Ofcom’s proposals on regulated dark fibre pricing
A REPORT PREPARED FOR THE PASSIVE ACCESS GROUP

July 2015
Ofcom’s proposals on regulated dark fibre pricing

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Executive Summary

Ofcom is proposing to impose a dark fibre remedy on BT Openreach, following a provision finding that BT has significant market power in relevant markets for wholesale leased lines. Ofcom is proposing to require BT to set the price of the dark fibre product using an active-minus approach based on a single reference product. In particular, the price of dark fibre would be calculated based on the price of the 1Gbit/s EAD and 1Gbit/s EAD LA products minus the avoidable costs (the “reference products”).

In this report, we explain why a well-designed cost-based approach to pricing dark fibre is a superior option allowing for efficient and sustainable competition. This superiority reflects a number of issues with Ofcom’s proposed active-minus approach:

- **Active-minus pricing based on a single reference product would result in only a small part of the market being contestable, as the dark fibre remedy would not be a commercially viable option for much of the market.** Ofcom itself states that, under its proposed pricing approach, the dark fibre product would only be commercially viable for services of 1Gbit/s and above. Under Ofcom’s demand forecasts, this means that only around one third of the Ethernet services would be contestable by the end of the charge control, which will significantly limit the benefits of the dark fibre remedy. Further, it is unclear whether the dark fibre product would be commercially viable even for 1Gbit/s services, as Ofcom is proposing to set the active-minus using LRIC rather than attempting to ascertain the margin necessary to ensure effective competition. Given that competitors would not be able to match BT’s scale and scope under Ofcom’s proposals and may face other cost disadvantages, this may not provide sufficient margin for competing on the provision of 1Gbit/s services. If 1Gbit/s services were not commercially viable, then this could mean that less than 10% of the Ethernet services would be contestable under Ofcom’s proposed pricing approach. In such a case, the remedy would not be effective for the products where BT Openreach currently has the highest market share.

- **Active-minus lacks predictability compared to a forward looking cost based charge control.** There is a lack of clarity around how the margin (the “minus”) would be set under the active-minus approach proposed by

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1 “Business Connectivity Market Review: Leased lines charge controls and dark fibre pricing – Consultation document (June 2015)” Figure 6.1. Throughout this report, references relate to this document, unless otherwise stated.
Ofcom. Rather than determining the margin in advance, Ofcom has provided guidance on how BT would calculate the margin based on LRIC. However, despite the guidance, it appears that there would be little information available to other stakeholders about how the margin would be calculated in practice. This means that there would be uncertainty for potential purchasers of dark fibre over both the initial margin and the margin in later years of the charge control and beyond. This lack of predictability in Ofcom’s proposals could limit take-up of dark fibre and almost certainly would tie CPs, BT and Ofcom up in lengthy disputes.

- **To the extent that there are benefits from allowing Openreach to set the structure of prices, these are unlikely to be realised under Ofcom’s proposals.** One of the purported advantages of an active minus approach over a cost plus approach is that it can provide increased allocative efficiency if BT has the incentive and ability to set the structure of prices to maximise demand under the overall price cap (i.e. Ramsey like prices). Ofcom recognises that Openreach’s incentives would be affected by the introduction of dark fibre on an active minus basis and that it would use any freedom in setting the active reference price to push up the cost of dark fibre\(^2\), which could render the remedy ineffective. As a result, Ofcom has by necessity drastically limited the ability of BT to determine the structure of active prices implicitly, accepting that in this case BT would not have incentives to set Ramsey like prices in this case. Ofcom essentially imposes a price structure for active services, which in part reflects current tariff gradients, and is unlikely to be efficient on a forward looking basis\(^3\).

When comparing an active-minus approach with a cost-based approach, we use Ofcom’s own assessment framework. Ofcom evaluated the potential options by scoring them against the following criteria:

- Economic efficiency considerations (allocative, dynamic, and productive efficiency); and
- Implementation considerations (compatibility with active remedies/risk of arbitrage, risk of gaming, and ability to implement).

Based on its analysis, Ofcom considered that an active minus approach based on a single reference product provided the best outcome. However, taking full account of the issues with Ofcom’s proposals set out above, we consider that

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\(^2\) 6.147.

\(^3\) It is arguable as to whether the existing tariff gradient is currently efficient given BT’s existing incentives.
that a well-designed cost based charge control is clearly superior overall, particularly in terms of efficiency and ease of implementation.

**Efficiency considerations**

Ofcom appears to favour the proposed active-minus approach rather than a cost-based approach, largely because this enables BT to partially maintain the existing tariff gradient\(^4\). Ofcom argues that this leads to benefits in terms of allocative efficiency and infrastructure investment. Ofcom accepts that a cost-based approach would be superior in terms of productive efficiency and dynamic efficiency in the provision of active equipment, but argues that on balance, an active minus approach best meets its objectives.

We consider that the potential benefits from Ofcom’s proposals in terms of allocative efficiency are likely to be minimal for three reasons:

- BT will have no incentive to set efficient prices under Ofcom’s proposals and will have little ability to set such prices even if it did;
- the likely allocative efficiency gains even if wholesale Ethernet prices were set according to Ramsey pricing principles (which they are not) would be small; and
- Ofcom does not present any evidence that BT’s current active pricing is allocatively efficient.

Ofcom finds that the cost-based approach scores more highly on productive efficiency than the active-minus approach due to increased competition in the active layer, more appropriate build-or-buy signals for potential entrants and less duplication of passive assets.\(^5\) Ofcom’s assessment of the two pricing options for dynamic efficiency in the active layer is similar to its assessment of productive efficiency. We are in broad agreement with Ofcom’s scoring for these two objectives in qualitative terms. But we note that Ofcom’s score for the active-minus approach is based on the assumption that approximately one third of circuits will be contestable, which is an upper bound, given that there is uncertainty as to whether 1Gbit/s services will be contestable. In addition, the increased certainty under a cost plus based approach could further stimulate uptake of dark fibre and thereby lead to greater innovation in the active layer.

Ofcom has attached a lower score for the cost-based approach for dynamic efficiency in the passive layer. Ofcom’s main concern seems to be that a cost-based approach could lead to stranded assets for alternative Competing Providers.

\(^4\) BCMR (May 2015) - A26.145  
\(^5\) BCMR (May 2015) – Table A26.2.
(CPs). However, as investment in infrastructure will be largely driven by density of demand rather than the current structure of prices, a revenue neutral rebalancing of active prices should not result in significant changes in future returns. On a forward looking basis, a cost-based charge control would provide greater predictability than Ofcom’s proposed active-minus approach and as such should incentivise efficient investment in alternative infrastructure. For that reason we consider that a cost-based approach deserves a higher score than allocated by Ofcom.

**Implementation considerations**

Ofcom recognises that an active-minus approach results in a greater risk of gaming than a cost-based approach, as it provides BT with a greater opportunity to distort prices in an anti-competitive way. We agree with this assessment.

Ofcom has attached a low score to the ease of implementation for the cost-based approach. This appears to be because in the scoring, Ofcom has assumed that the cost-based approach would require a bottom-up model. Our proposal for a cost based charge control would use the same model and data as used for the charge control for active services, rather than a bottom-up model. This would also be more transparent and predictable than Ofcom’s proposals, which would allow BT to set the margin and would require other stakeholders to raise disputes to determine whether the margin was correctly estimated. On this basis, we attached a higher score to a cost based approach for ease of implementation.

In terms of compatibility with active pricing, by setting cost based active and passive charge controls on a CPI-X basis using a common underlying model, it would be possible to ensure that both sets of prices are consistent in the medium term. While Ofcom’s proposals allow the current active pricing structure to be partially retained in the short run, it only ensures consistency between active and passive prices for the reference product and creates uncertainty about the relationship between active and passive prices in the longer term.

**Our assessment of the options**

**Table 1** below shows Ofcom’s assessment of the generic options as set out in the consultation document and our assessment of the concrete proposals⁶. This table shows that our assessment is that the cost-based charge control approach is superior to Ofcom’s proposals on all of Ofcom’s objectives, other than allocative efficiency. However, we believe that the weight given to allocative efficiency should reflect the very limited potential efficiency gains under Ofcom’s

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⁶ Our scoring of the active-minus approach for productive efficiency and dynamic efficiency in the active layer can be considered as conservative, as we have not reduced the scores despite the fact that a lower proportion of the market may be contestable than assumed by Ofcom.
proposals. This low weighting for allocative efficiency is consistent with Ofcom’s approach elsewhere in the BCMR:

“Historically, we have typically attached higher weight to productive and dynamic efficiency considerations for wholesale leased lines, rather than trying to achieve allocative efficiency at every point in time. This is because productive and dynamic efficiency improvements are likely to generate greater benefit to consumers over time; as the firm becomes more efficient and increases investment and innovation, this should ultimately result in lower prices and better services for consumers.”

Table 1. Assessment of alternative passive pricing approaches – cost based v active-minus – Used 0-4 to reflect Ofcom’s scoring methodology (full moon=0 and eclipse=4)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Ofcom’s assessment</th>
<th>Frontier’s assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cost based</td>
<td>Active minus</td>
</tr>
<tr>
<td>Allocative</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Productive</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Dynamic – Active</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Dynamic – Infra</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Active compatibility</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Gaming Risk</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Ease of implementation</td>
<td>2³</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: Adapted from Table A26.8, BCMR May 2015

In summary, the overwhelming weight of evidence suggests that a cost-based charge control would better meet Ofcom’s efficiency objectives than its current proposals. In addition, a cost-based approach would be far simpler to implement.

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³ 4.77.

⁴ Although Ofcom makes this statement in the context of glidepaths, it is unclear why such a stance should not also apply when deciding on the preferred pricing approach.

⁵ Assuming a bottom up modelling approach. Ofcom indicates that a top down modelling approach would lead to a similar score to the active minus approach.
than Ofcom’s current proposals, provide greater clarity and hence clearer build or buy signals in the long run for stakeholders.
1 Background

1.1 Overview of Ofcom’s proposed approach

Leased lines are used to provide dedicated transmission capacity between fixed locations. Over the period of the market review, Ofcom expects demand for leased lines to increase due to higher demand for bandwidth-intensive services, rising demand for fixed and mobile backhaul and falling unit costs of leased lines. In the May 2015 BCMR consultation, Ofcom provisionally concluded that BT Openreach has Significant Market Power (SMP) in three wholesale leased lines markets, namely:

1. The wholesale market for low bandwidth Traditional Interface Symmetric Broadband Origination (TISBO) in the UK excluding the Hull area, at bandwidths up to and including 8Mbit/s;
2. The wholesale market for Contemporary Interface Symmetric Broadband Origination (CISBO) in the London Periphery (LP); and
3. The wholesale market for CISBO in the Rest of the UK (RoUK) excluding the Hull area.

This report focuses on the pricing of the dark fibre access remedies that Ofcom has proposed for SMP CISBO markets.

Ofcom is proposing to set the dark fibre access charge with reference to the price of active wholesale products – an ‘active minus’ approach. Given that the dark fibre pricing is linked to the pricing for Ethernet services, we also review Ofcom’s approach to regulating the prices for Ethernet services. In essence, the pricing of dark fibre access will be determined by a combination of the ‘active’ Ethernet charge control and the ‘active minus’ control applied to set the price of dark fibre. In the rest of this section, we provide a summary of Ofcom’s proposed approach for setting Ethernet and dark fibre prices.

1.1.1 Ethernet services

Ofcom is proposing to set a charge control for a broad basket of Ethernet services. Within the Ethernet basket, Ofcom is proposing sub-baskets and sub-
caps for various services. In particular, Ofcom is proposing to adopt the following approach:

- **Overall Ethernet basket.** The overall Ethernet basket would be subject to a price cap of CPI-13.75% combined with a P0 adjustment of -9%. This suggests that real prices will need to fall by over 40% during the three year price control.

- **Sub-cap on 1Gbit/s services.** Given that the dark fibre price is being set with reference to 1Gbit/s services, this gives BT an incentive to increase the prices of these services. Ofcom is proposing that there should be a price cap of CPI-13.75% combined with a P0 adjustment of -9% on 1Gbit/s services to prevent BT unduly raising the price of dark fibre services by increasing the price of the reference active product. To the extent that the overall cap and the sub-cap on 1Gbit/s services are binding constraints, the fact that the same CPI-X reduction is applied in both cases means that the opening tariff gradient (i.e. the relative price between 100Mbit/s and 1Gbit/s) will be maintained.

- **Sub-cap on all charges.** All charges within the Ethernet basket face a sub-cap of CPI-CPI meaning that BT cannot increase the nominal price of any Ethernet services.

- **Above 1Gbit/s.** Although Ethernet services above 1Gbit/s are outside of Ofcom’s Ethernet basket (including WDM), it is still proposing a sub-cap for such services in the Rest of UK, excluding the Hull area. The sub-cap is set at CPI-CPI for all charges. The logic for not including such services within the Ethernet basket is that the dark fibre remedy should provide a constraint on any anti-competitive behaviour by BT.

In setting the Ethernet charge control, Ofcom has also taken into account the forecast impacts of the dark fibre remedy on BT’s active services:

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12 There are also sub-baskets for Main Link services and BTL interconnection products with CPI-13.75% and a P0 adjustment of -9%.

13 Ofcom is using a P0 adjustment as it considered that BT has in the past made an inappropriate cost allocation between regulated and unregulated services. However, we note that the -9% P0 adjustment only reflects £22m of the £37m costs that were inappropriately allocated to Ethernet services. The remaining £15m is included in the glide path.

14 \(=0.91 \times (1-0.1375)^3\)

15 BT will be able to reduce EAD prices more or less than EAD LA within the caps.

1. The impact of the dark fibre remedy on Ethernet volumes and therefore forecast costs.

2. Active price rebalancing above 1Gbit/s and the consequent reduction in margins for these services.

3. The development costs for implementing the dark fibre remedy, which Ofcom proposes to recover across all circuits in the Ethernet basket.

### 1.1.2 Dark fibre pricing

Rather than setting the price of the dark fibre product based on an estimated cost stack, Ofcom is proposing to set the price using an active-minus approach. This means that the price will be determined based on the price of Ethernet services minus the costs avoided by BT from providing dark fibre instead of Ethernet\(^{17}\). Ofcom is proposing to use single reference products to set the dark fibre prices. In particular, it is proposing to use EAD 1Gbit/s and EAD LA 1Gbit/s as the active products used to determine the dark fibre price. Ofcom intends to set the “minus” based on LRIC. Ofcom has stated that using this active-minus approach will deliberately result in a higher dark fibre price compared to using a cost-based approach, where the dark fibre price reflects the average contribution of Ethernet services to the cost of the network. This reflects the fact that the 1Gbit/s price will be above the average price across all Ethernet services.

### 1.2 Structure of report

The rest of this report is structured as follows:

- In section 2, we explain key issues with Ofcom’s active-minus approach;
- In section 3, we set out alternative pricing options given the drawbacks of Ofcom’s active-minus approach; and
- In section 4, we show that a cost-based charge control is superior to Ofcom’s proposals when applying Ofcom’s scoring system across its different objectives.

\(^{17}\) Under Ofcom’s approach the cost of active equipment used to set the margin between active and dark fibre prices may differ from the forecast of active equipment costs used to set the charge controls on active services.
2 Key issues with Ofcom’s proposed approach

In this section, we set out some key issues with Ofcom’s proposed approach for the dark fibre remedy.

The rest of this section is structured as follows:

- In section 2.1, we explain that only a limited part of the market will be contestable under Ofcom’s proposed active-minus approach; and
- In section 2.2, we set out why entry could be deterred due to a lack of transparency in Ofcom’s approach, particularly around the value of LRIC;
- In section 2.3, we explain why Ofcom’s proposed approach would essentially determine the structure of prices at an active level.

2.1 Under Ofcom’s proposals only a limited part of the market would be contestable

Ofcom proposes to set the dark fibre price using an “active-minus” approach, using 1Gbit/s EAD services as a reference product (with an equivalent approach for 1Gbit/s EAD LA services). Ofcom acknowledges that the dark fibre product could not be used to compete for services below 1Gbit/s as the margin between the active price and the dark fibre price would be less than the costs of active equipment. Ofcom forecasts that sub 1Gbit/s services will still represent around two-thirds of the market by the end of the charge control. The inability to use dark fibre to serve sub 1Gbit/s customers limits the benefits from the active-minus approach as customers of these services will not directly benefit from any productive or dynamic efficiency benefits that could be brought by the use of dark fibre.

There may be indirect reductions in benefits even for those customers using higher bandwidth services as CPs will not be able to benefit from the same economies of scale and economies of scope as BT, potentially lessening the intensity of competition for these subscribers. When we provide our scores of the different options in section 4.2, we take into account that only a limited part of the market would be contestable under the active-minus approach.

In addition, it is not clear as to whether the dark fibre product could be used to compete for 1Gbit/s services, given that Ofcom is proposing to set the active-minus using LRIC rather than attempting to ascertain the margin necessary to ensure competition at 1Gbit/s. If CPs cannot efficiently compete in the provision of 1Gbit/s services using dark fibre, then this would significantly...
reduce the potential benefits of introducing dark fibre. Should dark fibre only be an option for circuits above 1Gbit/s, then less than 10% of the market will be contestable by the end of the charge control (and even less before then).

The proportion of the market that would be contestable with the dark fibre remedy has a key impact on our analysis of the merits of the active-minus approach compared to a cost-based approach (see section 4). The rest of this section is structured as follows:

- In section 2.1.1, we explain that Ofcom itself suggests that only 1Gbit/s services and above would be contestable; and
- In section 2.1.2, we set out why it is unclear whether even 1Gbit/s services would be contestable.

### 2.1.1 Ofcom itself suggests that only 1Gbit/s services and above would be contestable

Ofcom has modelled the impact that the dark fibre remedy could have on Ethernet volumes. It has suggested that the dark fibre product will only be a commercially viable alternative for certain active products, as shown by the table below. All of these viable alternatives have speeds of 1Gbit/s or more. We also show that even fewer products will be commercially viable if circuits of 1Gbit/s are not contestable.

**Key issues with Ofcom’s proposed approach**
Table 2. Active services for which dark fibre will be a commercially viable alternative

<table>
<thead>
<tr>
<th>Active circuit type</th>
<th>Likely to be commercially viable with dark fibre? (Ofcom view)</th>
<th>Likely to be commercially viable with dark fibre? (If 1Gbit/s is not contestable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAD 10Mbit/s</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>EAD 100Mbit/s</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>EAD 1Gbit/s</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>EAD LA 10Mbit/s</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>EAD LA 100Mbit/s</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>EAD LA 1Gbit/s</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>OSA 10Gbit/s</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>WES 10Mbit/s</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>WES 100Mbit/s</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>WES 1Gbit/s</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>WES other</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>WES above 1Gbit/s</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>BES 1Gbit/s</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>BES other</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>BES above 1Gbit/s</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source: Adapted based on Ofcom LLCC Table A12.1

The following figure helps illustrate why the dark fibre product would not be commercially viable for services below 1Gbit/s services under Ofcom’s active-

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18 Based on one year contract and 2015/16 prices and costs.
minus approach. The key issue is that for services below 1Gbit/s, the dark fibre price plus LRIC would be greater than the active price, meaning that alternative operators would effectively be margin squeezed for services below 1Gbit/s.

**Figure 1. Illustrative example of Ofcom’s proposals**

![Illustrative example of Ofcom's proposals](image)

Source: Frontier

In its modelling, Ofcom has assumed that there will be some cannibalisation of BT’s Ethernet volumes for new connections for circuits at and above 1Gbit/s. In particular, Ofcom has made the following assumptions.

- 50% **“cannibalisation”**\(^{19}\) of new connections (and associated rentals) for EAD, EAD LA and OSA circuits at 1Gbit/s and above in the second year of the control (the first year that the proposed dark will be commercially available);
- 100% cannibalisation of new connections (and associated rentals) for EAD, EAD LA, and OSA circuits at 1Gbit/s and above in the final year of the control;
- There will be no cannibalisation of existing circuits (i.e. operators will not migrate existing circuits to dark fibre); and

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\(^{19}\) Ofcom appears to uses the term cannibalisation to mean that new circuits which Openreach would have delivered as Openreach active services under a counterfactual where dark fibre were not available would be delivered using Openreach dark fibre.
One-to-one substitution between active circuits and the proposed dark fibre, meaning that the total number of circuits will be unaffected; both internal and external sales will be affected, i.e. downstream BT division will self-provide circuits using dark fibre.

Given Ofcom’s assumption on the degree of cannibalisation, the following figure shows Ofcom’s forecasts of the proportion of volumes of Ethernet products that will be replaced by the dark fibre product. The figure below shows that Ofcom expects the passive volumes to be only a fraction of all Ethernet volumes. Ofcom’s estimates of the passive volumes could represent an upper bound, given that it has assumed that 100% of all new connections for EAD, EAD LA, and OSA circuits at 1Gbit/s and above will rely on the dark fibre product by the final year of the control. In reality, it is unlikely that dark fibre would be rolled out by all CPs to all areas by the third year of the charge control and as such it is likely that there would still be some new connections that use Openreach’s active products.20

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20 There are a number of reasons why CPs may continue to use legacy products, even where improved products are available. For example, WES products continued to be sold after the launch of EAD products in 2009. New WES products were still being sold until June 2011 at which point certain bandwidths were withdrawn (6.39).
The low passive volumes in the above figure, even under optimistic assumptions about the roll out of dark fibre by CPs, can be explained by Ofcom’s volume forecasts for the different bandwidths as shown by the figure below. This shows that Ofcom still expects around two thirds of circuits to be at speeds of less than 1Gbit/s by the end of the price control period, which means that the majority of the market will not be commercially viable for the dark fibre product. This limits the benefits from the active-minus approach as customers of these services will not directly benefit from any productive or dynamic efficiency benefits that could be brought by the use of dark fibre. It also has an indirect impact on services at and above 1Gbit/s, as CPs cannot benefit from the same economies of scale and economies of scope as BT.
Figure 3. BT’s Ethernet circuit volumes (excluding impact of passive remedy)

Source: Ofcom LLCC (2015) Figure 6.1

2.1.2 The use of LRIC to calculate the ‘active minus’ margin is not justified

Ofcom is proposing to set the “active-minus” price based on LRIC. As shown by Ofcom’s volume forecasts in Figure 3, only a small fraction of the market would be contestable if alternative providers could compete for services at and above 1Gbit/s. The use of LRIC to set the ‘minus’ may also be likely to deter efficient entry at 1Gbit/s.

Ofcom considers the merits of LRIC v LRIC+ on the basis of four criteria:

- Regulatory consistency;
- Productive efficiency;
- Allocative efficiency; and
- Dynamic efficiency.

In practice, the regulatory consistency criterion relates to dynamic efficiency. Ofcom has in the past set similar differentials both above LRIC, where the objective of promoting entry in the downstream part of the supply chain was

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21 8.11 to 8.17

Key issues with Ofcom’s proposed approach
relatively important\textsuperscript{22}, and at LRIC, where such considerations were outweighed by other objectives. In relation to productive efficiency, Ofcom argues\textsuperscript{23} that LRIC may be preferable to LRIC+ as it is less likely to lead to inefficient entry. We therefore consider this issue as part of the review of Ofcom’s assessment of dynamic efficiency\textsuperscript{24}.

The key criterion is therefore dynamic (and productive) efficiency, where we find that Ofcom’s assessment is not sufficiently justified. Although the degree of economies of scale and scope may be relatively more limited in the provision of active services, it is reasonable to expect that both will still be present – otherwise there would be no/very limited difference between the LRIC and LRIC+ estimate\textsuperscript{25}. These economies of scale and scope will relate to:

- the higher volumes of active equipment purchased by BT;
- the sharing of operating/maintenance costs between active equipment and other equipment; and
- the sharing of other fixed/common costs between the provision of active and other services by BT.

This implies that BT would be expected to have lower unit costs for the provision of active services than other smaller or less diverse CPs offering active services. This unit cost difference could therefore affect the prospects for entry. The size of the unit cost difference may be even more pronounced under Ofcom’s proposals, given that the lack of contestability for at least two-thirds of the market will restrict the scale of CPs. This means that if the margin is set on the basis of BT’s LRIC, a BT rival that may already be present in the active market, and which has lower incremental costs than BT (and is therefore more efficient), may not enter (or expand). Even an efficient entrant may not be able to match the overall average costs of BT for offering active services as such rival would be unlikely to benefit from BT’s scale (and possibly scope) economies.

\textsuperscript{22} Ofcom recognises this in 8.14 when discussing the differential between ULL and active (bitstream) prices.

\textsuperscript{23} 8.12

\textsuperscript{24} Ofcom considers (8.13) that the allocative efficiency criterion is less important in relation to this assessment compared to the dynamic and productive efficiency criteria, and this seems a reasonable assessment.

\textsuperscript{25} Ofcom has not published any information on the LRIC v LRIC+ differential for the provision of active services – indeed they mention (footnote 284) that as they have concluded that LRIC is preferable, they have not considered how LRIC+ would be calculated. We note that this differs from the approach Ofcom has followed in other contexts where it considered the merits of LRIC v LRIC+: for example, when deciding whether to set Mobile Termination Rates on the basis of LRIC v LRIC+. 
Ofcom’s proposals could therefore deter what would be efficient longer-term entry.

Ofcom suggests that the introduction of a passive remedy may allow CPs to use dark fibre even where the margin is not sufficient to cover the long run incremental costs of active equipment, as they already have active equipment in place. Whilst this may be correct in some cases and would increase productive efficiency in the short run, the purpose of introducing passive remedies is to encourage competition in the provision of active services in what is expected to be a growing market. It is therefore reasonable to expect that CPs will evaluate entry/expansion into the provision of active services on the basis of overall future demand for active services rather than the substitution of existing services. We also note that active equipment tends to have relatively short asset lifetimes.

In summary, Ofcom has not provided sufficient justification or evidence that its choice of LRIC will provide sufficient margin for efficient operators to compete in the provision of active equipment. This could mean that even less than one third of the market may be contestable under Ofcom’s current proposals for the dark fibre product. If LRIC ends up being too low to make 1Gbit/s contestable, then less than 10% of the market would be contestable by the end of the charge control. This means there is a real risk that the charge control volume assumptions for active services (which are based on 100% cannibalisation of 1Gbit/s in the final year) may be too low. If this were the case, then the charge control for Ethernet services will allow BT to over-recover its costs.

2.2 Lack of predictability

Ofcom has proposed guidance on how BT should calculate LRIC when setting the “active-minus” price for dark fibre. However, the guidance provides significant scope for interpretation, which could provide BT with considerable flexibility in how it calculates LRIC. This lack of predictability on dark fibre prices could reduce take-up of the dark fibre product, as uncertainty tends to deter investment.

The proposed process for assessing BT’s compliance and some of the elements of the proposed guidance risk leading to too low a margin.

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26 ‘In particular, as explained in our analysis of the cost savings associated with removing duplication of active equipment, in many cases CPs are already supplying their own active elements (so the ‘minus’ component will be a simple cost saving, rather than needing to compensate for purchasing electronic equipment). Consequently, there is little additional investment required so there is no obvious need to increase the differential to allow CPs to achieve an efficient scale of operation’

27 This is likely to be the case for any non-binding guidelines that Ofcom implements, given the strong information asymmetry between BT and Ofcom.

Key issues with Ofcom’s proposed approach
2.2.1 Compliance procedure

Rather than determining margins between active products and ‘active minus’ ex ante, Ofcom is proposing to allow BT to estimate the appropriate margin in each year. Ofcom would set out the guidance about how BT should calculate the margin and then seek to ensure compliance on the basis of complaints that then may be brought against BT by CPs who consider the margin to be non-compliant²⁸.

It is not clear how the proposed guidance results in an estimate of c. £750-790 per annum (rental) and c. £2.6-8 (per connection) for LRIC²⁹. It is therefore unclear how CPs would be able to assess whether the LRIC estimate arrived at by BT is consistent with the guidance, leading to an increased risk of inefficient disputes just to determine whether BT is compliant with Ofcom’s guidance or not.

This lack of predictability increases the risk that, where there is some flexibility in how the guidance could be interpreted, this may be used by BT to favour a lower margin. This is not a theoretical risk as Ofcom indicates³⁰ that ‘…we may take a different approach if it is appropriate to do so in the specific circumstances of the dispute’, without providing any more information as to what these circumstances may be and/or how Ofcom would then modify its approach³¹. This uncertainty is likely to discourage investment in dark fibre due to uncertainty over the final margins and likelihood of administrative costs and regulatory disputes to achieve a LRIC margin.

2.2.2 Estimation of LRIC

Ofcom has tried to provide guidance on how the margin would be calculated by explaining which costs should be included within the calculation of LRIC when calculating the active-minus price for the dark fibre product.

The costs that Ofcom proposes to include in the calculation of LRIC are summarised in the table below. Ofcom has also provided guidance on the allocation rules that should be used to decide what proportion of the costs for different super-components should be included in LRIC.

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²⁸ 8.27
²⁹ Reported in Table 8.3
³⁰ 8.27
³¹ We note also flexibility provided in relation to differences between the dark fibre product provided and the corresponding EAD service, for which Ofcom allows BT to adjust the dark fibre price to reflect differences in the incremental cost – see 8.73-8.74. A similar approach is applied to repair, provisioning and migration charges – see 8.75 – 8.76.
Table 3. Cost included in the LRIC calculation

<table>
<thead>
<tr>
<th>Super-Component</th>
<th>Asset/Service</th>
<th>Rentals</th>
<th>Connections</th>
<th>Included in LRIC?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wholesale and LAN extension services fibre</td>
<td>Asset</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Ethernet Main links</td>
<td>Asset</td>
<td>Yes</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Ethernet Electronics</td>
<td>Asset</td>
<td>Yes</td>
<td></td>
<td>Partly</td>
</tr>
<tr>
<td>Access cards (other services)</td>
<td>Asset</td>
<td>N/A</td>
<td>N/A</td>
<td>Partly</td>
</tr>
<tr>
<td>Service Centres (Provision)</td>
<td>Service</td>
<td>Yes</td>
<td></td>
<td>Partly</td>
</tr>
<tr>
<td>Routeing and Records</td>
<td>Service</td>
<td>Yes</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>Service Centres (Assurance)</td>
<td>Service</td>
<td>Yes</td>
<td></td>
<td>Partly</td>
</tr>
<tr>
<td>Sales Product Management</td>
<td>Service</td>
<td>Yes</td>
<td>Yes</td>
<td>Partly</td>
</tr>
<tr>
<td>Revenue Debtors</td>
<td>Service</td>
<td>Yes</td>
<td>Yes</td>
<td>Partly</td>
</tr>
</tbody>
</table>

Source: Ofcom LLCC annexe 14

In addition to the above costs of super-components, Ofcom proposes that the following costs are included in the LRIC calculation:

- A proportion of BT’s non-domestic rates bill; and
- Any differences in the costs of provisioning, repair and migration activities.

However, despite Ofcom’s guidance about how LRIC will be calculated, alternative operators will still face considerable uncertainty about the value of LRIC because:

- The input cost data will not be available to CPs; and
- Ofcom does not provide sufficient guidance on how LRIC would be calculated.

Key issues with Ofcom’s proposed approach
Given these concerns, even if Ofcom were to provide further guidance on how LRIC would be calculated, there is still a risk that entry could be deterred because of the difficulty involved in predicting LRIC over a number of years.

In the following sections, we provide some specific examples of where Ofcom’s proposals lack transparency.

**Elements of proposed guidance – costs included**

There are a number of areas which lack clarity in Ofcom’s guidance:

- Ofcom state that it ‘assumes’ some software costs in wholesale and LAN extension services fibre and Ethernet Main Links (which are two asset categories that are included in the provision of active services but refer mainly to ducts and fibre) are not related to active services;

- Given that the cost of Electronics is based on FAC, Ofcom applies a LRIC to FAC ratio to calculate the LRIC of electronics based on asset volume elasticities (AVEs) and cost volume elasticities (CVEs). The derivation of the AVEs/CVEs by Openreach is not transparent with BT having an incentive to underestimate variable costs.

- Service centre costs – these relate to fault repair costs. Ofcom seem to be taking a conservative (i.e. likely to under-estimate LRIC) approach by attributing to the LRIC of active services the share of fault repair costs that relate to repair of equipment – which is 25%. There are however 50% of faults that are not related to ‘fibre’ – under the heading of ‘fault not found’ or ‘right when tested’. It is unclear why at least some proportion of costs related to these should not be attributed to the active service.

- Non-domestic rates – Ofcom state that a proportion of these costs should be included in the LRIC as in relation to dark fibre, ‘the rating authorities have determined that “as a general rule of thumb, the person who lights the fibre is considered to be in rateable occupation”. Under this precedent, if BT sells an active circuit to a CP, BT is liable for the associated rates, whereas if BT sells a dark fibre circuit then the purchasing CP is liable for the rates.’ Ofcom discussed whether the LRIC estimate should be based on BT’s costs or an access seeker’s costs, and concludes that it should be BT’s. This may be worth investigating further, if the choice has a material impact on the LRIC estimate – but this may differ by CP.

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32 8.55
33 8.67-8.68
Differences between the dark fibre RO and EAD services – as noted earlier, Ofcom provide flexibility for BT to adjust the dark fibre price to reflect differences in the incremental cost with the corresponding EAD service\(^{34}\), and in relation to repair, provisioning and migration charges\(^{35}\).

**Elements of proposed guidance – services requiring two fibres**

Ofcom also considers the pricing of one versus two fibres as, depending on the specification of the service to be provided, leased lines may require one or two fibres\(^{36}\). Ofcom considers two potential approaches.

1. Price fibre so that jointly the two dark fibres provide BT with a financial contribution equivalent to that of a single fibre. Using this approach, as the marginal cost of an additional fibre on the same route is low, the access price per fibre for a pair of fibres to be used jointly would be just over half of the ‘EAD 1Gbit/s minus’ access price for a single fibre.

2. Price two fibre services as double the provision of a single fibre. This initial price would then be adjusted for any incremental cost savings to BT associated with supplying multiple fibres.

Ofcom consider for the second approach that ‘the advantage of this approach is that it is consistent with our benchmark product, maintaining a similar level of contribution per fibre to that which BT receives from an EAD 1Gbit/s service. The disadvantage is that it makes two fibre services more expensive to supply using dark fibre, with the increased cost of a service requiring a pair of fibres not being directly related to the incremental cost of providing the second fibre.’ Ofcom concludes it should use the second approach on the grounds that the first approach may lead to customers ordering two fibres where one would do.

Ofcom’s proposed approach could further reduce the potential addressable market for a dark fibre product, as the margin between BT’s active products for services which require two fibres and the corresponding costs of dark fibre would not be sufficient for a competing provider to competitively offer the service using dark fibre. This reflects an underlying issue with Ofcom’s approach, where the contribution to common costs from BT’s active services may be lower than the corresponding contribution from dark fibre services.

Ofcom’s reasoning for rejecting the first approach is not clear. It is unlikely that CPs would incur the incremental cost (however small) for an additional fibre unless it provided a benefit to the end user which exceeded this cost. In this case,

\(^{34}\) 8.73-8.740

\(^{35}\) 8.75 – 8.76

\(^{36}\) 8.81 to 8.85
provision of a second fibre would increase allocative efficiency. As the contribution to common costs would be the same whether the CP used a single or two fibres, BT's recovery of fixed and common costs would not be affected by the choice. The cost recovery from dark fibre could also better reflect the contribution made by the equivalent Openreach active services, ensuring competitive neutrality.

2.3 Ofcom’s proposals would determine the structure of tariffs

Ofcom’s arguments on the superiority of its proposals rest on the assumption that BT has the incentive and ability to set the structure of prices in a way that maximises allocative and dynamic (for example, service migration) efficiency. The degree to which BT’s incentives could lead to a materially more efficient outcome is debatable in the absence of a dark fibre remedy. However, Ofcom recognises that BT will have an incentive to raise the price of the reference product and so has additionally constrained BT’s pricing of the active product. Ofcom’s proposals mean that the structure of active prices would effectively be set by Ofcom ex ante. In the following sections, we explain that Ofcom’s proposals result in:

- the relationship between 100Mbit/s and 1Gbit/s services being frozen by the leased line charge control; and
- to the extent that a dark fibre remedy is effective, the difference between 1Gbit/s services and higher bandwidth services will converge towards differences in incremental costs.

2.3.1 The relationship between 100Mbit/s and 1Gbit/s services would be frozen by the leased line charge control

Demand for 10Mbit/s services is low and declining rapidly as BT has set the price of this service at a premium to 100Mbit/s services to encourage migration to the higher bandwidth service or to Ethernet in the First Mile (EFM) services. This means that there are effectively two bandwidths in the Ethernet charge control basket, namely 100Mbit/s and 1Gbit/s.

As the overall cap on the two services is the same as the sub cap on the 1Gbit/s service (and both caps are likely to be binding) the relative prices of the two bandwidths would be fixed.

Given the evolution of the market over time, with customers migrating to higher bandwidth services, an efficient tariff gradient now is unlikely to be efficient in three years’ time. For example, the tariff gradient between 10Mbit/s and 100Mbit/s service has changed over time to reflect migration incentives.
Therefore, even if BT’s current tariff gradient were efficient - which we consider unlikely to be the case - it may no longer be efficient in future.

2.3.2 The differential between 1Gbit/s services and higher bandwidth services will converge towards differences in incremental costs

The existence of an effective dark fibre product based on the active price of 1Gbit/s services would be a competitive constraint on the price of services at higher bandwidths, which are currently priced at a significant premium. Prices would be likely to converge towards the dark fibre cost (which is the 1Gbit/s active price less LRIC) plus the incremental cost of active equipment to provide the higher bandwidth service.
3 Alternative pricing options

Given the key issues with Ofcom’s proposed approach, as explained in Section 2, in this section we set out an alternative cost based option for regulating dark fibre prices. We explain in detail how our proposed cost-based approach would work. In Section 4, we then explain why our cost-based approach is more likely to achieve Ofcom’s objectives than its proposed active-minus approach.

The rest of this section is structured as follows:

- In section 3.1, we summarise the different options considered by Ofcom; and
- In section 3.2, we explain the different options analysed in this report.

3.1 Options considered by Ofcom

Ofcom considered four options in relation to pricing of passive remedies, namely:

- No pricing obligation;
- FRND pricing obligations with guidance;
- Cost based charge control; and
- ‘Active minus’ charge control, with three different pricing approaches.

Ofcom does not consider that the first option is attractive, as some form of ex-ante price control is necessary given BT’s incentives to increase prices of passive remedies to a level where it is no longer attractive. Ex-post competition law is unlikely to be effective in encouraging efficient use of passive remedies in the absence of ex-ante regulation.

A FRND type obligation would increase uncertainty over the level of dark fibre prices and margins with respect to active services which again would reduce the effectiveness of a passive remedy. It could also lead to a high number of disputes that Ofcom would need to resolve.

Ofcom also considered that an active minus approach based on the active price for individual product links, would be undesirable. The reason is that it would be difficult to implement, as it would require monitoring of the use to which CPs would put the different active products they purchase, and would restrict CPs’ flexibility in the active products they could offer.

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37 A26.90
Ofcom therefore considered in more detail the following two options:

- First, a cost based approach, and
- Second, an active minus approach based on (i) a single reference product or (ii) a basket.

In terms of an active minus approach, Ofcom has determined that a single reference product approach is preferable to a basket approach and has produced detailed proposals based on such an approach.

### 3.2 Options considered in this report

In this paper, we compare Ofcom’s detailed proposals as set out in the BCMR and LLCC consultations against the proposals set out in our previous PAG paper.

#### 3.2.1 Proposed cost based approach

In our previous paper for the PAG, we set out proposals for a cost-based approach. Below we set out our assumptions on the implementation of this proposal, which we compare with Ofcom’s proposals.

**Cost base**

The approach to costing dark fibre would use a cost base consistent with that used to set the price cap for Ethernet with the costs of avoidable components removed on a FAC basis. Therefore, the cost model used to set the Ethernet charge control could also be used to estimate the costs of providing dark fibre.

This would ensure that dark fibre and equivalent active services would have a similar level of fixed and common costs attributed to them. Setting price regulation to allow Openreach’s prices for both active and passive products to reflect this cost attribution in the medium term would prevent ‘arbitrage’ between active and passive services, i.e. CPs choosing between active and passive services depending on which services implicitly make a lower contribution to fixed and common costs.

**Dark fibre charge control**

Price regulation could be implemented as separate CPI-X charge controls for the two relevant dark fibre services. Given the lack of a starting charge for these services, the charge control in each year could be set to the projected fully allocated costs of these services.

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**Alternative pricing options**
**Rebalancing**

Within the overall price cap on active services, we would expect Openreach to seek to rebalance prices, reducing the tariff differential between higher bandwidth (above 1Gbit/s) services, which make a disproportionately large contribution to fixed and common costs, and low bandwidth services, which make a disproportionately low contribution to fixed and common costs.

Such rebalancing would be appropriate in the long term as Openreach would be unlikely to maintain a disproportionately high recovery of fixed and common costs from high bandwidth services where CPs can compete using dark fibre. To the extent that this was possible under any active charge control (see below), Openreach would seek to set prices which would make a similar contribution to fixed and common costs as the dark fibre service.

Over time, prices would be expected to converge to the point at which active products and dark fibre products were making similar contributions to fixed and common costs, reflecting the attribution of costs underlying BT’s regulatory financial statements. This would ensure the correct build or buy decisions for CPs with respect to active or dark fibre products.

To the extent that rebalancing is not instantaneous and there would be some transient differences in the recovery of fixed and common costs between active and passive services in the short run, this would be unlikely to drive inefficient entry. The payback period on investments in rolling out dark fibre is likely to be a number of years, so that the additional margins available before prices were rebalanced would not be sufficient to offset the higher costs associated with inefficient entry. Therefore, entry is unlikely to be driven any short term arbitrage between active and passive products.

**Active charge control**

Given that dark fibre would be unlikely to form a sufficient constraint over the period of the next charge control, to ensure active prices were aligned with costs, a charge control on Ethernet services would still be required.

However, as the dark fibre price would be independent of active prices, there would be no need for a specific sub cap on the ‘reference products’ to prevent BT raising these prices excessively.

Sub-caps could be implemented to protect existing consumers from price rises, but with sufficient latitude to allow BT to rebalance prices for new demand to reflect dark fibre pricing in the medium term.

**Alternative pricing options**
4 Assessment of pricing options

Ofcom has developed a scoring system to assess how a range of options perform across various objectives compared to a cost-based approach. Ofcom considers that an active-minus approach performs better for allocative efficiency, dynamic efficiency in the passive layer, compatibility with active services and ease of implementation. In contrast, Ofcom considers that a cost-based approach performs better for productive efficiency, dynamic efficiency in the active layer and gaming risk. Therefore, even based on Ofcom’s scoring, it is arguable which of the two pricing options ranks higher.

In concluding that the active-minus approach is superior overall, Ofcom must be implicitly weighting the different criteria. In particular, it appears to be placing considerable weight on allocative efficiency, in contrast to the importance it attaches to allocative efficiency elsewhere in the LLCC document.

While we agree with Ofcom’s framework, we consider that Ofcom’s assessment does not accurately reflect the differences between its proposals and a cost based approach. When comparing Ofcom’s current proposals with a cost based approach as set out in section 3.2.1, the cost-based approach appears superior. The cost-based approach scores higher across all objectives, except for allocative efficiency, where neither approach scores particularly highly and where relatively little weight should be attached.

The rest of this section is structured as follows:

- In section 4.1, we explain the criteria and scoring system used by Ofcom and the minor modifications that we make to this system when providing our assessment of the two pricing options;
- In section 4.2, we provide our assessment of how the two pricing options perform across Ofcom’s different objectives; and
- In section 4.3, we provide our overall assessment of the two pricing options and conclude that a cost-based approach better meets Ofcom’s objectives.
4.1 Criteria and scoring

4.1.1 Ofcom’s criteria

In order to evaluate the above options in more detail, Ofcom has used the following two sets of criteria:

- Economic efficiency criteria (allocative, dynamic, and productive efficiency); and
- Implementation criteria (Compatibility with active remedies/risk of arbitrage, risk of gaming, and ability to implement). We are in broad agreement with Ofcom in terms of the criteria used.

4.1.2 Ofcom’s scoring

Ofcom scores each of the criteria based upon a qualitative 5 point scale. We have similarly used a 5 point scale, applying a score of 4 where an option fully meets a criterion and a score of 0 where an option does not meet a criterion.

Such a qualitative scoring system can provide information on whether one option is better than another, but inevitably requires a degree of judgement where a given option partially meets an objective as to whether the outcome is closer to fully meeting the objective (a score of 3) or not meeting the objective (a score of 1).

Ofcom has not explicitly set out its weighting of the different objectives.

4.2 Comparison of cost plus and active-minus

In this section, we set out our assessment of how Ofcom’s active-minus approach compares with a cost-based approach across Ofcom’s different objectives.

4.2.1 Allocative efficiency

Ofcom considers that a cost based approach would be less attractive in terms of allocative efficiency than a single reference product active-minus approach. Ofcom explains that ‘to the extent that the current pricing structure supports allocative efficiency, our assessment is that cost…(based) approach …is likely to perform relatively poorly with regard to allocative efficiency…this is because these approaches are likely to drive the market...

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38 A26.89
39 A26.106 and Table A26.1
towards a relatively flat pricing structure, with little room to account for consumer demand in price setting.\(^1\)

We consider that Ofcom’s assessment of the relative merits of the two options in terms of allocative efficiency is not justified on the basis of the analysis presented for a number of reasons:

- The magnitude of potential allocative efficiency gains in downstream markets due to the structure of prices (i.e. price discrimination) in wholesale Ethernet services is likely to be limited because of the complex relationship between these wholesale services and consumption of goods and services by end users.

- Ofcom assumes implicitly that the current tariff grading materially increases efficiency. As acknowledged by Ofcom itself\(^2\), there should not however be an a priori expectation that this is the case, as BT’s pricing incentives differ materially from those required to produce an efficient pricing structure. In addition, Ofcom’s proposals for the LLCC explicitly restrict BT’s ability to set tariff gradients as Ofcom believe that such flexibility would be used anti-competitively to raise dark fibre prices.

- We agree that the introduction of cost-based dark fibre passive access pricing may lead to a ‘flatter’ wholesale pricing structure compared to Ofcom’s preferred pricing option. However, any reduction in demand at a wholesale level is likely to be immaterial as demand is likely to be relatively inelastic overall. In addition, the ability of CPs to deliver higher bandwidth services in downstream markets due to lower unit costs in bandwidths may reduce prices in these downstream markets and hence increased demand and allocative efficiency.

Whilst we therefore agree that, under certain circumstances, a flatter pricing structure may have lower allocative efficiency in principle\(^3\), we do not consider that in practice this effect is likely to material, for the reasons explained above. The conclusion that Ofcom’s preferred pricing option is materially more attractive in terms of allocative efficiency than a cost-based approach, is not in our view justified. In any case, Ofcom itself acknowledges that even under the active-minus approach a degree of tariff-rebalancing may be needed. Ofcom has stated that:

\(^{1}\) A24.140 and A26.104

\(^{2}\) A24.143
“…we consider it is likely that BT will ultimately need to rebalance its active prices as a result of the proposed dark fibre being available”

Ofcom considers that the active tariff rebalancing may be needed as BT will face greater competition for tariffs above 1Gbit/s, as a result of the dark fibre remedy. Given this, even if tariff rebalancing were considered to be a valid issue, then the active-minus approach still doesn’t represent a better solution.

In the sections below, we provide further details on why the active-minus approach is unlikely to be better for allocative efficiency than the cost-based approach for the following reasons:

- Price discrimination in wholesale Ethernet services is unlikely to result in Ramsey-like end user prices;
- The current tariff gradient is unlikely to be efficient either now or in the future; and
- A flatter tariff structure is unlikely to reduce demand at a wholesale level and may lead to a faster migration to higher bandwidth services.

**Price discrimination in wholesale Ethernet services is unlikely to result in Ramsey-like end user prices**

It is important to recognise that allocative efficiency from Ramsey-like pricing relates to maximisation of demand at a consumer level. By definition wholesale products, either active or passive, are not directly purchased by consumers. As such, pricing of wholesale products can at best only indirectly increase allocative efficiency.

Price discrimination at a wholesale level could significantly enhance allocative efficiency in a straightforward manner if there is a relatively direct link between the prices of the wholesale inputs and the final consumption by customers and the wholesale inputs form a relatively large proportion of the final retail cost. However, for Ethernet services this is clearly not the case:

- Retail Ethernet services are used by a wide range of corporate customers. In some cases, the output of the Ethernet customers may not be purchased directly by end-users, but may itself be goods or services purchased by other corporate customers;
- Ethernet services are also used for backhaul and aggregation links in fixed and mobile networks. In these cases, the cost of links will effectively be shared over a large number of end users and may be considered in the short term a fixed and common cost between those
customers, with the downstream operator applying a degree of price
discrimination at the retail-level.

In view of this complex relationship between Ethernet services and final demand,
it is inconceivable that Openreach can effectively set wholesale prices such that
the resulting retail prices to final consumers are Ramsey like.

**The current tariff gradient is unlikely to be efficient either now or in the future**

Ofcom’s proposals effectively maintain the opening tariff gradient between
100Mbit/s services and 1Gbit/s service due to the sub-cap on 1Gbit/s services,
with the tariff gradient for greater than 1Gbit/s services becoming flatter due to
competition from dark fibre customers. As noted in previous submissions,
Openreach, in setting profit maximising prices, will take into account the impact
of competition and demand for unregulated services. As such, it is unlikely that
the current tariff gradient is efficient, in a Ramsey sense.

Even if the differential between 100Mbit/s and 1Gbit/s is currently efficient, it is
unlikely to be efficient in the future due to market developments as the optimal
tariff gradient is likely to change over time as demand for bandwidth increases.
For example, over time the differential between 10Mbit/s and 100Mbit/s
services has been reduced.

**A flatter tariff structure is unlikely to reduce demand at a wholesale level and may lead to faster migration to higher bandwidth services**

Overall demand for Ethernet services is unlikely to be significantly affected by
any flattening of the tariff gradient. While demand for Ethernet services is
homogeneous, for the majority of uses, demand is likely to be relatively inelastic
in that there is a compelling need for the link and other potential transmission
services are not acceptable substitutes, as the applications require the quality
provided by Ethernet services. Examples of such inelastic users could include:

- Connections to large corporate sites;
- LLU and VULA backhaul services; and
- 4G mobile back haul services.

The introduction of a cost-based dark fibre product will result in prices of
100Mbit/s increasing relative to 1Gbit/s services. However, Ofcom assumes the
overall prices for Ethernet services can fall considerably over the three year
period of the price control, with a 9% reduction at the beginning of the period
and a 13.75% real terms reduction in each year of the three year control. As such,
the result of the rebalancing may be less an increase in the price of low
bandwidth services and more an accelerated decrease in the price of higher
bandwidth (1Gbit/s and above) services.
A flatter tariff structure could help to increase the rate of migration to higher bandwidth services. Ethernet services are used for backhaul and aggregation links in fixed and mobile networks. These links are effectively shared by a number of customers. Due to the high differential between 100Mbit/s and 1Gbit/s services, some network operators that currently use 100Mbit/s or 1Gbit/s services may migrate to higher bandwidth services. This could lead to reduced unit prices and hence increased demand in downstream markets. For example, mobile operators may migrate to gigabit backhaul more rapidly, increasing available mobile capacity on the corresponding base stations and hence allowing increased usage/reduced congestion by end consumers, which in itself could reduce unit costs for end users.

Summary

Overall, we consider that the ability to increase the efficiency of end users prices through the structure of wholesale pricing of services in the business connectivity markets is limited whichever option is chosen. The main gain in terms of allocative efficiency is less through the structure of wholesale prices and more through the overall level of prices. In this respect, both options should prevent Openreach setting excessive prices. In the table below, we summarise our assessment of the two options for allocative efficiency.

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Ofcom’s assessment</th>
<th>Frontier’s assessment</th>
</tr>
</thead>
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<tr>
<td>Allocative</td>
<td>0</td>
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<tr>
<td></td>
<td>2</td>
<td>Frontier’s proposal</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Frontier’s proposal</td>
</tr>
</tbody>
</table>

Source: Adapted from Table A26.8, BCMR May 2015

4.2.2 Productive efficiency

In relation to productive efficiency, Ofcom finds that a cost-based passive access pricing option would be preferable to an active-minus approach, on the grounds that:

Assessment of pricing options
Increased competition in the active layer should lead to improved productive efficiency in that layer, and, to the extent that it disincentivises inefficient infrastructure-based competition, a lower level of duplication of passive assets;

- There are relatively limited scale/scope economies in the provision of active services based on dark fibre access, hence the risks of inefficient duplication are relatively limited; and

- Any price rebalancing that would follow a cost-based passive access remedy should reduce any risks of inefficient entry.

We are in agreement with Ofcom that a cost-based approach would be preferable to an active-minus in terms of productive efficiency. However, we note that:

- Ofcom’s scoring for the single active reference product looks high given that would only seem to encourage efficient entry for services at 1Gbit/s and above, which are a small proportion of links under Ofcom’s forecast. As set out above, there is a risk with the margin being set by BT at LRIC that even efficient operators may not be able to compete for 1Gbit/s services, further reducing the benefits under Ofcom’s proposals.

In this section, we also consider one of Ofcom’s arguments related to the compatibility of the proposed passive pricing option with the active price control applied by Ofcom, as far as they relate to productive efficiency. When considering the compatibility with the active pricing structure\(^4\), Ofcom is concerned that a cost-based approach may be incompatible with the active pricing approach, if the active price was set to equal cost at the outset, rather than as a glide path. Given that the dark fibre remedy would not be implemented until mid-way through the charge control period, by which time active prices should have moved closer to costs, this is unlikely to be a significant effect. CPs are unlikely to invest in active equipment on the basis of a slightly elevated margin for a single year. To the degree that this is a valid concern, it could be addressed by applying a glide path to the cost-based passive access dark fibre prices. On that basis Ofcom has materially overstated the lack of compatibility between its Ethernet charge control and a dark fibre product using a cost-based approach. In the table below, we summarise our assessment of the two options for productive efficiency.

\(^{4}\) A26.130
Table 5. Assessment of alternative passive pricing approaches for productive efficiency – cost based v active-minus – Used 0-4 to reflect Ofcom’s scoring methodology (full moon=0 and eclipse=4)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Ofcom’s assessment</th>
<th>Frontier’s assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cost based</td>
<td>Active minus</td>
</tr>
<tr>
<td>Productive</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Adapted from Table A26.8, BCMR May 2015

4.2.3 Dynamic efficiency – investment in active assets

Overall, Ofcom’s assessment of the two pricing options in relation to the dynamic efficiency criterion in the active layer is similar to its assessment using the productive efficiency criterion. We are in broad agreement with Ofcom’s overall evaluation, although we note that:

- An active minus approach based on a single active reference product would restrict competition and innovation in the active layer to a subset of lines, thereby increasing barriers to entry; and

- Ofcom’s preferred approach would also increase uncertainty for investors, with prices being dependent on BT’s decision on active pricing and estimates of LRIC. This contrasts with a cost-based approach where the path of dark fibre prices could be set in advance through a CPI-X type control. The greater uncertainty on prices under an active minus approach could deter efficient investment compared to a cost-based approach.

For these reasons, we consider that Ofcom potentially over-estimates the dynamic efficiency benefits of its proposed option, as it has rated it as having ‘half’ the benefits of a cost based pricing option. In the table below, we summarise our assessment of the two options for dynamic efficiency at the active layer.
Table 6. Assessment of alternative passive pricing approaches for dynamic efficiency in the active layer – cost based v active-minus – Used 0-4 to reflect Ofcom’s scoring methodology (full moon=0 and eclipse=4)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Ofcom’s assessment</th>
<th>Frontier’s assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cost based</td>
<td>Active minus</td>
</tr>
<tr>
<td>Dynamic – Active</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Frontier’s proposal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Ofcom’s proposal</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Adapted from Table A26.8, BCMR May 2015

4.2.4 Dynamic efficiency – investment in passive infrastructure

Ofcom assesses a cost based passive access remedy to have a significantly worse impact in terms of investment in passive infrastructure, primarily because it would lead to an increased risk of stranding investments of alternative CPs45. As mentioned earlier, the proposed cost based passive access pricing to dark fibre would be set to reflect BT’s efficiently incurred costs, including an appropriate rate of return to capital employed. Under such a price access regime, it is not clear why any of the investment of alternative infrastructure-based providers of active services should be stranded as the overall level of prices will not be reduced, only the structure of prices altered. There is nothing preventing existing infrastructure operators from rebalancing active prices, to minimise any net loss of its active customers following the introduction of dark fibre access on BT’s network.

Ofcom’s assessment seems to assume that efficient alternative infrastructure investment should be dependent on longer term expectations of high premia for high bandwidth services – but Ofcom does not explain why this should be the case. Given the long asset lives related to infrastructure, the level of investment is unlikely to be strongly influenced by the structure of prices in the last two years of the charge control.

In general, infrastructure investment appears to be driven by economies of density, i.e. investment in areas where there is a high density of customers. While there may be some bias in the past towards areas where there are proportionately more high bandwidth services, given the asset lives of infrastructure investments

45 A26.123-A26.125
the current tariff structure is unlikely to have been the key determinant on where operators have invested.\footnote{Even if it were, Ofcom’s proposals for significant price reduction in overall Ethernet prices expected rebalancing for services above 1Gbit/s would significantly reduce returns for such investments.}

Furthermore:

- Cost plus dark fibre based on average prices would appear to send the appropriate pricing signals for future alternative infrastructure investments, as CPs would only build their own alternative infrastructure if they could do so at a lower cost than BT; and

- Moving to a cost based dark fibre pricing model will provide operators with much more certainty on future pricing than a less transparent and more unpredictable active minus regime.

In summary therefore, we do not agree with Ofcom’s assessment of the relative merits of the two passive pricing remedies in terms of dynamic efficiency in the infrastructure layer. We consider that the increased certainty of a cost based approach could provide more appropriate signals for build or buy decisions by CPs, and should not be expected to dampen incentives for efficient investment in infrastructure by both BT and alternative infrastructure based providers. In the table below, we summarise our assessment of the two options for dynamic efficiency in the passive layer.

**Table 7. Assessment of alternative passive pricing approaches for dynamic efficiency in the passive layer – cost based v active-minus – Used 0-4 to reflect Ofcom’s scoring methodology (full moon=0 and eclipse=4)**

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Ofcom’s assessment</th>
<th>Frontier’s assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dynamic – Infra</td>
<td>Cost based</td>
<td>Active minus</td>
</tr>
<tr>
<td></td>
<td>Frontier’s proposal</td>
<td>Ofcom’s proposal</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Adapted from Table A26.8, BCMR May 2015

### 4.2.5 Risk of gaming

Ofcom recognises that a cost-based active product rather than an active minus product will provide BT with fewer degrees of freedom and hence less ability to distort prices for anti-competitive ends.
Ofcom recognises that pricing under an active minus approach may be distorted to reduce competition. While Ofcom is proposing to put in place a sub cap on 1Gbit/s services to counteract this potential distortion, BT will still have some freedom in prices (such as between EAD LA and EAD services) which could be used anti-competitively. For example, it could reduce prices at a faster rate for those circuits where it faces less competition and offset this by reducing prices slower for those circuits where it faces high competition. In the table below, we summarise our assessment of the two options for the risk of gaming.

**Table 8. Assessment of alternative passive pricing approaches for the risk of gaming – cost based v active-minus – Used 0-4 to reflect Ofcom’s scoring methodology (full moon=0 and eclipse=4)**

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Ofcom’s assessment</th>
<th>Frontier’s assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cost based</td>
<td>Active minus</td>
</tr>
<tr>
<td>Gaming Risk</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Adapted from Table A26.8, BCMR May 2015

### 4.2.6 Ease of implementation

Ofcom’s relatively low scoring of a cost-based approach is based on the difficulty of setting prices using a bottom up model, while noting that a costing approach based on the existing active costing is straightforward to implement. Given that our proposal is for a cost based approach that uses the same cost data as the charge control for active services, this does not appear to be relevant.

Ofcom’s proposals for setting the active minus control, with the LRIC differential determined annually, appears to require more resources than a simple forward looking charge control under our cost-based proposals.

As such we consider that the cost plus option should be allocated with full marks, while marking down Ofcom’s active minus proposals to reflect the need to determine LRIC avoidable cost on an annual basis. We also note that the cost-based approach may result in a lower regulatory burden on Ofcom, given that it may have to deal with regular disputes about the level of LRIC under the active-minus approach. In the table below, we summarise our assessment of the two options for ease of implementation.
### Table 9. Assessment of alternative passive pricing approaches for ease of implementation – cost based v active-minus – Used 0-4 to reflect Ofcom’s scoring methodology (full moon=0 and eclipse=4)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Ofcom’s assessment</th>
<th>Frontier’s assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cost based</td>
<td>Active minus</td>
</tr>
<tr>
<td>Ease of implementation</td>
<td>2(^{47})</td>
<td>4</td>
</tr>
</tbody>
</table>

Source: Adapted from Table A26.8, BCMR May 2015

#### 4.2.7 Active compatibility

Ofcom seems to consider that the active-minus approach is more compatible with its active remedies, as BT would be able to more or less retain its current tariff gradient for Ethernet services and it considers that the active-minus would be easier to implement. We disagree with Ofcom’s scoring for active compatibility for the following reasons:

- By setting active and passive charge controls together using a consistent cost model, as Ofcom already does for LLU and WLR prices, Ofcom can ensure that prices of the two sets of services are set with respect to a consistent cost base in the medium term\(^ {48}\). This would prevent the risk of inefficient entry due to differences in the recovery of common costs between active and passive services\(^ {49}\).

- Ofcom recognises that setting dark fibre prices based on a single reference product introduces a series of inconsistencies between pricing at different levels of the value chain, with 100Mbit/s active services making a lower contribution to fixed and common costs than dark fibre services. Under Ofcom’s proposals, the tariff gradient between 1Gbit/s and 10Gbit/s services may need to be rebalanced. Therefore, Ofcom’s proposals attempt to maintain the current active price structure to some degree in this charge

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\(^{47}\) Assuming a bottom up modelling approach. Ofcom indicates that a top down modelling approach would lead to a similar score to the active minus approach.

\(^{48}\) This contrasts with Ofcom’s proposals where the LRIC based differential used to set dark fibre prices may be based on different estimates of unit costs to those used to set the forward looking active charge control.

\(^{49}\) i.e. so called ‘arbitrage’
control period is effectively limited to the relative pricing between 1Gbit/s and 100Mbit/s services, which are frozen at the opening level. Going forwards, even this is likely to be unsustainable in the medium term.

- The relationship between active and passive prices would be transparent and predictable under a cost based approach. In contrast, the LRIC for the active-minus approach would need to be set on an annual basis by BT, which could lead to regular disputes with CPs, which Ofcom would need to resolve (see section 4.2.6).

Overall, we would therefore consider that the cost-based approach performs slightly better for active compatibility in the medium term as prices at both levels can be set on a consistent basis.

**Table 10.** Assessment of alternative passive pricing approaches for active compatibility – cost based v active-minus – Used 0-4 to reflect Ofcom’s scoring methodology (full moon=0 and eclipse=4)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Ofcom’s assessment</th>
<th>Frontier’s assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cost based</td>
<td>Active minus</td>
</tr>
<tr>
<td>Active compatibility</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Adapted from Table A26.8, BCMR May 2015
4.3 Overall assessment

We provide below Ofcom’s and our overall assessment of the two pricing options using the same criteria and framework as set out by Ofcom\(^50\). To be conservative, we have not reduced the scores of the active-minus approach for productive efficiency and dynamic efficiency in the active layer, even though we consider that Ofcom’s scoring may overstate the efficiency of its proposals (as discussed in sections 4.2.2 and 4.2.3).

Table 11. Assessment of alternative passive pricing approaches – cost based v active-minus – Used 0-4 to reflect Ofcom’s scoring methodology (full moon=0 and eclipse=4)

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Ofcom’s assessment</th>
<th>Frontier’s assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cost based</td>
<td>Active minus</td>
</tr>
<tr>
<td>Allocative</td>
<td>0</td>
<td>2</td>
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<tr>
<td>Productive</td>
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<td>2</td>
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<tr>
<td>Dynamic – Active</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Dynamic – Infra</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Gaming Risk</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Ease of implementation</td>
<td>2(^51)</td>
<td>4</td>
</tr>
<tr>
<td>Active compatibility</td>
<td>0</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: Adapted from Table A26.8, BCMR May 2015

As illustrated in the table above, Ofcom’s preferred option, by Ofcom’s own assessment, is not clearly superior to the cost based option. Ofcom’s preference can only be explained by Ofcom implicitly giving a high weight to the ability to better maintain the current tariff gradient for which Ofcom assumes will lead to a material increase in allocative efficiency and better investment incentives for infrastructure based operators. For the other criteria, a cost based approach

\(^50\) A26.142

\(^51\) Assuming a bottom up modelling approach, Ofcom indicates that a top down modelling approach would lead to a similar score to the active minus approach.

Assessment of pricing options
performs better in general than Ofcom’s preferred approach, in particular in terms of productive and dynamic efficiency due to a wider range of active services being contestable using dark fibre.

When considering our revised assessment, we conclude that the cost based option is clearly superior to the active-minus option overall. This is because:

- Ofcom over-estimates the difference between the two options in terms of allocative efficiency. Price discrimination at the wholesale level is not likely to significantly increase allocative efficiency for these services and the tariff gradient employed by BT may actually reduce allocative efficiency in downstream markets by increasing unit costs of bandwidth. We consider that it is likely that the two options could in fact have similar outcomes in terms of allocative efficiency.

- Ofcom’s assessment of the difference in dynamic efficiency benefits for infrastructure competition is unjustified: a cost based approach, with appropriately set access prices should not deter efficient infrastructure investment, and indeed could offer better incentives than the active-minus option of Ofcom.

- A cost based approach, using a CPI-X price cap, is also likely to be more robust and require fewer resources to implement than Ofcom’s proposed approach.

In order to find that Ofcom’s proposals are preferable, we would have to give a very high weight to allocative efficiency, where Ofcom’s proposals perform marginally better than a cost based approach. This would be inconsistent, with Ofcom’s approach elsewhere in the LLCC consultation document. For example, in the context of glide paths, Ofcom has stated that:

- “Historically, we have typically attached higher weight to productive and dynamic efficiency considerations for wholesale leased lines, rather than trying to achieve allocative efficiency at every point in time. This is because productive and dynamic efficiency improvements are likely to generate greater benefit to consumers over time; as the firm becomes more efficient and increases investment and innovation, this should ultimately result in lower prices and better services for consumers.”

We therefore conclude, on the basis of the evidence and analysis presented by Ofcom, and our own assessment, that the cost-based approach is the preferred outcome.

Although Ofcom makes this statement in the context of glidepaths, it is unclear why such a stance should not also apply when deciding on the preferred pricing approach.
Assessment of pricing options