3<] in the final year of the control.
  - **Common cost uplift:** As set out in section 3, we are proposing to maintain our approach of pricing dark fibre with reference to BT's EAD, EAD LA and Main Link 1Gbit/s products, such that the dark fibre product makes the same contribution to BT's common costs as the 1Gbit/s active products (EAD 1Gbit/s active-minus approach). However, because BT will have the choice to prevent the use of dark fibre above 1Gbit/s, we consider that there is no longer a need to provide an allowance for the lost common cost contributions of cannibalised VHB active circuits. We have therefore removed the common cost uplift of c.£1.4m from the final year of the control.
- 5.18 We have taken into account these updated dark fibre proposals in calculating the level of the Ethernet basket controls for the BCMR Temporary Conditions Statement resulting in a control of CPI-13.50% in each of Period 1<sup>85</sup> and Period 2.<sup>86</sup> Should our dark fibre proposals change following consultation we would need to modify the Period 2 control. For example, if we do not go ahead with our proposals to introduce dark fibre, the Period 2 control would need to be revised to CPI-15.75%.
- 5.19 As set out in the BCMR Temporary Conditions Statement, using these assumptions results in a control which is 0.75 percentage points more negative than if we were to retain the 2016 BCMR Statement assumptions. The Ethernet basket X becomes more negative under our new dark fibre proposals because: (i) our updated dark fibre volume forecasts result in additional 1Gbit/s services being included in the basket – BT earns higher margins over FAC on 1Gbit/s services than on other services in the Ethernet basket; and (ii) the updated

<sup>85</sup> Starting 1 December 2017 and ending on 31 March 2018.

<sup>86</sup> Starting 1 April 2018 and ending 31 March 2019.

2018/19 cost uplifts total £[X] which is lower than the £[X] included in the 2016 BCMR Statement.

**Question 5.1:** Do you agree with our forecast for dark fibre take-up in 2018/19? Please set out your reasons and supporting evidence for your response, including any volume forecasts you have for consumption of dark fibre for 2018/19.

**Question 5.2:** Do you agree with our proposed charge control on the proposed dark fibre product? Please set out your reasons and supporting evidence for your response.

# A1. Responding to this consultation

Delete these annexes if your document is not a consultation

## How to respond

- A1.1 Ofcom would like to receive views and comments on the issues raised in this document, by 5pm on 29 December 2017.
- A1.2 You can download a response form from <https://www.ofcom.org.uk/consultations-and-statements/category-3/dark-fibre>. You can return this by email or post to the address provided in the response form.
- A1.3 If your response is a large file, or has supporting charts, tables or other data, please email it to [dark.fibre@ofcom.org.uk](mailto:dark.fibre@ofcom.org.uk), as an attachment in Microsoft Word format, together with the cover sheet (<https://www.ofcom.org.uk/consultations-and-statements/consultation-response-coversheet>). This email address is for this consultation only, and will not be valid after 5 January 2018.
- A1.4 Responses may alternatively be posted to the address below, marked with the title of the consultation:  
Georgi Pojarliev  
Ofcom  
Riverside House  
2A Southwark Bridge Road  
London SE1 9HA
- A1.5 We welcome responses in formats other than print, for example an audio recording or a British Sign Language video. To respond in BSL:
- Send us a recording of you signing your response. This should be no longer than 5 minutes. Suitable file formats are DVDs, wmv or QuickTime files. Or
  - Upload a video of you signing your response directly to YouTube (or another hosting site) and send us the link.
- A1.6 We will publish a transcript of any audio or video responses we receive (unless your response is confidential).
- A1.7 We do not need a paper copy of your response as well as an electronic version. We will acknowledge receipt if your response is submitted via the online web form, but not otherwise.
- A1.8 You do not have to answer all the questions in the consultation if you do not have a view; a short response on just one point is fine. We also welcome joint responses.
- A1.9 It would be helpful if your response could include direct answers to the questions asked in the consultation document. The questions are listed at Annex 4. It would also help if you could explain why you hold your views, and what you think the effect of Ofcom's proposals would be.

- A1.10 If you want to discuss the issues and questions raised in this consultation, please contact Georgi Pojarliev on 020 7981 3241, or by email to [georgi.pojarliev@ofcom.org.uk](mailto:georgi.pojarliev@ofcom.org.uk).

## Confidentiality

- A1.11 Consultations are more effective if we publish the responses before the consultation period closes. In particular, this can help people and organisations with limited resources or familiarity with the issues to respond in a more informed way. So, in the interests of transparency and good regulatory practice, and because we believe it is important that everyone who is interested in an issue can see other respondents' views, we usually publish all responses on our website, [www.ofcom.org.uk](http://www.ofcom.org.uk), as soon as we receive them.
- A1.12 If you think your response should be kept confidential, please specify which part(s) this applies to, and explain why. Please send any confidential sections as a separate annex. If you want your name, address, other contact details or job title to remain confidential, please provide them only in the cover sheet, so that we don't have to edit your response.
- A1.13 If someone asks us to keep part or all of a response confidential, we will treat this request seriously and try to respect it. But sometimes we will need to publish all responses, including those that are marked as confidential, in order to meet legal obligations.
- A1.14 Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to Ofcom to use. Ofcom's intellectual property rights are explained further at <https://www.ofcom.org.uk/about-ofcom/website/terms-of-use>.

## Next steps

- A1.15 Following this consultation period, Ofcom plans to publish a statement before the end of the first quarter of 2018.
- A1.16 If you wish, you can register to receive mail updates alerting you to new Ofcom publications; for more details please see <https://www.ofcom.org.uk/about-ofcom/latest/email-updates>.

## Ofcom's consultation processes

- A1.17 Ofcom aims to make responding to a consultation as easy as possible. For more information, please see our consultation principles in Annex x.
- A1.18 If you have any comments or suggestions on how we manage our consultations, please email us at [consult@ofcom.org.uk](mailto:consult@ofcom.org.uk). We particularly welcome ideas on how Ofcom could more effectively seek the views of groups or individuals, such as small businesses and residential consumers, who are less likely to give their opinions through a formal consultation.
- A1.19 If you would like to discuss these issues, or Ofcom's consultation processes more generally, please contact Steve Gettings, Ofcom's consultation champion:

Steve Gettings  
Ofcom  
Riverside House  
2a Southwark Bridge Road  
London SE1 9HA  
Email: [corporationsecretary@ofcom.org.uk](mailto:corporationsecretary@ofcom.org.uk)

## A2. Ofcom's consultation principles

### **Ofcom has seven principles that it follows for every public written consultation:**

#### **Before the consultation**

- A2.1 Wherever possible, we will hold informal talks with people and organisations before announcing a big consultation, to find out whether we are thinking along the right lines. If we do not have enough time to do this, we will hold an open meeting to explain our proposals, shortly after announcing the consultation.

#### **During the consultation**

- A2.2 We will be clear about whom we are consulting, why, on what questions and for how long.
- A2.3 We will make the consultation document as short and simple as possible, with a summary of no more than two pages. We will try to make it as easy as possible for people to give us a written response. If the consultation is complicated, we may provide a short Plain English / Cymraeg Clir guide, to help smaller organisations or individuals who would not otherwise be able to spare the time to share their views.
- A2.4 We will consult for up to ten weeks, depending on the potential impact of our proposals.
- A2.5 A person within Ofcom will be in charge of making sure we follow our own guidelines and aim to reach the largest possible number of people and organisations who may be interested in the outcome of our decisions. Ofcom's Consultation Champion is the main person to contact if you have views on the way we run our consultations.
- A2.6 If we are not able to follow any of these seven principles, we will explain why.

#### **After the consultation**

- A2.7 We think it is important that everyone who is interested in an issue can see other people's views, so we usually publish all the responses on our website as soon as we receive them. After the consultation we will make our decisions and publish a statement explaining what we are going to do, and why, showing how respondents' views helped to shape these decisions.

## A3. Consultation coversheet

### BASIC DETAILS

Consultation title:      organisation realise

To (Ofcom contact):

Name of respondent:

Representing (self or organisation/s):

Address (if not received by email):

### CONFIDENTIALITY

Please tick below what part of your response you consider is confidential, giving your reasons why

Nothing ☐

Name/contact details/job title ☐

Whole response ☐

Organisation ☐

Part of the response ☐

If there is no separate annex, which parts? \_\_\_\_\_

\_\_\_\_\_  
If you want part of your response, your name or your organisation not to be published, can Ofcom still publish a reference to the contents of your response (including, for any confidential parts, a general summary that does not disclose the specific information or enable you to be identified)?

### DECLARATION

I confirm that the correspondence supplied with this cover sheet is a formal consultation response that Ofcom can publish. However, in supplying this response, I understand that Ofcom may need to publish all responses, including those which are marked as confidential, in order to meet legal obligations. If I have sent my response by email, Ofcom can disregard any standard e-mail text about not disclosing email contents and attachments.

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Name

Signed (if hard copy)

## A4. Consultation questions

**Question 2.1:** Do you agree with our findings in relation to product market definition as set out in paragraphs 2.9 to 2.13 of the BCMR Temporary Conditions Statement, namely that we define a market comprising wholesale leased line services of all bandwidths at and below 1Gbit/s using contemporary interface (CI) technologies, including EFM? Please set out your reasons and supporting evidence for your response.

**Question 2.2:** Do you agree with our findings in relation to geographic market definition as set out in paragraphs 2.14 to 2.19 of the BCMR Temporary Conditions Statement, namely that we define the following geographic markets: (a) the CLA; (b) the LP; (c) the CBDs of each of Birmingham, Bristol, Leeds, Glasgow and Manchester; and (d) the RoUK excluding the Five CBDs? Please set out your reasons and supporting evidence for your response.

**Question 2.3:** Do you agree with our assessment of the CI Core, as set out in paragraphs 2.101 to 2.111 of the BCMR Temporary Conditions Statement? Please set out your reasons and supporting evidence for your response.

**Question 2.4:** Do you agree with our findings that BT has SMP in the markets for Lower Bandwidth CISBO services in the LP, the CBDs of each of Bristol and Manchester and the RoUK excluding the Five CBDs, up to the end of March 2019, as set out in paragraphs 2.20 to 2.100 of the BCMR Temporary Conditions Statement? Please set out your reasons and supporting evidence for your response.

**Question 3.1:** Do you agree with our proposed design of the dark fibre access remedy? Please set out your reasons and supporting evidence for your response.

**Question 3.2:** If BT were to make available a dark fibre product based on the design set out above, how long would it take before your company was in a position to purchase it? From what date would you want BT to make such a product available?

**Question 4.1:** Do you agree with our assessment of the benefits of our proposed dark fibre remedy? Please set out your reasons and supporting evidence for your response.

**Question 4.2:** Do you have evidence on the current relative prevalence of each scenario of active equipment configurations as shown in Figures 4.1 and Figure 4.2? Please set out your reasons and supporting evidence for your response.

**Question 4.3:** Do you agree with our view, as expressed in paragraph 4.27, that situations where cost savings to providers will be available from dark fibre are likely to be common? Please set out your reasons and supporting evidence for your response.

**Question 4.4:** Do you agree with our assessment of the risks and costs of our proposed dark fibre remedy? Please set out your reasons and supporting evidence for your response.

**Question 4.5:** Do you agree that we should impose a dark fibre remedy for the period April 2018 to March 2019? Please set out your reasons and supporting evidence for your response.

**Question 5.1:** Do you agree with our forecast for dark fibre take-up in 2018/19? Please set out your reasons and supporting evidence for your response, including any volume forecasts you have for consumption of dark fibre for 2018/19.

**Question 5.2:** Do you agree with our proposed charge control on the proposed dark fibre product? Please set out your reasons and supporting evidence for your response.

## A5. Methodology for estimating cost savings

### Introduction

- A5.1 This annex explains how we have estimated the potential overall cost savings that could be achieved by providers using dark fibre circuits to deliver their services rather than purchasing an active Ethernet circuit from Openreach. We outline our methodology, calculations and data sources.
- A5.2 We present these calculations for illustrative purposes to show the potential overall savings regardless of who they ultimately accrue to.<sup>87</sup> Nevertheless, for ease of exposition these calculations proceed by examining the cost saving from the perspective of a provider. We adjust this to take account of differences in NDR rates that may be paid and believe that this final calculation is a reasonable approximation of the total potential cost savings that may be available.
- A5.3 We focus on the example of Scenario 1 given in section 4 (Figure 4.1) covering both dark fibre Standard and dark fibre LA type circuits. This example illustrates the potential for significant cost savings from dark fibre. While other scenarios (such as those shown in Figure 4.2) and circuit types are possible, we believe that in many of these cases cost savings will also be attainable (e.g. as shown in Figure 4.1 for Scenario 2). In scenarios where a provider requires a dual fibre or resilient circuit, it is likely that the cost savings would be significantly greater than the examples given here. In scenarios where no such savings are available then we would expect limited, or no, take-up of dark fibre.

### Methodology

- A5.4 Our estimate of the cost savings is calculated as:
- Avoided costs from taking a dark fibre product as opposed to a 1Gbit/s EAD active service;
- less
- Any additional provider or end-user costs from using a dark fibre product (including capital and operating costs).

### Cost avoided from taking a dark fibre product

- A5.5 We wish to calculate potential avoided costs in 2017/18. To do this we:
- a) Step 1: Take the active differential for 2015/16 based on Openreach's 2016 Reference Offer;
  - b) Step 2: Adjust this to reflect the net cost saving (i.e. after paying rates)

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<sup>87</sup> We have proposed to require BT to publish a reference offer for dark fibre within one month of the date that the proposed SMP conditions come into force. As part of that, BT will be required to calculate afresh the active differential and prices for dark fibre.

c) Step 3: Adjust this 2015/16 net cost saving to reflect changes in costs in 2016/17.

A5.6 We explain the steps of this calculation in detail below

### Step 1: Openreach's reference offer

A5.7 We have estimated the costs avoided from taking a dark fibre product by first considering the active differential. This is the difference between Openreach's active and dark fibre prices and so reflects the initial cost savings that a provider taking a dark fibre product obtains. The dark fibre prices we have used for this are those given in Openreach's final Reference Offer, which was dated 1 December 2016.<sup>88</sup> As Openreach's website notes, these were illustrative prices calculated as per the guidance given in Annex 24 of the BCMR and condition 10C of the legal instruments. The active prices we have used were those in place in December 2016, again as given on Openreach's pricing website. These active and dark fibre prices and the resulting active differentials are summarised in Table A5.1 below.

**Table A5.1: Comparison of Active and Dark Fibre prices at time of Openreach dark fibre RO<sup>89</sup>**

Type	Active Service	Price (£)	Dark Fibre Service	DF Price (£)	Active Differential (£)
Connections	EAD LA 1 Gbit/s	2,050	DFA LA	2,022.98	27
Connections	EAD 1 GBit/s	2,100	DFA	2,066.35	34
Rentals	EAD LA 1 GBit/s	2,598 p.a.	DFA LA	1,968.97 p.a.	629 p.a.
Rentals	EAD 1 GBit/s	3,198 p.a.	DFA	2,541.03 p.a.	656 p.a.

Source: Openreach, Dark Fibre Access (DFA), Final Reference Offer – Pricing, 1 December 2016.<sup>90</sup>

A5.8 Table A5.1 shows that for EAD services the active differentials for connection services were relatively modest compared to the savings in rentals.

A5.9 The active differentials in Table A5.1 reflect contributions from three components as follows:

- The First Component: the Long Run Incremental Costs (LRIC) avoided by BT in providing dark fibre rather than EAD services. In our guidance, we specified calculations referring to the costs of various network components as reported in BT's Regulatory Financial

<sup>88</sup> Dark fibre prices are taken from, Openreach, Dark Fibre Access (DFA), Final Reference Offer – Pricing, 1 December 2016, <https://www.openreach.co.uk/orpg/home/products/darkfibreaccess/darkfibreaccess/downloads/DFAfinalreferenceofferpricing011216.pdf>.

<sup>89</sup> Openreach also published prices for fibre pair dark fibre and dark fibre LA rental and connection services. Rental prices were roughly double those for the single fibre services, less around £90. Dark fibre pair connection prices were roughly 47% higher than the single fibre prices given above. There are no directly equivalent fibre pair active services. See Openreach pricing website as referenced above.

<sup>90</sup> <https://www.openreach.co.uk/orpg/home/products/darkfibreaccess/darkfibreaccess/downloads/DFAfinalreferenceofferpricing011216.pdf>.

Statement (RFS). The most important of these when calculating the active differential for rental services was Ethernet Electronics. The costs of this component cover the operating and capital costs associated with running and maintaining active equipment. In 2015/16 the Fully Allocated Cost (FAC) (not LRIC) unit rental cost of Ethernet Electronics equipment for EAD and EAD LA 1 Gbit/s services in BT's 2016 RFS was c. £667, i.e. similar to the overall differential.<sup>91</sup> Further contributions to the First Component come from costs associated with the Openreach Systems and Development, Service Centres (Assurance) and Sales and Product Management network components.

- The Second Component: the non-domestic rates costs attributed to the relevant active service. In what follows we assume this contributes a relatively small amount, around £40, to the above active differentials for rental services.<sup>92</sup>
- The Third Component: this covers the objectively justifiable Long Run Incremental Costs of providing dark fibre rather than EAD. The Openreach website notes that these might include patch panel costs, additional testing on provision and dark fibre cease costs.

A5.10 Since Openreach published the Reference Offer for dark fibre prices there have been two major changes that might affect the active differential going forward. We account for these in steps 2 and 3 below.

## Step 2: Adjusting for NDRs

A5.11 Since the issuing of the reference offer, we have issued our 2017 NDR Statement. In this statement we made adjustments to how the Second Component should be calculated for some operators. We recognised that our NDR adjustment would not precisely match the NDRs payable by individual purchasers of dark fibre for all circuits but that for most circuits it would offset the NDR differential appropriately.<sup>93</sup> The 2017 NDR Statement did not affect the calculation of the other two active differential components.

A5.12 In calculating cost savings, we are interested in the net cost saving, i.e. after paying NDRs. We have therefore estimated these from the original 2015/16 differentials, less our estimate of £40 per circuit for the Second Component provided above. We refer to this as the Adjusted Active Differential (AAD). The impact of our 2017 NDR Statement will have been to increase the active differential for some operators but to have had little impact on the AAD. We think that our AAD estimate therefore provides a reasonable estimate of the net cost savings after NDRs that would have been experienced by all operators in 2016/17 following our 2017 NDR Statement decision.

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<sup>91</sup> This is based on Ofcom analysis of pages 74 and 75 of BT's 2016 RFS.

<sup>92</sup> In its evidence to the CMA to support its appeal TalkTalk estimated BT's attribution was £55.84 per circuit in 2014/15. See paragraph 4.57 of the CMA's final determination of TalkTalk's appeal available at [http://www.catribunal.org.uk/files/1259;1261\\_BCMR\\_CMA\\_Final\\_Determination\\_100417.pdf](http://www.catribunal.org.uk/files/1259;1261_BCMR_CMA_Final_Determination_100417.pdf). In 2015/16 Ethernet volumes grew and BT's rating valuation and payments have fallen. These would support a lower attribution in 2015/16 and hence we have assumed a value of £40 per circuit.

<sup>93</sup> 2017 NDR Statement, paragraph 2.110.

### Step 3: Adjusting for changes in costs

- A5.13 Since the issuing of the reference offer BT has published its 2017 RFS. Under our proposals the 2016/17 costs will provide the input costs for the calculation of the First and Second Components of the active differential when setting 2017/18 dark fibre prices. The unit costs of the Ethernet Electronics component within EAD and EAD LA 1 Gbit/s service unit costs in 2016/17 were 13% lower than those in 2015/16 in the 2016 RFS. Unit costs of the other relevant network component fell by more than this, between 24% and 52%. The unit costs of Openreach Service Centre Assurance however increased.<sup>94</sup> Given the large weight of the Ethernet Electronics equipment cost in the calculation of the First Component, it seems likely that the overall impact on First Component unit cost will be close to 13%.
- A5.14 To be consistent with our estimates of additional costs incurred by providers or end users we have estimated the AAD based on 2016/17 costs as this will then give the appropriate input to cost savings in 2017/18. On the basis of the above assumptions, we have calculated this by first restricting our analysis to consider costs for rental services and then:
- Step 1: Taking the 2015/16 active differential based on Openreach's 2016 reference offer;
  - Step 2: Reducing this by £40 to calculate the 2015/16 AAD;
  - Step 3: Calculating the 2016/17 AAD by reducing the 2015/16 AAD by 13%. This assumes that there would be similar reductions in unit costs across both the First and Third Components. We believe that this is an appropriate assumption.
- A5.15 This process produces the following estimates of per circuit cost savings in 2016/17:
- EAD:  $\text{£}656 - \text{£}40 = \text{£}616 \times (1-13\%) = \text{£}536$ , or  $\text{£}535$  rounded to the nearest  $\text{£}5$ .
  - EAD LA:  $\text{£}629 - \text{£}40 = \text{£}589 \times (1-13\%) = \text{£}512$ , or  $\text{£}510$  rounded to the nearest  $\text{£}5$ .
- A5.16 The above cost savings are those that the provider will benefit from as a result of purchasing a dark fibre rather than an active product. However, as a result of the way they have been calculated, we believe they are also a reasonable estimate of the net cost savings to Openreach. The costs within the First Component reflect the long run savings in active equipment and other associated transaction costs. These are then partially offset by the long run incremental costs within the Third Component, including additional equipment such as patch panels, required to provide the dark fibre service.<sup>95</sup>

### Additional provider costs

- A5.17 A provider which takes a dark fibre product from Openreach will incur some additional equipment and operational costs. We focus on Scenario 1, identified in Figure 4.1, where an operator originally had equipment "bookended" with the Openreach equipment when

<sup>94</sup> Ofcom analysis, using information published on pages 74 and 75 of BT's 2016 RFS and page 60 of BT's 2017 RFS.

<sup>95</sup> This is the case for new connections. Where a provider is considering switching an existing active circuit to dark fibre, the Openreach equipment is already present and the cost is therefore sunk. The cost savings in this case will be smaller. However, we expect that existing circuits transferring to dark fibre will account for 11% of dark fibre circuit volumes in 2018/19 (see Table 5.3).

buying an active Ethernet circuit from Openreach. The operator is likely to incur extra operating and capital costs. We discuss each of these separately.

### Capital costs

- A5.18 To operate the dark fibre circuit the provider may need to invest in equipment to fulfil some of the functions that would otherwise be fulfilled by Openreach's equipment. For Scenario 1, we think that the only equipment difference for a provider between the active combination and the dark fibre alternative is additional small form-factor pluggable (SFP) costs at the A and/or B end in the form of a more powerful laser.<sup>96</sup> We have estimated these incremental costs at £35 at each end (£70 in total). We think that these costs would only be incurred for Standard circuits and would not be required in the case of the dark fibre LA service.
- A5.19 As this equipment could be specified when ordering the circuits and as no extra equipment is installed, we believe that no incremental capitalised labour costs would be incurred or network interface devices required at the A or B ends (for this specific Scenario 1).
- A5.20 We have annuitised this cost by assuming:
- An asset life of six years (for the SFP);<sup>97</sup>
  - A WACC of 10.0%. This estimate is similar to the WACC we applied to BT on BCMR services of 9.8%. We note that any specific provider who may use dark fibre may have a different WACC depending on their intended use of the service.
- A5.21 We consider that these both assumptions are appropriate given the relatively short period over which the assets have been depreciated and the relatively small size of the incremental capital costs.
- A5.22 This yields an annuitised capital cost of £16 per year.

### Operating costs

- A5.23 In addition, providers who use dark fibre will be responsible for operating and managing the circuit. We have estimated the incremental operating costs by assuming the following:
- The incremental costs of running and maintaining the incremental equipment – for example power consumption and preventative maintenance - would be 10% per year of the additional equipment costs. So in this case £7 per year (10% \* £70).
  - Depending on the scenario there may be an incremental operational cost associated with the circuit management of dark fibre-based services. In Scenario 1, this cost may be negligible but it is unclear if this is the case, so we have taken a conservative approach and included such a cost.<sup>98</sup> We have estimated the circuit management costs by assuming this activity is undertaken by an engineer with an annual salary of c. £30,000

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<sup>96</sup> For Scenarios 2 and 3 additional Network Interface Devices may also be needed, we have taken these into account in our estimates for those scenarios.

<sup>97</sup> For Scenarios 2 and 3 we also assume an asset life of additional Network Interface Devices of six years, which we consider a conservative assumption.

<sup>98</sup> These costs are more likely to arise in Scenarios 2 and 3 and we have included them in our estimates of those scenarios.

per annum. We have then added 50% to cover overheads such as accommodation costs, general management and other pay related overheads. Lastly, we have assumed that each such engineer would be able to manage 400 circuits. This produces a per-circuit cost of £112.50 per year.

- A5.24 This yields total additional operating costs of £120 per year for Scenario 1 for standard circuits and £113 per year for LA circuits (because there are no incremental running and maintenance costs).

### Net cost savings of Scenario 1

- A5.25 Combining the above—the costs savings and incremental provider operating and capital costs—yields the following:

- Scenario 1, dark fibre instead of EAD 1 Gbit/s: £535 - £16 - £120 = £399 per year
- Scenario 1, dark fibre instead of EAD LA 1 Gbit/s: £510 - £113 = £398 per year<sup>99</sup>

- A5.26 We therefore estimate net cost savings of around £400 per year on both a dark fibre and dark fibre LA circuit. Openreach's prices are currently £2,850 per year for the "active" EAD 1 Gbit/s service and £2,250 per year for the corresponding EAD LA service.<sup>100</sup> The savings therefore represent 14% of the EAD and 18% of the EAD LA rental prices. It is likely that the percentage savings will increase as Openreach reduces active prices to comply with the charge control we have imposed in the BCMR Temporary Conditions Statement, but the differential remains broadly the same.

### Other equipment combinations and circuit types

- A5.27 We recognise (as discussed in section 4) that the extent of cost savings will depend on the precise equipment configuration that would have been used had a provider taken an active service instead of a dark fibre product. We believe that in most of these combinations there will be scope for cost savings. If there are specific situations where there are no cost savings, then we would not necessarily expect take up of dark fibre in those circumstances.
- A5.28 Further, our calculations above show the savings only for single-fibre, non-resilient, EAD circuits. In general, we would expect the savings to be greater (approximately double) when a dual-fibre or a resilient (RO2) circuit is in use, because in both cases there is scope for twice as much equipment to be saved.

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<sup>99</sup> Values shown are rounded values.

<sup>100</sup> Prices accurate as of 1 October 2017,

<https://www.openreach.co.uk/orpg/home/products/pricing/loadProductPriceDetails.do?data=0d0zetWgShsiqKWjcN2Y5WJA8BGGqsBLxL7lgSM4fRpZ6rNZujnCs99NbIKJZPD9hXYmijixH6wr%0ACQm97GZMyQ%3D%3D>

## A6. Legal instruments

Published separately.